Biological Assessment
Bethel Energy Center
Anderson County, Texas

Prepared for

APEX Bethel Energy Center, LLC

Revised September 2013

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September 16, 2013

Via Overnight Mail

A.C. Dumaual
United States Environmental Protection Agency, Region VI
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

Subject: Revised Biological Assessment Report for the Proposed Apex Bethel Energy Center near Tennessee Colony, Anderson County, Texas

Dear Mr. Dumaual:

We are submitting two paper copies and two CDs of the revised Biological Assessment Report for the Proposed Bethel Energy Center near Tennessee Colony, Texas. This revised report incorporates the revisions requested by USEPA in our August 13, 2013 conference call and some additional project modifications to proposed well locations and wastewater pipeline routes. As discussed in our August 13, 2013 conference call, these project modifications have not changed the report conclusions. This report is being submitted in conjunction with the Greenhouse Gas PSD Permit Application for the APEX Bethel Energy Center that was submitted to your office on June 12, 2012. A revised Consolidated Cultural Resource Report is being completed and will be sent to you under separate cover in approximately a week.

If you have any questions regarding this report, please contact Peter Barth with CH2M HILL at 412-249-6518 or peter.barth@ch2m.com, or myself at 713-963-8104 or Stephen.naeve@apexcaes.com

Sincerely,

Neat Clark for
Stephen Naeve
Chief Operating Officer

Enclosure

CC: Melanie Magee, USEPA Region 6
Tina Arnold, USEPA Region 6
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Acronyms and Abbreviations

AERMOD	An air emissions model
APEX	APEX Bethel Energy Center, LLC.
BA	Biological assessment
BEC	Bethel Energy Center
BMP	Best management practice
CAES	Compressed Air Energy Storage
CCN	Certificate of Convenience and Necessity
CO	Carbon monoxide
CWA	Clean Water Act
ERCOT	Electric Reliability Council of Texas
ESA	Endangered Species Act
ETC	Energy Transfer Company
ITP	Incidental take permit
MBTA	Migratory Bird Treaty Act
MW	Megawatt
NAAQS	National Ambient Air Quality Standards
NED	National Evaluation Dataset (for air modeling)
NO_x	Nitrogen oxides (NO, NO_2)
NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
NWS	National Weather Service
PEM	Palustrine emergent
PFO	Palustrine forested
PM	Particulate matter
PM_{10}	10-micron particulate matter
$PM_{2.5}$	2.5-micron particulate matter
PSD	Prevention of Significant Deterioration
PSS	Palustrine scrub-shrub
PUC	Texas Public Utility Commission
SCR	Selective catalytic reduction
SIL	Significant impact level
SO_2	Sulfur dioxide
TCEQ	Texas Commission on Environmental Quality

TDU	Transmission and Distribution Utility
TPWD	Texas Parks and Wildlife Department
TXNDD	Texas Natural Diversity Database
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VOC	Volatile organic compound
WMA	Wildlife Management Area

SECTION 1.0

Introduction

1.1 Background and Consultation History

APEX Bethel Energy Center, LLC proposes to construct the Bethel Energy Center (BEC), a 317 MW Compressed Air Energy Storage (CAES) facility located near Tennessee Colony, Anderson County, Texas. CAES is a commercially available, economically attractive form of bulk energy storage for the electricity grid. CAES technology enhances the integration of renewable energy (wind and solar facilities) and conventional fossil fuel generation by storing energy during off-peak demand periods as compressed air in an underground cavern. The compressed air is released during peak demand periods to generate electricity.

Pursuant to the Clean Air Act, BEC has applied for a permit under the United States Environmental Protection Agency's (EPA) Greenhouse Gas (GHG) Prevention of Significant Deterioration (PSD) Program to authorize construction of the facility. Under Section 7 of the Endangered Species Act (ESA), Federal agencies must consult with the U.S. Fish and Wildlife Service (USFWS) when any action the agency carries out, funds, or authorizes (such as through a permit) *may affect* a listed endangered or threatened species or its proposed or designated critical habitat, as defined within Section (3)(5)(A) of the ESA.

At the request of APEX, CH2M HILL conducted threatened and endangered species habitat surveys on approximately 46 acres of land in Anderson County, Texas ("the Property") on January 30, 2012 and February 6, 2012. The purpose of these surveys was to describe and quantify the extent of potentially jurisdictional areas and special habitats, as well as observe the potential presence of any federally listed species or designated critical habitat.

CH2M HILL personnel also performed a search of several sources of information regarding special status species that may be found on or in the vicinity of the Property. The USFWS and TPWD were contacted for technical assistance regarding potential affects to threatened or endangered species and wildlife resources. Sources were consulted on January 23, 2012 and included: 1) the USFWS' Threatened and Endangered Species System internet database; 2) the Texas Parks and Wildlife Department (TPWD) Annotated County List of Rare Species for Anderson County; and 3) the Texas Natural Diversity Database (TXNDD). The TPWD TXNDD was also reviewed on February 7, 2012 within a radius of 10 miles from the Property. A report on the biological resources on and near the Property was submitted to APEX in February 2012 (Appendix A).

On May 2, 2012, APEX representatives met with USEPA Region 6 personnel to discuss the need for, and scope of, a biological assessment (BA) for the proposed project. It was USEPA's determination that a BA would be necessary to more fully support the determination of the project's lack of an effect on listed species. The contents for a BA are described in 50 CFR 402.12(f).

On June 6, 2012, Mr. Ross Carrie (Raven Environmental; under contract to APEX) contacted (via email) Mr. Omar R. Bocanegra (USFWS, Arlington, TX) to clarify whether the Oncor Electric Delivery Company (Oncor) incidental take permit (ITP; Federal Register, 2012) would provide a sufficient instrument to adequately address potential impacts to listed species that may occur in electric transmission line easement(s) that will ultimately service the APEX facility. On June 8, 2012, Mr. Bocanegra responded (via email) that the BA for the proposed project would not need to include a biological analysis of the electric transmission connection because that falls under Oncor's ITP.

On July 24 and 25, 2012, CH2M HILL conducted a threatened and endangered species habitat survey along an approximately 4-mile wastewater pipeline in Anderson County, Texas. Subsequent habitat surveys were conducted on September 24 and October 1, 2012, July 30 and 31, August 26-27, 2013 and September 4, 2013 as a result of modifications to the original Project area. The purpose of these surveys was to describe and quantify the extent of special habitats within the Project area, as well as observe the potential presence of any federally listed

species or designated critical habitat. A report on the biological resources on and near the proposed pipeline was submitted to APEX in October 2012 (Appendix B).

On July 30 and 31, 2013 and August 26 and 27 and September 4, CH2M HILL conducted threatened and endangered species habitat surveys along (1) an approximately 1.88-mile reroute of the proposed wastewater pipeline; (2) water pipeline reroutes and alternate well pad locations; and (3) a 2.87 mile brine pipeline and proposed injection well radial pipeline and well pad. A biological resources addendum to the October 2012 report was submitted to Apex in September 2013 (Appendix C) and includes these additional survey areas.

The purpose of this BA, prepared by CH2M HILL, is to reach a conclusion regarding the potential for the proposed APEX CAES BEC project to affect species proposed or listed as federal endangered or threatened under the ESA, as well as any designated critical habitat for such species.

1.2 Description of the Proposed Action

APEX proposes to construct the BEC, a 317 MW CAES facility located near Tennessee Colony, Anderson County, Texas. CAES is a commercially available, economically attractive form of bulk energy storage for the electricity grid. The latitude and longitude coordinates for the APEX BEC facility are: 31.887725,-95.913241, respectively.

CAES facilities require an underground storage cavern for storage of compressed air. In Texas, salt domes provide the unique geologic conditions necessary for cavern creation but are only present in selected areas within the state. APEX conducted an evaluation of more than twenty potential sites in west and southeast Texas before selecting the proposed BEC site. This site was selected for development of this facility due to the presence of suitable geologic conditions, existing gas and electric transmission lines crossing the Property, and availability of groundwater as a water source. Figure 1-1 is a map showing the location of the proposed facility.

The cavern for the BEC will be created by drilling a “cavern well” having a cemented well casing at a terminal depth of approximately 3,750 feet. Fresh water withdrawn from one on-site and six off-site groundwater wells (See Section 1.4.5) will be pumped down the well to dissolve salt, creating the storage cavern. Salt brine withdrawn from the cavern during this “leaching” process will be injected into two existing brine disposal and two new brine disposal wells on nearby properties. This leaching process, expected to require 555 days, is carefully controlled to produce a cavern of the desired capacity and shape.

The proposed BEC will consist of two Dresser-Rand expansion turbine/generation trains, each rated at 158.34 MW output at full load. The total generating capacity of the plant will thus be approximately 317 MW. Two compression trains will be installed, each driven by an electrical motor of 150 MW (nominal) power rating. Two sets of cooling towers will be installed to reject heat produced during compression. The proposed BEC will also have an emergency generator engine fired with natural gas, and an aqueous ammonia storage and feed system for the Selective Catalytic Reduction (SCR) emission control system. Figure 1-2 shows the planned facility layout and identifies the arrangement of key components and equipment.

Figure 1-3 is a simplified diagram for the CAES process. Off-peak electrical energy is stored as compressed air in the salt dome cavern. Because compression of air results in an increase in air temperature, it is necessary to cool the air between the stages of compression, as well as prior introduction to the cavern. Two sets of wet cooling towers will be installed to provide cooling for this purpose. The towers will emit particulate matter (PM), 10-micron PM (PM_{10}), and 2.5-micron PM ($PM_{2.5}$). High efficiency demisters will therefore be installed to control drift loss and PM emissions. Make-up water to the cooling tower will be sourced from two offsite wells. Cooling tower blow down water will be discharged via pipeline to the Trinity River. Water consumption under design basis conditions is expected to be approximately 1,462 gallons per minute (gpm), while annual water consumption is projected to be approximately 2,258 acre-feet.

Electricity generation will involve passing compressed air through the high pressure and low pressure expansion turbines and heating the air with natural gas in advance of expansion turbine stages. The combustion of natural gas will produce emissions of nitrogen oxides (NO_x), carbon monoxide (CO), sulfur dioxide (SO_2), volatile organic compounds (VOC), PM, PM_{10}, and $PM_{2.5}$. The emission control system for the turbine trains will consist of water

injection and a SCR system to control NO_x emissions and an oxidation catalyst system to control VOC and CO emissions. SO_2 emissions will not be controlled as they are expected to be very low due to the extremely low sulfur content of the pipeline-quality natural gas that will be used by the facility.

Economic modeling of the BEC predicts that the facility will operate in generation service at minimum load (ranging from 10 to 20 percent of maximum output) much of the time, ready to respond to Electric Reliability Council of Texas (ERCOT) instructions to quickly ramp up in order to provide ancillary services. At other hours of the year, the facility is expected to operate at or near full load. Additionally, unless removed from service for maintenance, the BEC is expected to be in operation, synchronized to the grid, 8,760 hours of the year. The emissions presented in this BA are based on these assumptions.

1.3 Impact Avoidance and Minimization Measures

Construction of the facility will extend over a period of approximately three years (1st Quarter 2013 - 1st Quarter 2016). Two access roads will be built from existing roads into the center of the site where construction of the facility will occur. Preparation for, and construction of, foundations, buildings, and supporting structures, as well as installation of turbines, compressors, cooling towers, and other equipment will involve noise, dust, and other disturbances typically associated with heavy construction projects. Appropriate Best Management Practices (BMPs) will be implemented during facility construction activities in order to minimize potential impacts to soil and water resources. Based on the database searches and field surveys conducted to date, there is no evidence of federally listed species or designated critical habitat in the action area. The current site layout has been developed to avoid wetlands and vegetated areas along the southern site boundary and to place the facility on existing pasture and previously disturbed areas on the Property.

Planned construction BMPs will be identified in the Site Pollution Prevention Plan and will include:

- The construction of berms around the construction work area to direct surface water run-off away from active construction area;
- The establishment of erosion control measures (e.g. filter socks, silt fence, gravel entrance apron) along the perimeter of construction work areas and at other key areas involving slope changes or drainage features;
- The application of water to roads and construction areas for dust control during construction activities; and
- The locations of fuel storage and other construction materials in secondary containment.

When the facility is in operation, the following controls will be employed to minimize air emissions:

- Low NO_X burners with water injection on the expander combustors and a SCR system to reduce NO_X emissions from the expansion turbine train;
- An oxidation catalyst to reduce CO and VOC emissions from the expander combustors;
- Good combustion design and operation to reduce PM_{10} and $PM_{2.5}$ emissions from the expander combustors;
- Use of pipeline-quality natural gas to minimize SO_2 emissions from the expander turbine trains;
- High-efficiency drift eliminators on the cooling tower to reduce PM_{10} and $PM_{2.5}$ emissions via cooling tower drift; and
- An SCR system to limit NO_X emissions from the emergency generator engine.

1.4 Action Area

The action area for a proposed project is defined as all areas to be affected directly and indirectly by the federal action, and not merely the immediate area involved in the action (50 CFR 17.11). The action area is determined independently of the effects of the action on listed species and critical habitat. After the action area is identified, the distribution of the listed species and critical habitat is overlaid on that same area to determine which species and critical habitat may be subject to effects of the action.

The action area for this proposed project is shown on Figure 1-6 and includes four interconnected areas: (1) the Property itself (i.e., the area within the existing property boundary), (2) the utility corridor for the blow down wastewater pipeline and potential reroute, (3) at and near the blow down water discharge point on the Trinity River, and (4) offsite water wells and brine injection wells and associated pipelines. An existing natural gas transmission line crosses the site and will be tapped to secure natural gas required for CAES plant operation. In addition, an electrical transmission line will be required to connect the facility to the ERCOT grid, but is not part of the action area, for reasons discussed in Section 1.4.5 below.

1.4.1 Property

The Property is automatically included in the action area for the proposed project. In addition, an air dispersion modeling analysis was conducted to determine whether the action area associated with facility operations should extend beyond the Property boundary. The latest version of AERMOD (Version 12060) was used to estimate ambient concentrations of the following air pollutants and averaging periods corresponding to the National Ambient Air Quality Standards (NAAQS) and Prevention of Significant Deterioration (PSD) Increments: CO, 1-hour and 8-hour; NO_x (as NO_2), 1-hour and annual; SO_2, 1-hour, 3-hour, 24-hour, and annual; PM_{10}, 24-hour and annual; $PM_{2.5}$, 24-hour and annual. As indicated in the federal Guideline on Air Quality Models (40 CFR Part 51, Appendix W, November 2005), AERMOD is the dispersion model currently recommended by USEPA for conducting air dispersion modeling analyses of industrial facilities for PSD permitting purposes.

The pollutants were modeled from five emission points within the facility - two turbine stacks (TURBASTK, TURBBSTK), two cooling towers (CTOWERA, CTOWERB), and one natural gas fired emergency generator engine (GENENG1), as depicted in Figure 1-2. The modeling analysis evaluated two operating scenarios: normal and startup. The "normal" scenario assumed maximum normal operating emissions with turbines and cooling towers at 100% load and the emergency generator engine operating in test mode (non-emergency mode). This scenario is applicable to all modeled pollutants. The "startup" scenario assumed that both turbines were in startup mode simultaneously, with the emergency generator engine operating in test mode. This scenario only applies to NO_x because other pollutant emissions under normal maximum operating conditions are higher than under startup conditions. The maximum modeled emission rates for each pollutant are summarized in Table 1-1. Other modeling-related source inputs, such as stack heights and release characteristics, are provided in Table 1-2.

Meteorological data used for modeling conform to Texas Commission on Environmental Quality's (TCEQ) guidance for PSD modeling analyses. This data set consisted of: (a) 1987 – 1991 pre-processed data from TCEQ, (b) surface observations from Waco National Weather Service (NWS) Station ID 13959, (c) upper air observations from Longview NWS Station ID 3951, and (d) medium surface roughness data set.

Modeling was conducted using a receptor grid with varying spacing between receptor points, as follows: (a) 25-meter spacing along the fence line and extending 200 meters from the modeled sources, (b) 100-meter spacing extending 1 kilometer from modeled sources, (c) 500-meter spacing extending 5 kilometers from modeled sources, and (d) 1000-meter spacing extending 25 kilometers from modeled sources. Figures 1-4 and 1-5 provide a graphical depiction of the receptor grid at large and small scales. Receptor elevations and hill height scales were extracted from United States Geological Survey (USGS) National Elevation Dataset (NED) files using the AERMAP terrain pre-processor. These data were then imported into the AERMOD input file to account for terrain effects on plume dispersion.

Building downwash parameters were included in the modeling analysis by running the BPIP-Prime downwash pre-processor and importing the results into the AERMOD input files. This pre-processing step was necessary for AERMOD to adjust plume dispersion estimates to account for the wake effects caused by buildings, such as the turbine buildings, and other solid structures, such as the storage tanks and cooling towers.

Modeling results are provided in Table 1-3. The modeling analysis concluded that emissions from the project will not result in exceedances of any of the applicable Significant Impact Levels (SILs) as defined by USEPA for PSD permitting purposes at any point within the Property boundary. Therefore, from an air emissions standpoint, the action area was conservatively set as the Property boundary.

1.4.2 Utility Corridor

Cooling tower blow down water that is no longer suitable for recycling on-site will be conveyed via a pipeline to a discharge point on the Trinity River. The proposed utility corridor for that pipeline consists of two potential routes. The north route will originate at the southwest corner of the Property and run approximately 4 miles west-southwest to the Trinity River (Figure 1-6). The latitude and longitude coordinates for the proposed discharge point are: 31.873452, -95.968745, respectively.

Early phases of project routing and siting of the proposed wastewater pipeline identified large areas of high quality forested wetlands along the Trinity River. In order to avoid adverse impacts to these wetlands, Apex has identified an alternate route to the Trinity River which consists of a reroute that will tie-in to the proposed wastewater pipeline just north of Farm-to-Market (FM) 321 and travel approximately 1.88 miles before discharging into the Trinity River approximately 1 mile south of the original discharge location (Figure 1-6). The latitude and longitude coordinates for the alternate discharge point are: 31.862733, - 95.979531.

At this time, a preferred wastewater pipeline route to the Trinity River has not been determined. As discussed above, the proposed utility corridor is located entirely within Anderson County and is included in the action area for the project.

1.4.3 Trinity River

The two potential discharge points on the Trinity River exist within state stream segment #0804, Trinity River above Lake Livingston. Section #0804 extends from a point 1.8 km upstream of Boggy Creek in Houston/Leon County to a point immediately upstream of the Cedar Creek Reservoir discharge canal in Henderson/Navarro County. As noted above, in addition to the proposed utility corridor, the area of the Trinity River at or near the potential blow down water discharge points has been included in the action area for the project.

1.4.4 Offsite Wells and Pipeline Corridors

1.4.4.1 Water Wells

During cavern creation, groundwater from seven (six offsite and one onsite) wells will be used to provide the 4,000 gpm required for cavern creation. The six offsite wells are:

- Two existing water wells on ETC property (ETC1 and ETC2), connected to the APEX site via an approximately 1,500 foot pipeline (Figure 1-6). Installation of this pipeline will involve a road bore under Farm to Market Road 2706. The connection points with existing ETC infrastructure will be installed within an approximate 1-acre area on ETC Property (Figure 1-6).
- Two new wells (APEX 1S/1D) connected to the APEX site via new 17,218 foot pipeline that will share the previously surveyed utility corridor (Section 1.4.3 above) and a 75 foot pipeline from the well pad to the pipeline in the utility corridor (Figure 1-6).
- Two new wells (APEX 2S/2D) connected to the APEX site via new 8,151 foot pipeline that will share the previously surveyed utility corridor (Section 1.4.3 above) and a 50 foot pipeline from the well pad to the pipeline in the utility corridor (Figure 1-6).

During facility operations, the new offsite APEX well 2S completed in the upper/middle Wilcox formation and Apex well 3D completed in the lower Wilcox formation will be pumped to provide the 1,462 gpm to meet the CAES plant water demand. Use of other water wells is not anticipated during facility operation. Use of wells completed in the lower Wilcox formation is not planned. As discussed above, the offsite water wells and associated pipelines are included in the action area for the project.

1.4.4.2 Brine Injection Wells

Brine generated during cavern creation will be disposed of in deep (> 5,000 feet below the ground surface) injection wells. Five injection wells will be required. APEX has contracted to use two of ETC's existing permitted deep injection wells for brine disposal (ETC SWD-1 and ETC SWD-2) which are connected to the existing ETC site

infrastructure via an a new 2.87 mile brine pipeline. A third permitted injection well site (ETC SWD-3) will be installed and will connect to the existing ETC pipeline via a new 0.33 mile connector pipeline. APEX is currently siting an additional injection well (SWD-4) for use during cavern creation activities. The potential location of SWD-4 is approximately 3.2 miles from the APEX site and would require less than 1 mile of new pipeline to connect with the existing ETC injection well pipeline infrastructure at ETC SWD-2 (Figure 1-6). A 750 foot connector pipeline will be installed, via a road bore under Farm to Market Road 2706, to connect the APEX cavern well with the existing ETC infrastructure on the adjacent ETC property. In addition, Apex has retained a potential location (SWD-5) for a Class I injection well or salt water disposal well. SWD-5 will be connected to the APEX site via new 9,609 foot pipeline that will share the previously surveyed utility corridor (Section 1.4.3 above) and a 409 foot pipeline from the well pad to the pipeline in the utility corridor (Figure 1-6). As noted previously, the brine injection wells and associated pipelines are included in the action area for the project.

1.4.5 Transmission Corridor

Electrical transmission will also be required for facility development but is not being addressed as a component of the action area for the proposed project, for reasons explained below. Within ERCOT, Transmission and Distribution Utilities (TDU's) are obligated to provide electrical interconnection to new generating plants, with the cost of interconnection (aside from the cost of the step-up transformer at the plant site, and certain metering and protection equipment) borne by the end users within the ERCOT market. Thus for the BEC the transmission lines will be independently sited, constructed and operated by Oncor, the TDU providing electric transmission and distribution in the vicinity of the project. Oncor, not APEX, will evaluate the alternative routes and present a recommended route for interconnection (as well as alternative routes) to the Texas Public Utility Commission (PUC) in accordance with the PUC's rules and procedures for granting of a Certificate of Convenience and Necessity (CCN) for new transmission line construction or upgrading. Under this law and by PUC practice, a comprehensive evaluation of environmental impacts of proposed lines is required as a component of the CCN approval process. Once a route for any new construction (as well as plans for any necessary network upgrades) is approved, the Oncor will design, build, own, and operate the interconnection facilities.

Oncor's operations are extensive, with almost 120,000 miles of transmission and distribution lines in operation. Given this broad reach, and facing the necessity of ongoing expansion and upgrade of its facilities to meet customer needs, Oncor has established an agreement with the USFWS in the form of an Incidental Take Permit. The existence of this agreement adequately addresses potential impacts to listed species that may occur in electric transmission line easements developed to achieve interconnection of the Apex facility.

SECTION 2.0

Listed Species/Critical Habitat in Action Area

2.1 Species and Critical Habitat List

The USFWS Threatened and Endangered Species System internet database and the TPWD Annotated County List of Rare Species for Anderson County were reviewed on January 23, 2012 to determine if any federally listed endangered, threatened, or candidate species have the potential to occur in the action area. Simply having a species listed in the county does not mean that it is present within the action area. It is important to note that TPWD's county lists include several species that are federally listed under the ESA, but are not considered by the USFWS as potentially occurring in Anderson County. These include the interior least tern, piping plover, red-cockaded woodpecker, Sprague's pipit, whooping crane, Louisiana black bear, red wolf, and Louisiana pine snake. However, to address potential concerns from both agencies, all federally listed species identified in both agency lists are discussed below. In addition, although state-listed species are not protected under the ESA, potential impacts to these species were considered in this assessment.

Habitat requirements of listed species were reviewed to determine the potential for habitat of a listed species to be present within the action area. This habitat determination is based on a review of aerial photography, topographic maps, field reconnaissance, and biological knowledge of the region. Although habitat may exist for eight of the federally listed species within Anderson County, as suggested by TPWD, it is unlikely that any of these species persist within the action area due to the historically disturbed nature of the area.

No federally listed species were observed within or near the action area during the field surveys. A review of the TPWD TXNDD by CH2M HILL on February 7, 2012 for species recorded within 10 miles of the action area found reports of four state listed species (A caddisfly, Morse's net-spinning caddisfly, Holzenthal's philopotamid caddisfly, purse casemaker caddisfly) within the Gus Engling Wildlife Management Area (WMA) located approximately one mile north of the Property. One rare plant community, Quercus stellata-Quercus marilandica series, occurs along the western half of the proposed utility corridor (Figure 1-6).

Based on the database searches and field surveys conducted to date, there is no evidence of federally listed species or designated critical habitat in the action area.

2.2 Descriptions of Listed Species

2.2.1 Federal Listed Species

2.2.1.1 Earth Fruit

The USFWS internet database lists the earth fruit (*Geocarpon minimum*) as the only designated threatened species for Anderson County, Texas. The earth fruit was listed by the USFWS as threatened in 1987 (USFWS, 2009). A major threat to the earth fruit is the destruction or adverse modification of its habitat from silviculture, agriculture, pasture, and road expansion. The earth fruit is found throughout southwestern Missouri, Arkansas, Louisiana, and Texas. In Texas, the earth fruit is known to occur in Anderson, Harrison, and Panola Counties (TPWD, 2012b).

The earth fruit is a small (1-4 cm), winter annual flowering plant that is only visible for three to six weeks during the spring. In Texas, the flowering and fruiting period ranges from February to late March. The earth fruit occurs in barren saline complexes at the vegetative edge of saline "slick spots", which are sparsely vegetated soils with high concentrations of magnesium and sodium. The local soils are not mapped at this level of detail, but are typically clay pans which exhibit a spongy feel when wet and hard cement when dry (TPWD, 2012b).

Based on the TPWD TXNDD, the nearest known occurrence of this plant is along the Neches River in Anderson County, approximately 31 miles east of the action area (Figure 2-1). After conducting a field investigation and reviewing habitat requirements, it was determined that there is no suitable habitat for this species (i.e., vegetated

edges of slick spots in saline barren complexes) within the action area. No members of this species were observed during the field investigations. Therefore, the project would have no effect on the earth fruit.

2.2.2 Non-Designated Federal Listed Species

As listed by the TPWD internet database, there are eight (8) non-designated federal listed species that historically occurred, or have limited potential to occur in Anderson County, Texas. TWPD Non-designated Federal listed species are defined as species that are federally listed under the ESA but are not considered by the USFWS as potentially occurring in Anderson County.

2.2.2.1 Interior Least Tern

The interior least tern (*Sterna antillarum anthalassos*) was added to the USFWS threatened and endangered species list in 1985 (USFWS, 1985a). Widespread loss and alteration of its riverine nesting habitat has eliminated the species from many locations within its former breeding range in the interior U.S. Additionally, recreational vehicle use and other disturbances around nesting colonies has reduced nesting success and reproduction. The interior least tern is a migratory, colonial shorebird that breeds and rears its young along inland river systems in the United States and winters in Central and South America. In Texas, interior least terns are found at three reservoirs along the Rio Grande River, along the Canadian River in the Panhandle, on the Prairie Dog Town Fork of the Red River in the eastern Panhandle, along the Red River, and along the Trinity River and nearby reservoirs (TPWD, 2012c).

Interior least terns are the smallest of the North American terns, averaging 8 to 10 inches in length with a wingspan of approximately 20 inches. Preferred nesting habitat includes bare or sparsely vegetated sand, shell, and gravel beaches, sandbars, islands, and salt flats associated with rivers and reservoirs. Foraging habitat includes shallow water areas of rivers, lakes, and ponds located close to nesting areas. Terns arrive at breeding areas from April to early June and spend 3 to 5 months on the breeding grounds (USFWS, 1985a).

There are no documented occurrences of the interior least tern within the action area (TXNDD, 2012). The closest known documented occurrence of the interior least tern is at the Richland-Chambers Reservoir in Freestone County, approximately 9.3 miles northwest of the action area (Kasner et al., 2005). After reviewing habitat requirements and conducting a field investigation of the proposed discharge location, pipeline corridor and facility site, it was determined that the discharge location and areas immediately upstream and downstream of the discharge location do not provide suitable habitat (i.e. gravel beaches, sandbars, islands or salt flats for breeding or shallow water habitat near breeding areas) for the interior least tern. No terns were observed during the field investigation. Therefore, the project would have no effect on the interior least tern.

2.2.2.2 Piping Plover

The piping plover (*Charadrius melodus*) was added to the USFWS threatened and endangered species list in 1985 (USFWS, 1985b). The Great Lakes population is listed as endangered, while the Northern Great Plains and Atlantic Coast populations are listed as threatened. Hunting in the late 19th and early 20th century likely caused the initial population decrease. More recent factors that have contributed to decreases in population include habitat degradation and destruction, human disturbance to breeding areas, channelization and damming of rivers that reduce the presence of sandbars, and wetland destruction (USFWS, 2003). In Texas, similar habitat degradation has occurred within the piping plover winter range along the Gulf Coast. Protection under the Migratory Bird Treaty Act of 1918 (MBTA) has provided relief to the population from hunting and harassment.

The piping plover is a small, migratory shorebird that can be found wintering along the Texas coast on sandy beaches, sand flats, mudflats, algal flats, and spoil islands. They roost on beaches, sandy flats behind dunes, or behind driftwood or other beach debris (TPWD, 2012d). Piping plovers forage along ocean beaches and intertidal flats and feed on various small invertebrates (NatureServe, 2012). Critical habitat was designated in 2001 for the wintering population of piping plover across eight states (Federal Register, 2001). There is no designated critical habitat for the piping plover within Anderson County.

There are no documented occurrences of the piping plover within the action area or the surrounding area (TXNDD, 2012). After conducting a field investigation and reviewing habitat requirements, it was determined that the waterbodies, waterways, and wetlands in the action area do not exhibit habitat characteristics (i.e. sandy areas, large open flats) preferred by piping plovers. No piping plovers were observed during the field investigations. Therefore, the project would have no effect on the piping plover.

2.2.2.3 Red-cockaded Woodpecker

The red-cockaded woodpecker (*Picoides borealis*) was listed as endangered by the USFWS in 1970 (USFWS, 2012b). The primary threat to the existence of this species is almost complete habitat loss. Historically, the woodpecker's range extended into the southeastern United States from Florida as far west as eastern Texas and Oklahoma and as far north as Maryland. Due to extensive logging of its preferred habitat, the current red-cockaded woodpecker range in Texas extends into only 17 counties (TPWD, 2012e).

The red-cockaded woodpecker is a small, black and white woodpecker which is most easily distinguished by its black cap and nape that encircle large, white cheek patches. The red-cockaded woodpecker feeds primarily on a variety of insects and occasionally on fruits and seeds (NatureServe, 2012). Preferred red-cockaded woodpecker habitat includes open, old-growth longleaf pine (*Pinus palustris*) or pine-hardwood forests with little to no mid story. Old-growth longleaf pines are defined as being in excess of 120 feet tall and 3 feet in diameter-at-breast height (Shackelford and Reid, 2001). Red-cockaded woodpeckers are cooperative breeders, and live in small groups composed of one breeding pair and several helpers. The nesting season runs from April to June and eggs are laid within cavities of living pine trees (NatureServe, 2012).

There are no documented occurrences of the red-cockaded woodpecker within the action area or the surrounding area (TXNDD, 2012). The eastern portion of Anderson County is listed in the historic range of the species and it has been determined by the TPWD to be extirpated from the county due to lack of suitable habitat (TPWD, 2012e). Cooperative breed groups are known to occur over 40 miles away within the managed longleaf pine communities of Davy Crockett National Forest in Houston and Cherokee Counties (TXNDD, 2012). No red-cockaded woodpeckers were observed during the field investigation. After reviewing habitat requirements and conducting a field investigation, it was determined that there is no suitable habitat (i.e. old growth longleaf pine or pine hardwood forests with open mid-story) for this species within the action area. Therefore, the project would have no effect on the red-cockaded woodpecker.

2.2.2.4 Sprague's Pipit

The Sprague's pipit (*Anthus spragueii*) is currently a candidate species for the threatened and endangered species list that has been deemed warranted but is precluded by higher priority actions by the USFWS (USFWS, 2010). As a result of the priority status, the Sprague's pipit has remained a candidate species since the original 12 month finding, and the status is reviewed annually by the USFWS (USFWS, 2012c). Current threats to the Sprague's pipit include grassland conversion, overgrazing, habitat fragmentation, and energy development (drilling) in the northern prairies of the U.S. (Federal Register, 2010). The Sprague's pipit breeding range is located in south central Canada, North Dakota, and portions of South Dakota, Minnesota, and Montana. The pipit is a migratory species that winters throughout the southern prairie states including portions of Arizona, Texas, Oklahoma, Arkansas, Louisiana, and Mississippi.

The Sprague's pipit is a small, grassland bird that occupies prairie habitats consisting of native grasslands (never tilled) that are maintained by fire or historically maintained by bison grazing. They rely on large patches of native grassland where the patch size ranges from 170 to 776 acres (Federal Register, 2010). During winter, the Sprague's pipit can be found utilizing dense and sparsely vegetated grassland areas, but tend to avoid areas with a shrub component and grassy edges of agricultural fields (Federal Register, 2010). The Sprague's pipit feeds primarily on insects during the summer and seeds during the fall and winter (NatureServe, 2012).

There are no documented occurrences of the Sprague's pipit within the action area (TXNDD, 2012). After reviewing habitat requirements and conducting a field investigation, it was determined that there is no suitable habitat for this species within the action area. Grassland habitats are restricted to grazing pastures for livestock, and exhibit a significant shrub component. Native prairie habitat does not exist within the action area. No

Sprague's pipits were observed during the field investigation. Therefore, the project would have no effect on the Sprague's pipit.

2.2.2.5 Whooping Crane

The whooping crane (*Grus americana*) was designated endangered in 1967 (Federal Register, 2007). The most common threats to the whooping crane that have led to its current listing status are human induced factors including habitat modification, reduction of freshwater inflow into wintering estuary habitats, occasional illegal hunting, disturbance on breeding grounds, and collisions with power lines, fences, and other man-made structures (Federal Register, 2007). In Texas, the whooping crane winters in the coastal marshes of the Aransas National Wildlife Refuge, located in Aransas, Calhoun, and Refugio Counties near the town of Rockport, Texas (Federal Register, 1978).

The whooping crane is North America's tallest bird, with males approaching 5 feet when standing erect. The whooping crane's diet varies seasonally. The cranes are primarily carnivorous during the breeding and wintering seasons, foraging on a wide variety of aquatic invertebrates. On migration, it consumes more vegetable matter such as tubers and grains (NatureServe, 2012). Wintering habitat along the Texas Gulf Coast is typically a mix of coastal marsh, inland margins of the flats, and inland oak, grassland, swale, and pond habitats (Federal Register, 2007).

The entire whooping crane migratory corridor encapsulates 95% of all sightings and spans approximately 106 counties across Texas (USFWS, 2012d). Anderson County is not considered part of the whooping crane migration corridor and therefore, the whooping crane is not expected to occur in Anderson County. However, the neighboring county to the west, Freestone County, is included in the migration corridor. CH2M Hill evaluated the habitat within the action area for potential habitat for the whooping crane. It was determined that the wetland characteristics of the palustrine wetlands within the action area do not support habitat favored by the whooping crane because they lack salt marsh vegetation and large expanses of herbaceous wetlands. Therefore, the project would have no effect on the whooping crane.

2.2.2.6 Louisiana Black Bear

The Louisiana black bear (*Ursus americanus luteolus*) was added to the USFWS threatened and endangered species list in 1992 (USFWS, 2012e). Primary threats to the Louisiana black bear include habitat destruction/degradation, habitat fragmentation, loss of travel corridors between habitat fragments, and illegal take (USFWS, 1995). Historically, the Louisiana black bear range covered all of Louisiana, southern Mississippi, and the eastern third of Texas including the upper Texas Coast. Current breeding populations are concentrated in northeast and south central Louisiana within the Tensas and Atchafalaya River basins, which were designated Critical Habitat in 2009 (Federal Register, 2009a). There have been sightings outside these breeding subpopulations, but it is unclear if these are breeding individuals or wandering sub-adults and males (USFWS, 1995). Long term protection strategies include establishing and protecting travel corridors within suitable habitats that connect subpopulations. These corridors would need to be fairly remote with little fragmentation (USFWS, 2009e).

The Louisiana black bear is a subspecies of the American black bear that typically inhabits bottomland hardwood forest habitat. Additional habitat types occasionally utilized include brackish and freshwater marshes, levees along canals and bayous, and agricultural fields. Typically, the Louisiana black bear requires large, remote habitat patches with plentiful food, water, cover, and denning sites adequately distributed across habitat patches (USFWS, 1995). Females prefer winter den sites in hollow trees, especially cypress or tupelo, or brush piles to bare their young; usually a litter of one to three pups (NatureServe, 2012).

There are no documented occurrences of the Louisiana black bear within the action area or the surrounding area (TXNDD, 2012). Anderson County is within the historic range of the species, but the species is believed to have been extirpated from the county since the early 1900s. However, since 1977, the TPWD has documented reliable sightings of black bears at 24 locations within East Texas, including Anderson County (TPWD, 2005). The bottomland hardwood forests along the Trinity River could provide suitable habitat for the Louisiana black bear. However, a desktop review and field investigations confirmed that the bottomland hardwood forest habitat

within the action area lacks a connection to migration corridors and known breeding populations, which reduces the probability of juveniles and roaming males occurring in the action area.

2.2.2.7 Red Wolf

The red wolf (*Canis rufus*) was designated endangered in 1967 (USFWS, 2012f).The red wolf historically ranged throughout the southeastern U.S., from the Atlantic coast to central Texas, and from the Gulf Coast to central Missouri and southern Illinois. Between 1900 and 1920, red wolves were extirpated from most of the eastern portion of their range. A small number persisted in the wild in southeastern Texas and southwestern Louisiana until the late 1970s; however, by 1980, the species was declared extinct in the wild. Since then, experimental populations have been reintroduced in North Carolina and Tennessee (NatureServe 2012), however, no reintroduced populations occur in Anderson County.

Red Wolves are habitat generalists but require large contiguous areas of suitable habitat with a minimum size of 170,000 acres. Absence of coyotes is preferable, but habitat segments must have only moderate population of the competing coyote for populations of red wolves to be sustainable (USFWS, 1989). Large contiguous areas of habitat are not present near the project area that would support populations of red wolves. Therefore, the project would have no effect on the red wolf.

2.2.2.8 Louisiana Pine Snake

The Louisiana pine snake (*Pituophis ruthveni*) is currently a candidate species for the threatened and endangered species list that has been deemed warranted but is precluded by higher priority actions by the USFWS (USFWS, 2012g). Urban development, conversion to agriculture, road construction, and mining have all three contributed to loss and fragmentation of pine snake habitat. However, the greatest impact to Louisiana pine snakes has been loss of the native longleaf and shortleaf-pine ecosystem. Louisiana pine snakes originally occurred in at least nine Louisiana parishes and fourteen Texas counties, coinciding with an adjunct portion of the longleaf pine ecosystem west of the Mississippi River. They are now found in only four Louisiana parishes and five Texas counties. In Texas, records confirm their presence only in the southern portion of Sabine National Forest (Sabine County) and adjacent private land (Newton County), and in the southern portion of Angelina National Forest (Angelina, Jasper, Tyler counties).

The Louisiana pine snake is a non-venomous constrictor of the Colubridae family. It is large, usually 4-5 feet long. The Louisiana pine snake is generally associated with sandy, well-drained soils with a well-developed herbaceous understory dominated by grasses. Its activity appears to be heavily concentrated on low, broad ridges overlain with sandy soils. Pocket gophers appear to be their primary food source in addition to other small mammals, amphibians, and ground-nesting birds. Louisiana pine snakes are known to use the burrows of Baird's pocket gophers (*Geomys breviceps*) for foraging, hibernation, and escape from predators and fire (Rudolph et al., 2012).

There are no documented occurrences of the Louisiana pine snake within the action area (TXNDD, 2012). After reviewing habitat requirements and conducting a field investigation, it was determined that there is no suitable habitat (i.e. longleaf or shortleaf pine savannah) for this species within the action area. In addition, soil textures found in the action area are clay to clay loam, and are not indicative of preferred Louisiana pine snake habitat. No pine snakes were observed during the field investigation. Therefore, the project would have no effect on the Louisiana pine snake.

2.3 Federally Designated & Proposed Critical Habitat

The USFWS Critical Habitat Portal was accessed to determine whether any designated critical habitat for federally listed species occurs in the action area. A review of the habitat portal, in addition to field investigations, determined that the action area does not contain, nor is it within, any designated critical habitat area, as defined under the ESA, as amended (USFWS, 2012).

SECTION 3.0

Environmental Setting

3.1 Property

The Property is located in Anderson County, Texas, approximately 20 miles northwest of Palestine, Texas and 100 miles southeast of Dallas, Texas (Figure 1-1). Current land use on the Property consists of undeveloped, heavily grazed pasture land, two small industrial facilities, and several pipeline rights-of-way. The Property is bounded by Farm-To-Market Road 2706 to the west and County Road 2504 to the north. Land to the south and east of the Property is primarily undeveloped. Two small residences are located along the northeast corner of the Property. The surrounding land use is a mixture of industrial, commercial, and undeveloped property.

Field surveys revealed that the Property consists of heavily grazed pasture land (dominated by bahiagrass and a variety of small forbs), Palustrine Emergent (PEM) Wetlands (broadleaf cattail, common rush, and strawcolored sedge), Palustrine Scrub-Shrub (PSS) Wetlands (Eastern baccharis and wax myrtle), Palustrine Forested (PFO) Wetlands (black willow and American elm), and industrialized land.

Surface waters within the Property include two intermittent streams and two man-made ponds. Generally, surface water on the Property flows to the southwest corner of the Property before discharging through a culvert into an intermittent stream located on the west side of Farm-To-Market Road 2706.

3.2 Utility Corridor

The proposed utility corridor is located within Anderson County, Texas. The proposed corridor consists of two potential pipeline routes. The north route originates at the southwest corner of the Property and then runs approximately 4 miles west/southwest before discharging into the Trinity River. The alternate route will tie-in to the proposed wastewater pipeline just north of FM 321 and travel approximately 1.88 miles before discharging into the Trinity River approximately 1 mile south of the original discharge location. Land uses surrounding the utility corridor include industrial, agriculture, and large tracts of forested land. Several streams, PEM Wetlands and PFO wetlands were identified within and adjacent to the proposed utility corridor. Sections of the utility corridor run adjacent to existing pipeline corridors.

3.3 Trinity River

The original discharge point is located within a relatively straight stretch of the Trinity River. Approximately 265 meters downstream of the discharge point, the river makes a 90-degree turn to the west. The river is approximately 110 feet wide and approximately 15 feet deep along this stretch. One sandbar was observed just north of the proposed utility corridor on the east bank of the river. The riparian corridor on the east bank consists of a bottomland hardwood PFO wetland dominated by green ash (*Fraxinus pennsylvanica*) and swamp privet (*Forestiera acuminata*). The alternate discharge location is located approximately 1 mile south of the original discharge location. The river is narrower and deeper along this stretch, with steeper vegetated banks. The riparian corridor consists of bottomland hardwood forest dominated by water oak (*Quercus nigra*), sugarberry (*Celtis laevigata*), and hickories.

3.4 Offsite Wells and Pipeline Corridors

3.4.1.1 Water Wells

The offsite water wells consist of a pair of shallow and deep wells at each of 2 designated locations (APEX 1S/1D and APEX 2S/2D) along the proposed utility corridor (Figure 1-6). The proposed water wells are approximately 75 and 50 feet south of the proposed utility corridor. The habitat at APEX 1S/1D consists of mixed hardwood forest dominated by post oak, green ash, and cedar elm (*Ulmus crassifolia*). The habitat at APEX 2S/2D consists of

heavily grazed pasture land and is dominated by Texas crabgrass (*Digitaria texana*), hogwort (*Croton capitatus*), and common ragweed (*Ambrosia artemisiifolia*).

3.4.1.2 Brine Injection Wells

The offsite brine well sites and pipeline corridors are located within Anderson County, Texas. Land uses within the proposed areas for new injection wells SWD-3 and SWD-5 and pipeline corridors include industrial, residential, agriculture, and large tracts of pasture and forested land. Several streams and PEM wetlands were identified within and adjacent to the new brine pipeline and radial pipeline corridors.

The specific location of the new SWD-4 injection well has not been selected at this time. Therefore, a desktop habitat assessment and windshield survey was conducted of the proposed area for the new SWD-4 injection well and associated pipeline corridor. Land uses within the proposed SWD-4 injection well and pipeline corridor review area include industrial, residential, agriculture, and large tracts of pasture and forested land. Several streams, ponds, PEM and PFO wetlands were identified within the review area using USGS topographic maps and the NWI.

SECTION 4.0

Effects of the Proposed Action

4.1 Direct Effects

Direct effects are "direct or immediate effects of the project" and include all immediate impacts (adverse and beneficial) from project-related actions (e.g., construction-related impacts such as noise disturbance or loss of habitat), those disturbances that are directly related to project elements that occur very close to the time of the action itself, and those impacts stemming from actions or activities that are interrelated or interdependent to the proposed action. Based on the database searches and field surveys conducted to date, there is no evidence of federally listed species or designated critical habitat in the action area. All direct effects (e.g. noise, dust, truck traffic, etc.) would be related to construction activities within the Property boundaries, along the existing pipeline utility corridor, or where the pipeline reaches the Trinity River.

4.1.1 Construction Traffic

Construction activities for the APEX BEC CAES facility are divided into four phases: CAES cavern construction, facility construction, water and wastewater pipeline construction and injection well development. Construction activities during these phases will be temporary.

CAES cavern construction will occur on the APEX site and take about 500 days to complete. Water used for solution activities and wastewater generated during cavern development will be transported to and from the site via pipelines and thereby minimize additional construction traffic. Because most of the activities will be underground and the construction area will be limited to drilling sites and access roads on the APEX site, traffic impacts during construction will be limited to a small area of the APEX site.

The construction of the APEX BEC facility will temporarily increase traffic patterns on local paved roads, particularly Farm to Market (FM) 2706. Construction deliveries will be confined to existing paved roads thereby limiting the potential for dust. The APEX site contains existing commercial facilities and no federally listed species were observed during the field investigations conducted in 2012. Water will be used as a dust suppression measure on the site.

Water and wastewater pipeline construction will involve the installation of water wells, water supply pipeline, wastewater pipeline along a 4-mile utility corridor between the site and the Trinity River and connector pipelines on ETC property. The proposed utility corridor area was surveyed in 2012 and no federally listed species were observed during the field investigation. Water will be used as a dust suppression measure on the site.

Injection well and connector pipeline construction will be limited to areas involving well pads, access roads and connector pipelines. APEX plans on utilizing existing pipeline infrastructure to minimize construction activities. Construction activities will require limited construction traffic and water will be used as a dust suppression measure on unpaved roads.

Based on the review of various threatened and endangered species databases, observations during field surveys, and facility development plans and durations, construction traffic is not expected to affect federally listed species.

4.1.2 Construction Stormwater

During construction, erosion/sediment control and stormwater BMPs will be implemented in order to avoid impacts to surface water resources. Planned construction BMPs will be identified in the Site Pollution Prevention Plan (PPP) and will include:

- Stormwater management
- The construction of berms around the construction work area to direct surface water run-off away from active construction areas;

- The establishment of erosion control measures (e.g. filter socks, silt fence, gravel entrance apron) along the perimeter of construction work areas and at other key areas involving slope changes or drainage features;
- The application of water to roads and constructions areas for dust control during construction activities; and
- The locations of fuel storage and other construction materials in secondary containment.

Based on the review of various threatened and endangered species databases, observations during field surveys, and planned erosion, sediment and stormwater control measures, impacts to surface waters and federally listed species are not expected.

4.1.3 Construction Noise

Construction activities will temporarily increase noise levels at specific locations. Based on the review of various threatened and endangered species databases, observations during field surveys, and the short duration and intermittent nature of construction noise activities, construction noise is not expected to affect federally listed species.

4.1.4 Wastewater Discharge to the Trinity River

Non-contact cooling water discharge will be generated from the APEX BEC during cooling tower operation and will be discharged to the Trinity River via a 4-mile pipeline. Groundwater obtained from wells will be recirculated four times before being discharged. Small amounts of a biocide and scale inhibitor are added to the water, but are consumed by the process and treated prior to discharge so concentrations in the effluent will not be detectable at the point of discharge. Due to evaporation of water, this non-contact cooling process increases the concentration of naturally occurring substances that are present in groundwater. The projected water quality for the APEX BEC wastewater discharge is presented in Table 4-1.

The two potential discharge points on the Trinity River exist within state stream segment #0804, Trinity River above Lake Livingston. No federally listed species are known to exist within this segment of the Trinity River. The proposed discharge of non-contact cooling water is expected to have an average flow rate of 155 gallons per minute (gpm) and have a maximum flow rate of 550 gpm (0.792 mgd). The proposed discharge of 155 gpm is less than 0.1 percent of the Trinity River flow at the minimum low flow conditions of 499 cubic feet per second for the period from 2001 to 2011 for USGS Gauge 0806500.

Based on the review of various threatened and endangered species databases and the small discharge volume to the Trinity River, the facility wastewater discharge is not expected to affect federally listed species.

4.2 Indirect Effects

Indirect effects include those effects that are caused by or will result from the proposed action or the larger action (including interrelated and interdependent actions or activities) and are later in time (generally after the construction period), but are still reasonably certain to occur (50 CFR §402.02). These are essentially direct effects delayed in time. Indirect impacts may result from the operation of the project or future activities related to the project.

4.2.1 Air Emissions

Air emissions due to project operations were considered as a possible source of indirect effects to the earth fruit (*Geocarpon minimum*), the only federally listed threatened or endangered species present or likely to be present in Anderson County. Plants can be damaged through direct contact with gaseous pollutants, pollutants deposited as droplets, or through changes in soil conditions (e.g., nutrient enrichment [from NO_X] or acidification [from NO_X or SO_X]) due to deposition.

Table 1-3 lists the modeled off-property air concentrations for pollutants emitted during operation of the facility. Three different criteria are available to evaluate whether these concentrations pose a threat to a listed plant species or its critical habitat (there is no evidence to suggest the presence of a listed animal species on the

Property): (1) significant impact levels (SILs), (2) secondary NAAQS, and (3) critical loads for air pollutants capable of deposition (USEPA, 2008).

The SIL is a *de minimis* threshold for individual facilities that apply for a permit to emit a regulated pollutant in an area that meets the NAAQS. The state and USEPA must determine if emissions from that facility will cause the air quality to worsen. The SIL is a measure of whether a source may cause or contribute to a violation of PSD increment or the NAAQS (i.e. to a significant deterioration of air quality). None of the values in Table 1-3 exceed their respective SILs at any off-property location, indicating that facility operations are highly unlikely to cause any deterioration in air quality or adversely affect listed species.

Particulate matter, unless present in quantities sufficient to cause smothering, is unlikely to adversely affect vegetation. Carbon monoxide may cause reversible decreases in photosynthetic rates, but only at levels much higher (> 1,000,000 $\mu g/m^3$) than those expected from this facility (USEPA, 1980).

Current NO_2 and SO_2 NAAQS secondary standards are designed to protect against direct exposure of vegetation to ambient concentrations of oxides of nitrogen and sulfur (USEPA, 2011). The NO_2 secondary standard is 0.053 ppmv (100 $\mu g/m^3$), annual arithmetic average, calculated as the arithmetic mean of the 1-hour NO_2 concentrations. The SO_2 NAAQS secondary standard is a 3-hour average of 0.5 ppmv (1,300 $\mu g/m^3$), not to be exceeded more than once per year. Based on currently available information, USEPA believes that the current secondary standards serve to protect vegetation from direct damage associated with exposures to gaseous NO_2 and SO_2 (USEPA, 2008, 2011). None of the NO_2 and SO_2 values in Table 1-3 exceed their respective secondary NAAQS, indicating that facility operations are unlikely to adversely affect any vegetation off the Property.

There is no clear definable relationship between atmospheric sulfur deposition and ecological effects. Thus, one cannot specify a level of sulfur deposition that would be likely to cause adverse effects across the landscape (USEPA, 2008). For nitrogen (N) deposition, however, lichens can serve as sentinels for broader ecosystem changes in terrestrial systems. They have been shown to experience such changes at nitrogen loads above approximately 3 kg N/ha/yr (300 mg $N/m^2/yr$) (USEPA, 2008, 2011). A maximum annual nitrogen loading rate was estimated for the facility based on the annual off-property air concentration, total annual precipitation in Dallas, TX, a nitrogen scavenging ratio of 149, and a deposition rate estimation algorithm (Wolff et al., 1987). This estimated rate (calculations appear in Appendix C) was 60 mg $N/m^2/yr$, which is approximately five times lower than the lichen-based critical load. It is therefore unlikely that air deposited nitrogen would have an adverse affect on terrestrial plant communities off the Property. On Property impacts are not expected due to lack of suitable habitat and the presence of buildings and other impervious surfaces.

4.2.2 Noise

The major equipment for the Bethel Energy Center is being manufactured specifically for this facility and do not have established noise profiles. In order to mitigate potential noise impacts from the facility, APEX has incorporated a number of noise mitigation measures that include:

- Enclosing facility compressors and turbines in a building with 8-10 inch concrete walls or acoustically insulated steel,
- Incorporation of silencing elements in the stacks,
- Use of silencers at the inlets to the wall fans and at the exhaust openings in the buildings,
- Use of low-noise motors for the cooling tower pumps,
- Use of low-noise fans in the cooling towers, or fan deck barriers, and
- Use of lagging on the exterior piping and valve bodies to limit vibration and noise propagation.

APEX will perform noise monitoring during facility start up and subsequent operations in order to determine actual noise levels and where appropriate, incorporate additional mitigation measures into the facility to further reduce noise levels. It should be noted that the facility will have intermittent operations depending upon power compressions and dispatch schedules.

4.2.3 Wastewater Discharge to the Trinity River

Non-contact cooling water discharge generated from facility cooling tower operation will be discharged to the Trinity River via a 4-mile pipeline. Water used in the cooling tower will be obtained from groundwater wells constructed in the upper and middle Wilcox aquifer and located near the APEX BEC site. During facility operations, small amounts of a biocide and anti-scaling chemicals will be added to the water. These chemicals will be consumed during the process or treated prior to discharge so concentrations in the effluent should not be detectable at the point of discharge. After four cycles of concentration, water will be discharged to a 250,000 gallon blowdown tank prior to flowing through an approximately 4-mile pipeline that originates at the Property and has a discharge point on the Trinity River. Due to evaporation of water, this non-contact cooling process increases the concentration of naturally occurring substances that are present in groundwater. The projected water quality for the APEX BEC wastewater discharge is presented in Table 4-1.

The proposed discharge to Segment #0804 (Trinity River above Lake Livingston) is anticipated to have an average flow rate of 155 gallons per minute (gpm) (0.223 million gallons per day (mgd)) and a maximum flow rate of 550 gpm (0.792 mgd). The average flow rate was estimated based on fall/spring cooling tower water temperatures (will be slightly higher in summer, lower in winter). The maximum flow rate was estimated based on summer cooling tower water temperatures while the plant is compressing at full load. The proposed discharge of 155 gpm is less than 0.1 percent of the Trinity River flow at the minimum low flow conditions of 499 cfs for the period from 2001 to 2011 for USGS Gauge 0806500.

4.3 Effects from Interrelated & Interdependent Actions

An interrelated action is one that is part of a larger action and depends on the larger action for its justification. An interdependent action is one having no independent utility apart from the proposed action (50 CFR 402.02).

For this proposed project, the transmission corridor is an interrelated and interdependent action, in that it would not be required but for the need for electrical energy to flow into and out of the APEX BEC project. As discussed above, effects on listed species related to this corridor will be addressed through the existing Oncor ITP.

Discharge of cooling tower blow down water to the Trinity River, through a pipeline routed along an existing utility corridor, would be necessitated by the cooling needs of the APEX BEC project. The expected flow rate from both cooling towers at 366 gallons per minute is about 0.82 cfs and is less than 0.2 percent of the river flow at low flow conditions. Pursuant to the Clean Water Act (CWA), BEC has applied for a permit under the TCEQ's Texas Pollutant Discharge Elimination System (TPDES) Program to authorize construction of the facility. All potential pollutants will be addressed in the permit. Based on the database searches and field surveys conducted to date, there is no evidence of federally listed species or designated critical habitat in the action area, which includes the river and riparian habitat upstream and downstream of the discharge location; therefore, there is no indication that discharge of the blow down water would have any effect on federally listed species.

Water wells, brine injection wells, and their associated pipelines would be necessitated by the cavern creation needs of the project. Based on the database searches and field surveys conducted to date, there is no evidence of federally listed species or designated critical habitat in the action area; therefore, there is no indication that operation of the water and brine injection wells would have any effect on federally listed species.

SECTION 5.0

Conclusions

Based on the information presented in its biological assessment, an agency may reach one of three conclusions regarding effects on federal proposed or listed species and proposed or designated critical habitat that may be present in the action area: "No effect" (no impacts, positive or negative, to listed or proposed resources), "May affect, but not likely to adversely affect" (all effects are beneficial, insignificant, or discountable), or "May affect, and likely to adversely affect" (listed resources are likely to be exposed to the action or its environmental consequences and will respond in a negative manner to that exposure).

If a project will have no effect (NE) whatsoever (i.e., not a minimal effect or a long-term beneficial effect) on a listed species, a NE determination is appropriate. NE means no effect whatsoever will result from the proposed project, including no beneficial, highly improbable, or insignificant effects.

5.1 Earth fruit (*Geocarpon minimum*)

Based on field surveys, review of various threatened and endangered species databases, the results of air modeling, and comparisons to available effect thresholds and critical levels for pollutants of concern to this proposed project, this BA has determined that the proposed project will have no effect on the earth fruit within the action area because:

- The preferred habitat for this species is the vegetated edges of slick spots in saline barren complexes just above the floodplain of the Neches River, which is approximately 31 miles east of the project site. Within the action area, there is:
  - No suitable habitat for this species,
  - No habitat present that is known to be crucial to the survival of this species,
  - No critical habitat for this species.
- There is no evidence that this species is present or potentially present in the action area, as documented by field observations and a review of the USFWS and TPWD listed and rare species databases for Anderson County, nor is there historical documentation of the species in the action area.
- This species is unlikely to be present during construction due to a lack of suitable habitat and the already disturbed, ruderal nature of the Property and utility corridor.
- Estimated air emission levels are below levels associated with adverse effects in vegetation due to either direct contact or through enrichment or acidification of soils.

5.2 Interior Least Tern (*Sterna antillarum anthalassos*)

Based on field surveys and areview of various threatened and endangered species databases, this BA has determined that the proposed project will have no effect on the interior least tern within the action area because:

- There is no suitable habitat for the species in the action area, nor is there historical documentation of the species in the action area. Preferred nesting habitat includes bare or sparsely vegetated sand, shell, and gravel beaches, sandbars, islands, and salt flats associated with rivers and reservoirs. Foraging habitat includes shallow water areas of rivers, lakes, and ponds located close to nesting areas (USFWS, 1985a).
- This species is not present or potentially present, as documented by field observations and a review of the USFWS and TPWD listed and rare species databases for Anderson County.
- There is no habitat present in the action area that is known to be crucial to the survival of this species.
- There is no critical habitat for this species present within the action area.

- The listed species' presence is unlikely during construction due to a lack of suitable habitat and the already disturbed, ruderal nature of the Property and utility corridor.

5.3 Piping Plover (*Charadrius melodus*)

Based on field surveys and a review of various threatened and endangered species databases, this BA has determined that the proposed project will have no effect on the piping plover within the action area because:

- There is no suitable habitat for the species in the action area, nor is there historical documentation of the species in the action area. Preferred roosting habitat includes beaches, sandy flats behind dunes, or behind driftwood or other beach debris (TPWD, 2012d). Piping plovers forage along ocean beaches and intertidal flats and feed on various small invertebrates (NatureServe, 2012)
- This species is not present or potentially present, as documented by field observations and a review of the USFWS and TPWD listed and rare species databases for Anderson County.
- There is no habitat present in the action area that is known to be crucial to survival of this species.
- There is no critical habitat for this species present within the action area.
- The listed species' presence is unlikely during construction due to a lack of suitable habitat and the already disturbed, ruderal nature of the Property and utility corridor.

5.4 Red-cockaded Woodpecker (*Picoides borealis*)

Based on field surveys and a review of various threatened and endangered species databases, this BA has determined that the proposed project will have no effect on the red-cockaded woodpecker within the action area because:

- There is no suitable habitat for the species in the action area, nor is there historical documentation of the species in the action area. Preferred red-cockaded woodpecker habitat includes open, old-growth longleaf pine (*Pinus palustris*) or pine-hardwood forests with little to no mid story. Old-growth longleaf pines are defined as being in excess of 120 feet tall and 3 feet in diameter-at-breast height (Shackelford and Reid, 2001).
- It has been determined by the TPWD to be extirpated from the county due to lack of suitable habitat (TPWD, 2012e). There is no critical habitat for this species present within the action area.
- This species is not present or potentially present, as documented by field observations and a review of the USFWS and TPWD listed and rare species databases for Anderson County.
- There is no habitat present in the action area that is known to be crucial to the survival of this species.
- The listed species' presence is unlikely during construction due to a lack of suitable habitat and the already disturbed, ruderal nature of the Property and utility corridor.

5.5 Sprague's Pipit (*Anthus spragueii*)

Based on field surveys and a review of various threatened and endangered species databases, this BA has determined that the proposed project will have no effect on the Sprague's pipit within the action area because:

- There is no suitable habitat for the species in the action area, nor is there historical documentation of the species in the action area. Preferred Sprague's Pipit habitat includes prairie habitats consisting of native grasslands (never tilled) that are maintained by fire or historically maintained by bison grazing. They rely on large patches of native grassland where the patch size ranges from 170 to 776 acres (Federal Register, 2010). During winter, the Sprague's pipit can be found utilizing dense and sparsely vegetated grassland areas, but tend to avoid areas with a shrub component and grassy edges of agricultural fields (Federal Register, 2010).

- This species is not present or potentially present, as documented by field observations and a review of the USFWS and TPWD listed and rare species databases for Anderson County.
- There is no habitat present in the action area that is known to be crucial to the survival of this species.
- There is no critical habitat for this species present within the action area.
- The listed species' presence is unlikely during construction due to a lack of suitable habitat and the already disturbed, ruderal nature of the Property and utility corridor.

5.6 Whooping Crane (*Grus americana*)

Based on field surveys and a review of various threatened and endangered species databases, this BA has determined that the proposed project will have no effect on the whooping crane within the action area because:

- There is no suitable habitat for the species in the action area, nor is there historical documentation of the species in the action area. Preferred whooping crane wintering habitat along the Texas Gulf Coast include a mix of coastal marsh, inland margins of the flats, and inland oak, grassland, swale, and pond habitats (Federal Register, 2007).
- Anderson County is not considered part of the whooping crane migration corridor and therefore, the whooping crane is not expected to occur in Anderson County. This species is not present or potentially present, as documented by field observations and a review of the USFWS and TPWD listed and rare species databases for Anderson County.
- There is no wintering habitat present in the action area that is known to be crucial to the survival of this species.
- There is no critical habitat for this species present within the action area.
- The listed species' presence is unlikely during construction due to a lack of suitable habitat and the already disturbed, ruderal nature of the Property and utility corridor.

5.7 Louisiana Black Bear (*Ursus americanus luteolus*)

Based on field surveys and a review of various threatened and endangered species databases, this BA has determined that the proposed project will have no effect on the Louisiana black bear within the action area because:

- There is no suitable habitat for the species in the action area, nor is there historical documentation of the species in the action area. Bottomland hardwood forest is the preferred habitat for the Louisiana black bear. Additional habitat types occasionally utilized include brackish and freshwater marshes, levees along canals and bayous, and agricultural fields. Typically, the Louisiana black bear requires large, remote habitat patches with plentiful food, water, cover, and denning sites adequately distributed across habitat patches (USFWS, 1995).
- This species is not present or potentially present, as documented by field observations and a review of the USFWS and TPWD listed and rare species databases for Anderson County.
- Bottomland hardwood forest habitat within the action area lacks a connection to known breeding populations, which reduces the probability of juveniles and roaming males occurring in the action area.
- The listed species' presence is unlikely during construction due to a lack of suitable habitat and the already disturbed, ruderal nature of the Property and utility corridor.

5.8 Red Wolf (*Canis rufus*)

Based on field surveys and a review of various threatened and endangered species databases, this BA has determined that the proposed project will have no effect on the red wolf within the action area because:

- The species was declared extinct in the wild in 1980. Since then, experimental populations have been reintroduced in North Carolina and Tennessee (NatureServe 2012). No reintroduced populations occur in Anderson County.
- This species is not present or potentially present, as documented by field observations and a review of the USFWS and TPWD listed and rare species databases for Anderson County.

5.9 Louisiana Pine Snake (*Pituophis ruthveni*)

Based on field surveys and a review of various threatened and endangered species databases, this BA has determined that the proposed project will have no effect on the Louisiana pine snake within the action area because:

- No impacts to the Louisiana pine snake are expected, as there are no longleaf or shortleaf pine savannah habitats located within the action area. In addition, soil textures found within the action area are clay to clay loam, and are not indicative of preferred Louisiana pine snake habitat.
- Within Texas, populations of the Louisiana pine snake are only found in Sabine, Newton, Angelina, Jasper and Tyler counties. No populations are known to occur in Anderson County.
- This species is not present or potentially present, as documented by field observations and a review of the USFWS and TPWD listed and rare species databases for Anderson County.
- The listed species' presence is unlikely during construction due to a lack of suitable habitat and the already disturbed, ruderal nature of the Property and utility corridor.

SECTION 6.0

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SECTION 7.0

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Tables

Table 1-1. Air Pollutant Emission Estimates for the Proposed Bethel Energy Center

Source ID	Source Description	NOx			SO_2			CO			$PM_{2.5}$			PM_{10}		
		(lb/hr)	(TPY)	(g/s)	(lb/hr)	(TPY)	(g/s)	(lb/hr)	(TPY)	(g/s)	(lb/hr)	(TPY)	(g/s)	(lb/hr)	(TPY)	(g/s)
TURBASTK	Turbine Train A Stack	7.304	18.506	0.920	0.666	1.824	0.084	7.691	22.414	0.969	1.569	4.136	0.198	1.569	4.136	0.198
TURBBSTK	Turbine Train B Stack	7.304	18.506	0.920	0.666	1.824	0.084	7.691	22.414	0.969	1.569	4.136	0.198	1.569	4.136	0.198
GENENG1	Emergency Generator Engine	0.348	0.017	0.044	0.002	0.0001	0.0003	0.580	0.029	0.073	0.037	0.002	0.005	0.037	0.002	0.005
CTOWERA	Cooling Tower for Train A	--	--	--	--	--	--	--	--	--	0.0004	0.002	0.0001	0.127	0.556	0.016
CTOWERB	Cooling Tower for Train B	--	--	--	--	--	--	--	--	--	0.0004	0.002	0.0001	0.127	0.556	0.016
	Totals	14.96	37.03	1.88	1.33	3.65	0.17	15.96	44.86	2.01	3.18	8.28	0.40	3.43	9.39	0.43

Notes:

1. *Modeled emission rates shown in this table represent estimated maximum hourly rates. These rates were modeled every hour of the year.*
2. *For NOx, the modeled rates from the turbines represent startup conditions because NOx emissions are higher during startup than during normal maximum operating conditions.*
3. *For pollutants other than NOx, the modeled rates from the turbines represent maximum normal operating conditions because emissions are higher during normal condition than during startup for these pollutants.*

Table 1-2. Modeled Emission Source Parameters

Point Source Parameters:

Source ID	Source Description	UTM-E (NAD 83) (m)	UTM-N (NAD 83) (m)	Base Elevation		Stack Height		Exit Temperature		Exit Velocity		Stack Diameter	
				(ft)	(m)	(ft)	(m)	(°F)	(K)	(ft/s)	(m/s)	(ft)	(m)
TURBASTK	Turbine Train A Stack	791,946	3,532,222	348.00	106.07	150.00	45.72	210.00	372.07	56.82	17.32	13.0	3.96
TURBBSTK	Turbine Train B Stack	791,946	3,532,125	348.00	106.07	150.00	45.72	210.00	372.07	56.82	17.32	13.0	3.96
GENENG1	Emergency Generator Engine	791,928	3,532,099	345.51	105.31	35.00	10.67	886.05	747.65	78.45	23.91	1.5	0.46

Notes:

1. *In startup mode, the turbine stacks have a weighted avg. velocity of 41.21 fps and temp. of 204 F. NOx was modeled in startup mode because NOx emissions are higher during startup events than under normal operating conditions. All other pollutants were modeled in normal mode because emissions for them are significantly higher under normal operating conditions at 100% load.*

Area Source Parameters:

Source ID	Source Description	UTM-E (NAD 83) (m)	UTM-N (NAD 83) (m)	Base Elevation		Release Height		Easterly Length		Northerly Length		Angle from North
				(ft)	(m)	(ft)	(m)	(ft)	(m)	(ft)	(m)	(°)
CTOWERA	Cooling Tower for Train A	791,874	3,532,071	344.49	105.00	50.00	15.24	42.98	13.10	124.67	38.00	0.000
CTOWERB	Cooling Tower for Train B	791,903	3,532,071	344.49	105.00	50.00	15.24	42.98	13.10	124.67	38.00	0.000

Table 1-3. Air Dispersion Modeling Results

Pollutant	Operating Scenario	Avg. Period	Max Off-property Concentration[1,2] (µg/m^3)	PSD Significant Impact Level (µg/m^3)	Max Conc. as % of SIL	National Ambient Air Quality Standard (µg/m^3)	Max Conc. as % of NAAQS	Class II Area PSD Increment (µg/m^3)	Max Conc. as % of Increment	Radius of SIL Exceedance (m)
NO_2	Turbines in startup mode, generator engine in test mode	1-hr	6.1	7.5	81%	188	3.2%	N/A	N/A	N/A
		Annual	0.5	1	50%	100	0.5%	25	2.0%	N/A
$PM_{2.5}$	Turbines and cooling towers in normal mode, generator engine in test mode	24-hr	0.6	1.2	54%	35	1.9%	9	7.2%	N/A
		Annual	0.1	0.3	33%	15	0.7%	4	2.5%	N/A
PM_{10}	Turbines and cooling towers in normal mode, generator engine in test mode	24-hr	1.6	5	33%	150	1.1%	30	5.5%	N/A
		Annual	0.4	1	41%	N/A	N/A	17	2.4%	N/A
SO_2	Turbines in normal mode, generator engine in test mode	1-hr	0.4	7.8	5%	196	0.2%	N/A	N/A	N/A
		3-hr	0.4	25	2%	1300	0.0%	512	0.1%	N/A
		24-hr	0.2	5	5%	365	0.1%	91	0.3%	N/A
		Annual	0.0	1	4%	80	0.0%	20	0.2%	N/A
CO	Turbines in startup mode, generator engine in test mode	1-hr	9.9	2000	0.5%	40000	0.02%	N/A	N/A	N/A
		8-hr	5.1	500	1.0%	10000	0.1%	N/A	N/A	N/A

Notes:

1. Maximum off-property concentration predicted by the AERMOD dispersion model based on maximum estimated emission rates from the facility.

2. The EPA-recommended default NO_2/NOx ratio of 0.8 was applied to the NO_x concentrations to estimate the ambient NO_2 concentrations.

TABLE 4-1:
PROJECTED DISCHARGE WATER QUALITY
APEX BETHEL ENERGY CENTER
ANDERSON COUNTY, TEXAS

Constituent	Projected Effluent Concentration (mg/l)
BOD (5-day) (mg/l)	7.19
CBOD (5-day) (mg/l)	7.19
Chemical Oxygen Demand	14.37
Total Organic Carbon	3.59
Dissolved Oxygen	≥2.0
Ammonia Nitrogen	Trace
Total Suspended Solids	30.0
Nitrate Nitrogen	2.0
Total Organic Nitrogen	0.26
Total Phosphorus	1.67
Oil and Grease	NE
Total Residual Chlorine	0.0
Total Dissolved Solids	1,696
Sulfate	98.69
Chloride	314.53
Fluoride	0.40
Temperature (°F)	90.27
pH (Standard Units; min/max)	7.0/8.0
Total Aluminum	0.676
Total Antimony	UK
Total Arsenic	0.012
Total Barium	0.783
Total Beryllium	0.004
Total Cadmium	0.004
Total Chromium	0.023
Total Copper	0.059
Cyanide	UK
Total Lead	0.013

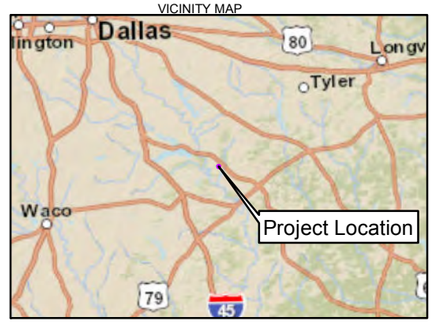
Constituent	Projected Effluent Concentration (mg/l)
Total Mercury	UK
Total Nickel	0.021
Total Selenium	0.020
Total Silver	UK
Total Thallium	0.009
Total Zinc	0.035
Fluoride	Trace

NE – Not Expected

UK - Unknown

Figures

VICINITY MAP



LEGEND

Streams

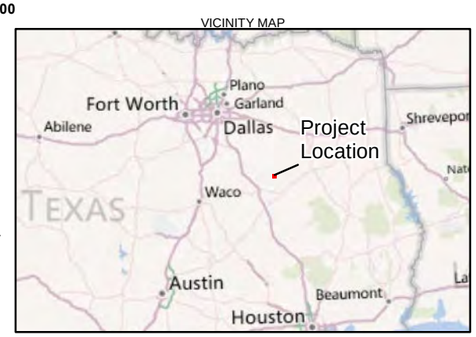
Proposed Site

Image:
National Agriculture
Imagery Program (NAIP) - 08/02/2010

N

0 100 200 400
Feet

FIGURE 1-1
Proposed Bethel Energy Center
Property Location and Boundary
Anderson County, Texas



LEGEND

Property Line

Coordinate System:
UTM Zone 14, NAD83

N

0 100 200
Feet

FIGURE 1-2

APEX Bethel Energy Center – Plot Plan
Anderson County, Texas

CH2MHILL

DEN \\COBRA\PROJ\APEX\GIS\MAPFILES\FIG2_PLOT_PLAN_11X17_20120604.MXD LHEYERDA 6/12/2012 3:38:39 PM

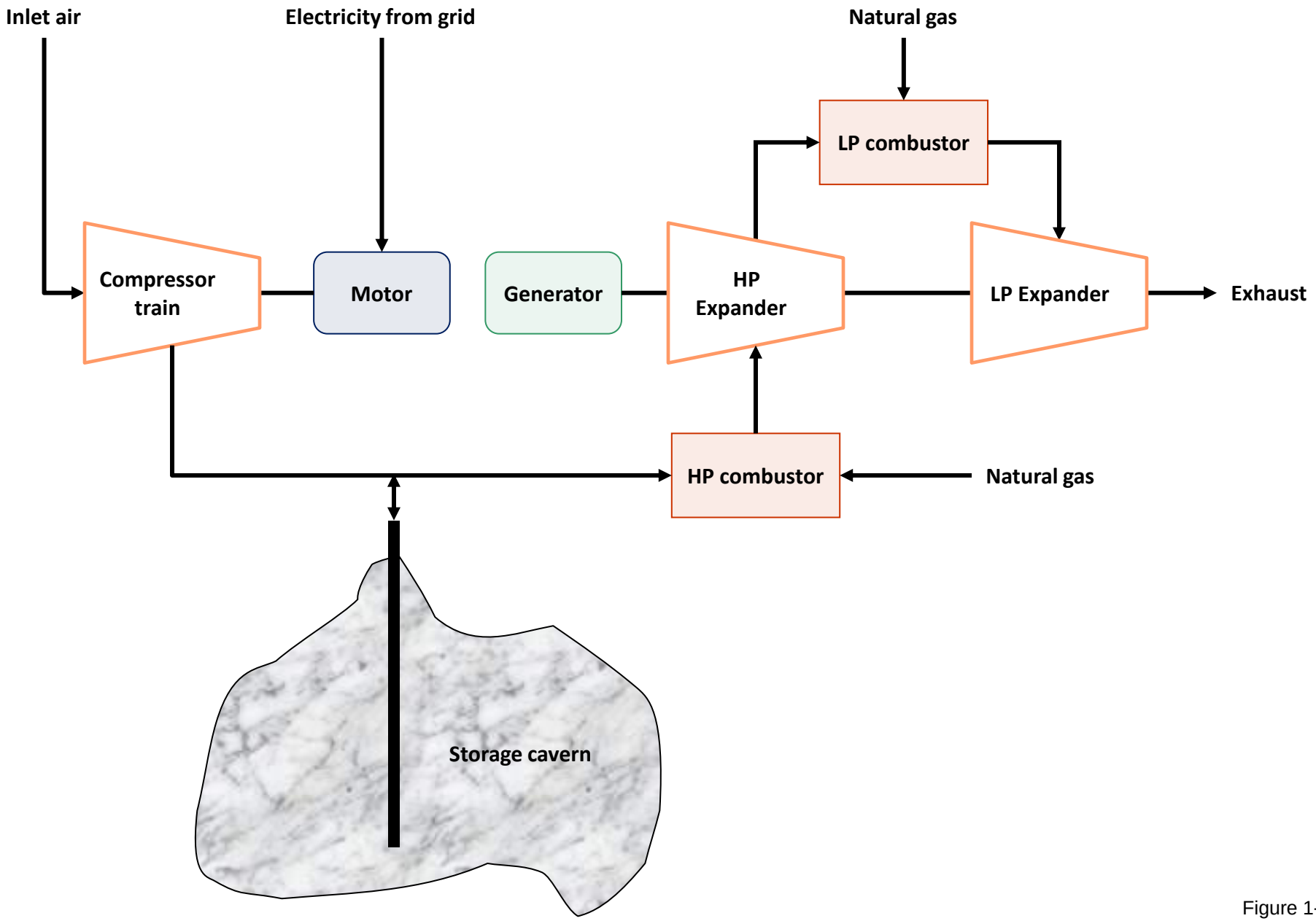


Figure 1-3
Simplified Schematic of CAES Operation
Proposed Bethel Energy Center

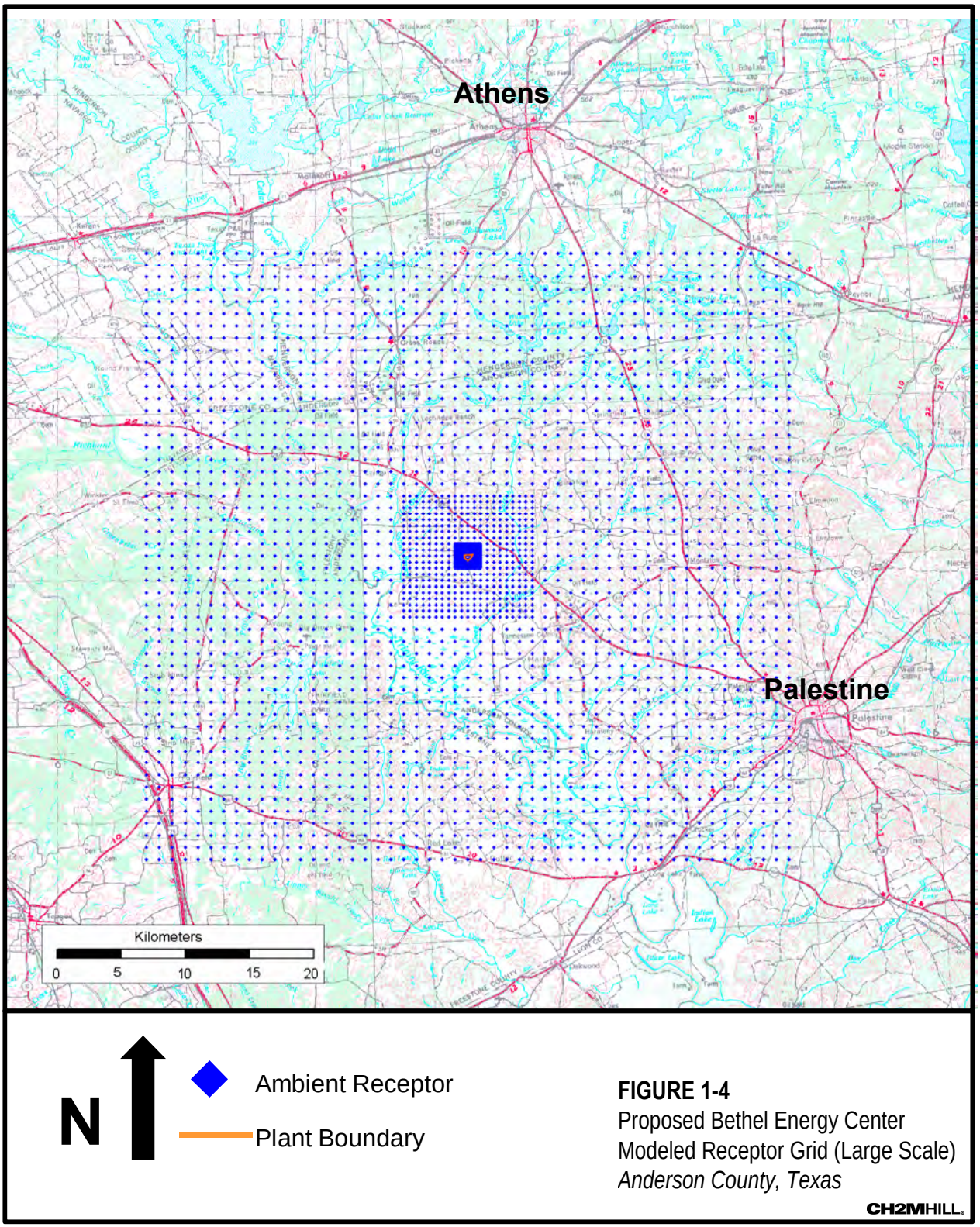


FIGURE 1-4
Proposed Bethel Energy Center
Modeled Receptor Grid (Large Scale)
Anderson County, Texas

CH2MHILL

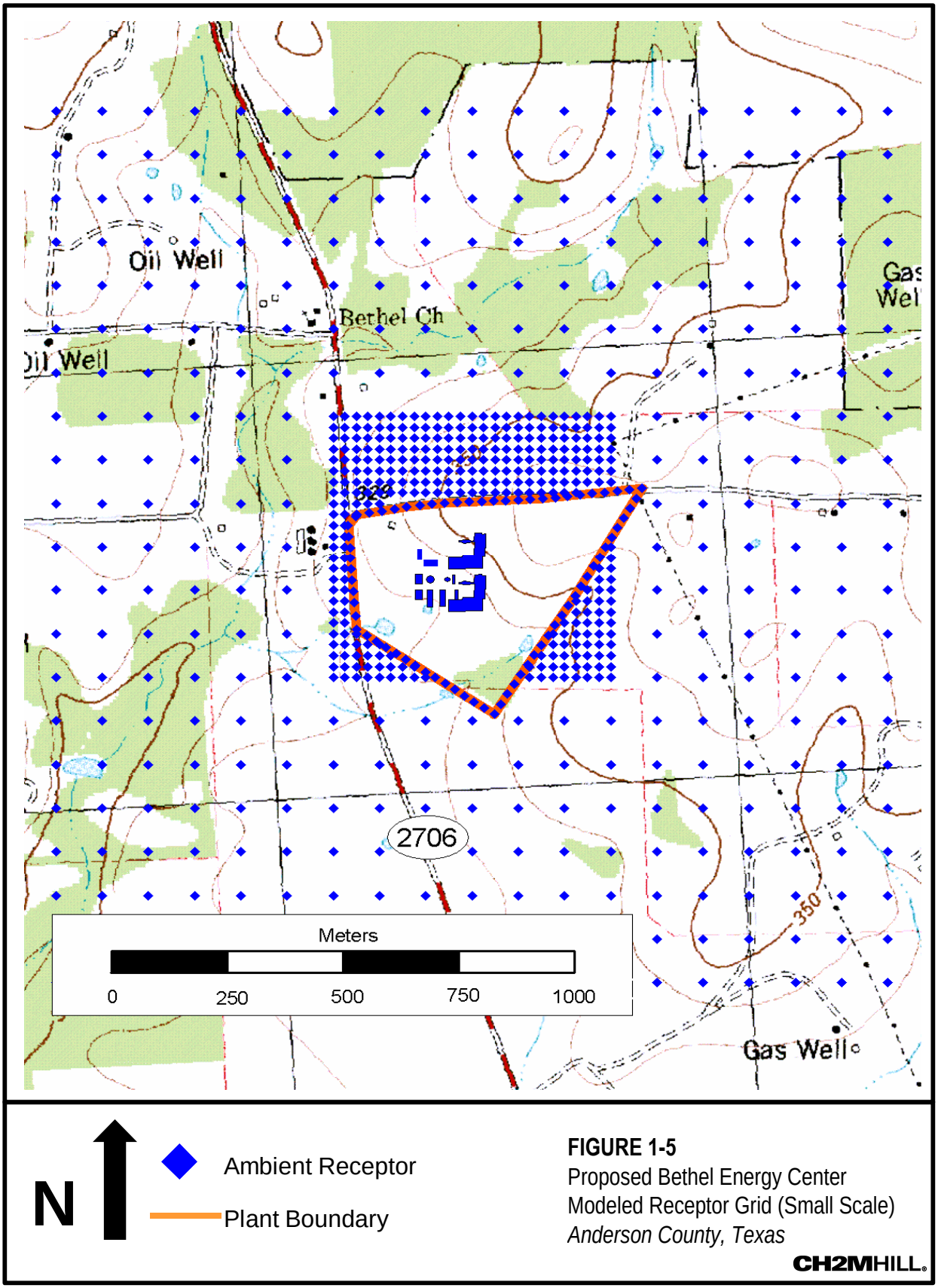
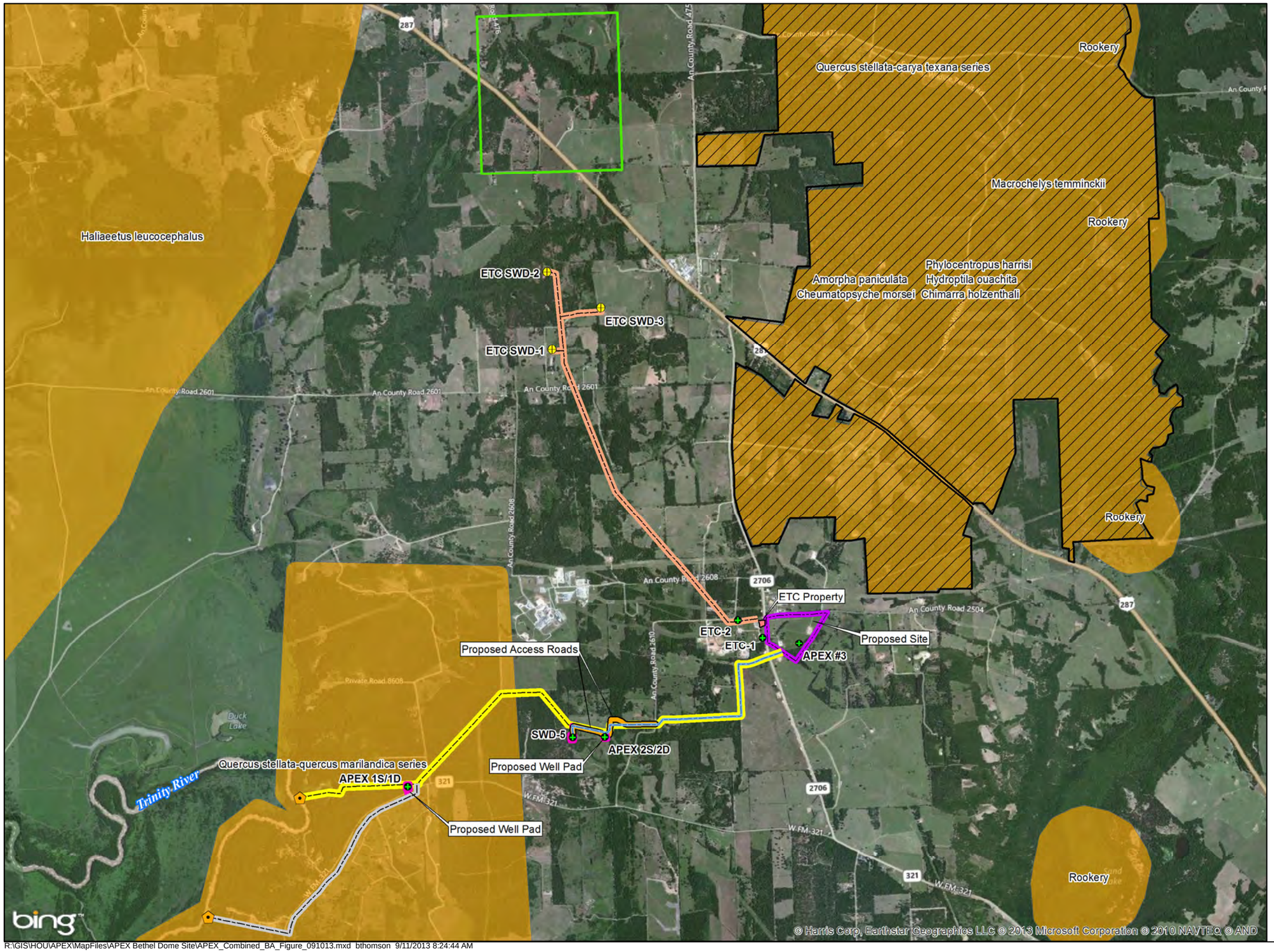
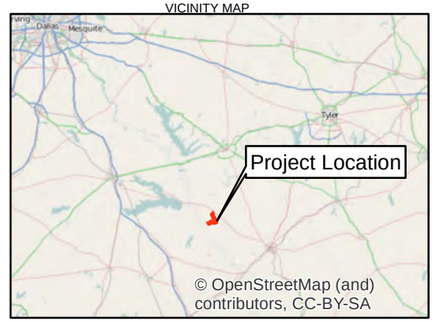


FIGURE 1-5
Proposed Bethel Energy Center
Modeled Receptor Grid (Small Scale)
Anderson County, Texas

CH2MHILL



VICINITY MAP



LEGEND

- Proposed Water Wells
- Permitted Injection Well Location
- Point of Discharge
- Water Supply Pipeline
- Estimated ETF Brine Disposal Pipeline
- Proposed Wastewater Pipeline Corridor
- Alternate Wastewater Pipeline to Trinity River
- Carter Tract Access Roads
- Proposed Well Pad
- ETC Property
- Proposed Site
- SWD-4 Review Area
- Wildlife Occurrence
- Gus Engeling Wildlife Management Area

Background Image:
Bing Maps Hybrid

N

0 0.25 0.5 1
Miles

Figure 1-6
Apex Bethel Energy, LLC.
Action Area
Anderson County, Texas

CH2MHILL

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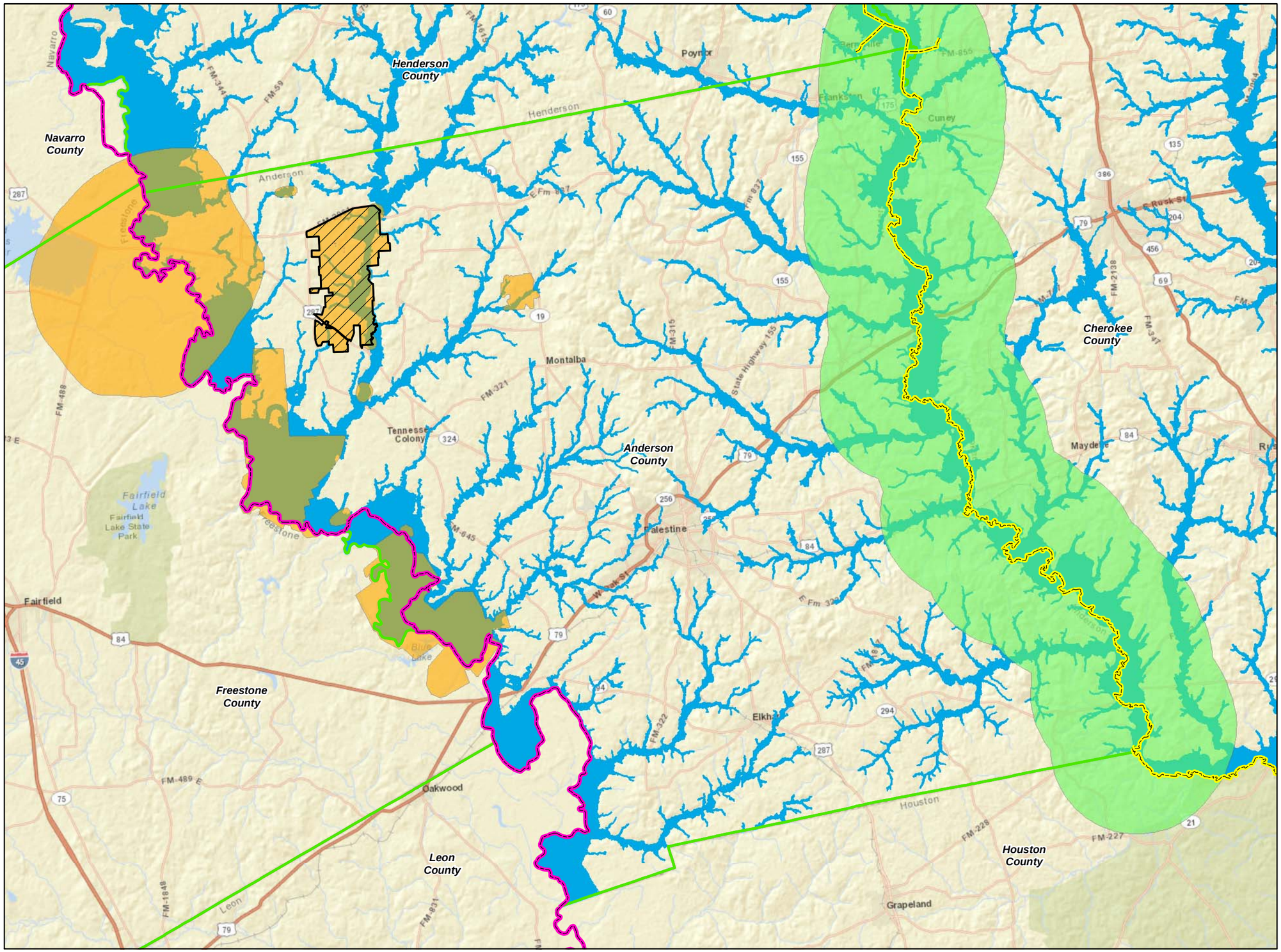

Figure 2-1
Sensitive Wildlife Areas and Potential Earth Fruit Habitat
Proposed Alignment of Discharge Water Pipeline
Anderson County, Texas

Appendix A
APEX Biological Resources Review (February 2012)

Final

APEX CAES Biological Resources Review Anderson County, Texas

Prepared for

APEX CAES Texas, LLP

February 2012

CH2MHILL®

Contents

Acronyms and Abbreviations

CFR	Code of Federal Regulations
CWA	Clean Water Act
DOQQS	Digital Ortho Quarter Quadrangles
GPS	Global Positioning System
JD	Jurisdictional Determination
NRCS	Natural Resource Conservation Service
NWI	National Wetland Inventory
NWP	Nationwide Permit
OHWM	Ordinary High Water Mark
PEM	Palustrine Emergent Wetland
PFO	Palustrine Forested Wetland
PSS	Palustrine Scrub-Shrub Wetland
PJD	Pre-jurisdictional Determination
ROW	Right –of-Way
RPW	Relatively Permanent Water
T&E	Threatened or Endangered
TPWD	Texas Parks and Wildlife Department
TNW	Traditional Navigable Water
TXNDD	Texas Natural Diversity Database
TOB	Top-of-Bank
USACE	U.S. Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WOUS	Waters of the U.S

Introduction

At the request of APEX CAES Texas, LLP (APEX), CH2M HILL conducted a Waters of the United States (WOUS) survey, including wetlands, and a threatened and endangered species habitat survey on approximately 46 acres of land in Anderson County, Texas ("the Property"). The purpose of the WOUS evaluation and threatened and endangered species habitat survey was to describe and quantify the extent of potentially jurisdictional areas and special habitats, providing a tool for future planning on the Property.

This report presents the findings of a WOUS and wetland delineation conducted by CH2M HILL biologists Jennifer Speights and Jacob Trahan on January 30, 2012 and February 6, 2012. The USACE ultimately is responsible for determining the limit of its jurisdiction of "wetlands and waters of the U.S." identified on the Property. This report is intended to be used to assist APEX in minimizing impacts to jurisdictional waters to the extent possible as a result of the proposed project.

Site Description

The Property is located in Anderson County, Texas, approximately 20 miles northwest of Palestine (**Appendix A, Figure 1**). Current land use on the Property consists of undeveloped, heavily grazed pasture land, 2 small industrial facilities, and several pipeline right-of-ways. The Property is bounded by Farm-To-Market 2706 to the west and County Road 2504 to the north. Land to the south and east of the Property is primarily undeveloped. Two small residences are located along the northeast corner of the Property. The surrounding land use is a mixture of industrial, commercial, and undeveloped property.

Surface waters within the Property include two intermittent streams and 2 man-made ponds. Generally, surface water on the Property flows to the southwest corner of the Property before discharging through a culvert into an intermittent stream located on the west side of FM 2706. These features are all shown in **Appendix A, Figure 2**.

Methodology

Desktop Review

A desktop analysis of WOUS and jurisdictional status of these features initially was completed using the U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) (USFWS, 2011) , U.S. Geological Survey (USGS) quadrangle maps (USGS, Cayuga, TX 2012), the Web Soil Survey (Natural Resource Conservation Service [NRCS], 2012) and infrared Digital Ortho Quarter Quadrangles (DOQQs) to identify potentially jurisdictional WOUS and investigate the potential connection to traditional navigable waters. The presence of WOUS was confirmed by a field visit during which the boundaries of these features were defined more accurately.

A qualified biologist performed a search of several sources of information regarding special status species that may be found on or in the vicinity of the Property. Sources were consulted on January 23, 2012 and included: 1) the U.S. Fish and Wildlife Service's (USFWS) Threatened and Endangered Species System internet database; 2) the Texas Parks and Wildlife Department (TPWD) Annotated County List of Rare Species for Anderson County; and 3) the Texas Natural Diversity Database (TXNDD).

WOUS Delineation

CH2M HILL biologists conducted a field delineation of WOUS, including wetlands, on the Property on February 6, 2012. Field delineations were conducted following procedures set forth in the *U.S. Army Corps of Engineers Wetland Delineation Manual* (USACE, 1987) and the *Interim Regional Supplement of the Corps of Engineers Wetlands Delineation Manual: Atlantic and Gulf Coast Region (Manual)* (USACE, 2008). CH2M HILL biologists followed USACE standard procedures to evaluate wetlands and WOUS subject to regulation under the Clean Water Act (CWA) (jurisdictional waters), as established in the *Atlantic and Gulf Coast Supplement* and the *U.S. Army Corps of Engineers Jurisdictional Determination Form Instructional Guidebook* (USACE, 2007), respectively. While delineating WOUS on the Project, the biologists also searched for evidence of use by protected species (state and federally listed threatened or endangered species) and potentially suitable habitat for listed species.

WOUS, as defined in 33 *Code of Federal Regulations* (CFR) Part 328 of the CWA, include "intrastate lakes, rivers, streams (including intermittent streams), mudflats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds." The USACE further defines jurisdictional waters to include ephemeral tributaries of navigable waters, as well as adjacent wetlands and even man-made impoundments, when those impoundments occur within drainages that meet the definition of jurisdictional waters (USACE, 2007).

The *Manual* (USACE, 1987) defines wetlands as areas that have positive indicators for hydrophytic vegetation, wetland hydrology, and hydric soils, or as:

"*Areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas*."

Definition of Boundaries

The limits of USACE jurisdiction for non-tidal waters (not including wetlands) of the United States (creeks, streams, etc.) are identified by the presence of ordinary high water marks (OHWMs). The OHWM is defined as "that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in soil character, destruction of terrestrial vegetation, the presence of litter or debris, or other appropriate means that consider the characteristics of the surrounding areas" (USACE, 2007).

Field Documentation

The following text describes the methods used during the WOUS and endangered species habitat surveys.

WOUS and Wetlands

The entire Property was surveyed to assess the presence of WOUS and wetlands. Wetland boundaries and other identified site features were located in the field using a mapping-grade Trimble GeoXT global positioning system (GPS) receiver to sub-meter accuracy. **Appendix A, Figure2** shows the locations of the wetlands and other waters identified during the field work.

Standard USACE wetland data forms, for a representative wetland point and a representative upland point, were completed for each wetland. **Figure 2** depicts the WOUS and wetlands recorded during the survey. The data forms are presented in **Appendix B**; photographs at each sampling point are located in **Appendix C**.

Each identified wetland was classified based on the U.S. Fish and Wildlife Service (USFWS) classification system (Cowardin et al., 1979). Dominant vegetation was noted according to stratum: tree, shrub/sapling, woody vine, or herb. The wetland indicator status (**Table 1**) for each species was identified using the *National Wetlands Inventory List of Plants that Occur in Wetlands* (Reed, 1988) and subsequent approved modifications to this list. Plants were identified using current taxonomic references, such as *Aquatic and Wetland Plants of the Southeastern United States* (Godfrey and Wooten, 1980; 1981). Where recent taxonomic changes resulted in plant names that were not included in the *National Wetlands Inventory List of Plants that Occur in Wetlands* (Reed, 1988), appropriate synonymy was used to reference the national list.

Soil information was obtained from the *Web Soil Survey of Anderson County, Texas* (NRCS, 2011). Within each area investigated, soil samples were inspected for hydric soil indicators, as provided for on the wetland data forms. Using the *Munsell Soil Color Charts* (1994), the value and chroma of soil samples were recorded. Soil texture and any observations of redoximorphic features were recorded. Wetland hydrology observations included soil saturation, evidence of any standing or ponded water, the presence of drainage patterns, and/or drift lines, and any additional primary or secondary hydrology indicator as defined by the *Atlantic and Gulf Coast Supplement*.

TABLE 1
Definitions for Wetland Indicator Status

Code[a]	Term	Definition
OBL	Obligate	Species occurs in wetlands greater than 99% of time.
FACW	Facultative Wetland	Species occurs in wetlands 67 to 99% of time.
FAC	Facultative	Species occurs in wetlands 34 to 66% of time.
FACU	Facultative Upland	Species occurs in wetlands 1 to 33% of time.
UPL	Upland	Species occurs in wetlands less than 1% of time.

[a]An indicator status with a "+" added indicates a plant that would be in the wetter third of the indicated range of the status, while a "-" would indicate the drier third of the range of the status.

Sensitive Wildlife and Habitat

During the field effort, all habitat types on the Property were described, documented, and photographed. Important features such as plant community composition, types of disturbance, and incidental wildlife observations were used to describe each habitat type found on the Property. Observations of listed sensitive species were documented using a Trimble GeoXT GPS receiver, and the habitat was recorded at the location. Photographs are presented in **Appendix C**.

Results

Desktop Review

The *Soil Survey of Anderson County, Texas* (NRCS, 2011) identifies three soil types within the Property. These soil types include Lilbert loamy fine sand, 0 to 3 percent slopes (FuB), Lilbert loamy fine sand, 3 to 8 percent slopes (FuD), and Rentzel loamy fine sand, 1 to 5 percent slopes (LeC). Of these three soils, the Rentzel loamy fine sand is the only soil map unit that has a small component listed as hydric by the NRCS. The hydric component is the Naconiche, which accounts for approximately 10 percent of the Rentzel loamy fine sand unit. This component consists of very deep, very poorly drained, nearly level soils on flood plains.

Pre-field review of the USGS Cayuga 7.5-minute quadrangle identified three open water bodies and one unnamed intermittent stream within the Property. Two of the open water bodies are identified on the NWI mapping as Palustrine, Open water, Permanently Flooded, Diked (POWHh) waters. The NWI did not identify any wetlands within the Property.

WOUS and Wetlands

Within the Property, 10 potential WOUS (6 wetlands and 4 waters) were identified and delineated. **Table 2** summarizes the water bodies and wetlands identified on the Property, and the locations are depicted in **Figures 2** in **Appendix A**. Wetland determination data forms are in **Appendix B**. Representative photographs of the wetlands and waters are provided in **Appendix C**.

TABLE 2
Potential Jurisdictional Waters
APEX CAES– Anderson County, TX

Feature ID	Type*	Potential Jurisdictional Size
S1- Intermittent Stream	Intermittent	386 linear feet
S2- Man-made Pond	Perennial	0.21 acres
S3- Intermittent Stream	Intermittent	552 linear feet
S4- Man-made Pond	Perennial	0.35 acres
W1	PFO	0.17 acres
W2	PSS	0.08 acres
W3	PFO	0.22 acres
W4	PSS	0.13 acres
W4	PEM	0.03 acres
W5	PEM	0.18 acres
W6	PEM	0.10 acres

Notes: All measurements generated using ArcGIS 9.2. S2
*Cowardin system from NWI mapping for the project area.

Non-wetland Waters

S1- Intermittent Stream

S1 is an unnamed intermittent stream that originates from a spring/seep at the east-central border of the Property and flows from the northeast to the southwest along the eastern property line. The average OHWM across its reach is 8 feet with an average top-of-bank (TOB) width of 20 feet and a water width of 2 feet. There are approximately 386 linear feet of channel within the Property. S1 is a relatively permanent water (RPW) which flows southwest before flowing through a palustrine forested (PFO) wetland (W1) and discharging into a man-made pond (S2). Surface water flow from the pond's spillway (S3) continues in a southwesterly direction to a man-made pond located just outside of the Property boundary. The spillway from the pond flows under FM 2706 via culvert and discharges into an unnamed intermittent stream on the west side of FM 2706. This intermittent stream flows approximately 8.6 aerial miles south before ultimately flowing into the Trinity River (TNW); therefore, S1 would likely be considered jurisdictional by the USACE.

S2- Man-made Pond

S2 is a 0.21 acre man-made pond located in the southeast corner of the Property. The pond is approximately 4 to 6 feet deep and does not support hydrophytic vegetation. During periods of heavy rainfall, overflow from the pond discharges into an intermittent stream (S3) located at the southeast corner of the pond. Surface water flow continues in a southwesterly direction to a man-made pond located just outside of the Property boundary. S2 is in-line with an RPW (S1/S3) which would likely be considered jurisdictional by the USACE based on the analysis discussed in the above paragraph.

S3- Intermittent Stream

S3 is identified as an unnamed intermittent stream on the USGS Cayuga 7.5-minute quadrangle map. S3 serves as the pond's (S2) principal spillway. S3 flows southwest across the southeast corner of the Property before losing bed and bank and discharging into a large PFO located along the southern Property line. The average OHWM is 2 feet within an average TOB width of 30 feet and a water width of 1 foot. There are approximately 552 linear feet of channel within the Property. S3 is an RPW which flows in a southwesterly direction before discharging into a large PFO wetland (W3) located within the riparian corridor of the stream. Surface flow continues through the

wetland to discharge into a man-made pond located just outside of the Property boundary. S3 would likely be considered jurisdictional by the USACE based on the analysis discussed in the above paragraph.

S4- Man-made Pond

S4 is a 0.35 acre man-made pond located in the southwest corner of the Property. The pond is approximately 4 to 6 feet deep and does not support hydrophytic vegetation. A PSS and a PEM wetland directly abut the southeast corner of the pond. During periods of heavy rainfall, overflow from the pond discharges into a PEM wetland (W5) located on the east side of the pond. Surface water flow from the wetland continues under FM 2706 via a culvert and discharges into an unnamed intermittent stream on the west side of FM 2706. This intermittent stream flows approximately 8.6 aerial miles south before ultimately flowing into the Trinity River; therefore, S4 would likely be considered jurisdictional by the USACE.

Wetlands

W1 PEM

W1 is a moderate-quality wetland approximately 0.17 acres in size. Dominant vegetation within the wetland consists of black willow (*Salix nigra*), Texas ragwort (*Senecio ampullaceus*), and annual bluegrass (*Poa annua*).

Soils within the wetland consist of 0-2 inches of dark brown (7.5YR 3/3) sand with approximately 10 percent of strong brown (7.5YR 5/8) redoximorphic (redox) concentrations, 2-14 inches of brown (7.5YR 4/2) sand with approximately 15 percent abundance of strong brown (7.5YR 5/6) redox concentrations, and 14-16 inches of light brown (7.5YR 6/4) sand with approximately 1 percent abundance of olive brown (2.5YR 4/8) redox concentrations. The primary hydric soil indicator included the presence of sandy redox. The high water table was observed at 8 inches from surface. Saturation in the upper 12 inches, oxidized rhizospheres on living roots, and drainage patterns further indicate the presence of wetland hydrology.

The NWI does not identify this area as wetland. W1 directly abuts an RPW (S1) that ultimately flows into the Trinity River, and would likely be considered jurisdictional by the USACE.

W2 PSS

W2 is a moderate-quality wetland approximately 0.08 acres in size. Dominant vegetation within the wetland consists of slippery elm (*Ulmus rubra*), annual bluegrass, and southern dewberry (*Rubus trivialis*).

Soils within the wetland consist of 0-4 inches of very dark grayish brown (10YR 3/2) sand, 4-8 inches of brown (7.5YR 5/4) coarse sand with approximately 7 percent abundance of strong brown (7.5YR 5/8) redox concentrations, and 8-16 inches of dark grayish brown (10YR 4/2) silt clay with approximately 20 percent abundance of strong brown (7.5YR 4/6) redox concentrations. Hydric soil indicators included the presence of sandy redox and a depleted matrix. The high water table was observed at 6 inches from the surface. Saturation in the upper 12 inches, drift deposits, and drainage patterns further indicate the presence of wetland hydrology.

The NWI does not identify this area as wetland. W2 directly abuts an RPW (S3) that ultimately flows into the Trinity River, and would likely be considered jurisdictional by the USACE.

W3 PEM

W3 is a moderate-quality wetland approximately 0.22 acres in size. Dominant vegetation within the wetland consists of American elm (*Ulmus americana*), water oak (*Quercus nigra*), and roundleaf greenbriar (*Smilax rotundifolia*).

Soils within the wetland consist of 0-3 inches of brown (7.5YR 4/3) sand, 3-8 inches of brown (7.5YR 5/4) sand, and 8-16 inches of dark gray (7.5YR 4/1) sandy loam with approximately 20 percent abundance of strong brown (7.5YR 4/6) redox concentrations. The primary hydric soil indicator included the presence of sandy redox. The wetland area was inundated at the time of the visit, with surface water depths averaging 2 inches. The presence of the high water table, saturation in the upper 12 inches, drift deposits, and drainage patterns further indicate the presence of wetland hydrology.

The NWI does not identify this area as wetland. W3 directly abuts an RPW (S3) that ultimately flows into the Trinity River, and would likely be considered jurisdictional by the USACE.

W4 PEM/PSS

W4 is comprised of approximately 0.03 acres of low-quality PEM wetlands and 0.13 acres of moderate-quality PSS wetlands. Dominant vegetation within the PEM wetland consists of strawcolored flatsedge (*Cyperus strigosus*), common rush (*Juncus effusus*), wooly rosette grass (*Dichanthelium scabriusculum*), Canada goldenrod (*Solidago canadensis*) and St. Augustine grass (*Stenotaphrum secundatum*). Dominant vegetation within the PSS wetland consists of Eastern baccharis (*Baccharis halimifolia*), waxmyrtle (*Morella cerifera*), strawcolored flatsedge, and Canada goldenrod.

Soils within both wetland types consist of 0-2 inches of very dark gray (10YR 3/1) sandy loam, 2-4 inches of brown (7.5YR 4/3) sand, and 4-16 inches of brown (7.5YR 4/2) sand with approximately 30 percent abundance of dark brown (7.5YR 3/4) redox concentrations. Hydric soil indicators included the presence of sandy redox and 1 cm muck. The high water table was observed at 3 inches from the surface. Saturation in the upper 12 inches and the presence of oxidized rhizospheres on living roots further indicate the presence of wetland hydrology.

The NWI does not identify this area as wetland. W4 directly abuts an RPW (S4) that ultimately flows into the Trinity River, and would likely be considered jurisdictional by the USACE.

W5 PEM

W5 is a moderate-quality wetland approximately 0.18 acres in size. Dominant vegetation within the wetland consists of broadleaf cattail (*Typha latifolia*), strawcolored flatsedge, common rush, and wooly rosette grass.

Soils within the wetland consist of 0-2 inches of very dark gray (10YR 3/1) sandy loam, 2-4 inches of brown (7.5YR 4/3) sand, and 4-16 inches of brown (7.5YR 4/2) sand with approximately 30 percent abundance of dark brown (7.5YR 3/4) redox concentrations. Hydric soil indicators included the presence of sandy redox and 1 cm muck. The high water table was observed at 3 inches from the surface. Saturation in the upper 12 inches and the presence of oxidized rhizospheres on living roots further indicate the presence of wetland hydrology.

The NWI map does not identify this area as wetland. W5 is adjacent to an RPW (S4) that ultimately flows into the Trinity River, and would likely be considered jurisdictional by the USACE.

W6 PEM

W6 is a moderate-quality wetland approximately 0.10 acres in size. Dominant vegetation within the wetland consists of grassy arrowhead (*Sagittaria graminea*), American spongeplant (*Limnobium spongia*), pondweed (*Potamogeton* sp.), and Canada goldenrod.

Soils within the wetland consist of 0-2 inches of dark brown (10YR 3/3) silt loam and 2-16 inches of grayish brown (10YR 5/2) silt loam with approximately 20 percent abundance of brownish yellow (10YR 6/8) redox concentrations. The primary hydric soil indicator was a depleted soil matrix. The wetland area was inundated at the time of the visit, with surface water depths averaging 24 inches. The presence of the high water table, saturation in the upper 12 inches, oxidized rhizospheres on living roots, and aquatic fauna further indicate the presence of wetland hydrology.

The NWI map does not identify this area as wetland. W6 is adjacent to an RPW (S4) that ultimately flows into the Trinity River, and would likely be considered jurisdictional by the USACE.

Endangered Species and Sensitive Wildlife Habitat

Forty-four federal and state-listed threatened, endangered, and rare species are known to occur in Anderson County (**Table 3**). This list is compiled by the agencies based on knowledge of each species and historic ranges. Simply having a species listed in the county does not mean that it is present within the Property. The table below lists the threatened or endangered (T&E) species for Anderson County along with a potential for a listed species habitat being present within the Property. It was determined that habitat may exist for 8 of the listed species, however due to the disturbed nature of the area it is not likely any of these listed species persist in the Property

boundary. This determination is based on a review of aerial photography, topographic maps, field reconnaissance, and biological knowledge of the region. During the field reconnaissance, no listed species were observed near or within the Property.

TABLE 3
Federal and State Threatened and Endangered Species in Anderson County, Texas.

Species	Federal Status	State Status	Description of Suitable Habitat	Habitat Present	Species Effect
Birds					
Peregrine Falcon *Falco peregrinus*	--	T	Both subspecies migrate across the state from more 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 statuses differ, F.p. tundrius is no longer listed in Texas; but because the subspecies are not easily distinguishable at a distance, reference is generally made only to the species level; see subspecies for habitat.	No	No
American Peregrine Falcon *Falco peregrinus anatum*	--	T	Breeds in west Texas, nest in tall cliff eyries. Migrates through Texas and winters along the coastlines. Stopovers preferred are edges of lakes, coasts, and barrier islands.	No	No
Arctic Peregrine Falcon *Falco peregrines tundrius*	--	--	Migrates through Texas and winters along the coastlines. Stopovers preferred on edges of lakes, coasts, and barrier islands.	No	No
Bachman's Sparrow *Aimophila aestivalis*	--	T	Open pine woodlands with scattered bushes and grassy understory, overgrown fields with thickets and brambles.	No	No
Bald Eagle *Haliaeetus leucocephalus*	--	T	Nests and winters near rivers, lakes and along coasts; nests in tall trees or on cliffs near large bodies of water.	No	No
Henslow's Sparrow *Ammodramus henslowii*	--	--	Found in weedy fields or cut-over areas where lots of bunch grasses occur along with vines and brambles.	No	No
Interior Least Tern *Sterna antillarum athalassos*	--	E	Nests along sand and gravel bars within braided streams and rivers.	No	No
Piping Plover *Charadrius melodus*	--	T	Wintering migrant along the Texas Gulf Coast; beaches and bayside mud or salt flats.	No	No
Red-cockaded Woodpecker *Picoides borealis*	--	E	Cavity nests in older pines (60+ years); forages in younger pines (30+ years.	No	No
Sprague's Pipit *Anthus spragueii*	--	--	Wintering migrant along the Texas Gulf Coast; locally common in local grasslands.	No	No

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Federal and State Threatened and Endangered Species in Anderson County, Texas.

Species	Federal Status	State Status	Description of Suitable Habitat	Habitat Present	Species Effect
White-faced Ibis *Plegadis chihi*	--	T	Prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats.	No	No
Whooping Crane *Grus americana*	--	E	Potential migrant throughout most of state to coast. Winters in coastal marshes.	No	No
Wood Stork *Mycteria americana*	--	T	Forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, inhabits mud flats and other wetlands.	Yes	Not likely to adversely affect. Impacts to potential habitat would be minor
Fishes					
American eel *Anguilla rostrata*	--	--	Coastal waterways below reservoirs to Gulf. Inhabits muddy bottoms, still waters, large streams, lakes or any waterbody with access to the ocean.	No	No
Paddlefish *Polyodon spathula*	--	T	Large, free-flowing rivers	No	No
Insects					
A caddisfly *Phylocentropus harrisi*	--	--	Lotic systems, but specifics unknown.	Yes	Not likely to adversely affect. Impacts to potential habitat would be minor
A Purse casemaker caddisfly *Hydroptila ouachita*	--	--	Lotic systems, but specifics unknown.	Yes	Not likely to adversely affect. Impacts to potential habitat would be minor
Holzenthal's philopotamid caddisfly *Chimarra holzenthali*	--	--	Lotic systems within the Trinity River basin.	Yes	Not likely to adversely affect. Impacts to potential habitat would be minor
Morse's net-spinning caddisfly *Cheumatopsyche morsei*	--	--	Lotic systems, but specifics unknown.	Yes	Not likely to adversely affect. Impacts to potential habitat would be minor
Texas emerald dragonfly *Somatochlora margarita*	--	--	Springfed creeks and bogs; small sandy forested streams with moderate current.	Yes	Not likely to adversely affect. Impacts to potential habitat would be minor
Reptiles					

TABLE 3
Federal and State Threatened and Endangered Species in Anderson County, Texas.

Species	Federal Status	State Status	Description of Suitable Habitat	Habitat Present	Species Effect
Alligator snapping turtle *Macrochelys temminckii*	--	T	Perennial water bodies; deep water of rivers, canals, lakes, and oxbows; also swamps, bayous, and ponds near deep running water; usually in water with mud bottom and vegetation.	No	No
Louisiana pine snake *Pituophis ruthveni*	--	--	Mixed deciduous-longleaf pine woodlands.	No	No
Sabine map turtle *Graptemys ouachitensis sabinensis*	--	--	Rivers and related tributaries, ponds and reservoirs of the Sabine River system	No	No
Texas horned lizard *Phrynosoma cornutum*	--	T	Open, arid and semi-arid regions with sparse vegetation.	No	No
Timber/Canebrake rattlesnake *Crotalus horridus*	--	T	Swamps, floodplains, upland pine and deciduous woodlands, riparian zones, abandoned farmland; limestone bluffs, sandy soil or black clay; prefers dense ground cover, i.e. grapevines or palmetto.	Yes	Not likely to adversely affect. Impacts to potential habitat would be minor
Mammals					
Black bear *Ursus americanus*	--	T	Bottomland hardwood forests and large tracts of inaccessible forested areas.	No	No
Louisiana black bear *Ursus americanus luteolus*	--	T	Possible as transient, bottomland hardwoods and large tracts of inaccessible forested areas.	No	No
Plains spotted skunk *Spilogale putorius interrupta*	--	--	Ubiquitous; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie.	Yes	Not likely to adversely affect. Impacts to potential habitat would be minor
Red wolf *Canis rufus*	--	E	Extirpated; formerly known throughout eastern half of Texas in brushy and forested areas, as well as coastal prairies.	No	No
Southeastern myotis bat *Myotis austroriparius*	--	--	Roosts in cavity trees of bottomland hardwoods, concrete culverts, and abandoned man-made structures.	No	No

TABLE 3
Federal and State Threatened and Endangered Species in Anderson County, Texas.

Species	Federal Status	State Status	Description of Suitable Habitat	Habitat Present	Species Effect
Mollusks					
Creeper (squawfoot) *Strophitus undulatus*	--	--	Gravel and mud in small to large streams in the Neches (historic) and Trinity (historic) river basins.	No	No
Fawnsfoot *Truncilla donaciformis*	--	--	Small and large rivers on all substrates in still to swiftly moving water; Sabine (historic), Neches, Trinity, and San Jacinto River basins.	No	No
Little spectaclecase *Villosa vienosa*	--	--	Perennial creeks, rivers, and reservoirs, sandy substrates in slight to moderate current, usually along the banks in slower currents; east Texas, Cypress through San Jacinto River basins.	No	No
Louisiana pigtoe *Pleurobema riddellii*	--	T	Perennial streams and moderate-size rivers, usually flowing water on substrates of mud, sand, and gravel.	No	No
Sandbank pocketbook *Lampsilis satura*	--	T	Small to large rivers with moderate flows and swift current on gravel, gravel-sand, and sand bottoms; east Texas, Sulfur south through San Jacinto River basins; Neches River.	No	No
Southern hickorynut *Obovaria jacksoniana*	--	T	Medium sized gravel substrates in perennial streams with low to moderate currents; Neches, Sabine, and Cypress River basins.	No	No
Texas heelsplitter *Potamilus amphichaemus*	--	T	Quiet waters in perennial streams over mud and sand; Sabine, Neches, and Trinity River basins.	No	No
Texas pigtoe *Fusconaia askewi*	--	T	Rivers with mixed mud, sand, and fine gravel in protected areas associated with fallen trees or other structures; east Texas River basins, Sabine through Trinity rivers as well as San Jacinto River.	No	No
Wabash pigtoe *Fusconaia flava*	--	--	Perennial creeks to large rivers on mud, sand, and gravel from all habitats except deep shifting sands; found in moderate to swift current velocities; east Texas River basins, Red through San Jacinto River basins; elsewhere occurs in reservoirs and lakes with no flow.	No	No
Wartyback *Quadrula nodulata*	--	--	Medium to large rivers on mud, gravel, and sand-gravel bottoms; Red, Sabine, Neches River basins.	No	No
Plants					
Earth fruit *Geocarpon minimum*	T	T	Vegetated edges of slick spots in saline barren complexes just above the floodplain of the Nueces River. Flowers late February-March.	No	No

TABLE 3
Federal and State Threatened and Endangered Species in Anderson County, Texas.

Species	Federal Status	State Status	Description of Suitable Habitat	Habitat Present	Species Effect
Rough-stem aster *Symphyotrichum puniceium var. scabricaule*	--	--	Relatively open sites in saturated soils associated with bogs, marshes, ponds, drainages, and degraded wetland remnants on the Queen City, Carrizo, and Sparta sand formations.	No	No
Sandhill woolywhite *Hymenopappus carizzoanus*	--	--	Disturbed or open areas in grasslands and post oak woodlands on deep sands derived from the Carrizo sand.	No	No
Small-headed pipewort *Eriocaulon koernickianum*	--	--	Post oak woodlands and xeric sandhill openings on permanent wet acid sands of upland seeps and hillside seepage bogs; usually in patches of bare sand.	No	No

E – Endangered
T – Threatened
"--" – rare or species of concern, but with no regulatory listing status

Source: US Fish & Wildlife Department, 2012 and Texas Parks and Wildlife Department, 2012.

After reviewing habitat requirements and conducting a field investigation, it was determined that there is suitable habitat for the wood stork, caddisfly, purse casemaker caddisfly, Holzenthal's philopotamid caddisfly, Morse's net-spinning caddisfly, Texas emerald dragonfly, plains spotted skunk, and timber/canebrake rattlesnake, all of which are state species of concern except for the wood stork and timber/canebrake rattlesnake, which are both state listed as threatened. Site reconnaissance revealed that the Property consists of heavily grazed pasture land (dominated by bahiagrass and a variety of small forbs), PEM wetlands (broadleaf cattail, common rush, and strawcolored sedge), PSS wetlands (Eastern baccharis and wax myrtle), PFO wetlands (black willow and American elm), and industrialized land. However, no evidence of listed species was observed during the site visit within any habitat type.

The TPWD NDD was reviewed on February 7, 2012. The search radius was 10 miles from the Property. Though not documented on the Property, occurrences of A caddisfly, Morse's net-spinning caddisfly, Holzenthal's philopotamid caddisfly, and a purse casemaker caddisfly have been documented in close proximity to the Property. All occurrences have been documented within the Gus Engling Wildlife Management Area located approximately 1 mile north of the Property. **Figure 3** shows all of the documented records within 10 miles of the Property.

Recommendations

Jurisdictional Recommendations for WOUS

A total of 0.91 acres of wetlands, 0.56 acres of open water habitat, and 937 linear feet of stream were identified on the Property. It is the opinion of CH2M HILL that the wetlands, ponds, and streams identified in the report are jurisdictional and therefore a permit from the USACE Fort Worth District is required before any fill activities are conducted in these areas.

Authority over activities conducted within jurisdictional wetlands at the preferred site is vested in the Fort Worth District of the USACE pursuant to Section 404 of the Clean Water Act.[1] The Fort Worth District of USACE is within

[1] 33 U.S.C.A § 1344 specifically provides for permits for the discharge of dredged or fill material to the navigable waters of the United States.

the Fifth Circuit Court of Appeals area. USACE Districts within the Fifth Circuit Court area use a test for jurisdiction that emphasizes some physical connection to traditional navigable water, rather than a non-avian interstate commerce link.[2] This jurisdictional determination (JD) can be made through concurrence with a Preliminary Jurisdiction Determination (PJD) report submitted to the Fort Worth District. APEX should consider submitting a PJD to the USACE-Fort Worth District to obtain a JD for planning purposes and before engaging in any activities that could result in impacts to jurisdictional wetlands or other WOUS. This could be produced by adapting the contents of this report. Although an official JD only lasts 5 years, an expired JD can facilitate future determinations and expedite any permitting process that may be needed for future projects on the Property. Consultation with the USACE-Fort Worth District during the early planning phase of future projects could prevent delays and reduce processing times later in the project. Failure to contact the USACE or obtain a permit prior for activities that result in impacts to wetlands or other WOUS is a violation of federal law and could result in project delays, fines, and litigation.

A variety of nationwide permits (NWP) are available through the USACE, each with its own criteria that must be followed to qualify for a specific permit. Depending on the nature of the project, many of the wetlands documented on site would be small enough to qualify under a NWP if impacted if the individual wetlands are the only wetland impacted. This may not be the case when multiple wetlands are impacted and the sum exceeds the threshold of the NWP. NWPs authorize only those activities that have minimal individual and cumulative adverse effects on the aquatic environment and satisfy other public interest factors, such as utility and road construction or maintenance of flood control facilities. However, if a NWP is not applicable or if the size of impacts resulting from a specific project exceeds the maximum amount allowed under a NWP, an individual permit would need to be obtained for wetland losses. Individual permits are required for activities that may result in more than minimal adverse effects on the aquatic environment or do not satisfy other public interest review factors, and thus warrant a more thorough individual review through a public notice and comment process.

Endangered Species Recommendations

Any federal permit requires compliance with the federal Endangered Species Act (ESA). Protection of critical habitat for federal listed endangered and threatened species is a regulatory requirement under the ESA. Critical habitat is defined within Section (3)(5)(A) of the ESA as “areas within a listed species’ current (at time of listing) range that contain the physical or biological features that are essential to that species’ conservation or that for some reason require special management; and areas outside the species’ current range that the secretary determines to be essential to its conservation.”

A review of the existing data determined that the Property is not within nor does it contain any designated critical habitat area, as defined under the ESA, as amended. Although critical habitat is not present on site, individuals of a listed species could occur on the Property, especially highly mobile or migratory species. Proper planning of development activities around migration and consultation with local sources that track migration and scheduled migratory bird fallouts should be used to decrease impacts to more mobile species.

Early coordination has been initiated with the USFWS and TPWD regarding potential affects to threatened or endangered species and wildlife resources. A letter was submitted to the USFWS and TPWD on February 14, 2012 to confirm that the proposed action would not adversely impact any federally listed threatened or endangered plant or animal species within the project area. A copy of the coordination letters is provided in **Appendix D**.

2 Rice v Harken Exploration, 2001 U.S .App. Lexis 7462. This case is actually an OPA case that interprets the identical waters of the United States Language found in the Clean Water Act. The court, in this case, found plenty of interstate commerce connection for the waters in question, but insufficient linkage to a navigable water. The court declined to specify how much linkage was required to convey jurisdiction, but did decide that the overland flow and outcropping of groundwater theorized by the plaintiff was not sufficient.

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U.S. Geological Survey (USGS). 2012. Cayuga, Texas. 7.5 minute quadrangle, 1:24000.

Appendix A
Figures

VICINITY MAP

LEGEND

Streams

Proposed Site

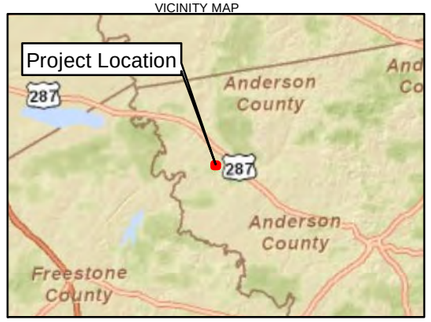
Image:
National Agriculture
Imagery Program (NAIP) - 08/02/2010

N

0 100 200 400
Feet

FIGURE 1
Site Map- Proposed Property Boundary
Proposed Energy Development Site
Anderson County, Texas

VICINITY MAP



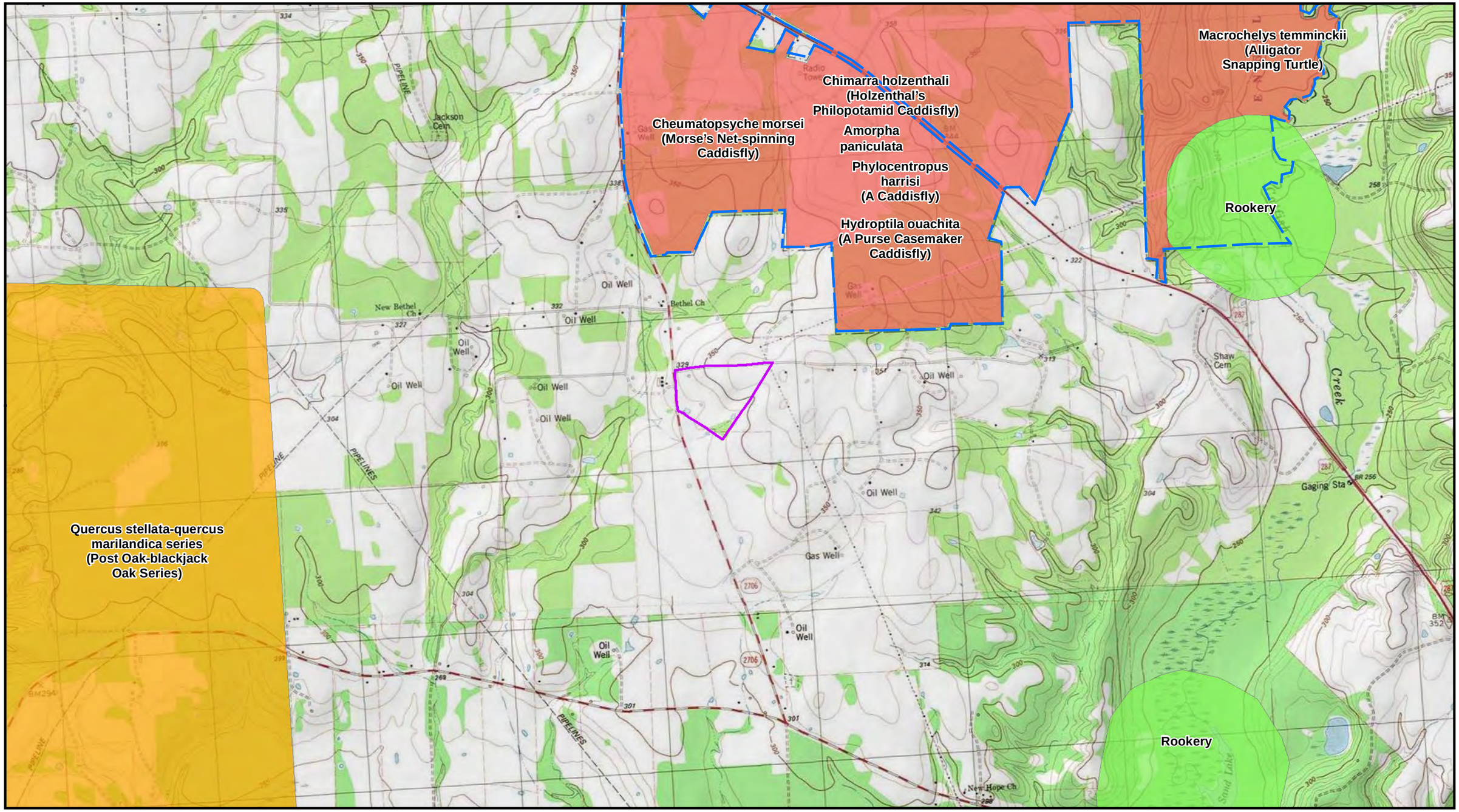
LEGEND

- Wetland Document Point
- Upland Point
- Proposed Site
- Streams
- PEM
- PFO
- PSS
- Pond

N

0 50 100 200
Feet

FIGURE 2
Wetlands and other Waters of the US
Proposed Energy Development Site
Anderson County, Texas



Legend

- Proposed Site
- Gus Engling Wildlife Management Area
- Animal Assemblage
- Invertebrate Animal; Vascular Plant; Vertebrate Animal
- Terrestrial Community - Other Classification

USGS Quad Source:
Cayuga, TX USGS 1:24K - 1982

N

0 800 1,600
Feet

1 inch = 2,000 feet

FIGURE 3
NDD Data
Proposed Energy Development Site
Anderson County, Texas

CH2MHILL

J:\Proposed_Energy_Site\MapFiles\NND_Data.mxd flondon 2/21/2012 8:05:45 AM

Appendix B
Data Sheets

At the request of the USEPA, wetland/waterbody data sheets were removed from the appendices to facilitate reproduction of the Apex BEC Biological Assessment.

Appendix C
Photo Log

Site: Anderson County, TX Photo: 1 Date: 2/6/2012 Direction: Southwest
Subject: Downstream view of intermittent stream (S1).

Site: Anderson County, TX Photo: 2 Date: 2/6/2012 Direction: Southwest
Subject: Representative photo of W1 PFO. Wetland is dominated by black willow.

Site: Anderson County, TX Photo: 3 Date: 2/6/2012 Direction: East
Subject: Representative photo of man-made pond located in the southeast corner of the Property.

Site: Anderson County, TX Photo: 4 Date: 2/6/2012 Direction: Southwest
Subject: Downstream view of intermittent stream (S3) located in the southeast corner of the Property.

Site: Anderson County, TX Photo: 5 Date: 2/6/2012 Direction: South
Subject: Representative photo of PFO wetland (W3) located in the southeast corner of the Property.

Site: Anderson County, TX Photo: 6 Date: 2/6/2012 Direction: Northwest
Subject: Representative photo of PSS wetland (W4) located in the southwest corner of the Property.

Site: Anderson County, TX Photo: 7 Date: 2/6/2012 Direction: South
Subject: Representative photo of PEM wetlands (W4 and W5) located along the fringe of the man-made pond in the southwest corner of the Property.

Site: Anderson County, TX Photo: 8 Date: 2/6/2012 Direction: South
Subject: Representative photo of man-made pond (S4) located in the southwest corner of the Property.

Site: Anderson County, TX Photo: 9 Date: 2/6/2012 Direction: Northeast
Subject: Representative photo of PEM wetland (W6) located in a small depression along the western portion of the Property.

Site: Anderson County, TX Photo: 9 Date: 2/6/2012 Direction: West
Subject: Representative photo of the dominant habitat type across the Property. Vegetation is dominated by bahiagrass and a variety of small forbs. The Property is heavily grazed by horses.

Appendix B
APEX Biological Resources Review - Trinity River Pipeline (October 2012)

Final

APEX CAES Biological Resources Review for the Trinity River Pipeline, Water Well Pad and Pipeline Areas and ETC Connector Pipeline Area Anderson County, Texas

Prepared for

APEX Compressed Air Energy Storage, LLC

October 2012

CH2MHILL®

Contents

Acronyms and Abbreviations

APEX	APEX Compressed Air Energy Storage, LLC
BEC	Bethel Energy Center
CAES	Compressed Air Energy Storage
CFR	Code of Federal Regulations
CWA	Clean Water Act
DOQQS	Digital Ortho Quarter Quadrangles
ETC	Energy Transfer Company
GPS	Global Positioning System
JD	Jurisdictional Determination
NRCS	Natural Resource Conservation Service
NWI	National Wetland Inventory
NWP	Nationwide Permit
OHWM	Ordinary High Water Mark
PEM	Palustrine Emergent Wetland
PFO	Palustrine Forested Wetland
ROW	Right –of-Way
RPW	Relatively Permanent Water
T&E	Threatened or Endangered
TCEQ	Texas Commission on Environmental Quality
TPWD	Texas Parks and Wildlife Department
TNW	Traditional Navigable Water
TXNDD	Texas Natural Diversity Database
TOB	Top-of-Bank
USACE	U.S. Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WOUS	Waters of the U.S

Introduction

At the request of APEX Compressed Air Energy Storage, LLC (APEX), CH2M HILL conducted a biological resources survey, including wetlands, Waters of the United States (WOUS), and threatened and endangered species habitats along a 4-mile wastewater pipeline in Anderson County, Texas. CH2M HILL biologists Jennifer Speights and Jason Speights conducted the survey from July 24 to 25, 2012. Subsequent wetland and waterbody delineations were conducted on September 24 and October 1, 2012 as a result of modifications to the original Project area. The USACE ultimately is responsible for determining the limit of its jurisdiction of "wetlands and waters of the U.S." affected by the Project. This report is intended to be used to assist APEX in minimizing impacts to jurisdictional waters and rare species habitats to the extent possible as a result of the proposed Project.

Site Description

APEX proposes to construct the Bethel Energy Center (BEC), a 317 MW Compressed Air Energy Storage (CAES) facility located near Tennessee Colony, Anderson County, Texas. CH2M HILL previously conducted a WOUS survey and threatened and endangered species habitat survey on approximately 46 acres of land proposed for this facility ("the Property") on January 30, 2012 and February 6, 2012 (CH2M HILL, 2012).

The facility is expected to produce wastewater consisting primarily of cooling tower blow down water that is no longer suitable for recycling on-site. APEX proposes to convey this wastewater to a discharge point on the Trinity River. The proposed utility corridor for that pipeline will originate at the southwest corner of the Property and run approximately 4 miles west-southwest to the Trinity River and is located entirely within Anderson County, Texas (**Appendix A, Figure 1**). The proposed alignment consists of a 50-foot temporary construction easement of which a 30-foot easement would remain as permanent right-of-way (ROW). For approximately 1.2 miles, the proposed alignment parallels an existing pipeline ROW.

Water required for cavern creation and facility operations will be obtained from groundwater wells. To meet the solution mining needs of the Project, APEX proposes to construct a pair of shallow and deep wells at each of 2 designated locations (APEX 1S/1D and APEX 2S/2D) along the proposed utility corridor. An additional deep water well (APEX 3D) will be constructed on the Property. Water from APEX 1S/1D and APEX 2S/2D will be connected to the proposed utility corridor via 2 new water supply pipelines. The connecting pipelines are approximately 75 and 409 feet in length. An approximately 3,522-foot access road will be constructed in order to access APEX 2S/2D. As part of the solution mining facility, APEX also proposes to construct 4 brine tanks, 4 brine pumps, and an electrical building on approximately 1 acre of Energy Transfer Company (ETC) property located immediately west of the Property (**Appendix A, Figure 1**).

The surrounding land use is a mixture of industrial, commercial, and undeveloped property. Surface waters near the vicinity of the Project include the Trinity River to the east. The Project alignment intersects three ephemeral streams and one intermittent stream before discharging into the Trinity River. These features are all shown in **Appendix A, Figures 2-1 – 2-6.**

Desktop Review

A desktop analysis was completed using the U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) (USFWS, 2011) , U.S. Geological Survey (USGS) quadrangle maps (USGS, Cayuga, TX 2012), the Web Soil Survey (Natural Resource Conservation Service [NRCS], 2012) and infrared Digital Ortho Quarter Quadrangles (DOQQs) to identify potentially jurisdictional WOUS and investigate the potential connection to traditional navigable waters. The *Soil Survey of Anderson County, Texas* (NRCS, 2012) identifies 18 soil types within the Project area. Of these 18 soil types, the Trinity clay, Garner clay, Rentzel fine sand, 0 to 5 percent slopes, Iuka fine sandy loam, Thenas fine sandy loam, and Axtell-Derby complex, 0 to 1 percent slopes are listed as partially hydric by the NRCS.

Pre-field review of the USGS Cayuga 7.5-minute quadrangle identified two unnamed intermittent streams within the Project area. Both streams are tributaries of Catfish Creek, which is a major tributary of the Trinity River. The

NWI identified two Palustrine Forested Broad-leaved Deciduous Seasonally Flooded (PFO1c) wetlands and one Palustrine Forsted/Scrub-shrub Broad-leaved Deciduous Temporary Flooded (PFO/PSS 1a) wetland within the Project area. The Project is located within the Lower Trinity-Tehuacna drainage basin (HUC 12030201).

A qualified biologist performed a search of several sources of information regarding special status species that may be found on or in the vicinity of the Project. Sources were consulted on January 23, 2012 and included: 1) the U.S. Fish and Wildlife Service's (USFWS) Threatened and Endangered Species System internet database; 2) the Texas Parks and Wildlife Department (TPWD) Annotated County List of Rare Species for Anderson County; and 3) the Texas Natural Diversity Database (TXNDD). The TXNDD was reviewed on February 7, 2012. The search radius was 10 miles from the Project area. The search identified one rare plant community, Quercus stellata-Quercus marilandica series, along the western half of the Project area. Though not documented in the Project area, occurrences of A caddisfly, Morse's net-spinning caddisfly, Holzenthal's philopotamid caddisfly, and a purse casemaker caddisfly have been documented in close proximity to the Project. All occurrences have been documented within the Gus Engling Wildlife Management Area located approximately 1 mile north of the Project. **Figure 3** shows all of the documented records within 10 miles of the Project.

Methodology

WOUS Delineation

WOUS, as defined in 33 *Code of Federal Regulations* (CFR) Part 328 of the CWA, include "intrastate lakes, rivers, streams (including intermittent streams), mudflats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds." The USACE further defines jurisdictional waters to include ephemeral tributaries of navigable waters, as well as adjacent wetlands and even man-made impoundments, when those impoundments occur within drainages that meet the definition of jurisdictional waters (USACE, 2007).

CH2M HILL biologists conducted a field delineation of WOUS, including wetlands, on the Project from July 24 to 25, 2012. Subsequent wetland and waterbody delineations were conducted on September 24 and October 1, 2012 due to a modification in the Project area. Wetland delineations were conducted following procedures set forth in the *U.S. Army Corps of Engineers Wetland Delineation Manual* (USACE, 1987) and the *Interim Regional Supplement of the Corps of Engineers Wetlands Delineation Manual: Atlantic and Gulf Coast Region (Manual)* (USACE, 2008). The *Manual* (USACE, 1987) defines wetlands as areas that have positive indicators for hydrophytic vegetation, wetland hydrology, and hydric soils, or as:

"*Areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas*."

The limits of USACE jurisdiction for non-tidal waters of the United States excluding wetlands, that is, creeks, streams, etc., are identified by the presence of ordinary high water marks (OHWMs). The OHWM is defined as "that line on the shore established by the fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in soil character, destruction of terrestrial vegetation, the presence of litter or debris, or other appropriate means that consider the characteristics of the surrounding areas" (USACE, 2007).

CH2M HILL biologists followed USACE standard procedures to evaluate wetlands and WOUS subject to regulation under the Clean Water Act (CWA) (jurisdictional waters), as established in the *Atlantic and Gulf Coast Supplement* and the *U.S. Army Corps of Engineers Jurisdictional Determination Form Instructional Guidebook* (USACE, 2007), respectively.

While delineating WOUS on the Project, the biologists also searched for evidence of use by protected species (state and federally listed threatened or endangered species) and potentially suitable habitat for listed species.

Field Documentation

The following text describes the methods used during the WOUS and endangered species habitat surveys.

WOUS and Wetlands

The entire Project was surveyed to assess the presence of WOUS and wetlands. Wetland boundaries and other identified site features were located in the field using a mapping-grade Trimble GeoXT global positioning system (GPS) receiver to sub-meter accuracy.

Standard USACE wetland data forms, for a representative wetland point and a representative upland point, were completed for each wetland.

Each identified wetland was classified based on the U.S. Fish and Wildlife Service (USFWS) classification system (Cowardin et al., 1979). Dominant vegetation was noted according to stratum: tree, shrub/sapling, woody vine, or herb. The wetland indicator status (**Table 1**) for each species was identified using the *National Wetlands Inventory List of Plants that Occur in Wetlands* (Reed, 1988) and subsequent approved modifications to this list. Plants were identified using current taxonomic references, such as *Aquatic and Wetland Plants of the Southeastern United States* (Godfrey and Wooten, 1980; 1981). Where recent taxonomic changes resulted in plant names that were not included in the *National Wetlands Inventory List of Plants that Occur in Wetlands* (Reed, 1988), appropriate synonymy was used to reference the national list.

Soil information was obtained from the *Web Soil Survey of Anderson County, Texas* (NRCS, 2011). Within each area investigated, soil samples were inspected for hydric soil indicators, as provided for on the wetland data forms.

TABLE 1
Definitions for Wetland Indicator Status

Code[a]	Term	Definition
OBL	Obligate	Species occurs in wetlands greater than 99% of time.
FACW	Facultative Wetland	Species occurs in wetlands 67 to 99% of time.
FAC	Facultative	Species occurs in wetlands 34 to 66% of time.
FACU	Facultative Upland	Species occurs in wetlands 1 to 33% of time.
UPL	Upland	Species occurs in wetlands less than 1% of time.

[a]An indicator status with a "+" added indicates a plant that would be in the wetter third of the indicated range of the status, while a "-" would indicate the drier third of the range of the status.

Sensitive Wildlife and Habitat

During the field effort, habitat types in the survey corridor/area were described, documented, and photographed. Important features such as plant community composition, types of disturbance, and incidental wildlife observations were used to describe each habitat type found on the Project. Observations of listed sensitive species were documented using a Trimble GeoXT GPS receiver, and the habitat was recorded at the location. Photographs are presented in **Appendix C**.

Results

WOUS and Wetlands

Within the Project, 13 potential WOUS (8 wetlands and 5 waters) were identified and delineated. **Table 2** summarizes the water bodies and wetlands identified on the Project, and the locations are depicted in **Figures 2-1 – 2-6** in **Appendix A**. Wetland determination data forms are in **Appendix B**. Representative photographs of the wetlands and waters are provided in **Appendix C**.

TABLE 2
Potential Jurisdictional Waters
APEX CAES– Anderson County, TX

Feature ID	Type*	Potential Jurisdictional Size Within the Project Area
S1	Ephemeral	136 linear feet
S2	Intermittent	123 linear feet
S3	Ephemeral	203 linear feet
S4	Ephemeral	116 linear feet
S5	Perennial	NA
WL1	PEM	0.37 acres
WL1	PFO	0.61 acres
WL2	PEM	0.06 acres
WL3	PEM	0.06 acres
WL3	PFO	0.12 acres
WL4	PFO	0.34 acres
WL5	PEM	0.04 acres
WL5	PFO	1.00 acres

Notes: All measurements generated using ArcGIS 9.2. S2
*Cowardin system from NWI mapping for the project area.

Non-wetland Waters

S1- Ephemeral Stream

S1 is an ephemeral stream that flows from east to west across the Project and ultimately flows into a man-made pond located north of the Project. The average OHWM across its reach is 1 foot with an average top-of-bank (TOB) width of 2 feet. No water was observed in the channel at the time of the survey. There are approximately 136 linear feet of channel within the Project. Surface flow from the pond's spillway continues in a southerly direction before intersecting the Project as S2. S2 flows approximately 2.2 aerial miles south before flowing into S3 and then Catfish Creek, a tributary of the Trinity River. Therefore, S1 would likely be considered jurisdictional by the USACE.

S2- Intermittent Stream

S2 is identified as an unnamed intermittent stream on the USGS Cayuga 7.5-minute quadrangle map. S2 flows north to south across the Project. The average OHWM is 8 feet with an average TOB width of 20 feet and a water width of 2 feet. There are approximately 123 linear feet of channel within the Project. S2 flows approximately 2.2 aerial miles south before flowing into S3 and then Catfish Creek. Therefore, S2 would likely be considered jurisdictional by the USACE.

S3- Ephemeral Stream

S3 is identified as an unnamed intermittent stream on the USGS Cayuga 7.5-minute quadrangle map. S3 is identified on the NWI as an R2OWH (Riverine system, lower perennial subsystem, open water/unknown bottom class, and a permanently flooded water regime). However, based on field observations of the stream within and adjacent to the Project area, the stream along this segment appears to be ephemeral. The stream lacks the biological, hydrological, and physical characteristics commonly associated with the continuous or intermittent

conveyance of water. The average OHWM across its reach is 3 feet with an average TOB width of 8 feet. No water was observed in the channel at the time of the survey. There are approximately 203 linear feet of channel within the Project. S3 flows approximately 5.8 aerial miles south before flowing into Catfish Creek, a tributary of the Trinity River. Therefore, S3 would likely be considered jurisdictional by the USACE.

S4- Ephemeral Stream

S4 is an ephemeral stream that flows from north to south across the Project and flows through WL5_PFO. The average OHWM across its reach is 3 feet with an average TOB width of 4 feet. No water was observed in the channel at the time of the survey. There are approximately 116 linear feet of channel within the Project. S4 flows through the floodplain of the Trinity River and would likely be considered jurisdictional by the USACE.

S5- Trinity River

The Trinity River is a perennial stream that flows from north to south along the western boundary of the Project. The average OHWM is 110 feet with an average TOB width of 200 feet and a water width of 108 feet. One sandbar was observed just north of the Project area on the east bank of the river. The riparian corridor on the east bank consists of a bottomland hardwood PFO wetland dominated by green ash (*Fraxinus pennsylvanica*) and swamp privet (*Forestiera acuminata*). The Trinity River is listed as a TNW (traditional navigable water) by the USACE and will be considered jurisdictional.

Wetlands

WL1 PEM/PFO

WL1 is comprised of approximately 0.37 acres of low-quality PEM wetlands and 0.61 acres of moderate-quality PFO wetlands. The PEM wetland is dominated by a monoculture of sedge (*Carex* sp.). Dominant vegetation within the PFO wetland consists of willow oak (*Quercus phellos*), roundleaf greenbriar (*Smilax rotundifolia*) and sedge.

Soils in both wetland types were characterized as a 10YR5/2 clay with approximately 40 percent abundance of 7.5YR 4/6 redoximorphic concentrations from 0 to 16 inches. Hydric soil indicators included depleted matrix (F3) and redox depressions (F8). Hydrology indicators included water marks, water-stained leaves, and geomorphic position.

The NWI identifies this area as a PFO1C wetland. The wetland extends into the existing cleared pipeline ROW where it becomes a PEM1C wetland. WL1 appears to be an isolated wetland located within a micro-depression. WL1 is located approximately 1.31 miles west of the nearest RPW and approximately 1.28 miles east of the Trinity River. A jurisdictional determination will be required to evaluate whether there is a significant nexus to a TNW.

WL2

WL2 is a low-quality PEM wetland approximately 0.06 acres in size. Dominant vegetation within the wetland consists of dotted smartweed (*Persicaria punctata*) and broad-leaf woodoats (*Chasmanthium latifolium*). The wetland consists of 40 percent bare ground.

Soils in the wetland were characterized as a 10YR4/2 clay loam with approximately 20 percent abundance of 7.5YR 3/4 redoximorphic concentrations from 0 to 16 inches. Hydric soil indicators included depleted matrix (F3). Primary hydrology indicators included water-stained leaves. Secondary indicators included sparsely vegetated concave surface, geomorphic position, and the FAC-neutral test.

The NWI does not identify this area as wetland. WL2 appears to be an isolated wetland located within a micro-depression created during construction of the existing pipeline ROW corridor. WL2 is located approximately 0.75 miles east of the Trinity River. The USACE will complete a significant nexus analysis to evaluate whether or not the wetland is isolated.

WL3 PEM/PFO

WL3 is comprised of approximately 0.06 acres of low-quality PEM wetland and 0.12 acres of moderate-quality PFO wetland. Dominant vegetation within the PEM wetland consists of dotted smartweed and broad-leaf

woodoats. Dominant vegetation within the PFO wetland consists of willow oak, dotted smartweed, and roundleaf greenbriar. The wetland consists of 30 percent bare ground as a result of long periods of ponding.

Soils within both wetland types were characterized as a 10YR4/2 clay loam with approximately 20 percent abundance of 7.5YR 3/4 redoximorphic concentrations from 0 to 16 inches. Hydric soil indicators included depleted matrix (F3). Hydrology indicators included water marks, water-stained leaves, and moss trim lines.

The NWI does not identify this area as wetland. WL3 appears to be an isolated wetland located within a micro-depression abutting the existing pipeline ROW corridor. WL3 is located approximately 0.76 miles east of the Trinity River. The USACE will complete a significant nexus analysis to evaluate whether or not the wetland is isolated.

WL4

WL4 is a high-quality PFO wetland approximately 0.34 acres in size. Dominant vegetation within the wetland consists of green ash, swamp privet, common buttonbush (*Cephalanthus occidentalis*), swamp smartweed (*Persicaria hydropiperoides*), lanceleaf frogfruit (*Phyla lanceolata*), and delta arrowhead (*Sagittaria platyphylla*).

Soils in the wetland were characterized as a 10YR3/1 clay with approximately 10 percent abundance of 7.5YR 4/6 redoximorphic concentrations from 0 to 16 inches. Hydric soil indicators included redox dark surface (F6) and redox depressions (F8). The wetland area was inundated at the time of the visit, with surface water depths averaging 12 inches. The presence of the high water table, saturation, water marks, aquatic fauna, inundation visible on aerial imagery, and geomorphic position further indicate the presence of wetland hydrology.

The NWI identifies this area as a PFO1A/PSS1A wetland. The mapped PFO wetland is associated with an oxbow lake lying within the floodplain of the Trinity River. WL4 would likely be considered jurisdictional by the USACE based on proximity to a TNW.

WL5 PEM/PFO

WL5 is comprised of approximately 0.04 acres of moderate-quality PEM wetlands and 1 acre of high-quality PFO wetlands. Dominant vegetation within the PEM wetland consists of swamp smartweed and broad-leaf cattail (*Typha latifolia*). Dominant vegetation within the PFO wetland consists of green ash (*Fraxinus pennsylvanica*) and swamp privet (*Forestiera acuminata*).

Soils in both wetland types were characterized as a 10YR3/1 clay with approximately 20 percent abundance of 7.5YR 4/6 redoximorphic concentrations from 0 to 16 inches. Hydric soil indicators included redox dark surface (F6) and redox depressions (F8). Hydrology indicators within the PFO wetland included water marks, sediment deposits, and geomorphic position. The PEM wetland was inundated at the time of the visit, with surface water depths averaging 2 inches. The presence of the high water table, saturation, hydrogen sulfide odor, inundation visible on aerial imagery, and geomorphic position further indicate the presence of wetland hydrology.

The NWI identifies this area as a PFO1A/PSS1A wetland. The mapped PEM wetland is not identified on the NWI as a PEM wetland. WL5 is located within the Trinity River floodplain, and would likely be considered jurisdictional by the USACE based on adjacency to a TNW.

Endangered Species and Sensitive Wildlife Habitat

Forty-four federal and state-listed threatened, endangered, and rare species are listed for Anderson County (**Table 3**). This list is compiled by the agencies based on records of each species and historic ranges. Simply having a species listed in the county does not mean that it is present within the Project. The table also identifies 11 species for which potential habitat appears to be present within the Project, based on a review of aerial photography, topographic maps, field reconnaissance, and biological knowledge of the region.

Site reconnaissance revealed that the Project area consists of grazed pasture land, mixed hardwood forests, bottomland hardwood forests, PEM wetlands and PFO wetlands. While suitable habitat appears to be present for a number of species, as listed in Table 3, no evidence of listed species was observed during the site visit within any habitat type.

TABLE 3
Federal and State Threatened and Endangered Species in Anderson County, Texas.

Species	Federal Status	State Status	Description of Suitable Habitat	Habitat Present	Species Effect
Birds					
Peregrine Falcon *Falco peregrinus*	--	T	Both subspecies migrate across the state from more 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 statuses differ, F.p. tundrius is no longer listed in Texas; but because the subspecies are not easily distinguishable at a distance, reference is generally made only to the species level; see subspecies for habitat.	No	No
American Peregrine Falcon *Falco peregrinus anatum*	--	T	Breeds in west Texas, nest in tall cliff eyries. Migrates through Texas and winters along the coastlines. Stopovers preferred are edges of lakes, coasts, and barrier islands.	No	No
Arctic Peregrine Falcon *Falco peregrines tundrius*	--	--	Migrates through Texas and winters along the coastlines. Stopovers preferred on edges of lakes, coasts, and barrier islands.	No	No
Bachman's Sparrow *Aimophila aestivalis*	--	T	Open pine woodlands with scattered bushes and grassy understory, overgrown fields with thickets and brambles.	No	No
Bald Eagle *Haliaeetus leucocephalus*	--	T	Nests and winters near rivers, lakes and along coasts; nests in tall trees or on cliffs near large bodies of water.	Yes	Not likely to adversely affect. Impacts to potential habitat would be temporary and minor
Henslow's Sparrow *Ammodramus henslowii*	--	--	Found in weedy fields or cut-over areas where lots of bunch grasses occur along with vines and brambles.	No	No
Interior Least Tern *Sterna antillarum athalassos*	--	E	Nests along sand and gravel bars within braided streams and rivers.	No	No
Piping Plover *Charadrius melodus*	--	T	Wintering migrant along the Texas Gulf Coast; beaches and bayside mud or salt flats.	No	No
Red-cockaded Woodpecker *Picoides borealis*	--	E	Cavity nests in older pines (60+ years); forages in younger pines (30+ years.	No	No
Sprague's Pipit *Anthus spragueii*	--	--	Wintering migrant along the Texas Gulf Coast; locally common in local grasslands.	No	No

TABLE 3
Federal and State Threatened and Endangered Species in Anderson County, Texas.

Species	Federal Status	State Status	Description of Suitable Habitat	Habitat Present	Species Effect
White-faced Ibis *Plegadis chihi*	--	T	Prefers freshwater marshes, sloughs, and irrigated rice fields, but will attend brackish and saltwater habitats; nests in marshes, in low trees, on the ground in bulrushes or reeds, or on floating mats.	No	No
Whooping Crane *Grus americana*	--	E	Potential migrant throughout most of state to coast. Winters in coastal marshes.	No	No
Wood Stork *Mycteria americana*	--	T	Forages in prairie ponds, flooded pastures or fields, ditches, and other shallow standing water, including salt-water; usually roosts communally in tall snags, inhabits mud flats and other wetlands.	No	No
Fishes					
American eel *Anguilla rostrata*	--	--	Coastal waterways below reservoirs to Gulf. Inhabits muddy bottoms, still waters, large streams, lakes or any waterbody with access to the ocean.	No	No
Paddlefish *Polyodon spathula*	--	T	Large, free-flowing rivers	No	No
Insects					
A caddisfly *Phylocentropus harrisi*	--	--	Lotic systems, but specifics unknown.	Yes	Not likely to adversely affect. Impacts to potential habitat would be temporary and minor
A Purse casemaker caddisfly *Hydroptila ouachita*	--	--	Lotic systems, but specifics unknown.	Yes	Not likely to adversely affect. Impacts to potential habitat would be temporary and minor
Holzenthal's philopotamid caddisfly *Chimarra holzenthali*	--	--	Lotic systems within the Trinity River basin.	Yes	Not likely to adversely affect. Impacts to potential habitat would be temporary and minor
Morse's net-spinning caddisfly *Cheumatopsyche morsei*	--	--	Lotic systems, but specifics unknown.	Yes	Not likely to adversely affect. Impacts to potential habitat would be temporary and minor
Texas emerald dragonfly *Somatochlora margarita*	--	--	Springfed creeks and bogs; small sandy forested streams with moderate current.	Yes	Not likely to adversely affect. Impacts to potential habitat would be temporary and minor

TABLE 3
Federal and State Threatened and Endangered Species in Anderson County, Texas.

Species	Federal Status	State Status	Description of Suitable Habitat	Habitat Present	Species Effect
Reptiles					
Alligator snapping turtle *Macrochelys temminckii*	--	T	Perennial water bodies; deep water of rivers, canals, lakes, and oxbows; also swamps, bayous, and ponds near deep running water; usually in water with mud bottom and vegetation.	Yes	Not likely to adversely affect. Impacts to potential habitat would be temporary and minor
Louisiana pine snake *Pituophis ruthveni*	--	--	Mixed deciduous-longleaf pine woodlands.	No	No
Sabine map turtle *Graptemys ouachitensis sabinensis*	--	--	Rivers and related tributaries, ponds and reservoirs of the Sabine River system	No	No
Texas horned lizard *Phrynosoma cornutum*	--	T	Open, arid and semi-arid regions with sparse vegetation.	No	No
Timber/Canebrake rattlesnake *Crotalus horridus*	--	T	Swamps, floodplains, upland pine and deciduous woodlands, riparian zones, abandoned farmland; limestone bluffs, sandy soil or black clay; prefers dense ground cover, i.e. grapevines or palmetto.	Yes	Not likely to adversely affect. Impacts to potential habitat would be temporary and minor
Mammals					
Black bear *Ursus americanus*	--	T	Bottomland hardwood forests and large tracts of inaccessible forested areas.	Yes	Not likely to adversely affect. Impacts to potential habitat would be temporary and minor
Louisiana black bear *Ursus americanus luteolus*	--	T	Possible as transient, bottomland hardwoods and large tracts of inaccessible forested areas.	Yes	Not likely to adversely affect. Impacts to potential habitat would be temporary and minor
Plains spotted skunk *Spilogale putorius interrupta*	--	--	Ubiquitous; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie.	Yes	Not likely to adversely affect. Impacts to potential habitat would be temporary and minor
Red wolf *Canis rufus*	--	E	Extirpated; formerly known throughout eastern half of Texas in brushy and forested areas, as well as coastal prairies.	No	No

TABLE 3
Federal and State Threatened and Endangered Species in Anderson County, Texas.

Species	Federal Status	State Status	Description of Suitable Habitat	Habitat Present	Species Effect
Southeastern myotis bat *Myotis austroriparius*	--	--	Roosts in cavity trees of bottomland hardwoods, concrete culverts, and abandoned man-made structures.	Yes	Not likely to adversely affect. Impacts to potential habitat would be temporary and minor
Mollusks					
Creeper (squawfoot) *Strophitus undulatus*	--	--	Gravel and mud in small to large streams in the Neches (historic) and Trinity (historic) river basins.	Yes	Not likely to adversely affect. Impacts to potential habitat would be temporary and minor
Fawnsfoot *Truncilla donaciformis*	--	--	Small and large rivers on all substrates in still to swiftly moving water; Sabine (historic), Neches, Trinity, and San Jacinto River basins.	Yes	Not likely to adversely affect. Impacts to potential habitat would be temporary and minor
Little spectaclecase *Villosa vienosa*	--	--	Perennial creeks, rivers, and reservoirs, sandy substrates in slight to moderate current, usually along the banks in slower currents; east Texas, Cypress through San Jacinto River basins.	No	No
Louisiana pigtoe *Pleurobema riddellii*	--	T	Perennial streams and moderate-size rivers, usually flowing water on substrates of mud, sand, and gravel.	Yes	Not likely to adversely affect. Impacts to potential habitat would be temporary and minor
Sandbank pocketbook *Lampsilis satura*	--	T	Small to large rivers with moderate flows and swift current on gravel, gravel-sand, and sand bottoms; east Texas, Sulfur south through San Jacinto River basins; Neches River.	No	No
Southern hickorynut *Obovaria jacksoniana*	--	T	Medium sized gravel substrates in perennial streams with low to moderate currents; Neches, Sabine, and Cypress River basins.	No	No
Texas heelsplitter *Potamilus amphichaemus*	--	T	Quiet waters in perennial streams over mud and sand; Sabine, Neches, and Trinity River basins.	Yes	Not likely to adversely affect. Impacts to potential habitat would be temporary and minor
Texas pigtoe *Fusconaia askewi*	--	T	Rivers with mixed mud, sand, and fine gravel in protected areas associated with fallen trees or other structures; east Texas River basins, Sabine through Trinity rivers as well as San Jacinto River.	Yes	Not likely to adversely affect. Impacts to potential habitat would be temporary and minor

TABLE 3
Federal and State Threatened and Endangered Species in Anderson County, Texas.

Species	Federal Status	State Status	Description of Suitable Habitat	Habitat Present	Species Effect
Wabash pigtoe *Fusconaia flava*	--	--	Perennial creeks to large rivers on mud, sand, and gravel from all habitats except deep shifting sands; found in moderate to swift current velocities; east Texas River basins, Red through San Jacinto River basins; elsewhere occurs in reservoirs and lakes with no flow.	Yes	Not likely to adversely affect. Impacts to potential habitat would be temporary and minor
Wartyback *Quadrula nodulata*	--	--	Medium to large rivers on mud, gravel, and sand-gravel bottoms; Red, Sabine, Neches River basins.	No	No
Plants					
Earth fruit *Geocarpon minimum*	T	T	Vegetated edges of slick spots in saline barren complexes just above the floodplain of the Nueces River. Flowers late February-March.	No	No
Rough-stem aster *Symphyotrichum puniceium var. scabricaule*	--	--	Relatively open sites in saturated soils associated with bogs, marshes, ponds, drainages, and degraded wetland remnants on the Queen City, Carrizo, and Sparta sand formations.	No	No
Sandhill woolywhite *Hymenopappus carizzoanus*	--	--	Disturbed or open areas in grasslands and post oak woodlands on deep sands derived from the Carrizo sand.	No	No
Small-headed pipewort *Eriocaulon koernickianum*	--	--	Post oak woodlands and xeric sandhill openings on permanent wet acid sands of upland seeps and hillside seepage bogs; usually in patches of bare sand.	No	No

E – Endangered
T – Threatened
"--" – rare or species of concern, but with no regulatory listing status

Source: US Fish & Wildlife Department, 2012 and Texas Parks and Wildlife Department, 2012.

Recommendations

Jurisdictional Recommendations for WOUS

CH2M HILL identified five jurisdictional streams and eight potentially jurisdictional wetlands in the Project area. Five of the eight wetlands may be determined to be non-jurisdictional isolated wetlands upon site review by the USACE.

Authority over activities conducted within jurisdictional wetlands is vested in the Fort Worth District of the USACE pursuant to Section 404 of the Clean Water Act.[1] The Fort Worth District of USACE is within the Fifth Circuit Court of Appeals area. USACE Districts within the Fifth Circuit Court area use a test for jurisdiction that emphasizes some

[1] 33 U.S.C.A § 1344 specifically provides for permits for the discharge of dredged or fill material to the navigable waters of the United States.

physical connection to traditional navigable water, rather than a non-avian interstate commerce link.[2] This jurisdictional determination (JD) can be made through concurrence with an Approved JD report submitted to the Fort Worth District. In order to gain concurrence from the USACE, the methods and results sections of this wetland report and corresponding map should be submitted to the Forth Worth District of the USACE, along with a letter requesting a JD of the mapping. Although an official JD only lasts 5 years, an expired JD can facilitate future determinations and expedite any permitting process that may be needed for future projects on the Property. Consultation with the USACE-Fort Worth District during the early planning phase of future projects could prevent delays and reduce processing times later in the project.

A variety of nationwide permits (NWP) are available through the USACE, each with its own criteria that must be followed to qualify for a specific permit. NWPs authorize only those activities that have minimal individual and cumulative adverse effects on the aquatic environment and satisfy other public interest factors, such as utility and road construction or maintenance of flood control facilities. However, if a NWP is not applicable or if the size of impacts resulting from a specific project exceeds the maximum amount allowed under a NWP, an individual permit would need to be obtained for wetland losses. Individual permits are required for activities that may result in more than minimal adverse effects on the aquatic environment or do not satisfy other public interest review factors, and thus warrant a more thorough individual review through a public notice and comment process.

The Project will likely be permitted under the Corps Nationwide Permit #12 (NWP #12) provided that the total project impacts do not result in the loss of greater than 1/2 acre of waters of the United States (including wetlands) and that the project adheres to the terms and conditions of the Nationwide Permit as well as the Regional Conditions for the Fort Worth District. The Project will also need to comply with the State of Texas Section 401 Water Quality Certification general conditions issued by the Texas Commission on Environmental Quality (TCEQ).

Endangered Species Recommendations

Any federal permit requires compliance with the federal Endangered Species Act (ESA). Protection of critical habitat for federal listed endangered and threatened species is a regulatory requirement under the ESA. Critical habitat is defined within Section (3)(5)(A) of the ESA as "areas within a listed species' current (at time of listing) range that contain the physical or biological features that are essential to that species' conservation or that for some reason require special management; and areas outside the species' current range that the secretary determines to be essential to its conservation."

A review of the existing data determined that the Project area is not within nor does it contain any designated critical habitat area, as defined under the ESA, as amended. Although critical habitat is not present on site, individuals of a listed species could occur in the Project area, especially highly mobile or migratory species. Proper planning of development activities around migration and consultation with local sources that track migration and scheduled migratory bird fallouts should be used to decrease impacts to more mobile species.

Concurrence from the USFWS that the Project would not affect threatened and endangered species must accompany any permit application to the USACE.

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2 Rice v Harken Exploration, 2001 U.S .App. Lexis 7462. This case is actually an OPA case that interprets the identical waters of the United States Language found in the Clean Water Act. The court, in this case, found plenty of interstate commerce connection for the waters in question, but insufficient linkage to a navigable water. The court declined to specify how much linkage was required to convey jurisdiction, but did decide that the overland flow and outcropping of groundwater theorized by the plaintiff was not sufficient.

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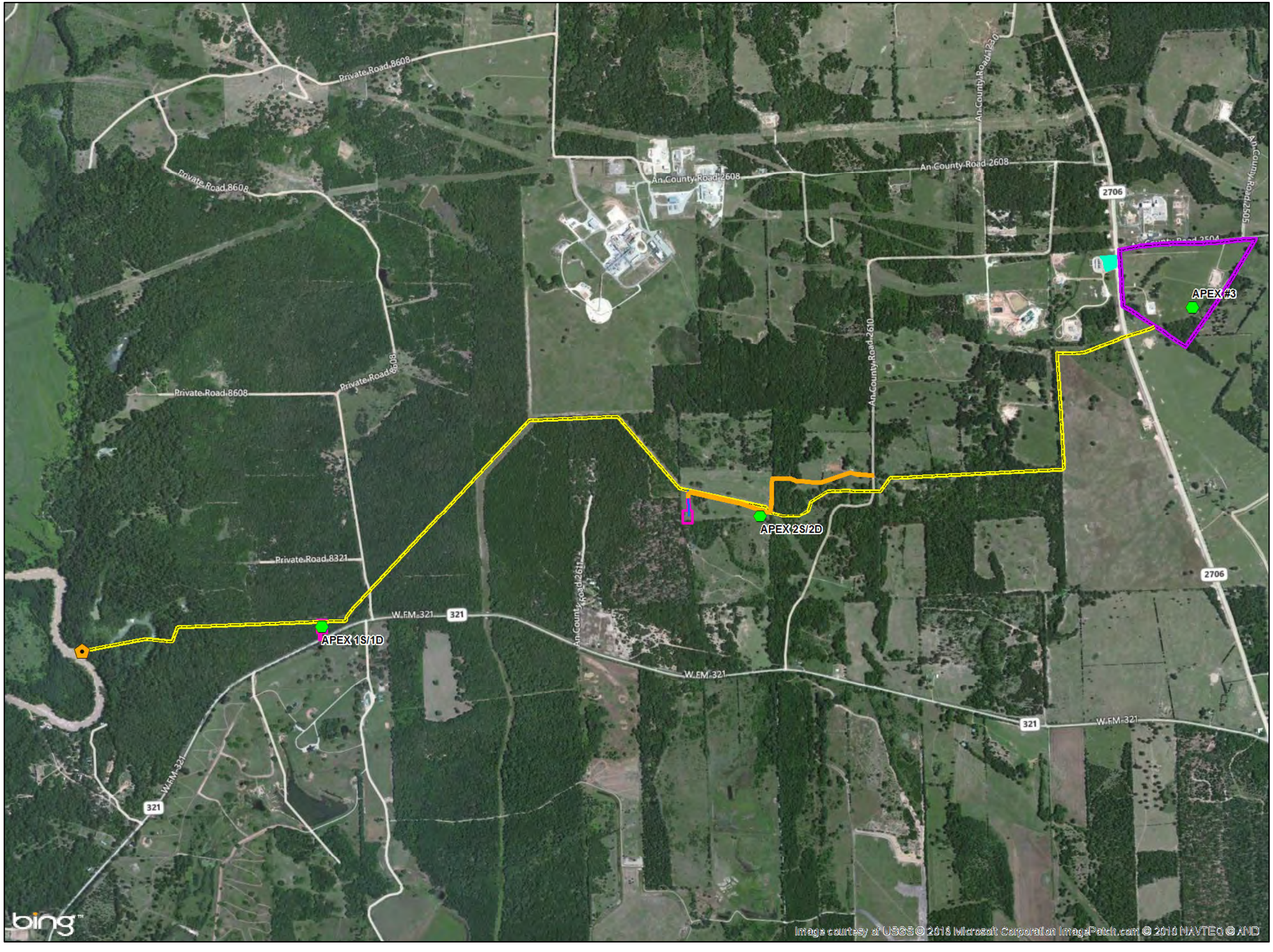
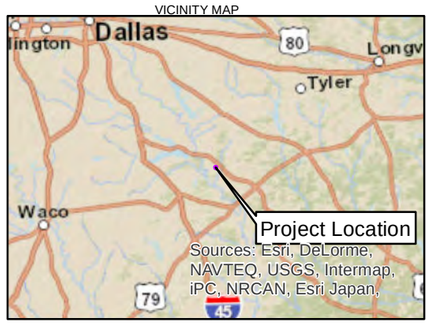
Appendix A
Figures





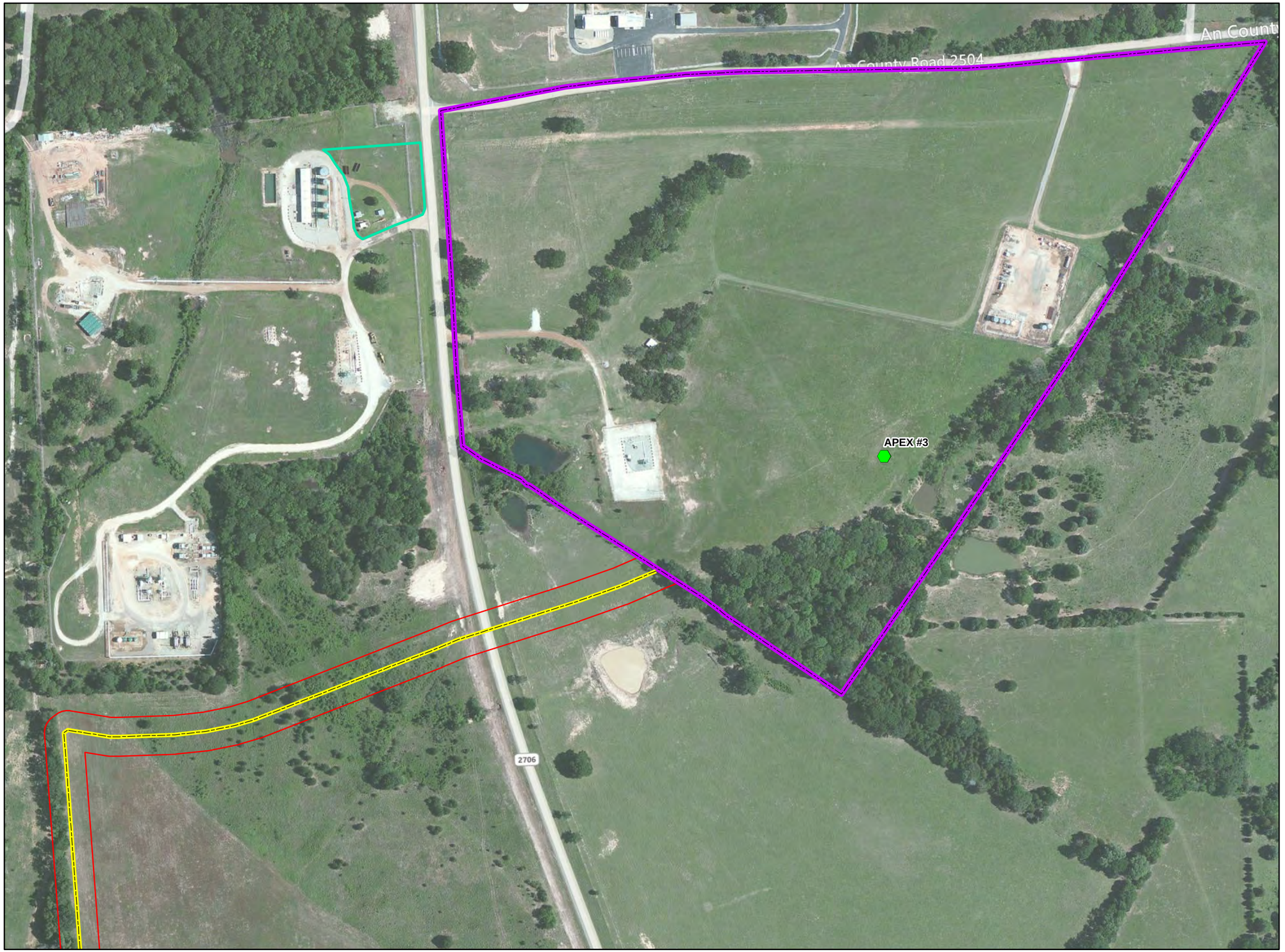
LEGEND
- Water Wells
- Point of Discharge
- Water Pipeline
- Access Roads
- Proposed Pipeline
- Well Pad
- ETC Property
- Proposed Site

Image:
National Agriculture
Imagery Program (NAIP) - 08/02/2010

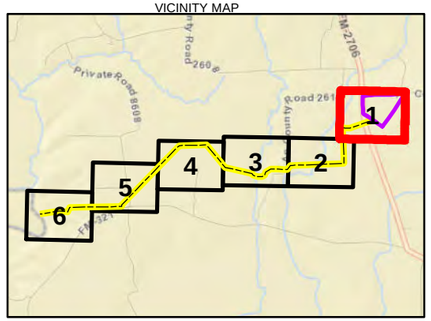
N

0 0.125 0.25 0.5
Miles

FIGURE 1
Proposed Alignment of Discharge
Water Pipeline
Proposed Energy Development Site
Anderson County, Texas



VICINITY MAP



LEGEND

- Point of Discharge
- Water Wells
- Well Pad
- Access Roads
- ETC Property
- Water Pipeline
- Streams
- Upland Point

Wetland Type

- PEM
- PFO
- Proposed Pipeline
- Proposed Site
- ROW

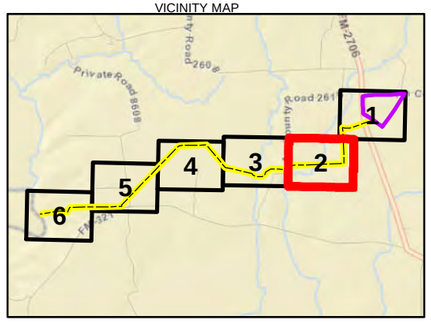
Image:
National Agriculture
Imagery Program (NAIP) - 08/02/2010

N

0 100 200 400
Feet

FIGURE 2-1
Wetlands and Other Waters of the US
Proposed Alignment of
Discharge Water Pipeline
Anderson County, Texas

VICINITY MAP



LEGEND

- Point of Discharge
- Water Wells
- Well Pad
- Access Roads
- ETC Property
- Water Pipeline
- Streams
- Upland Point

Wetland Type

- PEM
- PFO
- Proposed Pipeline
- Proposed Site
- ROW

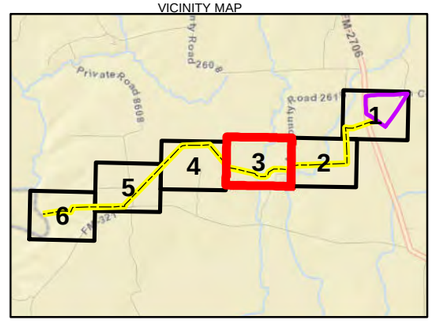
Image:
National Agriculture
Imagery Program (NAIP) - 08/02/2010

N

0 100 200 400
Feet

FIGURE 2-2
Wetlands and Other Waters of the US
Proposed Alignment of
Discharge Water Pipeline
Anderson County, Texas

VICINITY MAP



LEGEND

- Point of Discharge
- Water Wells
- Well Pad
- Access Roads
- ETC Property
- Water Pipeline
- Streams
- Upland Point

Wetland Type

- PEM
- PFO
- Proposed Pipeline
- Proposed Site
- ROW

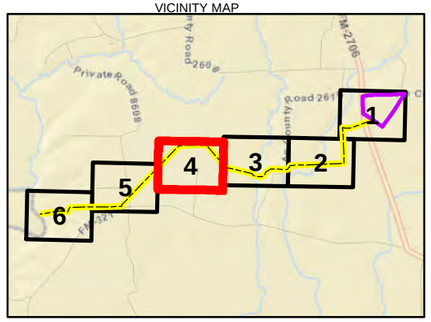
Image:
National Agriculture
Imagery Program (NAIP) - 08/02/2010

N

0 100 200 400
Feet

FIGURE 2-3
Wetlands and Other Waters of the US
Proposed Alignment of
Discharge Water Pipeline
Anderson County, Texas

VICINITY MAP



LEGEND

- Point of Discharge
- Water Wells
- Well Pad
- Access Roads
- ETC Property
- Water Pipeline
- Streams
- Upland Point

Wetland Type

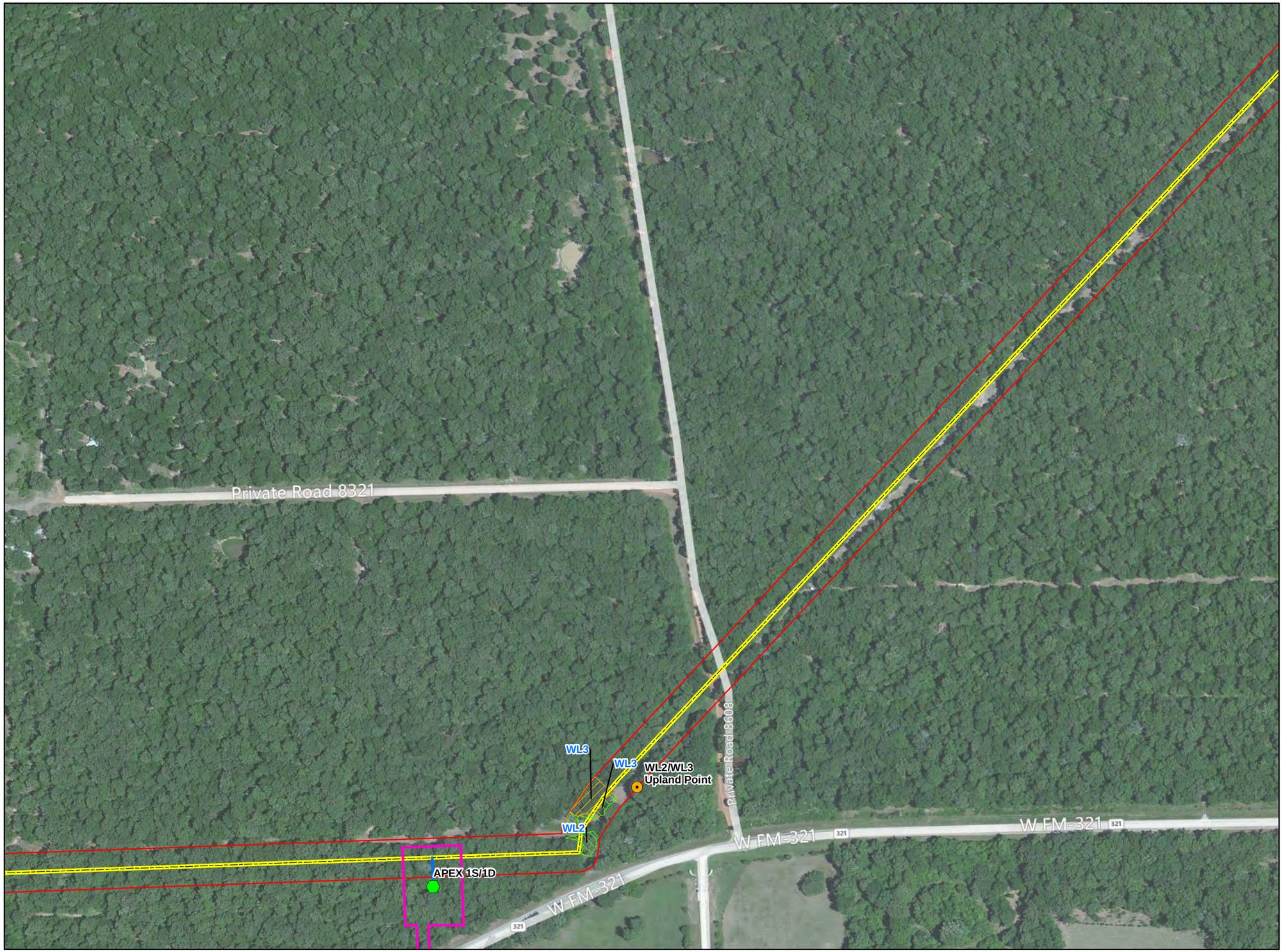
- PEM
- PFO
- Proposed Pipeline
- Proposed Site
- ROW

Image:
National Agriculture
Imagery Program (NAIP) - 08/02/2010

N

0 100 200 400
Feet

FIGURE 2-4
Wetlands and Other Waters of the US
Proposed Alignment of
Discharge Water Pipeline
Anderson County, Texas



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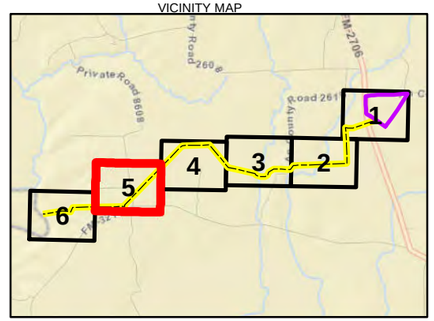


LEGEND

- Point of Discharge
- Water Wells
- Well Pad
- Access Roads
- ETC Property
- Water Pipeline
- Streams
- Upland Point

Wetland Type

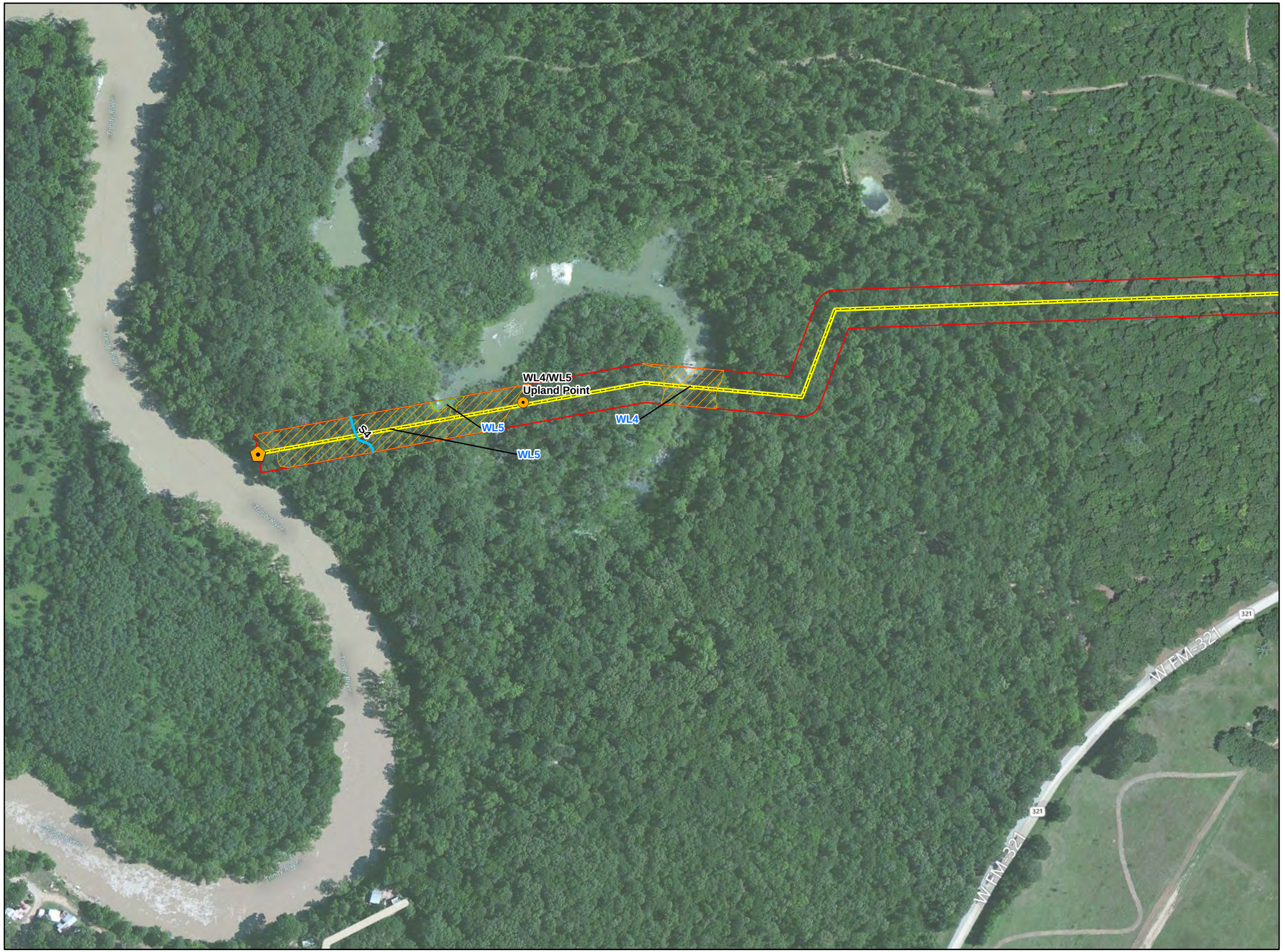
- PEM
- PFO
- Proposed Pipeline
- Proposed Site
- ROW

Image:
National Agriculture
Imagery Program (NAIP) - 08/02/2010

N

0 100 200 400
Feet

FIGURE 2-5
Wetlands and Other Waters of the US
Proposed Alignment of
Discharge Water Pipeline
Anderson County, Texas



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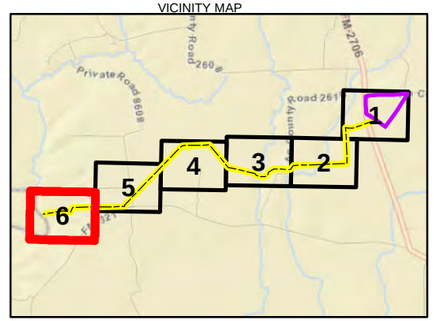

LEGEND

- Point of Discharge
- Water Wells
- Well Pad
- Access Roads
- ETC Property
- Water Pipeline
- Streams
- Upland Point

Wetland Type

- PEM
- PFO
- Proposed Pipeline
- Proposed Site
- ROW

Image:
National Agriculture
Imagery Program (NAIP) - 08/02/2010

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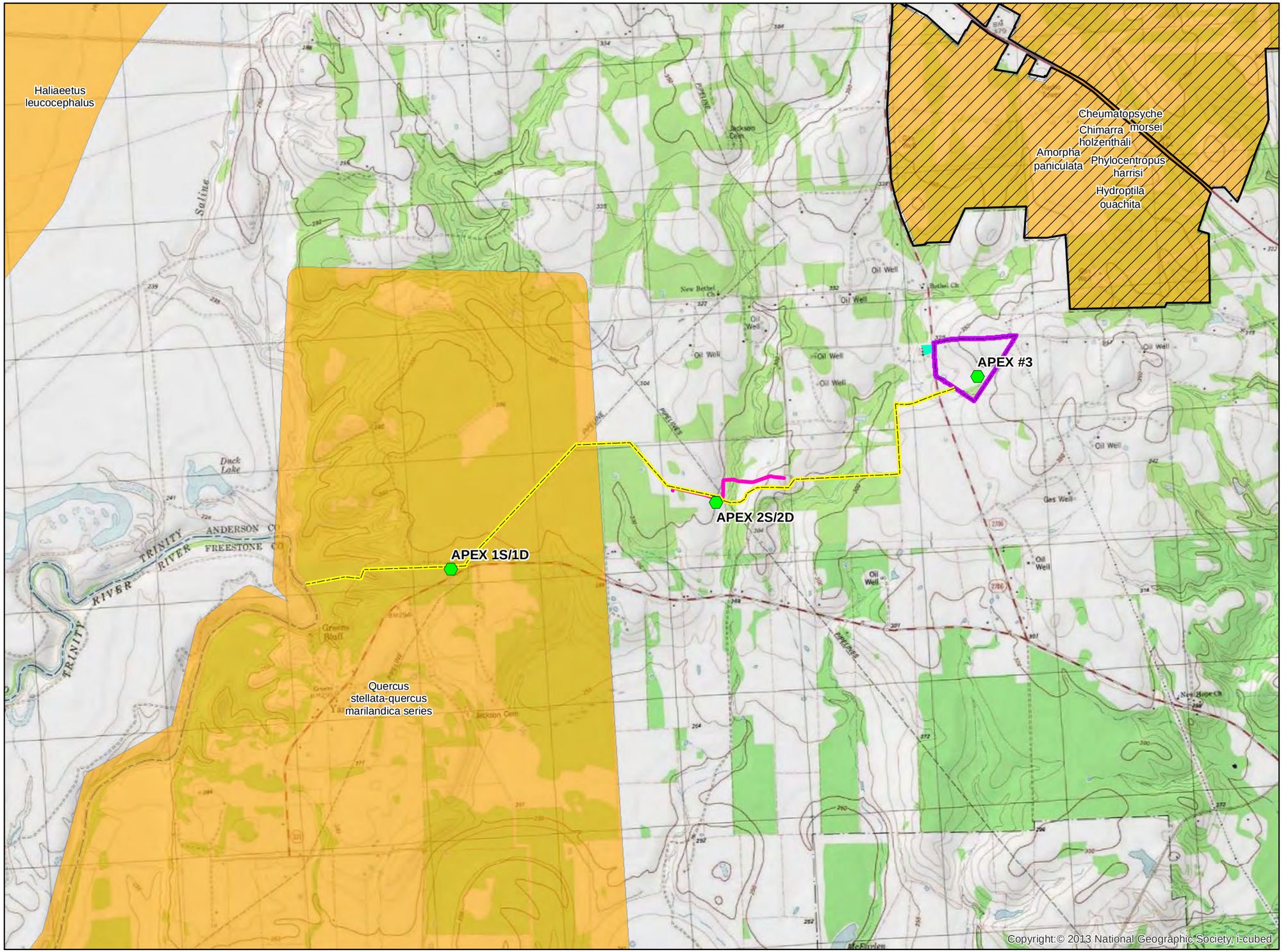
FIGURE 2-6
Wetlands and Other Waters of the US
Proposed Alignment of
Discharge Water Pipeline
Anderson County, Texas



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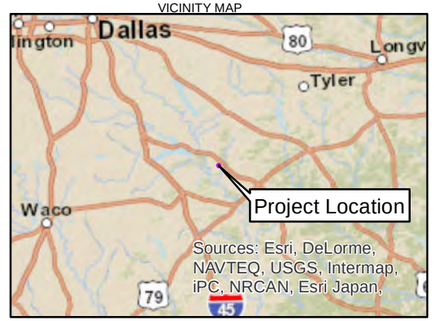

LEGEND

- Water Wells
- ETC Property
- Proposed Pipeline
- Access Roads
- Gus Engeling Wildlife Management Area
- Wildlife Occurrence
- Proposed Site

Topo:
Copyright:© 2011 National Geographic Society, i-cubed

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Miles

FIGURE 3
NDD Data
Proposed Alignment of
Discharge Water Pipeline
Anderson County, Texas

Appendix B
Data Sheets

At the request of the USEPA, wetland/waterbody data sheets were removed from the appendices to facilitate reproduction of the Apex BEC Biological Assessment.

Appendix C
Photo Log

Site: Anderson County, TX Photo: 1 Date: 7/24/2012 Direction: West
Subject: Representative photo of mixed hardwood forest habitat observed along the proposed route.

Site: Anderson County, TX Photo: 2 Date: 7/24/2012 Direction: West
Subject: Representative photo of scrub-shrub habitat observed along the route proposed route.

Site: Anderson County, TX Photo: 3 Date: 7/24/2012 Direction: North
Subject: Representative photo of many cattle/hay pastures observed along the proposed route.

Site: Anderson County, TX Photo: 4 Date: 7/24/2012 Direction: South
Subject: Representative photo of bottomland hardwood habitat observed along the route. These areas were not mapped as wetlands.

Site: Anderson County, TX Photo: 5 Date: 7/24/2012 Direction: North
Subject: Representative photo of ephemeral stream S1.

Site: Anderson County, TX Photo: 6 Date: 7/24/2012 Direction: Southwest
Subject: Representative photo of unnamed intermittent stream S2.

Site: Anderson County, TX Photo: 7 Date: 7/24/2012 Direction: Northeast
Subject: Representative photo of ephemeral stream S3.

Site: Anderson County, TX Photo: 8 Date: 7/25/2012 Direction: South
Subject: Representative photo of ephemeral stream S4. Flows north to south through WL5.

Site: Anderson County, TX Photo: 9 Date: 7/25/2012 Direction: North
Subject: Trinity River discharge location, facing upstream.

Site: Anderson County, TX Photo: 10 Date: 7/25/2012 Direction: South
Subject: Trinity River discharge location, facing downstream.

Site: Anderson County, TX Photo: 11 Date: 7/24/2012 Direction: West
Subject: Representative photo of WL1_PFO.

Site: Anderson County, TX Photo: 12 Date: 7/24/2012 Direction: North
Subject: Representative photo of WL1_PEM. Located within an existing ROW corridor.

Site: Anderson County, TX Photo: 16 Date: 7/25/2012 Direction: South
Subject: Representative photo of WL2_PEM. Small wetland located within existing ROW corridor.

Site: Anderson County, TX Photo: 17 Date: 7/25/2012 Direction: North
Subject: Representative photo of WL3_PEM and WL3_PFO. Located along northern boundary of proposed route.

Site: Anderson County, TX Photo: 15 Date: 7/25/2012 Direction: North
Subject: Representative photo of WL4_PFO. Part of a large oxbow lake located within Trinity River floodplain.

Site: Anderson County, TX Photo: 13 Date: 7/25/2012 Direction: East
Subject: Representative photo of WL5_PFO. Located within Trinity River floodplain.

Site: Anderson County, TX Photo: 14 Date: 7/25/2012 Direction: North
Subject: Representative photo of WL5_PEM. Located along the northern boundary of the proposed route.

Appendix C
Addendum APEX CAES, Biological Resources Review for Trinity River Pipeline, Water Well Pad and Pipeline Areas, and ETC Connector Pipeline Area, Anderson County, Texas (September 2013)

Final

ADDENDUM
APEX CAES Biological Resources Review for the Trinity River Pipeline, Water Well Pad and Pipeline Areas and ETC Connector Pipeline Area Anderson County, Texas

Prepared for

APEX Compressed Air Energy Storage, LLC

September 2013

CH2MHILL®

Contents

Acronyms and Abbreviations

APEX	APEX Compressed Air Energy Storage, LLC
BEC	Bethel Energy Center
CAES	Compressed Air Energy Storage
DOQQS	Digital Ortho Quarter Quadrangles
ETC	Energy Transfer Company
FM	Farm-to-Market
JD	Jurisdictional Determination
NRCS	Natural Resource Conservation Service
NWI	National Wetland Inventory
OHWM	Ordinary High Water Mark
PEM	Palustrine Emergent Wetland
ROW	Right –of-Way
TPWD	Texas Parks and Wildlife Department
TXNDD	Texas Natural Diversity Database
TOB	Top-of-Bank
USACE	U.S. Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WOUS	Waters of the U.S

Introduction

This report is an addendum to the APEX Compressed Air Energy Storage, LLC (APEX) Compressed Air Energy Storage (CAES) Bethel Energy Center (BEC) Project, Biological Resources Review for the Trinity River Pipeline, Water Well Pad and Pipeline Areas and Energy Transfer Company (ETC) Connector Pipeline, Anderson County, Texas (Trinity River Biological Resources Review). Refer to the Trinity River Biological Resources Review for project purpose and description. This addendum documents wetland boundaries observed within the extended Project area due to modifications to the proposed Project.

The extended Project area includes:

- a potential alternate wastewater discharge pipeline route to the Trinity River,
- 2S/2D water well, access road and pipeline relocations on the Hall and Carter tracts, and
- the SWD#3 well pad and new brine pipeline corridor.

After the previous delineation of the Trinity River wastewater discharge pipeline identified large areas of high-quality palustrine forested wetlands along the route, Apex identified a potential alternate route to the Trinity River that avoids adverse impacts to these forested wetlands. Due to landowner and constructability issues, a 1,594 foot section of the original wastewater discharge pipeline and associated access road were relocated to an adjacent property from the Malone tract to the Carter tract. Proposed APEX 2S/2D water wells were relocated further east to reduce costs associated with construction of a power line to be owned by Trinity Valley Electric Cooperative. The proposed SWD#3 brine injection well and brine pipeline will be constructed to dispose of brine water from CAES cavern leaching.

Site Description

The proposed alternate wastewater discharge pipeline route to the Trinity River consists of a partial reroute of the planned waste water pipeline that would tie-in to the proposed wastewater pipeline just north of Farm-to-Market (FM) 321 and travel approximately 1.88 miles before discharging into the Trinity River approximately 1 mile south of the original proposed discharge location (**Appendix A, Figure 1**). The proposed reroute crosses under FM 321 and follows the southern side of the road for approximately 1.29 miles before turning west northwest and crossing under FM 321 before continuing to the river. The proposed alignment consists of a 40-foot temporary construction easement of which a 20-foot easement would remain as permanent right-of-way (ROW). The proposed pipeline reroute is located in a rural area; land use consists of rangeland and bottomland hardwood forest.

The relocation from the Malone tract to the Carter tract reroutes the previously planned wastewater discharge and water pipeline routes from County Road 2610 west to the Malone tract and north to the adjacent Carter tract. The previously planned access road on the Carter tract will be relocated approximately 100 feet south to parallel the proposed wastewater discharge and water pipeline reroute before traveling north-northwest across an ephemeral stream to terminate at the Hall/Carter property boundary. Apex 2S/2D water wells will be relocated approximately 1,120 feet east from the southwest corner of the Hall tract to the southeast corner of the tract. Water from Apex 2S/2D will be connected to the proposed water supply pipeline via an approximately 50-foot pipeline (**Appendix A, Figure 2**). The proposed reroutes and relocations crosses land use areas consistent with the original pipeline route.

A 3.02 mile, 10-12 inch, brine pipeline, a 0.29 mile radial connector pipeline and injection well SWD #3 pad will be constructed northwest of the proposed APEX facility and be used to transport brine solution created during cavern construction for disposal injection wells (existing SWC#1 and SWD#2 and permitted SWC#3) owned by Energy Transfer. This pipeline will be co-located with an existing brine pipeline within an existing pipeline ROW. An additional 50 feet of temporary workspace will be needed to construct this pipeline (**Appendix A, Figure 3**). The proposed brine pipeline route is located in a rural area; land use consists of industrial, pastureland and hardwood forest.

Desktop Review

Prior to conducting a field visit, an in-office literature review was performed. The following information was reviewed:

- US Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) data layers (USFWS, 2013)
- US Geological Survey (USGS) topographic maps: 1:24,000 scale quadrangle maps (USGS, Cayuga, TX 2013)
- Web Soil Survey (Natural Resource Conservation Service {NRCS], 2013)
- Digital Ortho Quarter Quadrangles (DOQQs)

Topographic maps were used to locate and review potentially jurisdictional waterways in the Project area. NWI layers were used to locate potential wetlands and other water resources in the Project area. The *Web Soil Survey of Anderson County, Texas* (NRCS, 2013) was used to locate hydric soils to be verified by field observation. Maps containing Project design limits and aerial photography were used in the field to locate Project boundaries.

A qualified biologist performed a search of several sources of information regarding special status species that may occur on or in the vicinity of the Project. Sources were consulted on July 29, 2013 and included: 1) the U.S. Fish and Wildlife Service's (USFWS) Threatened and Endangered Species System internet database; 2) the Texas Parks and Wildlife Department (TPWD) Annotated County List of Rare Species for Anderson County; and 3) the Texas Natural Diversity Database (TXNDD). The TXNDD was reviewed on February 7, 2012. No additional threatened or endangered species had been added to either the federal or state list since the original Trinity River Biological Resources Review (CH2M HILL, 2012). A description of the methods for documenting sensitive wildlife and habitat is provided in the Methodology Section of the Trinity River Biological Resources Review (CH2M HILL, 2012).

Methodology

WOUS Delineation

CH2M HILL biologists conducted a field delineation of waters of the United States (WOUS), including wetlands, on the Project from July 30 to 31, 2013 and August 26 to 27, 2013. Wetland delineations were conducted following procedures set forth in the *U.S. Army Corps of Engineers Wetland Delineation Manual* (USACE, 1987) and the *Interim Regional Supplement of the Corps of Engineers Wetlands Delineation Manual: Atlantic and Gulf Coast Region (Manual)* v2.0 (USACE, 2012).

A description of the general methods for delineating wetlands, including the identification of hydric soils, wetland hydrology, and hydrophytic vegetation is provided in the Methodology Section of the Trinity River Biological Resources Review (CH2M HILL, 2012).

Results

WOUS and Wetlands

Please refer to the Trinity River Biological Resources Review for descriptions and location of WOUS identified within the larger Apex BEC Project area. This section is limited to a description of the wetlands and waterbodies identified within the alternate Trinity River pipeline route, Hall and Carter tract relocations, and SWD#3 well pad and brine pipeline. No potential WOUS were identified along the alternate Trinity River pipeline route. Within the Carter tract reroute, 1 potential WOUS (1 surface water) was identified and delineated this feature was previously identified along the original route. Within the SWD#3 well pad and brine pipeline route, 9 potential WOUS (6 surface waters and 3 wetlands) were identified and delineated. **Table 2** summarizes the waterbodies and wetlands identified on the Project, and the locations are depicted in **Figure 1-3** in **Appendix A**. Wetland determination data forms are in **Appendix B**. Representative photographs of the wetlands and waters are provided in **Appendix C**.

TABLE 1
Potential Jurisdictional Waters
APEX CAES BEC– Anderson County, TX

Feature ID	Location	Type*	Potential Jurisdictional Size Within the Project Area
Carter Tract Reroute			
S3	Carter Tract Reroute	Ephemeral	131 linear feet
SWD#3 and Brine Pipeline			
S1	Brine Pipeline	Ephemeral	13 linear feet
S2	Brine Pipeline	Ephemeral	96 linear feet
S3	Brine Pipeline	Ephemeral	50 linear feet
S4	Brine Pipeline	Man-made Pond	65 linear feet
S5	Brine Pipeline	Man-made Pond	101 linear feet
S6	Brine Pipeline	Intermittent	96 linear feet
WL1	Brine Pipeline	PEM	0.02 acres
WL2	Brine Pipeline	PEM	0.01 acres
WL3	Brine Pipeline	PEM	0.07 acres

Notes: All measurements generated using ArcGIS 9.2. S2. No wetland features were identified along the alternate waste water discharge pipeline route.
*Cowardin system from NWI mapping for the project area.

Non-wetland Waters

Carter Tract Reroute

S3- Ephemeral Stream

S3 is identified as an unnamed intermittent stream on the USGS Cayuga 7.5-minute quadrangle map. S3 is identified on the NWI as an R2OWH (Riverine system, lower perennial subsystem, open water/unknown bottom class, and a permanently flooded water regime). However, based on field observations of the stream within and adjacent to the Project area, the stream along this segment appears to be ephemeral. The stream lacks the biological, hydrological, and physical characteristics commonly associated with the continuous or intermittent conveyance of water. The average OHWM across its reach is 3 feet with an average TOB width of 8 feet. No water was observed in the channel at the time of the survey. There are approximately 131 linear feet of channel within the Project. S3 flows approximately 5.8 aerial miles south before flowing into Catfish Creek, a tributary of the Trinity River. Therefore, S3 would likely be considered jurisdictional by the USACE.

SWD#3 Well Pad and Brine Pipeline

S1 Ephemeral Stream

S1 is identified as an unnamed intermittent stream on the USGS Cayuga 7.5-minute quadrangle map. S1 is not identified on the NWI. However, based on field observations of the stream within and adjacent to the Project area, the stream along this segment appears to be ephemeral with the head cut beginning at the existing pipeline ROW. East of the existing pipeline ROW, no bed, band, or OHWM was present. Also, the stream lacks the biological, hydrological, and physical characteristics commonly associated with the continuous or intermittent conveyance of water. The average OHWM across its reach is 6 feet with an average TOB width of 8 feet. No water

was observed in the channel at the time of the survey. There are approximately 13 linear feet of channel within the Project. S1 flows approximately 2.1 aerial miles west before flowing into Saline, a tributary of the Trinity River. Therefore, S3 would likely be considered jurisdictional by the USACE.

S2 Ephemeral Stream

S2 is not identified on the USGS Cayuga 7.5-minute quadrangle map or on the NWI. However, based on field observations of the stream within and adjacent to the Project area, the stream along this segment appears to be ephemeral spillway to S4 Man-made Pond. The stream only flows during periods of high rainfall and when the adjoining man-made pond is at capacity. S2 has highly eroded banks with an average OHWM across its reach of 5 feet with an average TOB width of 10 feet. No water was observed in the channel at the time of the survey. There are approximately 96 linear feet of channel within the Project. S2 flows approximately 6.9 aerial miles south before flowing into Catfish Creek, a tributary of the Trinity River. Therefore, S2 would likely be considered jurisdictional by the USACE.

S3 Ephemeral Stream

S3 is identified as an unnamed intermittent stream on the USGS Cayuga 7.5-minute quadrangle map. S3 is not identified on the NWI. However, based on field observations of the stream within and adjacent to the Project area, the stream along this segment appears to be an ephemeral spillway to S4 Man-made Pond, and only flows during periods of high rainfall and when the adjoining pond is at capacity. The stream lacks the biological, hydrological, and physical characteristics commonly associated with the continuous or intermittent conveyance of water. The average OHWM across its reach is 12 feet with an average TOB width of 15 feet. No water was observed in the channel at the time of the survey. There are approximately 50 linear feet of channel within the Project. S3 flows approximately 6.9 aerial miles south before flowing into Catfish Creek, a tributary of the Trinity River. Therefore, S3 would likely be considered jurisdictional by the USACE.

S4 Man-made Pond

S4 is not identified on the USGS Cayuga 7.5-minute quadrangle map or on the NWI. Based on field observations of the stream within and adjacent to the Project area, this surface water is a man-made stock pond constructed within the drainage of S2 and S3. The average OHWM across its reach is approximately 65 feet. The average TOB width was 75 feet. Water width was approximately 50 feet. There are approximately 65 linear feet of channel within the Project. S4 flows approximately 6.9 aerial miles south before flowing into Catfish Creek, a tributary of the Trinity River. Therefore, S4 would likely be considered jurisdictional by the USACE.

S5 Man-made Pond

S5 is not identified on the USGS Cayuga 7.5-minute quadrangle map or on the NWI. However, based on field observations of the pond within and adjacent to the Project area, the pond appears to be man-made. The average OHWM dimensions were 20 feet by 40 feet. The TOB dimensions were 30 feet by 50 feet. Water was present at the time of observation. There are approximately 101 linear feet of channel within the Project. There was no observation of a spillway or existing stream feature and S5 appears to be isolated. Therefore, S5 would likely not be considered jurisdictional by the USACE.

S6 Intermittent Stream

S6 is identified as an unnamed intermittent stream on the USGS Cayuga 7.5-minute quadrangle map. S3 is identified on the NWI as an R4SBC (Riverine system, Intermittent subsystem, Streambed, and seasonally flooded water regime). Based on field observations of the stream within and adjacent to the Project area, the stream along this segment appears to be intermittent. The average OHWM across its reach is 25 feet with an average TOB width of 30 feet. Water was present at the time of observation. There are approximately 96 linear feet of channel within the Project. S6 flows approximately 6.1 aerial miles south before flowing into Catfish Creek, a tributary of the Trinity River. Therefore, S6 would likely be considered jurisdictional by the USACE.

Wetlands

SWD#3 Well Pad and Brine Pipeline

WL1 PEM

WL1 is a low-quality palustrine emergent (PEM) wetland approximately 0.02 acres in size. Dominant vegetation within the wetland consists of smartweed (*Persicaria pensylvanica*), Cherokee sedge (*Carex cherokeenisis*), and curly doc (*Rumex crispus*).

Soils in WL1 were characterized as a 10YR6/1 clay with approximately 20 percent abundance of 10YR 4/4 redoximorphic concentrations from 0 to 16 inches. Hydric soil indicators included depleted matrix (F3). Hydrology indicators included iron deposits, moss trim lines, and geomorphic position.

The NWI does not identify this area as wetland. WL1 appears to be an isolated wetland located within a micro-depression. WL1 is located approximately 0.25 miles east of the nearest stream identified on the USGS topographic map. The USACE will complete a significant nexus analysis to evaluate whether or not the wetland is isolated.

WL2 PEM

WL2 is a low-quality PEM wetland approximately 0.01 acres in size. Dominant vegetation within the wetland consists of common rush (*Juncus effusus*) and dwarf spikerush (*Eleocharis parvula*).

Soils in W2 were characterized as a 7.5YR 4/1 clay loam with approximately 20 percent abundance of 7.5YR 5/8 redoximorphic concentrations from 0 to 2 inches, a Gley 2.5/10b clay loam from 2 to 6 inches, a 2.5Y 4/3 sand from 6 to 8 inches, and a Gley 2.5/10b clay loam from 8 to 16. Hydric soil indicators included loamy gleyed matrix (F2) and depleted matrix (F3). Hydrology indicators included sediment deposits, surface soil cracks, drainage patterns, and geomorphic position.

The NWI does not identify this area as wetland. However WL2 is connected to S3 which is a tributary to Catfish Creek, and therefore likely a jurisdictional water.

WL3 PEM

WL3 is a fringe PEM wetland of S6 that is approximately 0.07 acres in size. Dominant vegetation within the wetland consists of Vasey's grass (*Paspalum urvillei*), bushy bluestem (*Andropogon glomeratus*), and broadleaf cattail (*Typha latifolia*).

Soils in W3 were characterized as a 10YR 3/3 silt loam from 0 to 2 inches and a 10YR 5/2 silt loam with approximately 20 percent abundance of 10YR 6/8 redoxomorphic concentrations from 2 to 16 inches. Hydric soil indicators included depleted matrix (F3) and redox depressions (F8). Hydrology indicators included water marks, water-stained leaves, and geomorphic position.

The NWI does not identify this area as wetland. WL3 is a fringe wetland of an intermittent tributary of Catfish Creek and therefore would likely be jurisdictional.

Sensitive Wildlife and Habitat

No additional habitat types were identified during this survey. As such, habitat descriptions and sensitive species effects determinations are provided in the Results Section of the Trinity River Biological Resources Review (CH2M HILL, 2012).

Recommendations

Jurisdictional Recommendations for WOUS

CH2M HILL identified seven potentially jurisdictional streams and three potentially jurisdictional wetlands in the Project area. One of the three wetlands may be determined to be a non-jurisdictional isolated wetland upon site review by the USACE.

Authority over activities conducted within jurisdictional wetlands is vested in the Fort Worth District of the USACE pursuant to Section 404 of the Clean Water Act.[1] The Fort Worth District of USACE is within the Fifth Circuit Court of Appeals area. USACE Districts within the Fifth Circuit Court area use a test for jurisdiction that emphasizes some physical connection to traditional navigable water, rather than a non-avian interstate commerce link.[2] This jurisdictional determination (JD) can be made through concurrence with an Approved JD report submitted to the Fort Worth District. In order to gain concurrence from the USACE, the methods and results sections of this wetland report and corresponding map should be submitted to the Forth Worth District of the USACE, along with a letter requesting a JD of the mapping. Although an official JD only lasts 5 years, an expired JD can facilitate future determinations and expedite any permitting process that may be needed for future projects on the Property. Consultation with the USACE-Fort Worth District during the early planning phase of future projects could prevent delays and reduce processing times later in the project.

References

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[1] 33 U.S.C.A § 1344 specifically provides for permits for the discharge of dredged or fill material to the navigable waters of the United States.

[2] Rice v Harken Exploration, 2001 U.S .App. Lexis 7462. This case is actually an OPA case that interprets the identical waters of the United States Language found in the Clean Water Act. The court, in this case, found plenty of interstate commerce connection for the waters in question, but insufficient linkage to a navigable water. The court declined to specify how much linkage was required to convey jurisdiction, but did decide that the overland flow and outcropping of groundwater theorized by the plaintiff was not sufficient.

Appendix A
Figures

VICINITY MAP

LEGEND

- Proposed Alternative Pipeline Corridor to Trinity River
- 75' Survey Buffer
- Other Waters of the U.S.

Wetlands

- PEM
- PFO

Background Image:
Bing Maps Hybrid

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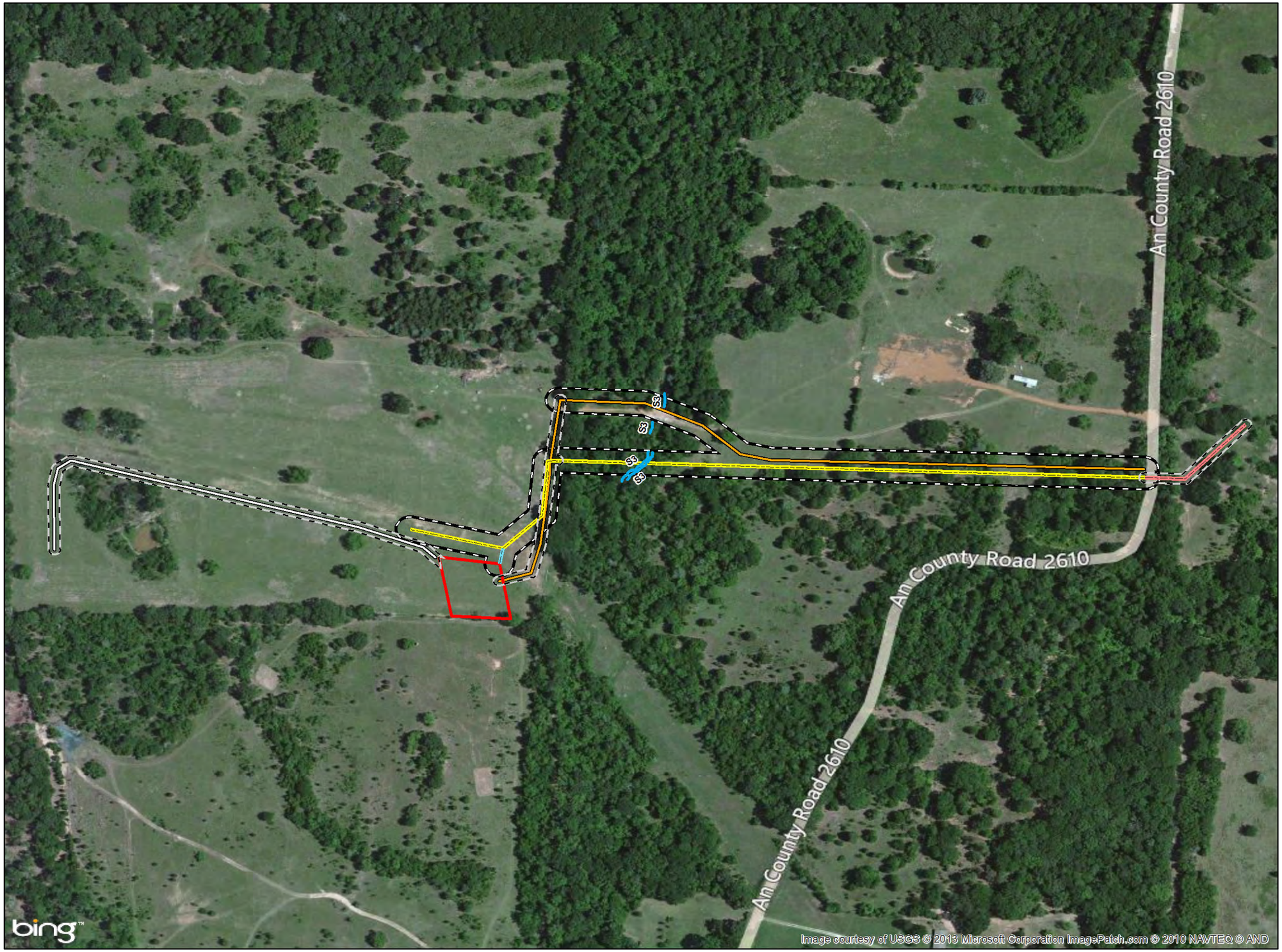
Feet

FIGURE 1-1
Alternate Wastewater Discharge Pipeline
Wetlands and Other Waters of the U.S
Anderson County, Texas



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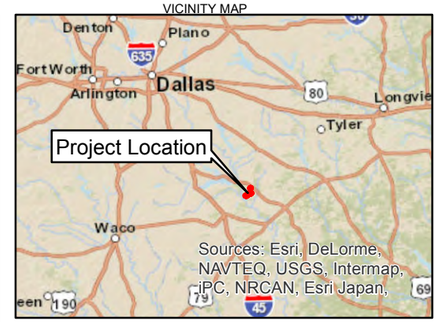

LEGEND

- Other Waters of the U.S.
- Eddie Lee Malone Property Proposed Pipeline Reroute
- Carter Property Proposed Pipeline Corridor
- Carter Property Proposed Access Road
- Hall Property Proposed Access Road
- Hall Property 50' Proposed Pipeline Corridor
- Hall Well Area
- 30' Survey Buffer
- 75' Survey Buffer

Wetlands

- PEM
- PFO

Background Image:
Bing Maps Hybrid

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Feet

FIGURE 2-1
Carter Tract Proposed Pipeline Reroute
Wetlands and Other Waters of the U.S
Anderson County, Texas

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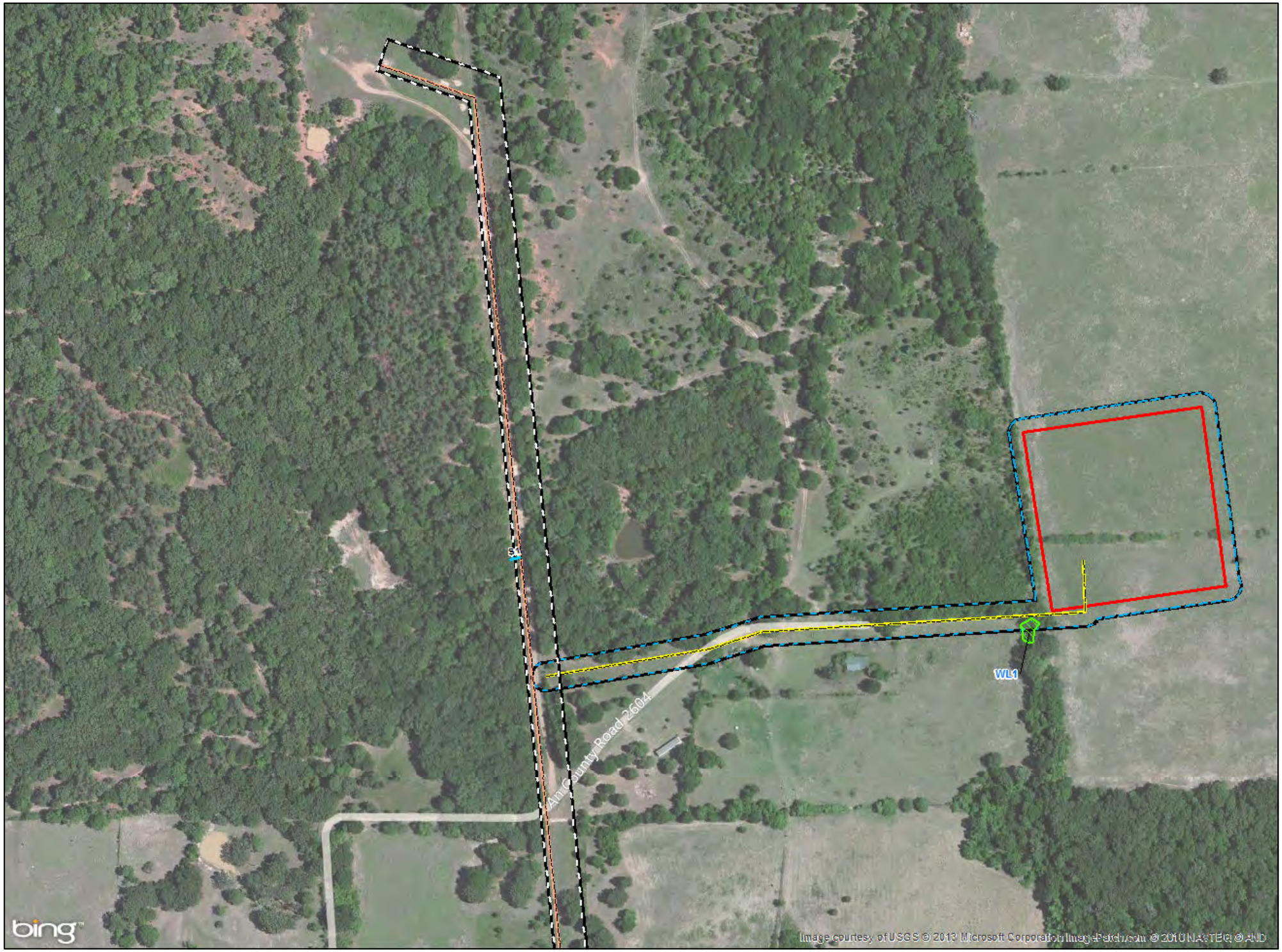
CH2MHILL



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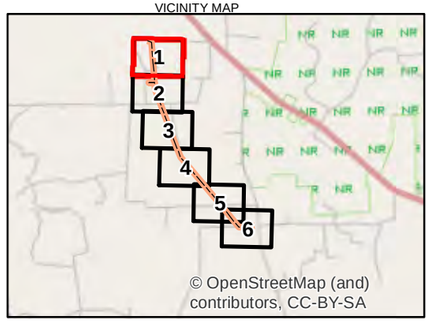


LEGEND

- Field Collected Points
- Streams
- Proposed Brine Pipeline
- 85' Survey Buffer
- 75' Survey Buffer
- Proposed Radial Pipeline - Route #3
- Proposed SWD#3 Well Pad

Wetland Type

- PEM
- PFO

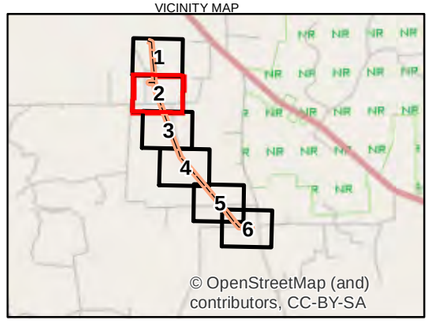
Image:
Bing Maps Hybrid

N

0 100 200 400
Feet

FIGURE 3-1
Proposed SWD#3 Well Pad and Brine Pipeline
Wetlands and Other Waters of the U.S.
Anderson County, Texas

VICINITY MAP



LEGEND

- Field Collected Points
- Streams
- Proposed Brine Pipeline
- 85' Survey Buffer
- 75' Survey Buffer
- Proposed Radial Pipeline - Route #3
- Proposed SWD#3 Well Pad

Wetland Type

- PEM
- PFO

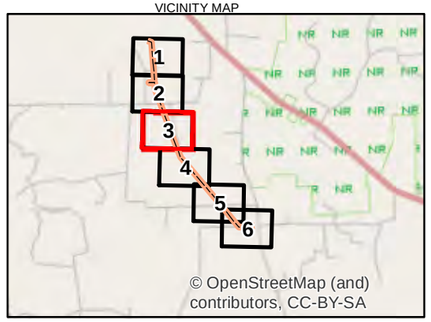
Image:
Bing Maps Hybrid

N

0 100 200 400
Feet

FIGURE 3-2
Proposed SWD#3 Well Pad and Brine Pipeline
Wetlands and Other Waters of the U.S.
Anderson County, Texas

VICINITY MAP



LEGEND

- Field Collected Points
- Streams
- Proposed Brine Pipeline
- 85' Survey Buffer
- 75' Survey Buffer
- Proposed Radial Pipeline - Route #3
- Proposed SWD#3 Well Pad

Wetland Type

- PEM
- PFO

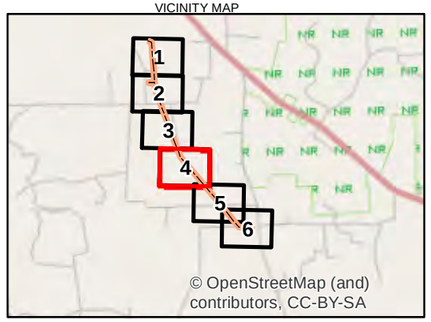
Image:
Bing Maps Hybrid

N

0 100 200 400
Feet

FIGURE 3-3
Proposed SWD#3 Well Pad and Brine Pipeline
Wetlands and Other Waters of the U.S.
Anderson County, Texas

VICINITY MAP



LEGEND

- Field Collected Points
- Streams
- Proposed Brine Pipeline
- 85' Survey Buffer
- 75' Survey Buffer
- Proposed Radial Pipeline - Route #3
- Proposed SWD#3 Well Pad

Wetland Type

- PEM
- PFO

Image:
Bing Maps Hybrid

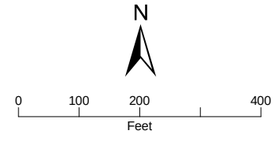
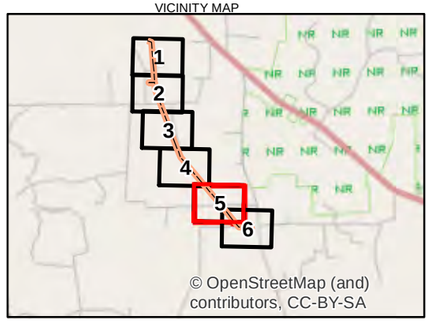


FIGURE 3-4
Proposed SWD#3 Well Pad and Brine Pipeline
Wetlands and Other Waters of the U.S.
Anderson County, Texas

VICINITY MAP



LEGEND

- Field Collected Points
- Streams
- Proposed Brine Pipeline
- 85' Survey Buffer
- 75' Survey Buffer
- Proposed Radial Pipeline - Route #3
- Proposed SWD#3 Well Pad

Wetland Type

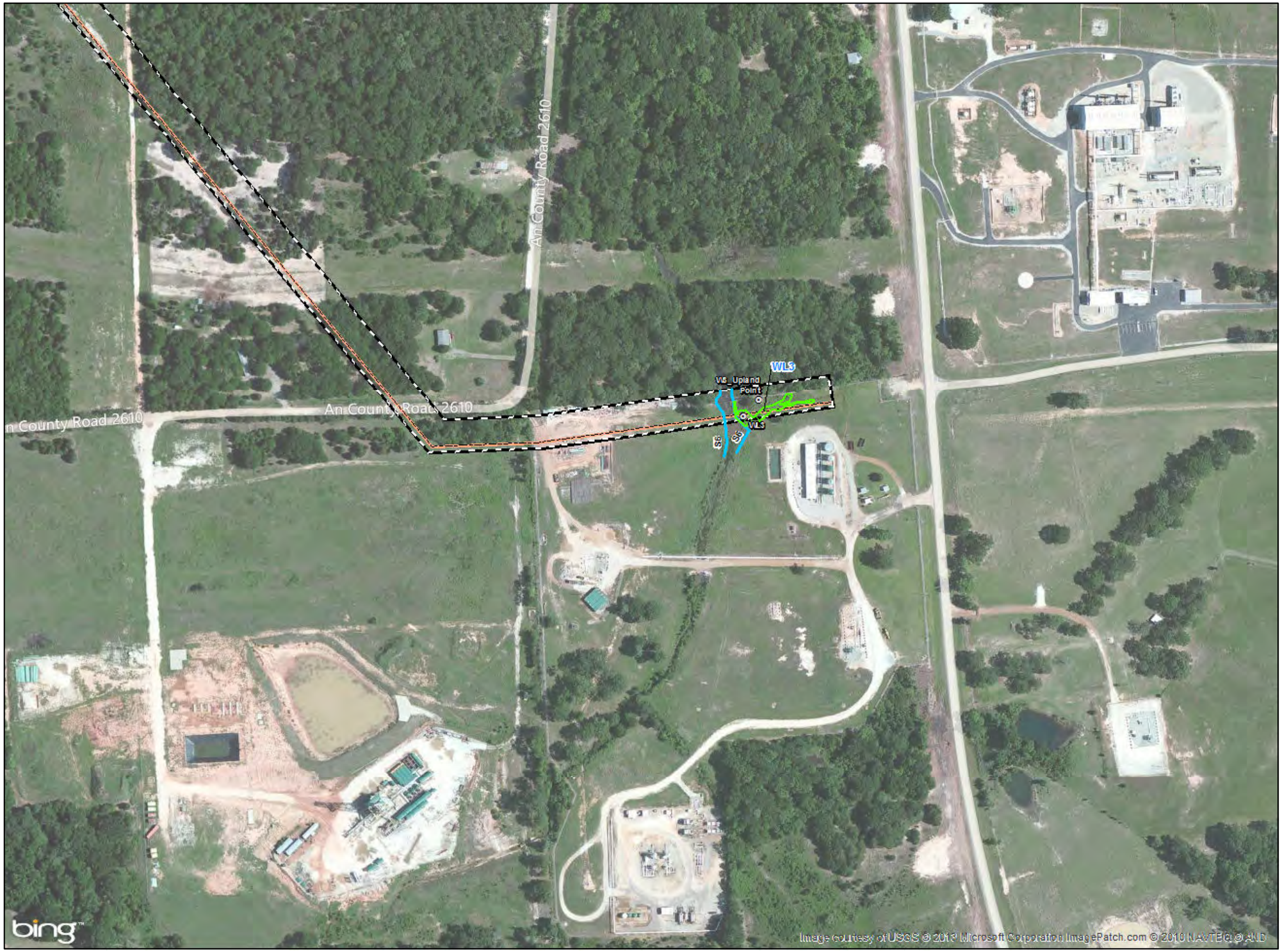
- PEM
- PFO

Image:
Bing Maps Hybrid

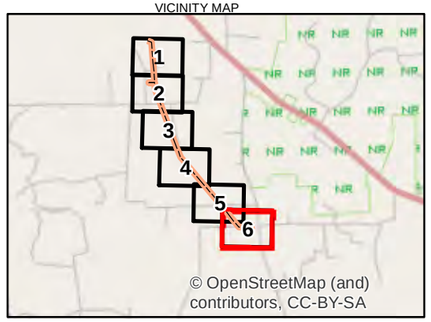
N

0 100 200 400
Feet

FIGURE 3-5
Proposed SWD#3 Well Pad and Brine Pipeline
Wetlands and Other Waters of the U.S.
Anderson County, Texas



VICINITY MAP



LEGEND

- Field Collected Points
- Streams
- Proposed Brine Pipeline
- 85' Survey Buffer
- 75' Survey Buffer
- Proposed Radial Pipeline - Route #3
- Proposed SWD#3 Well Pad

Wetland Type

- PEM
- PFO

Image:
Bing Maps Hybrid

N

0 100 200 400
Feet

FIGURE 3-6
Proposed SWD#3 Well Pad and Brine Pipeline
Wetlands and Other Waters of the U.S.
Anderson County, Texas

Appendix B
Data Sheets

At the request of the USEPA, wetland/waterbody data sheets were removed from the appendices to facilitate reproduction of the Apex BEC Biological Assessment.

Appendix C
Photo Log

Site: Anderson County, TX Photo: 1 Date: 7/31/2013 Direction: South
Subject: Representative photo of ephemeral stream S3 located along the Carter tract pipeline reroute. View is facing downstream.

Site: Anderson County, TX Photo: 2 Date: 7/31/2013 Direction: South
Subject: Representative photo of WL1 located within a shallow depression along the proposed brine pipeline corridor.

Site: Anderson County, TX Photo: 3 Date: 7/31/2013 Direction: South
Subject: Representative photo of upland associated with WL1.

Site: Anderson County, TX Photo: 4 Date: 8/26/2013 Direction: West
Subject: Representative photo of ephemeral stream S1 located along the proposed brine pipeline corridor. View is facing downstream.

Site: Anderson County, TX Photo: 5 Date: 8/26/2013 Direction: West
Subject: Representative photo of ephemeral stream S2 along the proposed brine pipeline corridor. View is facing downstream. The stream has been partially dammed.

Site: Anderson County, TX Photo: 6 Date: 8/26/2013 Direction: Southwest
Subject: Representative photo of ephemeral stream S3 located along the proposed brine pipeline corridor. View is facing downstream. S3 serves as the spillway to a man-made pond (S4) and connects to S2 outside of the proposed ROW.

Site: Anderson County, TX Photo: 7 Date: 8/26/2013 Direction: Northeast
Subject: Representative photo of WL2 located along the proposed brine pipeline corridor. WL2 is located at the base of a man-made pond's (S4) spillway (S3).

Site: Anderson County, TX Photo: 8 Date: 8/26/2013 Direction: Southeast
Subject: Representative photo of upland associated with WL2.

Site: Anderson County, TX Photo: 9 Date: 8/26/2013 Direction: North
Subject: Representative photo of man-made pond S4 located along the proposed brine pipeline corridor.

Site: Anderson County, TX Photo: 10 Date: 8/27/2013 Direction: West
Subject: Representative photo of man-made pond, S5. The pond is located on the west side of the existing ROW and will not be impacted by the proposed Project.

Site: Anderson County, TX Photo: 11 Date: 8/27/2013 Direction: South
Subject: Representative photo of intermittent stream S6 located along the proposed brine pipeline corridor. View is facing downstream. Flows north to south across the proposed ROW.

Site: Anderson County, TX Photo: 12 Date: 8/27/2013 Direction: Southeast
Subject: Representative photo of intermittent stream S6 along the proposed brine pipeline corridor. View is facing downstream.

Site: Anderson County, TX Photo: 13 Date: 8/27/2013 Direction: West
Subject: Representative photo of WL3 located along the proposed brine pipeline corridor.

Appendix D
Air Deposition Calculations

Nitrogen Deposition calculation for APEX Bethel Energy Center site:

Max annual NOx concentration (as NO_2) in air = **0.5 µg/m^3** (Source: AERMOD modeling of APEX facility)

Avg. Precipitation in Dallas, TX: 37.68 inches x (1m/39.37in.) = 0.96 m/yr

(Source: The weather channel website: http://www.weather.com/weather/wxclimatology/monthly/USTX0327)

So, for every m^2 of space, volume of precipitation per year is 0.96 m^3

Density of water is 1 g/cm^3 x 10^6 cm^3/m^3 = 1x10^6 g/m^3

M_p = Mass of precipitation per year per m^2 = 0.96 m^3/yr x 166g/m^3 x 1kg/10^3g = **960 kg H_2O/yr/m^2**

Equation for calculating concentration of nitrogen in precipitation (Source: 1987 Wolff washout ratio paper):

$Cp_N = W_N \times Ca_N / D_a$

Where:

Cp_N = concentration of nitrogen in precipitation

W_N = nitrogen washout ratio = concentration of N in precipitation / concentration of N in air = 149 (avg. of the three values 57, 352, and 37 in Table 2 of Wolff paper)

D_a = density of air = 1.20 kg/m^3

Ca_N = concentration of N in air = 0.5 µg/m^3 x 1g/10^6 µg = 5x10^{-7} g/m^3

Cp_N = 149 x 5.0E-07g/m^3 / 1.2 kg/m^3 = **6.208E-05 g N /kg H_2O**

Deposition Rate of N (as NO_2) = CpN x Mp

= (6.208E-05 g N /kg H_2O) x(960 kg H_2O/yr/m^2)

= 0.0596 g/m^2/yr

Converting to mg/m^2/yr:

Deposition Rate of N (as NO_2) = 0.0596 g/m^2/yr x 10^3mg/g = 60 mg/m^2/yr

Note: the above estimate is based only on the NO_2 air concentration resulting from the APEX plant. It does not include background NO_2 in the atmosphere.