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April 12, 2013

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

Subject: Biological Assessment Report for the Proposed Apex Matagorda Energy Center near Clemville, Matagorda County, Texas

Dear Mr. Dumaual:

We are submitting the Biological Assessment Report for the proposed Matagorda Energy Center (MEC) near Clemville, Matagorda County, Texas. This report is being submitted in conjunction with the Greenhouse Gas PSD Permit Application for the APEX Matagorda Energy Center that was submitted to your office on November 20, 2012. A consolidated cultural resource report for the proposed project will be submitted to USEPA next 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,

Stephen W. Naeve

Stephen Naeve
Chief Operating Officer

Enclosure

cc: Melanie Magee, USEPA Region 6
Tina Arnold, USEPA Region 6
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Biological Assessment
Matagorda Energy Center
Matagorda County, Texas

Prepared for

APEX Matagorda Energy Center, LLC

April, 2013

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Acronyms and Abbreviations

AERMOD	An air emissions model
APEX	APEX Matagorda Energy Center, LLC.
BA	Biological assessment
BMP	Best management practice
CAES	Compressed Air Energy Storage
CCN	Certificate of Convenience and Necessity
CO	Carbon monoxide
ERCOT	Electric Reliability Council of Texas
ESA	Endangered Species Act
ETC	Energy Transfer Company
ITP	Incidental take permit
LCRA	Lower Colorado River Authority
MEC	Matagorda Energy Center
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
PSS	Palustrine scrub-shrub
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
WOUS	Waters of the United States

SECTION 1.0

Introduction

1.1 Background and Consultation History

APEX Matagorda Energy Center, LLC proposes to construct the Matagorda Energy Center (MEC), a 317 MW Compressed Air Energy Storage (CAES) facility located near Clemville, Matagorda 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, MEC 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 43.8 acres of land in Matagorda County, Texas ("the Property") on November 1 and 2, 2012 and again on December 13, 2012 following a facility design change. The purpose of these surveys was to describe and quantify the extent of potential 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 Project area. Sources consulted on August 9, 2012 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 Matagorda County; and 3) the Texas Natural Diversity Database (TXNDD). The TPWD TXNDD was also reviewed on September 28, 2012 within a radius of 10 miles from the Property. A report on the biological resources on and near the Project area was submitted to APEX in April, 2013 (Appendix A).

Early coordination was initiated with the TPWD regarding potential affects to threatened or endangered species and wildlife resources. A letter was submitted to the TPWD on January 14, 2013 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 this coordination letter is provided in Appendix B.

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 November 1 and 2, 2012, CH2M HILL conducted a threatened and endangered species habitat survey on the Property along an approximately 0.25-mile wastewater pipeline, and a 0.2-mile air pipeline in Matagorda County, Texas ("the Project area"). Subsequent habitat surveys were conducted on December 13, 2012 and March 13, 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 April 2013 (CH2M Hill, 2013)(Appendix A).

The purpose of this BA, prepared by CH2M HILL, is to reach a conclusion regarding the potential for the proposed APEX CAES MEC 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 MEC, a 317 MW CAES facility located near Clemville, Matagorda County, Texas. CAES is a commercially available, economically attractive form of bulk energy storage for the electricity grid. The coordinates for the APEX MEC Facility are: 28.97279; -96.14062.

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 MEC site due to the presence of suitable geologic conditions, existing gas and electric transmission near the Property, and availability of surface water as a water source. Figure 1-1 is a map showing the location of the proposed facility.

The cavern for the MEC will be created by drilling a "cavern well" at a terminal depth of approximately 3,750 feet. Fresh water supplied by the Texas Brine Corporation (Texas Brine) brine production facility, located approximately 2,730 feet west of the Property, 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 transferred via pipeline to the Texas Brine facility for integration into their commercial brine production activities. This leaching process, expected to require approximately 500 days, is carefully controlled to produce a cavern of the desired capacity and shape.

The proposed MEC 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. Cooling tower make-up water will be obtained from the Lower Colorado River under a contract with the Lower Colorado River Authority (LCRA). The proposed MEC 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. Cooling tower blow down water will flow to a 250,000 gallon storage tank prior to being discharged via a pipeline to the Tres Palacios 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 MEC 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 MEC 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 (4th Quarter 2013 – 3rd 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. The current site layout has been developed to place the facility on existing crop land 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-on 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 constructions areas for dust control during construction activities; and
- The locations of fuels 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
- A 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 designated 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 includes four interconnected areas: (1) the 43.8 acre Property , (2) the utility corridor for the blow down wastewater pipeline to the Tres Palacios River, (3) at and near the blow down water discharge point on the river, (4) the compressed air pipeline corridor (including air injection well pads)carrying compressed air to and from the facility and cavern, and (5) the pipeline corridor carrying freshwater from the Texas Brine facility to the cavern and brine water back to Texas Brine. An existing natural gas transmission line crosses the site and will be tapped to secure natural gas required for CAES plant operation.

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. Therefore, from an air emissions standpoint, the action area does not extend beyond the property boundary.

1.4.2 Transmission Corridor

Electrical transmission will also be required for facility development. Within ERCOT, the transmission lines are independently sited and operated by a Transmission and Distribution Utility (TDU) not the generator (in this case, the MEC). The TDU, not APEX, will evaluate the alternative routes and present its case 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, 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 TDU will design, build, own, and operate the interconnection facilities. Texas law and PUC rules entitle generators to interconnection with costs (other than the step-up transformers and related protection at the plant site) being borne by the broad market.

1.4.3 Tres Palacios River

The discharge point on the Tres Palacios River exists within State stream segment #1502, Tres Palacios River. Section #1502 extends from a point 1.6 km upstream of Wilson Creek in Matagorda County to State Route 525 (Old US 59) in Wharton County. As noted above, the area of the Tres Palacios River at or near the blow down water discharge point has been included in the action area for the project.

1.4.4 Pipeline Corridors

1.4.4.1 Wastewater Pipeline

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 Tres Palacios River. The proposed wastewater pipeline corridor will originate at the eastern edge of the Property and run approximately 1,767 feet east to the Tres Palacios River discharge point at coordinates: 28.98923; -96.13357 (Figure 1-6).

1.4.4.2 Air Pipeline

From the Apex Matagorda Energy Center, a compressed air pipeline will extend west of the Property approximately 1,100 feet to air CAES wells that connect to the CAES cavern. This pipeline will be used to transport compressed air to and from the CAES storage cavern located west of County Route 417.

1.4.4.3 Freshwater/Brine Water Pipeline

During cavern creation activities, water required for cavern solutioning will be obtained from the Texas Brine water supply via 2 new 5,600 foot pipelines. Brine generated during cavern construction will be piped back to Texas Brine for incorporation into Texas Brine's commercial brine production activity. Texas Brine will process the brine for sale to customers.

SECTION 2.0

Listed Species/Critical Habitat in Action Area

2.1 Species and Critical Habitat List

Table 2-1 is a list of federal, state, and "of concern" (in the TPWD TXNND but without regulatory status) species known to occur in Matagorda County, Texas (CH2M HILL, 2012). Simply having a species listed in the county does not mean that it is present within the action area. This list was compiled by state and federal agencies based on knowledge of each species and of their historic ranges. It is important to note that TPWD's county lists includes several species that are federally listed under the ESA but are not considered by the USFWS as potentially occurring in Matagorda County including Eskimo curlew, Sprague's pipit, smalltooth sawfish, Louisiana black bear, ocelot, red wolf, West Indian manatee, smooth pimpleback, and Texas fawnsfoot. 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. Table 2-1 also identifies 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 three of the state listed species, it is unlikely that any of these species persist within the action area due to the historically disturbed nature of this habitat.

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 September 28, 2012 for species recorded within 10 miles of the action area found reports of one state rare plant occurrence, the coastal gay-feather, a state listed species of conservation concern and two occurrences of a federally delisted avian species, the bald eagle within 10 miles of the Project (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

The U.S. Fish and Wildlife Service's internet database lists the northern aplomado falcon (*Falco femoralis septentrionalis*), piping plover (*Charadrius melodus*), whooping crane (*Grus americana*), hawksbill sea turtle (*Eretmochelys imbricata*), green sea turtle *Chelonia mydas*) (, Kemp's ridley sea turtle (*Lepidochelys kempii*), leatherback sea turtle (*Dermochelys coriacea*), and loggerhead sea turtle (*Caretta caretta*) as the only designated threatened and endangered species in Matagorda County, Texas.

2.2.1.1 Northern Aplomado Falcon

The northern aplomado falcon was listed as endangered by the USFWS in 1986 due to reduction in habitat quality across its range. Historically, this bird ranged the coastal bend and Trans-Pecos regions of Texas (USFWS, 1990). The most recent recorded nesting attempts in the United States by aplomado falcons were documented in Brooks County Texas in 1941 and near Deming, NM in 1952 (USFWS 1990). The Laguna Atascosa National Wildlife Refuge, located on the southern Texas Gulf Coast, and some private land on its borders were the only areas in the United States considered occupied habitat by the aplomado falcon in 1990 (USFWS 1990). More recently, the reintroduction of over 100 captive-bred birds since 1997 along the south Texas coast has resulted in 37 breeding pairs (TPWD, 2012b). Leading causes to the aplomado falcon population decrease are thought to be a result of agricultural activities, overgrazing leading to brush encroachment, stream channelization, and pesticide contamination (USFWS, 1990).

Aplomado falcon habitat consists of open grassland with scattered trees and shrubs, where open lands are conducive to spot, chase, and capture avian and insect prey and scattered trees may be used for scanning for prey or nesting. Historically, the falcon inhabited two distinct ecological regions of Texas. In western Texas, it was associated with desert grasslands with scattered yucca, mesquite or other tree component. In southern Texas, coastal prairie and marsh habitats that support small patches of trees or estuaries that interfaced with a woodland component were used (TPWD, 2012b). No critical habitat rules have been published for the aplomado falcon (USFWS, 2012b).

CH2M Hill found no naturally existing coastal prairie grassland within or near the action area. All open areas in the action area have been converted to pastureland for grazing or cropland. Additionally, wooded areas near the action area are generally populated by the invasive Chinese tallow (*Triadica sebifera*) and live oak (*Quercus virginiana*), and contain a significant shrub component. The closest possible favorable habitat for aplomado falcons may be located in the costal marshes along east Matagorda Bay approximately 20 miles south of the Property.

2.2.1.2 Piping Plover

The piping plover was added to the USFWS threatened and endangered species list in 1986. 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.

Piping plovers wintering in Texas prefer sparsely vegetated tidal flats, mud flats, algal flats or beaches that are periodically covered with water and then exposed by tide or wind. They roost on beaches, sandy flats behind dunes, or behind driftwood or other beach debris (TPWD, 2012c). Critical habitat was designated in 2001 for the wintering population of piping plover across eight states. Critical habitat for the piping plover was designated in many locations across the Texas coast, including Matagorda County (Federal Register, 2001). The nearest designated piping plover critical habitat unit to the action area is located approximately 25 miles south-southeast along the eastern shore of West Matagorda Bay (USFWS, 2012c).

CH2M Hill found that the waterways within or near the action area do not exhibit the characteristics - large open flats or sandy areas - of habitat preferred by the piping plover. The closest possible suitable habitat is located approximately 15 miles south along the northern shore of West Matagorda Bay where the Tres Palacios River empties into the bay.

2.2.1.3 Whooping Crane

The whooping crane was designated endangered in 1967 (USFWS, 2012c). Most common threats to 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), approximately 55 miles southwest of the action area. 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). Matagorda County, Texas is within the migration corridor of the whooping crane and sightings have been reported (USFWS, 2005).

CH2M Hill determined that the palustrine wetlands within or near the action area (CH2M HILL, 2013) do not support habitat favored by the whooping crane due to a of lack salt marsh vegetation and the presence of large expanses of herbaceous wetlands. The nearest potentially suitable wintering habitat is approximately 25 miles south of the action area along East Matagorda Bay.

2.2.1.4 Hawksbill Sea Turtle

The hawksbill sea turtle was listed by the USFWS as endangered throughout its range in 1970. Primary threats to the hawksbill sea turtle include over harvesting for meat, eggs, and carapace in some parts of its range, degradation of coral reef habitats across its range, human encroachment on breeding grounds, and beach erosion (NMFS and USFWS, 1998). The hawksbill occurs throughout the world in tropical and subtropical regions, spending the majority of their lifecycle in the ocean, only coming to shore to lay eggs. Generally, juvenile and adult hawks bill are benthic in their feeding nature, consuming a variety of sponges and invertebrates. In the United States the hawksbill most commonly occurs in Puerto Rico and the U.S. Virgin Islands. Hawksbills do occur in the Gulf of Mexico and juveniles and hatchlings have been recorded along the Texas coast, believed to have originated from Mexican nesting beaches (USFWS, 2012d). No nesting beaches are found along the Texas coast (USFWS, 2012d). Hawsksbill sea turtles may use sea grass beds in Matagorda Bay, but generally prefer solid bottom substrates such as rock or coral reef habitats.

CH2M Hill found that no marine environments exist within or near the action area. The nearest potential habitat for hawksbill sea turtles is located approximately 25 miles south in Matagorda Bay.

2.2.1.5 Green Sea Turtle

The green sea turtle was listed as endangered/threatened in 1978. It was listed as threatened where ever found except the breeding populations found in Florida and the Pacific coast of Mexico were deemed endangered (Federal Register, 1978b). Historic threats to the green sea turtle include over harvesting of eggs and adults for human consumption (USFWS, 2012e). Current threats include direct take in nesting and marine environments, increased human presence, habitat degradation of nesting habitats, degradation of foraging habitat (sea grass beds, algae beds, and coral reefs), and incidental take (NMFS and USFWS, 1998b). The green sea turtle is a global species found in tropical and subtropical seas with water temperatures above 20 degrees Celsius. They feed in shallow sea grass and algae beds. They are also known to rest on shallow rocky bottoms and coral reefs, sometimes out of the water (NMFS and USFWS, 1998b). Green sea turtles nest in tropical beach habitats around the world and adult females return to their natal beach to lay eggs. There are no green sea turtle nesting beaches found in Texas, but individuals are seen along the Texas coast during migration (TPWD, 2012d).

CH2M Hill found that no marine environments exist within or near the action area. The nearest potential habitat for green sea turtles is located approximately 25 miles south in Matagorda Bay, which would only be used as a feeding ground during migration to Florida.

2.2.1.6 Kemp's Ridley Sea Turtle

The Kemp's ridley sea turtle was listed as endangered in 1970. Specific threats to this species include incidental take as by-catch, human presence in breeding and feeding habitats, terrestrial habitat degradation, and pollution (NMFS, USFWS, and SEMARNAT, 2011). Kemp's ridley sea turtles share a similar life history with other sea turtle species, where females lay eggs on coastal beaches, hatchlings leave the coast for deeper water and grow before returning to near shore habitats as juveniles and adults (NMFS, USFWS, and SEMARNAT, 2011). Kemp's ridley set turtles, however, have a much more restricted distribution than other sea turtles, nesting primarily in Mexico, Texas, and a few other U.S. states (NMFS, USFWS, and SEMARNAT, 2011). Adults primarily occur in the Gulf of Mexico, and utilize shallow near shore and inshore bay habitats. Kemp's ridley sea turtles are primarily carnivorous, feeding on a variety of crustaceans, including various crab species.

CH2M Hill found that no marine environments exist within or near the action area. The nearest potential habitat for Kemp's ridley sea turtles is located approximately 25 miles south in Matagorda Bay, which would only be used as a feeding habitat. Potential nesting habitat exists along Matagorda beach farther south.

2.2.1.7 Leatherback Sea Turtle

The leatherback sea turtle was listed as endangered wherever found by the USFWS in 1970. The leatherback prefers the open ocean and only utilizes coastal habitats when it comes to shore to lay eggs (TPWD, 2012e). It is found throughout the world, where it is primarily threatened by near shore and open ocean commercial fishing, illegal harvesting of eggs and adults for human consumption, and pollution (NMFS and USFWS, 1998c).

Designated critical habitat is located in the U.S. Virgin Islands (Federal Register, 1979). The leatherback, unlike other sea turtle species, is a pelagic species, foraging on jellyfish, squid, fish, and crustaceans. They are highly migratory and only use the deep waters of the Gulf of Mexico for foraging, rarely coming close to shore following schools of prey. There are no known nesting beaches in the United States. The majority of known nest beaches are located in the eastern Pacific, western Pacific, and Indian Ocean (NMFS and USFWS, 1998c).

CH2M Hill found that no marine environments exist within or near the action area. The nearest potential habitat for leatherback sea turtles is located approximately 30 miles south in the Gulf of Mexico. Potential nesting habitat exists along Matagorda beach farther south, but no known nest have been documented along the middle and upper Texas coast.

2.2.1.8 Loggerhead Sea Turtle

The loggerhead sea turtle was listed as threatened across its range in 1978 and in 2011 five segments of its population were relisted as endangered. Threatened portions of the loggerhead sea turtles population are generally concentrated in the Atlantic and Indian Oceans, while the endangered segments are found in the Pacific and north Indian Oceans, and the Mediterranean Sea (USFWS, 2012f). Current threats to the Loggerhead include illegal harvesting, beach cleaning and recreational activities, human presence, habitat degradation, and pollution (NMFS and USFWS, 2008). Loggerhead sea turtles are a tropical and temperate species, inhabiting the Atlantic, Pacific and Indian Oceans. In the U.S., they nest from Texas to Virginia, with the greatest concentrations of nesting activity along the Atlantic coast. Typical of other sea turtles, the loggerhead inhabits three habitats during its life cycle. Terrestrial habitats of coastal beaches are utilized for egg laying and incubation. Near shore habitat is utilized by juveniles and adults for feeding. Open ocean habitat is used for migration. Loggerheads occasionally nest on beaches in estuarine zones with coarse sandy beaches between the high tide line and the dunes (NMFS and USFWS, 2008). While in near shore habitats, loggerheads generally feed on invertebrates (mollusks) and benthic crabs. Non-nesting adults often prefer estuarine habitats with open ocean access for foraging (NMFS and USFWS, 2008). In Texas, loggerhead sea turtles do inhabit the Gulf of Mexico, occasionally are documented along the Texas coast, and only minor solitary nesting activity has been recorded along the Gulf coast.

CH2M Hill found that no marine environments exist within or near the action area. The nearest potential habitat for loggerhead sea turtles is located approximately 25 miles south in the Matagorda Bay. Potential nesting habitat exists along Matagorda beach farther south, but nesting attempts in Texas are most often documented along the south Texas coast.

2.2.2 Non-Designated Listed Species

As stated above, the TPWD's county lists includes several species that are federally listed under the ESA but are not considered by the USFWS as potentially occurring in Matagorda County. A brief description, including status, habitat requirement, population status and historical range, of the federally listed species and candidate species that TPWD indicates have the potential to occur in Matagorda County are provided below.

2.2.2.1 Eskimo Curlew

The Eskimo curlew (*Numenius borealis*) is a federally listed endangered bird identified as potentially present in Matagorda County by TPWD (TPWD, 2012f). The Eskimo curlew is a tundra nesting species that migrates through the prairies of the U.S., and is thought to winter in Pampas, in South America (USFWS, 2011). The species is thought to once number in the hundreds of thousands, but threats such as hunting, habitat degradation, decline of important forage species, and conversion of prairie habitat to farmland along the migration routes have reduced the numbers severely. The Eskimo curlew is so rare the last record of physical evidence was collected in 1963 in Barbados (USFWS, 2011). Since that time 39 potential sightings have occurred, but these reports were not able to be confirmed by physical evidence. Surveys of breeding territories, migration routes, and wintering grounds over the last few decades have not detected the species (USFWS, 2011).

CH2M Hill found that native prairie habitat favored by the curlew does not exist within the action area. Active agriculture is present in the action area and the surrounding area and grassland habitats are restricted to grazing pastures for livestock.

2.2.2.2 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 (Federal Register, 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 (Federal Register, 2012). 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). 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. Sprague's pipit 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).

CH2M Hill has evaluated the habitat within the action area. The Sprague's pipit is not expected to occur within the action area due to the presence of active agriculture there and in the surrounding area. Grassland habitats are restricted to grazing pastures for livestock, and exhibit a significant shrub component which is not suitable habitat for the pipit. Native prairie habitat does not exist within the action area.

2.2.2.3 Smalltooth Sawfish

The smalltooth sawfish (*Pristis pectinata*) is listed as endangered by USFWS and identified as potentially existing in Matagorda County by TPWD (TPWD, 2012). Current threats to the smalltooth sawfish include commercial and recreational fisheries by-catch, habitat loss and degradation, entanglement in debris, pollution, and disturbance from marine activities (Federal Register, 2001b). The smalltooth sawfish generally inhabit near shore marine environments, shallow water bays, estuaries, and river mouths, particularly shallow water mud banks and mangrove habitats. No critical habitat has been published for the smalltooth sawfish (USFWS, 2012g). The smalltooth sawfish is a tropical fish with a global distribution in tropical and subtropical waters. They have been documented in the Gulf of Mexico, Caribbean, western Atlantic, Pacific and Indian Oceans, with a core distribution in the U.S. in the coastal lagoons, reefs, mangroves, and bays of south Florida. Many individuals documented from Texas to the Atlantic coast of the U.S. are believed to originate from this breeding population (Federal Register, 2001b). In decades prior to 1970, the sawfish were considered "not uncommon" along the Texas coast, but since 1971 only three published or museum reported captured smalltooth sawfish have been from this region (Federal Register, 2001b).

CH2M Hill has evaluated the habitat within the action area. The smalltooth sawfish is not expected to occur within the action area. The segment of the Tres Palacios River within the action area is approximately 25 miles upstream of where the river empties into East Matagorda Bay. Water in the Tres Palacios within the action area would be too fresh to support a marine species such as the smalltooth sawfish.

2.2.2.4 Louisiana Black Bear

The Louisiana Black Bear (*Ursus americanus luteolus*) is listed as threatened by USFWS and identified as potentially existing in Matagorda County by TPWD (TPWD, 2012). 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). 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). 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 Atchaflaya River basins, which were designated Critical Habitat in 2009 (Federal Register, 2009). 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 (Federal Register, 2009).

CH2M Hill found no suitable bottomland hardwood forest habitat or designated critical habitat for the Louisiana black bear within the action area. In general, the area surrounding the Project area is highly fragmented with major roads and with no remote travel corridors that connect this region to known breeding populations, which reduces the probability juveniles and roaming males would occur in the action area.

2.2.2.5 Ocelot

The ocelot (*Leopardus pardalis*) was listed as endangered by the USFWS in 1972 and identified as potentially occurring in Matagorda County by TPWD (TPWD, 2012). Habitat loss, degradation, fragmentation, and connectivity of suitable habitat patches are the primary threats to the ocelot currently. Historically, over hunting and commercial exploitation were significant threats when the species was first listed (USFWS, 2010). Despite a rather large historic range, the ocelot is not a habitat generalist. The ocelot utilizes areas with a dense shrub layer (95% cover) in a variety of forested and savanna habitats. In Texas, ocelots prefer shrub communities with >95% shrub cover, and avoid areas with <75% shrub cover (USFWS, 2010). In the U.S. the current ocelot range is restricted to extreme southern Texas and southern Arizona. Two breeding populations are thought to exist in southern Texas, one located in Kennedy, and Willacy Counties and the second in Cameron County on the Laguna Atascosa National Wildlife Refuge (USFWS, 2010). No additional breeding populations are thought to exist. Between 1980 and 2010 ocelot specimens were documented in Cameron, Willacy, Kenedy, Hidalgo, and Jim Wells Counties.

CH2M Hill found that due to the lack of dense shrub (>95% cover) habitat within the action area, ocelot are not expected to occur there. The nearest potential habitat is located south of Corpus Christi, Texas, approximately 150 miles south in Kennedy County.

2.2.2.6 Red Wolf

The red wolf (*Canis rufus*) was designated endangered in 1967 (USFWS, 2012h).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 Matagorda County. Therefore, the project would have no effect on the red wolf.

2.2.2.7 West Indian Manatee

The West Indian manatee (*Trichechus manatus*) was listed as endangered by the USFWS in 1967 and identified as potentially occurring in Matagorda County by TPWD (USFWS, 2012i). Historically, the manatees were hunted by early Native Americans and European settlers. Today, many manatees face many threats including collisions with boat hulls and propellers, entrapment in water control structures and lock systems, entanglement in floating debris and discarded fishing nets, and habitat degradation. The West Indian manatee is a occupies marine, brackish, and fresh water systems where they feed on submerged, emergent, and floating vegetation, preferring shallow sea grass beds with access to deep channels. Manatees often use canals, creeks and lagoons associated with coastal rivers and sloughs in which to feed, rest, mate, and calving, and critical habitat was designated in Florida in 1976 (USFWS, 2001). Historic distribution is thought to be very similar to the manatee's current distribution concentrating in the warm waters of Florida, with some seasonal migration wets to Texas and north along the Atlantic coast. Seasonal movements of the manatee are dependent on water temperatures and

seasonal availability of plant species (USFWS, 2001). Individuals seen along the Texas Gulf Coast may be wanders from populations along the Mexican Gulf Coast (NatureServe, 2012).

CH2M Hill found that no suitable habitat exists within the action area for the West Indian Manatee. The Tres Palacios River, a freshwater system within the action area, is not suitable manatee habitat because it is a very shallow (1 to 3 feet deep) and narrow (10 foot wide)) water way with little of the vegetation typically consumed by manatees. The nearest potentially suitable habitat is located at the mouth of the Tres Palacios River where it empties into East Matagorda Bay approximately 25 miles south of the Property.

2.2.2.8 Smooth Pimpleback

The smooth pimpleback (*Quadrula houstonensis*) is listed by the USFWS as a candidate species of freshwater mussel, and listing is deemed as warranted by the USFWS (Federal Register, 2012). The smooth pimpleback is endemic to central Texas and has historically found throughout the Colorado and Brazos River basins, but is now currently found in 9 distinct locations mostly in the Brazos River basin. The smooth pimpleback is primarily threatened by habitat modification and degradation resulting from impoundments, poor water quality, stream flow modification, sedimentation, and dewatering (Federal Register, 2012). Smooth pimplebacks occur in small to medium sized stream and rivers and occasionally are found in small reservoirs. Typically, they are found utilizing mud, sand, and gravel substrates in as little as 3 to 4cm of water, but appear susceptible to dramatic water level fluctuations, scoured bedrock, and shifting sand substrates. The pimpleback is able to tolerate very slow to moderate stream flow velocities (NatureServe, 2012).

No apparent connection exists between the Tres Palacios and the Colorado and Brazos River basins. A search of the Natural Diversity Database did not indicate any known occurrences near the Project area. Also, the reach of the Tres Palacios River within the action area is likely dry during drought years. Therefore, it is unlikely that this species would occur within the action area..

2.2.2.9 Texas Fawnsfoot

The Texas fawnsfoot (*Truncilla macrodon*) is listed by the USFWS as a candidate species of freshwater mussel, and listing is deemed warranted (Federal Register, 2012). The Texas fawnsfoot is endemic to central Texas historically found in the Trinity, Brazos, and Colorado River basins. No apparent connection exists between the Tres Palacios and the Trinity, Colorado and Brazos River basins. More recently, the fawnsfoot are only found in five locations, having been nearly extirpated from the Colorado River basin and only three populations in the Brazos River basin appear to be sustainable (Federal Register, 2012). The Texas fawnsfoot is primarily threatened by habitat modification and degradation resulting from impoundments, poor water quality, stream flow modification, sedimentation, and dewatering (Federal Register, 2012). Very few live specimens have been documented, so little is known about their microhabitat preferences. However it appears that they prefer rivers and large streams with sand, gravel, and perhaps sandy-mud bottoms with moderate flows. No specimens have been documented in reservoirs (NatureServe, 2012). As with other freshwater mussel species, the Texas fawnsfoot would be susceptible to dramatic water level fluctuations, scoured bedrock, shifting sand substrates, and dewatering (NatureServe, 2012).

CH2M Hill has reviewed the habitat present within the action area for potential Texas fawnsfoot habitat. The reach of the Tres Palacios River within the action area is very narrow (10 ft) and shallow (1 ft), possibly going dry during drought years. Due to the apparent preference for large stream and river habitats, we do not believe habitat for the Texas fawnsfoot is present within the action area.

SECTION 3.0

Environmental Setting

3.1 Property

The Property is located in Matagorda County, Texas, approximately 5 miles northwest of Markham, Texas and 70 mi southwest of Houston, Texas (Figure 1-1). Current land use on the Property consists of undeveloped, heavily grazed pasture land, row crop farmland, and several pipeline right-of-ways. The Property is bounded by County Road 417 to the west. Land to the north, south and east of the Property is primarily row crop farmland. One small well pad is located along the northern boundary of the Property. The surrounding land use is a mixture of industrial, commercial, farmland, and undeveloped property.

Field surveys revealed that the Property consists of land under row crop production (planted in cotton), grazed pastureland, Palustrine Emergent (PEM) Wetlands (roughfruit amaranth, green flatsedge, and jungle rice), and industrialized land.

No surface waters were present within the Property. Two shallow drainage ditches were present within the cotton field to drain standing water from the planted field. These ditches channel water to the east to the ditch along County Road 417.

3.2 Tres Palacios River

The discharge point for the spent cooling water is located within a relatively sinuous stretch in the upper reach of the Tres Palacios River. The river is deeply incised along this reach with banks approximately 15 feet deep, and a single channel that is approximately 12 feet wide and 1 foot deep. The banks of the river were highly stable with 100% vegetation cover and no evidence of bank erosion within the reach observed. Vegetation along the banks was dominated by Johnson grass, horsetail, and giant cutgrass. However, no fringe wetlands were present due to the bank steepness (approximately 30% slope). No riparian corridor was apparent at the point of discharge, as the tilled farmland abuts the stream bank. Aerial imagery indicates that a riparian corridor consisting of bottomland hardwoods may be present south of the Project, and National Wetland Inventory Database indicates potential palustrine forested wetlands within the riparian corridor (USFWS, 2011).

3.3 Pipeline Corridors

3.3.1 Wastewater Pipeline

The pipeline corridor will be located within Matagorda County, Texas. It will originate at the eastern boundary of the Property and then run approximately 1,770 feet east to the Tres Palacios River. Land use surrounding the proposed pipeline corridor is row crop farmland. No surface waters are present within or adjacent to the proposed pipeline corridor.

3.3.2 Air Pipeline

A compressed air pipeline will extend west of the Property approximately 1,100 feet, connecting the cavern to the Apex Matagorda Energy Center. Land uses surrounding the air pipeline corridor include industrial and pasture land. Several PEM wetlands and one PSS wetland were identified within and adjacent to the proposed air pipeline corridor.

3.3.3 Freshwater/Brine Water Pipeline

The freshwater/brine water pipeline corridor will originate at the eastern most cavern well and will take several jogs to the south, west, and north before terminating within the Texas Brine facility located approximately 2,730 feet west of the Property. For approximately 0.14 miles, the proposed alignment parallels an existing pipeline

ROW. Land uses surrounding the freshwater/brine water pipeline corridor include industrial and pasture land. One man-made canal and two PEM wetlands were identified within and adjacent to the proposed corridor.

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 corridor, or where the pipeline reaches the Tres Palacios River.

4.1.1 Construction Traffic

Construction activities for the Apex MEC CAES facility are divided into three phases: CAES cavern construction, facility construction, and wastewater pipeline construction. 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 brine generated during cavern development will be transported to and from the site via pipelines and thereby minimize addition construction traffic. Because most of the activities will be underground and the construction area will be limited to drilling site 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 MEC facility will temporarily increase traffic patterns on local paved roads, particularly Farm to Market (FM) 417. Construction deliveries will be confined to existing paved roads thereby limiting the potential for dust. The Apex site is under existing agricultural use and no federally listed species were observed during wetland/waterbody delineation and habitat survey conducted in 2012. Water will be used onsite for dust suppression.

Wastewater pipeline construction will involve the installation of a wastewater pipeline along a 0.25-mile corridor between the site and the Tres Palacios River. The proposed corridor area was surveyed in 2012 and no federally listed species were observed during the wetland/waterbody delineation and habitat survey. Water will be used as a dust suppression measures on the site.

Based on the reviews of various threatened and endangered species data bases, observations during field surveys, 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-on 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 constructions areas for dust control during construction activities; and
- The locations of fuels storage and other construction materials in secondary containment.

Based on the reviews of various threatened and endangered species data bases, observations during field surveys, 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 reviews of various threatened and endangered species data bases, observations during field surveys, 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 Tres Palacios River

Non-contact cooling water discharge will be generated from the Apex MEC during cooling tower operation and will be discharged to the Tres Palacios River via a 0.25-mile pipeline. Cooling tower water sourced from the LCRA 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 LCRA water. The projected water quality for Apex MEC wastewater discharge is presented in Table 4-1.

The proposed discharge location to the Tres Palacios River is within stream segment #1502, Tres Palacios Creek Above Tidal. Section #1502 extends from a point 1.6 km upstream of Wilson Creek in Matagorda County to State Route 525 (Old US 59) in Wharton County. No federally listed species are known to exist within this segment of the Tres Palacios River. The proposed discharge of non-contact cooling water is expected to 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 Tres Palacios River flow at the minimum low flow conditions of 499 cubic feet per second for the period from 2001 to 2011 for USGS Gauge 08162600.

Based on the reviews of various threatened and endangered species data bases, small discharge volume, 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

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 Bay City, 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 77 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 impact 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 Matagorda Energy Center is being manufactured specifically for this facility and established noise profiles are not available. 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 acoustically treated wells,
- Incorporation of silencing elements in the stacks,
- Use low-noise motors for the cooling tower pumps,
- Use 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 operation 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.

4.3 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 CAES project. Within ERCOT, the transmission lines are independently sited and operated by a Transmission and Distribution Utility (TDU) not the generator (in this case, the MEC). The TDU, not APEX, will evaluate the alternative routes and present its case 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, comprehensive evaluation of environmental impacts of proposed lines is required as a component of the CCN approval process. Discharge of cooling tower blow down water to the Tres Palacios River, through a pipeline routed along an existing utility corridor, would be necessitated by the cooling needs of the CAES project. The expected flow rate from both cooling towers at 155 gallons per minute is about 0.34 cfs and is less than 0.1 percent of the river flow at low flow conditions. Pursuant to the Clean Water Act, MEC 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.

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 Northern Aplomado Falcon (*Falco femoralis septentrionalis)*

Based on field surveys, reviews of various threatened and endangered species data bases, 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 northern aplomado falcon within the action area because:

- The preferred habitat for this species is desert grasslands with scattered yucca, mesquite or other tree component or coastal prairie and marsh habitats that support small patches of trees or estuaries that interfaced with a woodland component were used. 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, a review of the USFWS and TPWD listed and rare species databases for Matagorda 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.

5.2 Piping Plover (*Charadrius melodus*)

Based on field surveys, reviews of various threatened and endangered species data bases, 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, a review of the USFWS and TPWD listed and rare species databases for Matagorda 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.

5.3 Whooping Crane (*Grus americana*)

Based on field surveys, reviews of various threatened and endangered species data bases, , 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 includes a mix of coastal marsh, inland margins of the flats, and inland oak, grassland, swale, and pond habitats (Federal Register, 2007).
- Matagorda County is within the migration route of the whooping crane , however no sightings have been reported in the action area.
- There is no wintering 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 Hawksbill Sea Turtle (*Eretmochelys imbricate*)

Based on field surveys, reviews of various threatened and endangered species data bases, this BA has determined that the proposed project will have no effect on the hawksbill sea turtle 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 hawksbill sea turtle habitat is various marine environments. 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, a review of the USFWS and TPWD listed and rare species databases for Matagorda County, nor is there historical documentation of the species in the action area.

5.5 Green Sea Turtle (*Chelonia mydas*)

Based on field surveys, reviews of various threatened and endangered species data bases, this BA has determined that the proposed project will have no effect on the green sea turtle 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 green sea turtle habitat is various marine environments. 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, a review of the USFWS and TPWD listed and rare species databases for Matagorda County, nor is there historical documentation of the species in the action area.

5.6 Kemp's Ridley Sea Turtle (*Lepidochelys kempii*)

Based on field surveys, reviews of various threatened and endangered species data bases, this BA has determined that the proposed project will have no effect on the Kemp's ridley sea turtle 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. Kemp's ridley sea turtle habitat is various marine environments. 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, a review of the USFWS and TPWD listed and rare species databases for Matagorda County, nor is there historical documentation of the species in the action area.

5.7 Leatherback Sea Turtle (*Dermochelys coriacea*)

Based on field surveys, reviews of various threatened and endangered species data bases, this BA has determined that the proposed project will have no effect on the leatherback sea turtle 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 leatherback sea turtle habitat is various marine environments. 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, a review of the USFWS and TPWD listed and rare species databases for Matagorda County, nor is there historical documentation of the species in the action area.

5.8 Loggerhead Sea Turtle (*Caretta caretta*)

Based on field surveys, reviews of various threatened and endangered species data bases, this BA has determined that the proposed project will have no effect on the loggerhead sea turtle 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 loggerhead sea turtle habitat is various marine environments. 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, a review of the USFWS and TPWD listed and rare species databases for Matagorda County, nor is there historical documentation of the species in the action area.

5.9 Eskimo Curlew (*Numenius borealis*)

Based on field surveys, reviews of various threatened and endangered species data bases, this BA has determined that the proposed project will have no effect on the Eskimo curlew within the action area because:

- The Eskimo curlew is so rare the last record of physical evidence was collected in 1963 in Barbados (USFWS, 2011). Since that time 39 potential sightings have occurred, but these reports were not able to be confirmed by physical evidence. Surveys of breeding territories, migration routes, and wintering grounds over the last few decades have not detected the species (USFWS, 2011).

5.10 Sprague's Pipit (*Anthus spragueii*)

Based on field surveys, reviews of various threatened and endangered species data bases, 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, a review of the USFWS and TPWD listed and rare species databases for Matagorda 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.

5.11 Smalltooth Sawfish (*Pristis pectinata*)

Based on field surveys, reviews of various threatened and endangered species data bases, , this BA has determined that the proposed project will have no effect on the smalltooth sawfish within the action area because:

- The smalltooth sawfish is a tropical fish with a global distribution in tropical and subtropical waters, with a core distribution in the U.S. in the coastal lagoons, reefs, mangroves, and bays in south Florida. In decades prior to 1970, the sawfish were considered "not uncommon" along the Texas coast, but since 1971 only three published or museum reported captured smalltooth sawfish have been from this region (NMFS, 2001).
- This species is not present or potentially present, as documented by field observations, a review of the USFWS and TPWD listed and rare species databases for Matagorda County.
- There is no habitat present in the action area that is known to be crucial to 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.

5.12 Louisania Black Bear (*Ursus americanus luteolus*)

Based on field surveys, reviews of various threatened and endangered species data bases, 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. Preferred habitat for the Louisiana Black Bear is 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).
- Observation or evidence of this species was not present during field observations.
- 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.

5.13 Red Wolf (*Canis rufus*)

Based on field surveys, reviews of various threatened and endangered species data bases, 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 Matagorda County.

5.14 Ocelot (*Leopardus pardalis*)

Based on field surveys, reviews of various threatened and endangered species data bases, this BA has determined that the proposed project will have no effect on the ocelot within the action area because:

- There are no areas with a dense shrub layer (95% cover) in forested or savanna habitats present in the action are, nor is there shrub habiat within the range of preferred habitat characteristics (75-95% shrub cover) present.
- Within Texas populations, the current ocelot range is restricted to extreme southern Texas and southern Arizona. No populations are known to occur in Matagorda County.
- Observation or evidence of this species was not present during field observations.
- 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.

5.15 West Indian Manatee (*Trichechus manatus*)

Based on field surveys, reviews of various threatened and endangered species data bases, this BA has determined that the proposed project will have no effect on the West Indian manatee 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. West Indian manatee habitat is various marine and near shore estuarine environments. 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, a review of the USFWS and TPWD listed and rare species databases for Matagorda County, nor is there historical documentation of the species in the action area.

5.16 Smooth Pimpleback (*Quadrula houstonensis*)

Based on field surveys, reviews of various threatened and endangered species data bases, this BA has determined that the proposed project will have no effect on the smooth pimpleback within the action area because:

- No apparent connection exists between the Tres Palacios and the Colorado and Brazos River basins. A search of the Natural Diversity Database did not indicate any known occurrences near the Project. Also, the reach of the Tres Palacios River within the action area is very narrow (10 ft) and shallow (1 ft), possibly going dry during drought years, and is therefore unlikely to support self-sustaining populations of mollusks.
- This species is not present or potentially present, as documented by field observations of habitat at the discharge location, a review of the USFWS and TPWD listed and rare species databases for Matagorda County.
- There is no habitat present in the action area that is known to be crucial to 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. No construction activities will occur within the Tres Palacios River.

5.17 Texas Fawnsfoot (*Truncilla macrodon*)

Based on field surveys, reviews of various threatened and endangered species data bases, this BA has determined that the proposed project will have no effect on the Texas fawnsfoot within the action area because:

- The Texas fawnsfoot are only found in five locations, having been nearly extirpated from the Colorado River basin and with only three populations in the Brazos River basin that appear to be sustainable (USFWS, 2012).
- This species is not present or potentially present, as documented by field observations of habitat at the discharge location, a review of the USFWS and TPWD listed and rare species databases for Matagorda County.
- The known population is known to only exist in the Colorado and Brazos River basin so the likelihood of an expanded range to the Tres Palacios River is very low.

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. No construction activities will occur within the Tres Palacios River.

SECTION 6.0

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Tables

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

Source ID	Source Description	NOx		SO_2		CO		$PM_{2.5}$		PM_{10}	
		(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)	(lb/hr)	(g/s)
TURBASTK	Turbine Train A Stack	7.304	0.920	0.666	0.084	7.691	0.969	1.569	0.198	1.569	0.198
TURBBSTK	Turbine Train B Stack	7.304	0.920	0.666	0.084	7.691	0.969	1.569	0.198	1.569	0.198
GENENG1	Emergency Generator Engine	0.348	0.044	0.002	0.0003	0.580	0.073	0.037	0.005	0.037	0.005
CTOWERA	Cooling Tower for Train A	--	--	--	--	--	--	0.0005	0.0001	0.158	0.020
CTOWERB	Cooling Tower for Train B	--	--	--	--	--	--	0.0005	0.0001	0.158	0.020
	Totals	14.96	1.88	1.33	0.17	15.96	2.01	3.18	0.40	3.49	0.44

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 conditions than during startup for these pollutants.*

Table 1-2. Emission Source Parameters - all but NOx

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)	(^{o}F)	(K)	(ft/s)	(m/s)	(ft)	(m)
TURBASTK	Turbine Train A Stack	778,615	3,210,120	56.50	17.22	120.00	36.58	216.00	375.40	52.67	16.05	13.0	3.96
TURBBSTK	Turbine Train B Stack	778,619	3,210,008	56.99	17.37	120.00	36.58	216.00	375.40	52.67	16.05	13.0	3.96
GENENG1	Emergency Generator Engine	778,601	3,210,248	56.50	17.22	35.00	10.67	912.00	762.07	78.91	24.05	1.0	0.30

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 (^{o})
				(ft)	(m)	(ft)	(m)	(ft)	(m)	(ft)	(m)	
CTOWERA	Cooling Tower for Train A	778,625	3,210,115	56.50	17.22	40.00	12.19	34.78	10.60	65.62	20.00	-1.600
CTOWERB	Cooling Tower for Train B	778,656	3,210,116	56.99	17.37	40.00	12.19	34.78	10.60	65.62	20.00	-1.600

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	7.4	7.5	98%	188	3.9%	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	0.4	1.2	36%	35	1.2%	9	4.8%	N/A
		Annual	0.1	0.3	24%	12	0.6%	4	1.8%	N/A
PM_{10}	Turbines and cooling towers in normal mode, generator engine in test mode	24-hr	3.7	5	75%	150	2.5%	30	12.5%	N/A
		Annual	0.4	1	44%	N/A	N/A	17	2.6%	N/A
SO_2	Turbines in normal mode, generator engine in test mode	1-hr	0.5	7.8	6%	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	3%	365	0.0%	91	0.2%	N/A
		Annual	0.0	1	3%	80	0.0%	20	0.1%	N/A
CO	Turbines in startup mode, generator engine in test mode	1-hr	9.5	2000	0.5%	40000	0.02%	N/A	N/A	N/A
		8-hr	5.4	500	1.1%	10000	0.1%	N/A	N/A	N/A

Notes:

1. *Maximum off-property concentrations 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 2-1
Federal and State Threatened and Endangered Species in Matagorda 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
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
Black Rail *Laterallus jamaicensis*	--	--	Inhabits salt, brackish, and freshwater marshes, wet meadows, and grassy swamps. Usually nests in marsh grass at the edge of marshes.	No	No
Brown Pelican *Pelicanus occidentalis*	DM	--	Largely coastal and near shore areas; roosts and nests on islands and spoil banks.	No	No
Eskimo Curlew *Numenius borealis*	--	E	Historic; inhabits grasslands, pastures, plowed fields, marshes, and mudflats.	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
Northern Aplomado Falcon *Falco femoralis septentrionalis*	E	E	Inhabits open country, especially savanna and open woodland. Nests in old stick nests of other bird species.	No	No
Piping Plover *Charadrius melodus*	E,T	T	Wintering migrant along the Texas Gulf Coast; beaches and bayside mud or salt flats.	No	No
Reddish Egret *Egretta rufescens*	--	T	Inhabits brackish marshes, shallow salt ponds, and tidal flats. Nests on ground or in trees or bushes.	No	No

TABLE 2-1
Federal and State Threatened and Endangered Species in Matagorda County, Texas.

Species	Federal Status	State Status	Description of Suitable Habitat	Habitat Present	Species Effect
Snowy Plover *Charadrius alexandrinus*	--	--	Wintering migrant along the Texas Gulf Coast.	No	No
Sooty Tern *Sterna fuscata*	--	T	Largely pelagic; nests on islets off Texas coast.	No	No
Southeastern Snowy Plover *Charadrius alexandrines tenuirostris*	--	--	Wintering migrant along the Texas Gulf Coast beaches and bayside mud or salt flats.	No	No
Sprague's Pipit *Anthus spragueii*	--	--	Wintering migrant along the Texas Gulf Coast; locally common in local grasslands.	No	No
Western Burrowing Owl *Athene cunicularia hypugaea*	--	--	Inhabits open grasslands, especially prairie, plains, and savanna; nests and roosts in abandoned burrows.	No	No
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
White-tailed Hawk *Buteo albicaudatus*	--	T	Found near the coast on prairies, cordgrass flats, and scrub-live oak. Found further inland on prairies, mesquite and oak savannas, and mixed savanna-chapparal.	No	No
Whooping Crane *Grus americana*	E	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
Crustaceans					
A crayfish *Cambarellus texanus*	--	--	Benthic; prefers standing water of ditches in which there is emergent vegetation.	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
Blue sucker *Cycleptus elongatus*	--	T	Found in major rivers of Texas, usually in channels and flowing pools with a moderate current.	No	No

TABLE 2-1
Federal and State Threatened and Endangered Species in Matagorda County, Texas.

Species	Federal Status	State Status	Description of Suitable Habitat	Habitat Present	Species Effect
Smalltooth Sawfish *Pristis pectinata*	--	E	Young found very close to shore over muddy and sandy bottoms of sheltered bays, estuaries, or river mouths. Adults are found in various habitats (mango, reef, seagrass, and coral).	No	No
Insects					
Gulf Coast clubtail *Gomphus modestus*	--	--	Found in medium-sized rivers and stream with a silty sand or rocky bottom. Adults forage in trees.	No	No
Reptiles					
Hawksbill sea turtle *Eretmochelys imbricata*	E	E	Gulf and bay systems.	No	No
Green sea turtle Chelonia mydas	E,T	T	Gulf and bay systems.	No	No
Gulf saltmarsh snake	--	--	Inhabits saline flats, coastal bays, and brackish river mouths.	No	No
Kemp's Ridley sea turtle *Lepidochelys kempii*	E	E	Gulf and bay systems.	No	No
Leatherback sea turtle *Dermochelys coriacea*	E	E	Gulf and bay systems.	No	No
Loggerhead sea turtle *Caretta caretta*	T	T	Gulf and bay systems.	No	No
Smooth green snake *Liochlorophis vernalis*	--	T	Inhabits mesic coastal cordgrass prairies of the Gulf Coastal Plain.	No	No
Texas diamondback terrapin *Malaclemys terrapin littoralis*	--	--	Inhabits coastal marshes, tidal flats, coves, estuaries, and lagoons behind barrier beaches. May venture into lowlands at high tide.	No	No
Texas horned lizard *Phrynosoma cornutum*	--	T	Open, arid and semi-arid regions with sparse vegetation.	No	No
Texas scarlet snake *Cemophora coccinea lineri*	--	T	Mixed hardwood scrub on sandy soils; feeds on reptile eggs; semi-fossorial.	No	No

TABLE 2-1
Federal and State Threatened and Endangered Species in Matagorda County, Texas.

Species	Federal Status	State Status	Description of Suitable Habitat	Habitat Present	Species Effect
Texas tortoise *Gopherus berlandieri*	--	T	Open brush with a grass understory is preferred; open grass and bare ground are avoided; when inactive occupies shallow depressions at base of bush or cactus.	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.	No	No
Mammals					
Louisiana black bear *Ursus americanus luteolus*	--	T	Possible as transient, bottomland hardwoods and large tracts of inaccessible forested areas.	No	No
Ocelot *Leopardus pardalis*	--	E	Inhabits dense chaparral thickets and mesquite-thorn scrub and live oak mottes; avoids open 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 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
West Indian manatee *Trichechus manatus*	--	E	Gulf and bay systems.	No	No
Mollusks					
Creeper (squawfoot) *Strophitus undulatus*	--	--	Gravel and mud in small to large streams in the Neches (historic) and Trinity (historic) river basins.	No	No
Smooth pimpleback *Quadrula houstonensis*	--	T	Small to moderate streams and rivers with mixed mud, sand, and fine gravel bottoms. Lower Trinity, Brazos, and Colorado river basins.	Yes	Not likely to adversely affect. Impacts to potential habitat would be temporary and minor
Texas fawnsfoot *Truncilla macrodon*	--	T	Possibly rivers, large streams, and rice irrigation canals over sand and gravel substrates. Brazos and Colorado river basins.	No	No
Plants					

TABLE 2-1
Federal and State Threatened and Endangered Species in Matagorda County, Texas.

Species	Federal Status	State Status	Description of Suitable Habitat	Habitat Present	Species Effect
Coastal gayfeather *Liatris bracteata*	--	--	Found in various types of coastal prairie grasslands, from salty prairie on low-lying saline clay loams to upland prairie on non-saline clayey to sandy loams. Flowers in fall.	Yes	Not likely to adversely affect. Impacts to potential habitat would be temporary and minor
Shinner's sunflower *Helianthus occidentalis spp. plantagineus*	--	--	Prairies on the coastal plain.	No	No
Threeflower broomweed *Thurovia triflora*	--	--	Found near the coast in sparse, low vegetation on silt or fine sand over saline clay. Found further inland in vegetative slick spots on prairie mima mounds. Flowers September through November.	No	No

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

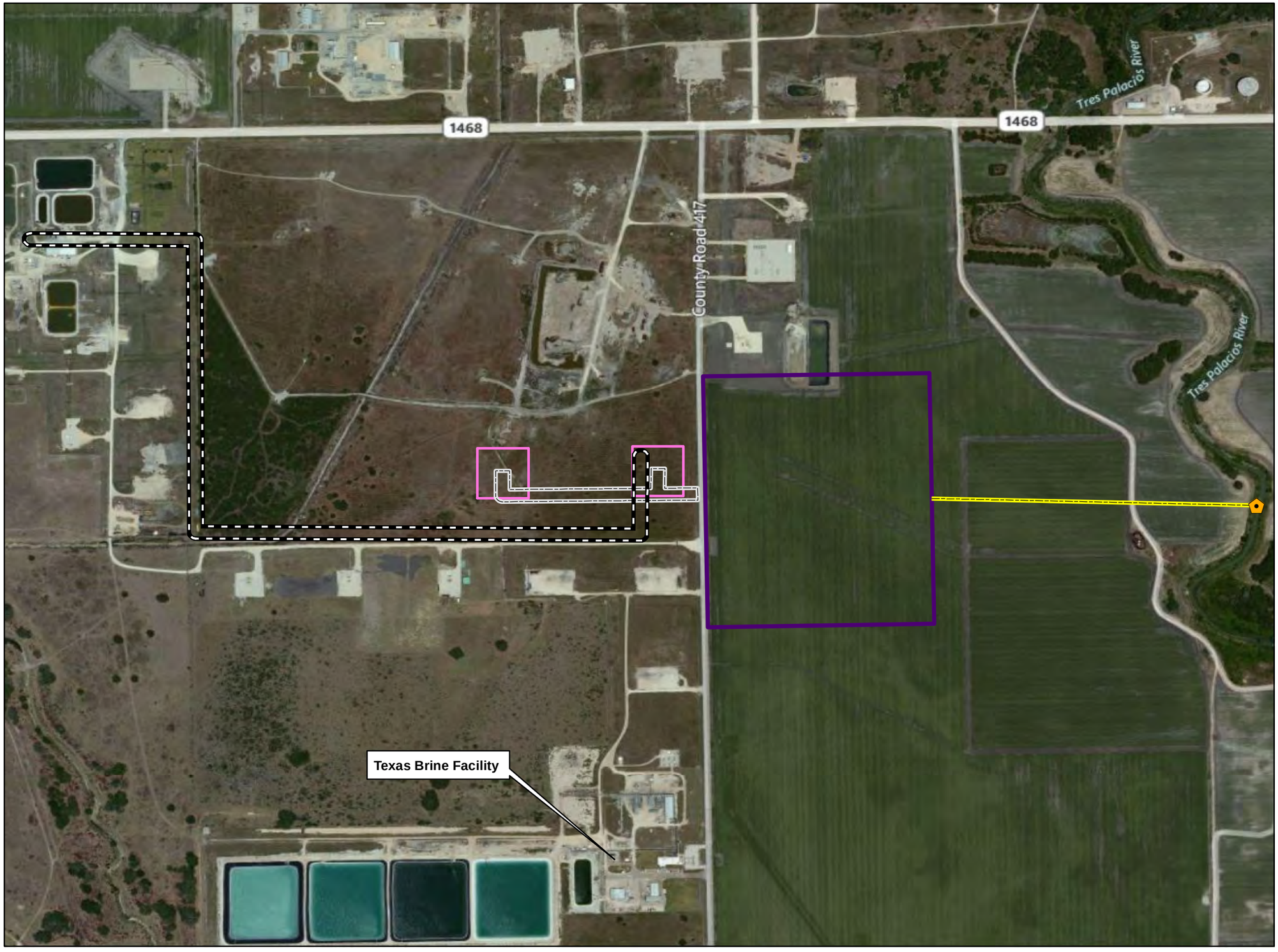
Source: US Fish & Wildlife Department, 2012 and Texas Parks and Wildlife Department, 2012.

TABLE 4-1
PROJECTED DISCHARGE WATER QUALITY
APEX MATAGORDA ENERGY CENTER
MATAGORDA COUNTY, TEXAS

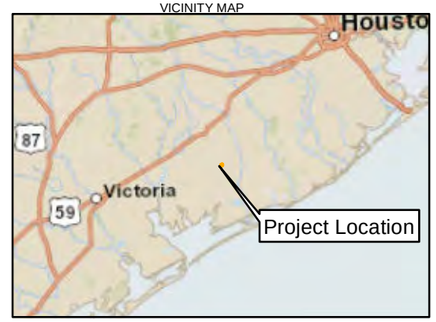
Constituent	Projected Effluent Concentration (mg/l)
BOD (5-day) (mg/l)	UK
CBOD (5-day) (mg/l)	UK
Chemical Oxygen Demand	UK
Total Organic Carbon	UK
Dissolved Oxygen	≥2.0
Ammonia Nitrogen	Trace
Total Suspended Solids	510.6
Nitrate Nitrogen	7.116
Total Organic Nitrogen	0.264
Total Phosphorus	3.004
Oil and Grease	UK
Total Residual Chlorine	0.0
Total Dissolved Solids	1,772
Sulfate	201.6
Chloride	267.6
Fluoride	UK
Temperature (°F)	73.4
pH (Standard Units; min/max)	7.05/8.70
Total Aluminum	UK
Total Antimony	UK
Total Arsenic	UK
Total Barium	UK
Total Beryllium	UK
Total Cadmium	UK
Total Chromium	UK
Trivalent Chromium	UK
Hexavalent Chromium	UK
Total Copper	UK
Cyanide	UK
Total Lead	UK
Total Mercury	UK
Total Nickel	UK
Total Selenium	UK
Total Silver	UK
Total Thallium	UK
Total Zinc	UK

NE – Not Expected
UK - Unknown

Figures



VICINITY MAP



LEGEND

- Point of Discharge
- Proposed Corridor for Freshwater/Brine Water Pipeline
- Proposed Wastewater Pipeline Corridor
- Proposed Site
- Proposed Air Pipeline Corridor
- Apex Designated CAES Well Locations

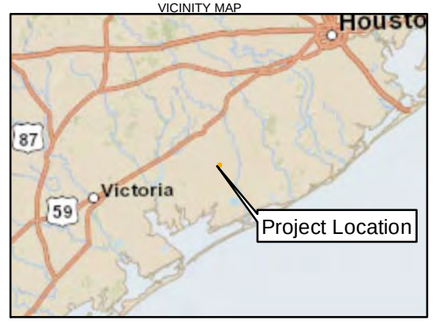
Image:
National Agriculture
Imagery Program (NAIP) - 08/02/2010

N

0 150 300 600
Feet

FIGURE 1-1
Property Location and Boundaries
Proposed Matagorda Energy Center
Matagorda County, Texas

VICINITY MAP



LEGEND

Property Line

Export_Output

Coordinate System:
NAD_1983_StatePlane_Texas_South_Central_FIPS_4204_Feet

N

0 50 100 200
Feet

Figure 1-2
Proposed Matagorda Energy Center
Plot Plan
Matagorda County, Texas

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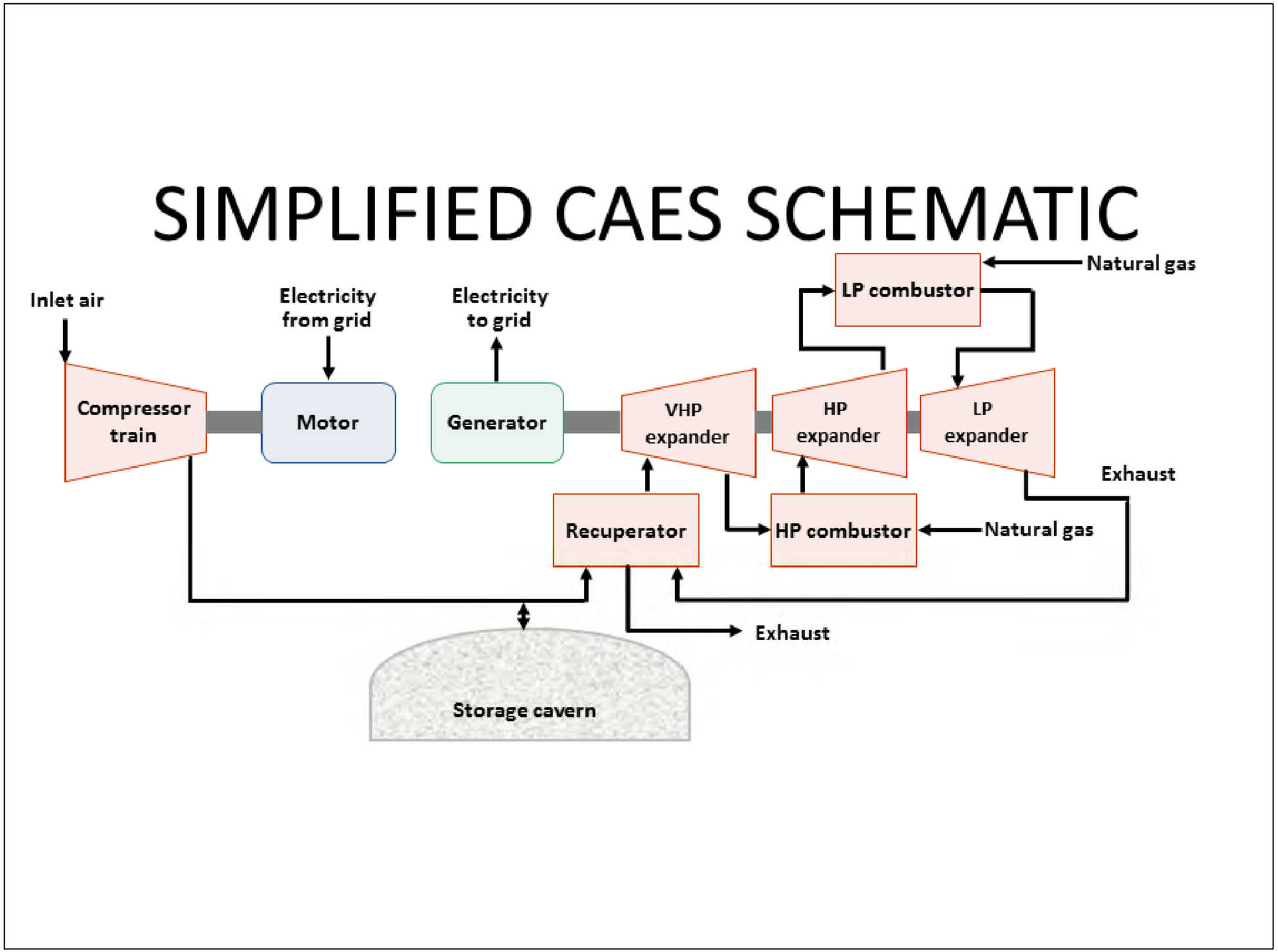
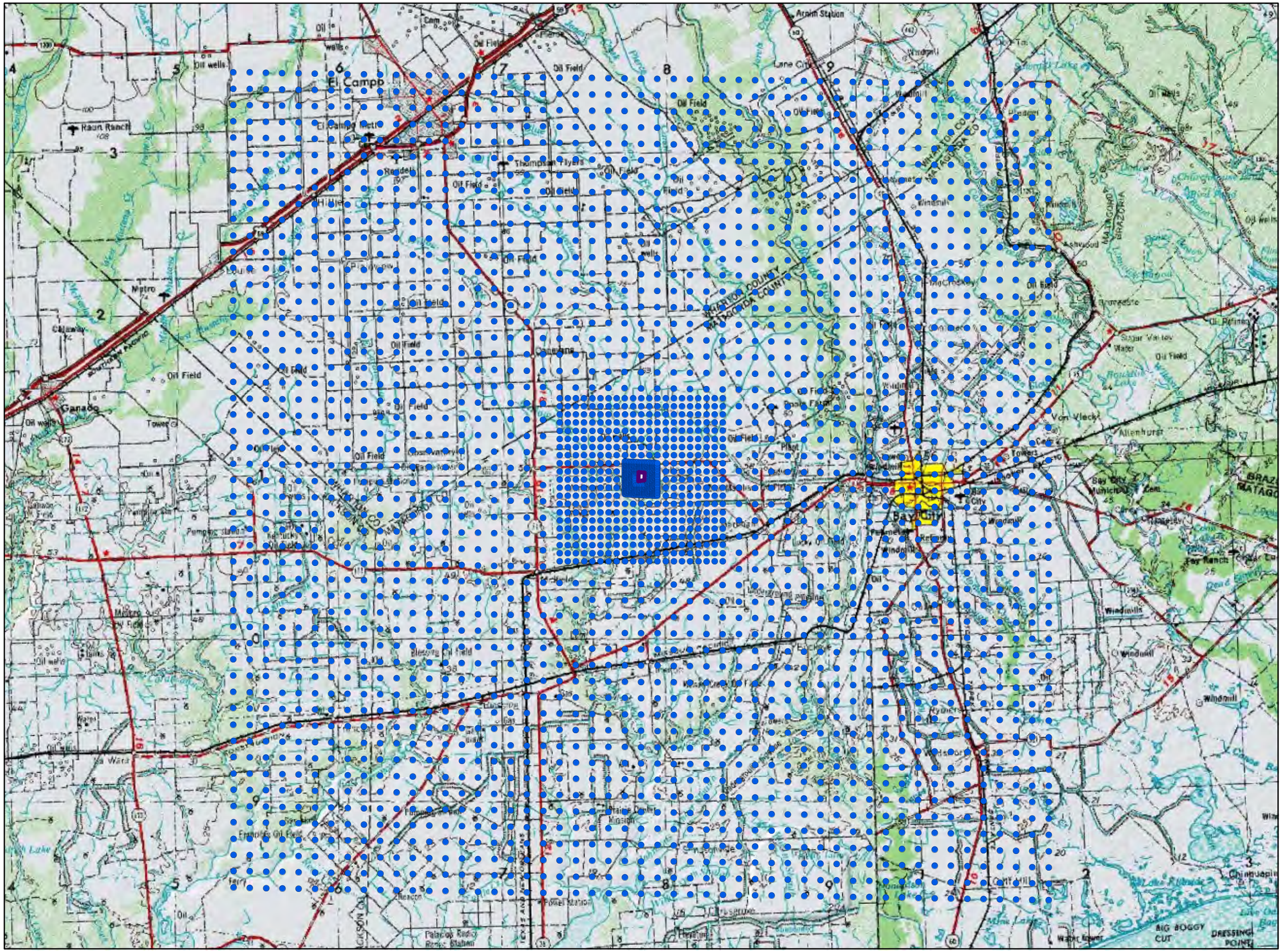


Figure 1-3
Simplified Schematic of CAES Operation
Proposed Matagorda Energy Center
Matagorda County, Texas



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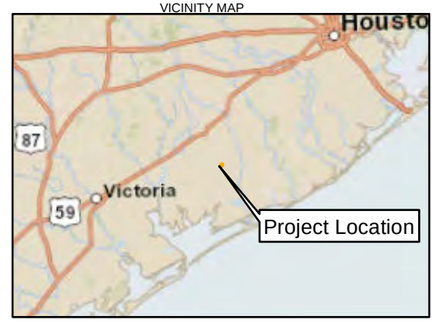


LEGEND

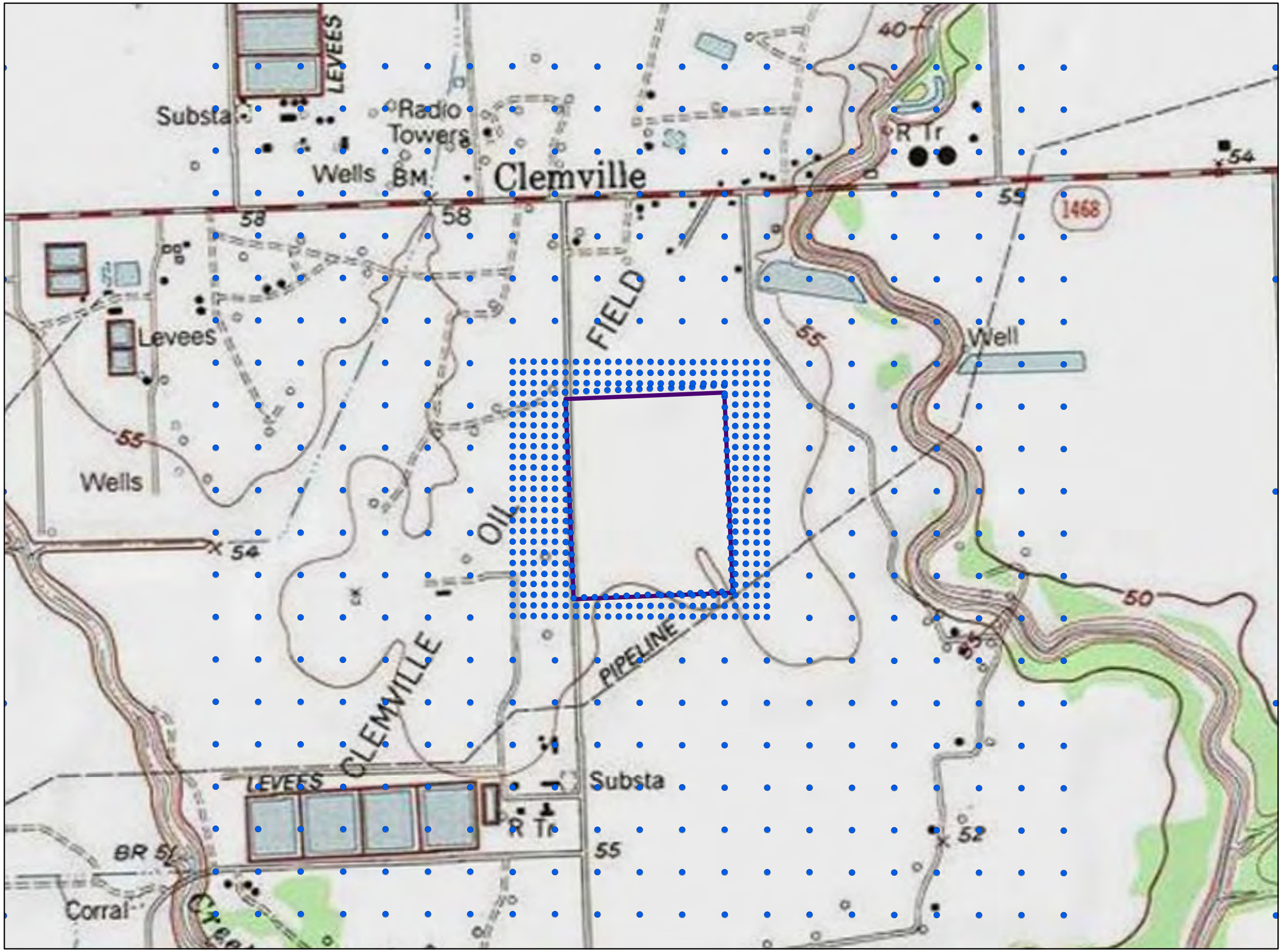
- Ambient Receptor
- Proposed Site

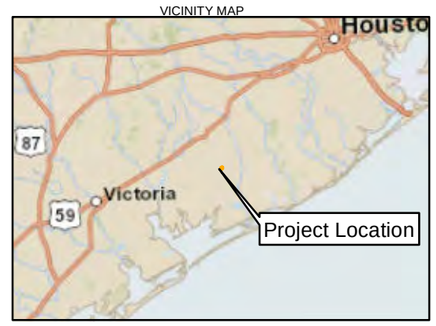
N

0 1.25 2.5 5 7.5

Miles

Figure 1-4
Proposed Matagorda Energy Center
Modeled Receptor Grid (Large Scale)
Matagorda County, Texas





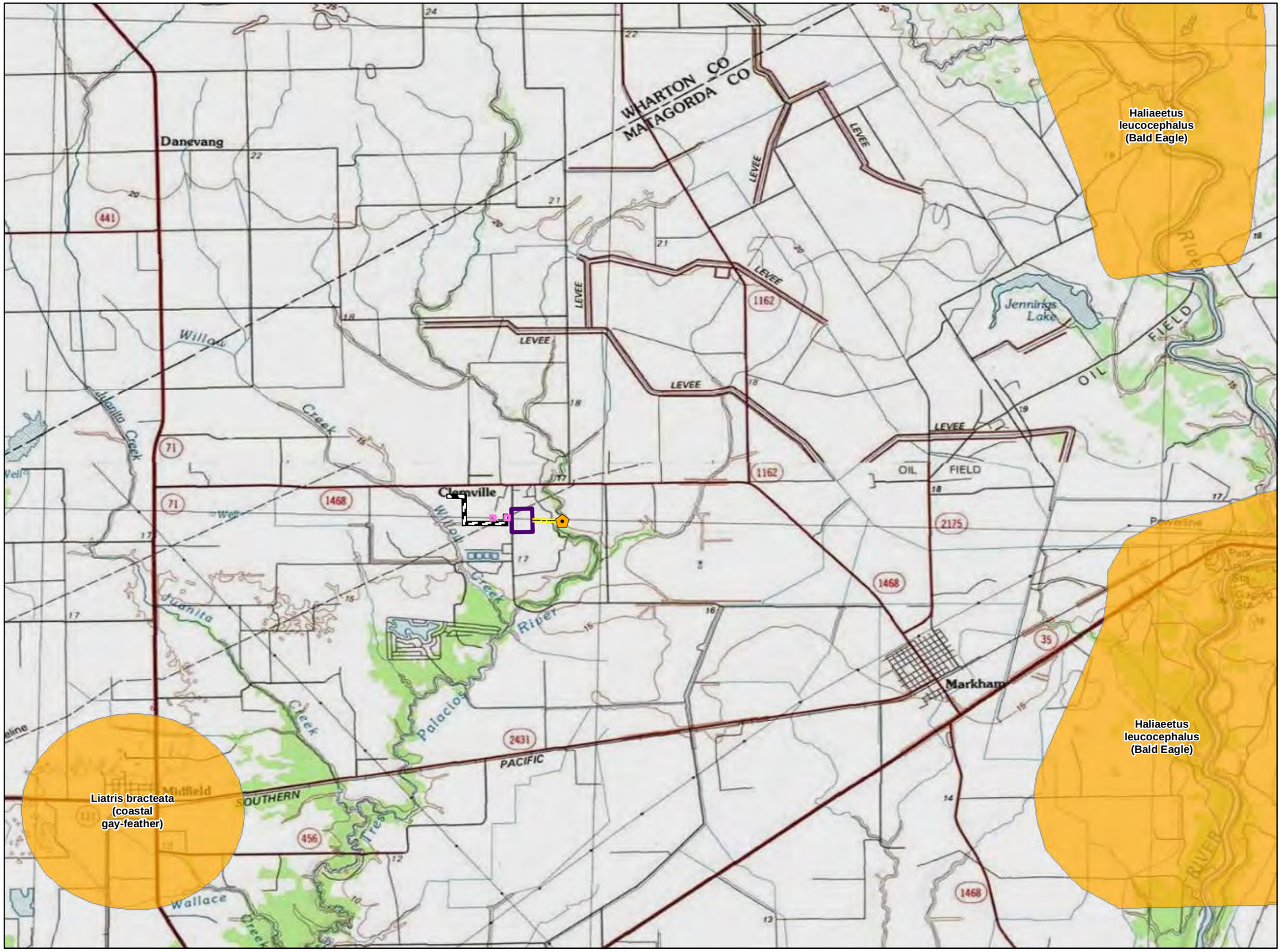
LEGEND

- Ambient Receptor
- Proposed Site

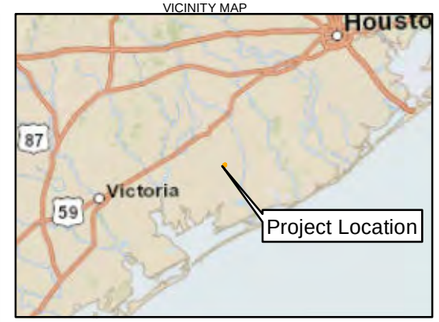
N

0 250 500 1,000 1,500
Feet

Figure 1-5
Proposed Matagorda Energy Center
Modeled Receptor Grid (Small Scale)
Matagorda County, Texas



VICINITY MAP



LEGEND

- Point of Discharge
- Proposed Wastewater Pipeline Corridor
- Proposed Corridor for Freshwater/Brine Water Pipeline
- Apex Designated CAES Well Locations
- Proposed Site
- Proposed Air Pipeline Corridor
- Wildlife Occurrence

N

0 0.5 1 2
Miles

Figure 1-6
Reports of State /Federal Listed Species Within 10-miles of the Proposed Matagorda Energy Center
Matagorda County, Texas

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Appendix A
APEX Biological Resources Review (April 2013)

Final

APEX CAES Biological Resources Review Matagorda County, Texas

Prepared for

APEX Matagorda Energy Center, LLC

April 2013

CH2MHILL®

Contents

Acronyms and Abbreviations

APEX	APEX Matagorda Energy Center, LLC
CAES	Compressed Air Energy Storage
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
NWPL	National Wetland Plant List
OHWM	Ordinary High Water Mark
PEM	Palustrine Emergent 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 Matagorda Energy Center, LLC (APEX), CH2M HILL conducted a biological resources survey, including wetlands, other Waters of the United States (WOUS), and threatened and endangered species habitats for a proposed Compressed Air Energy Storage (CAES) facility located in Matagorda County, Texas. CH2M HILL biologists Jason Speights and Jake Trahan conducted the survey from November 1 to 2, 2012. Subsequent wetland and waterbody delineations were conducted on December 13, 2012 and March 13, 2013 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 other 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 Matagorda Energy Center, a 317 MW CAES facility located near Clemville, Matagorda County, Texas. The proposed Project consists of an approximately 43.8 acre parcel of land proposed for the CAES facility, ("the proposed site"), a wastewater pipeline to the Tres Palacios River, two cavern well sites, air pipeline to the proposed cavern well, and freshwater/brine water pipeline (**Appendix A, Figure 1**).

The proposed site is located in Matagorda County, Texas, approximately 5 miles northwest of Markham, Texas and 70 mi southwest of Houston, Texas (**Appendix A, Figure 1**). Current land use on the proposed site consists of undeveloped, heavily grazed pasture land, row crop farmland, and several pipeline rights-of-way. The proposed site is bounded by County Road 417 to the west. Land to the north, south and east of the Property is primarily row crop farmland. One small well pad is located along the northern boundary of the proposed site. The surrounding land use is a mixture of industrial, commercial, farmland, and undeveloped property.

The facility is expected to produce wastewater consisting 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 Tres Palacios River. The proposed utility corridor for that pipeline will originate at the east-central boundary of the proposed site and will run approximately 0.3 miles east to the Tres Palacios River. (**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).

A new salt cavern will need to be created to support facility air storage and will require approximately two years to create. During cavern creation activities, water required for cavern solutioning will be obtained from the Texas Brine water supply . Brine generated during cavern construction will be piped back to Texas Brine via 2 new water supply pipelines for incorporation into Texas Brine's commercial brine production activity. The proposed alignment for these pipelines will consist of a 50-foot temporary construction easement of which a 30-foot easement would remain as permanent ROW. For approximately 0.14 miles, the proposed alignment parallels an existing pipeline ROW.

A compressed air pipeline will extend west of the facility property approximately 1,100 feet and will connect the air storage cavern to the Apex Matagorda Energy Center. This pipeline will be used to transport compressed air to and from the CAES storage cavern located west of County Route 417.

Surface waters near the vicinity of the Project include the Tres Palacios River to the east. These features are all shown in **Appendix A, Figure 2.**

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, Midfield, 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 Matagorda County, Texas* (NRCS, 2012) identifies one soil type, Laewest clay, 0 to1 percent slopes, within the Project area. This soil type is classified as "unknown hydric" by the NRCS.

Pre-field review of the USGS 7.5-minute quadrangle identified the Tres Palacios River at the eastern extent of the wastewater pipeline and an unnamed intermittent stream that crosses the proposed freshwater/brine water pipeline corridor. No other streams were identified within the Project. The NWI identified three small Palustrine Emergent (PEM1A) wetlands west of the Property within the air pipeline corridor. No additional waters were identified prior to the field event. The Project is within the hydrologic unit code (HUC) 121004010300 watershed.

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 August 9, 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 Matagorda County; and 3) the Texas Natural Diversity Database (TXNDD). The federal and state listed species known from Matagorda County and their preferred habitats are summarized in the Endangered Species and Sensitive Wildlife Habitat section below. The TXNDD was reviewed on November 14, 2012. The search radius was 10 miles from the Project area. The search identified one state rare plant occurrence, the coastal gay-feather, a state listed species of conservation concern and two occurrences of a federally delisted avian species, the bald eagle within 10 miles of the Project. **Figure 3** depicts all of the TXNDD documented records found 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 November 1 to 2, 2012. The survey area included the 43.8 acre parcel of land located east of County Road 417. Subsequent wetland and waterbody delineations were conducted on December 13, 2012 and March 13, 2013 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 *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coast Region (Version 2.0)* (USACE, 2010). The 1987 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).

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

Field Documentation

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

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 2012 National Wetland Plant List (NWPL)* (USDA, 2012). 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 2012 NWPL* (USDA, 2012), appropriate synonymy was used to reference the national list.

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.

Sensitive Wildlife and Habitat

During the field effort, habitat types on the Property and 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, five potential WOUS were identified and delineated including all wetlands and non-wetland waters. **Table 2** summarizes the water bodies and wetlands identified on the Project, and the locations are depicted in **Figure 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
Existing Wetland Resources
Identified within the Project Area
APEX CAES– Matagorda County, TX

Feature ID	Type[1]	Area within Project Area	12-Digit HUC	Hydrological Connection
WL1	PEM	0.60 acres	121004010300	Adjacent to Tres Palacios River
WL2	PEM	0.31 acres	121004010300	Significant Nexus Required
WL3	PEM	1.15 acres	121004010300	Significant Nexus Required
WL3	PSS	0.13 acres	121004010300	Significant Nexus Required
WL4	PEM	0.18 acres	121004010300	Significant Nexus Required

Notes: all measurements generated using arcgis 9.2. S2
[1] Cowardin system from NWI mapping for the Project area.

TABLE 3
Existing Waterbody Resources
Identified within the Project Area
APEX CAES– Matagorda County, TX

Feature ID	Stream Name	Flow Regime[1]	Length within Project Area	12-Digit HUC	TNW, RPW, or Non-RPW[2]
S1	Tres Palacios River	Perennial	30 linear feet	121004010300	TNW
S2	Man-made Canal	Ephemeral	197 linear feet	121004010300	Non-RPW

Notes: all measurements generated using arcgis 9.2. S2
[1]Flow regime is defined as perennial, intermittent, or ephemeral.

[2]Intermittent and perennial streams were recorded as RPWs, while ephemeral streams were recorded as Non-RPWs

Non-wetland Waters

S1- Tres Palacios River

S1, the Tres Palacios River, is a perennial river that flows from north to south at the terminus of the waste water outfall east of the Project. This river ultimately flows into Matagorda Bay approximately 25 miles south of the Project. Within the Project area, the Tres Palacios River has an OHWM width of 12 feet, a top-of-bank (TOB) width of 60 feet, and a TOB depth of 15 feet. At the time of observation, the water width was 10 feet with a depth of 1-2 foot, and slow flow was documented. S1 has highly incised/channelized steep banks (3:1 slope) with no fringe wetlands present and no definite riparian corridor within the Project area. Vegetation along the banks was dominated by Johnsongrass (*Sorghum halepense*) and cutgrass (*Leersia oryzoides*) at the water's edge. S1 is a named stream and therefore would be considered jurisdictional by the USACE. It is anticipated that an erosion control structure (i.e. riprap, concrete slope paving, or articulated concrete matting will be needed at the pipeline outfall as to minimize bank erosion. This structure will likely extend below the OHWM of the Tres Palacios River and be considered a permanent fill/impact. This should not impact more than 30 linear feet of streambank.

S2– Man-made Canal

S2 is identified as an unnamed intermittent stream on the USGS Midfield 7.5-minuted quadrangle map. 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.

S2 is a historic, man-made canal which appears to be part of a larger irrigation system, most of which is located outside of the Project area. S2 flows northeast to southwest across the proposed freshwater/brine water pipeline corridor, then makes a slight turn to flow just south of the proposed corridor. Within the Project area, S2 has an OHWM width of 12 feet, a TOB width of 15 feet, and a TOB of 6 feet. At the time of observation, no water was observed in the channel. There are approximately 197 linear feet of channel within the Project. S2 flows approximately 0.27 aerial miles west before flowing into Willow Creek, which ultimately flows into the Tres Palacios River. Therefore, S2 would likely be considered jurisdictional by the USACE. Apex will avoid disturbance of the canal by placing a temporary pipeline up and over the canal during cavern creation activities.

Wetlands

WL1 PEM

WL1 comprises approximately 0.60 acres of low-quality PEM wetlands. WL1 PEM is dominated by roughfruit amaranth (*Amaranthus tuberculatus*), green flatsedge (*Cyperus virens*), and jungle rice (*Echinochloa colona*). This wetland is not indicated in the NWI data. This wetland was located at the edge of a plowed agricultural field and had been highly disturbed by tractor operation and/or tilling. Historical imagery indicates man-made water holding structures were once at this location, but were not present at the time of field observations. This wetland would likely be considered jurisdictional by the USACE due to the proximity to the Tres Palacios River and the likelihood of overland connection through man-made swales located in the surrounding agricultural field.

WL2 PEM

WL2 is a low-quality PEM wetland approximately 0.31 acres in size. Dominant vegetation within the wetland consists of jointed flatsedge (*Cyperus articulatus*), broad-leaf cattail (*Typha latifolia*), and bigpod sesbania (*Sesbania herbacea*). The NWI classifies this area as a PEM1A wetland. WL2 appears to be an isolated wetland located within a micro-depression created during construction or decommissioning of an abandoned well at this location. However, there may be an overland connection to the Tres Palacios River via roadside ditches to establish a significant nexus for USACE jurisdiction. The USACE will complete a significant nexus analysis to evaluate whether or not the wetland is isolated.

WL3 PEM/PSS

WL3 comprises approximately 1.15 acres of low-quality PEM wetlands and 0.13 acres of low-quality PSS wetlands. Dominant vegetation within the PEM wetland consists of hairyseed paspalum (*Paspalum pubiflorum*), jointed flatsedge, and eastern baccharis (*Baccharis halimifolia*). Dominant vegetation within the PSS wetland consists of eastern baccharis, green flatsedge (*Cyperus virens*) and jointed flatsedge. The NWI indicates this area is a PEM1A wetland. WL3 appears to be an isolated wetland located within a micro-depression abutting an existing gravel access road, but may connect through roadside ditches with the Tres Palacios River to the south and east. The USACE will complete a significant nexus analysis to evaluate whether or not the wetland is isolated.

WL4 PEM

WL4 is a low-quality PEM wetland approximately 0.18 acres in size. Dominant vegetation within the wetland consists of Eastern annual saltmarsh aster (*Symphyotrichum subulatum*). This wetland is not indicated in the NWI data. WL4 is located within a micro-depression created by clearing and grading of the surrounding habitat. This wetland has been disturbed recently by clearing and off-road vehicle use, creating tire ruts and bare, disturbed ground. WL4 is approximately 32 feet north of a man-made canal (S2) and is separated from the canal by an upland berm. S2 flows west into a relatively permanent water (RPW) which ultimately flows into the Tres Palacios River. The USACE will complete a significant nexus analysis to evaluate whether or not the wetland is jurisdictional under the CWA.

Endangered Species and Sensitive Wildlife Habitat

Forty-eight federal and state-listed threatened, endangered, and rare species are listed for Matagorda 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 four 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. The TXNDD was reviewed on November 14, 2012. The search radius was 10 miles from the Project area. The search identified one state rare plant occurrence, the coastal gay-feather, a state listed species of conservation concern and two occurrences of a federally delisted avian species, the bald eagle within 10 miles of the Project. **Figure 3** depicts all of the TXNDD documented records found within 10 miles of the Project.

Site reconnaissance determined that the Project area consists of agricultural land, PEM wetlands, and undeveloped property. While potentially suitable habitat appears to be present for three of the species listed in Table 3 (plains spotted skunk, smooth pimpleback mussel, and the coastal gayfeather), no evidence of listed species was observed during the site visit within any habitat type. No adverse effects to sensitive species would be expected from implementation of the project.

TABLE 4
Federal and State Threatened and Endangered Species in Matagorda 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
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
Black Rail *Laterallus jamaicensis*	--	--	Inhabits salt, brackish, and freshwater marshes, wet meadows, and grassy swamps. Usually nests in marsh grass at the edge of marshes.	No	No
Brown Pelican *Pelicanus occidentalis*	DM	--	Largely coastal and near shore areas; roosts and nests on islands and spoil banks.	No	No

TABLE 4
Federal and State Threatened and Endangered Species in Matagorda County, Texas.

Species	Federal Status	State Status	Description of Suitable Habitat	Habitat Present	Species Effect
Eskimo Curlew *Numenius borealis*	--	E	Historic; inhabits grasslands, pastures, plowed fields, marshes, and mudflats.	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
Northern Aplomado Falcon *Falco femoralis septentrionalis*	E	E	Inhabits open country, especially savanna and open woodland. Nests in old stick nests of other bird species.	No	No
Piping Plover *Charadrius melodus*	E,T	T	Wintering migrant along the Texas Gulf Coast; beaches and bayside mud or salt flats.	No	No
Reddish Egret *Egretta rufescens*	--	T	Inhabits brackish marshes, shallow salt ponds, and tidal flats. Nests on ground or in trees or bushes.	No	No
Snowy Plover *Charadrius alexandrinus*	--	--	Wintering migrant along the Texas Gulf Coast.	No	No
Sooty Tern *Sterna fuscata*	--	T	Largely pelagic; nests on islets off Texas coast.	No	No
Southeastern Snowy Plover *Charadrius alexandrines tenuirostris*	--	--	Wintering migrant along the Texas Gulf Coast beaches and bayside mud or salt flats.	No	No
Sprague's Pipit *Anthus spragueii*	--	--	Wintering migrant along the Texas Gulf Coast; locally common in local grasslands.	No	No
Western Burrowing Owl *Athene cunicularia hypugaea*	--	--	Inhabits open grasslands, especially prairie, plains, and savanna; nests and roosts in abandoned burrows.	No	No
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
White-tailed Hawk *Buteo albicaudatus*	--	T	Found near the coast on prairies, cordgrass flats, and scrub-live oak. Found further inland on prairies, mesquite and oak savannas, and mixed savanna-chaparral.	No	No
Whooping Crane *Grus americana*	E	E	Potential migrant throughout most of state to coast. Winters in coastal marshes.	No	No

TABLE 4
Federal and State Threatened and Endangered Species in Matagorda County, Texas.

Species	Federal Status	State Status	Description of Suitable Habitat	Habitat Present	Species Effect
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
Crustaceans					
A crayfish *Cambarellus texanus*	--	--	Benthic; prefers standing water of ditches in which there is emergent vegetation.	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
Blue sucker *Cycleptus elongatus*	--	T	Found in major rivers of Texas, usually in channels and flowing pools with a moderate current.	No	No
Smalltooth Sawfish *Pristis pectinata*	--	E	Young found very close to shore over muddy and sandy bottoms of sheltered bays, estuaries, or river mouths. Adults are found in various habitats (mango, reef, seagrass, and coral).	No	No
Insects					
Gulf Coast clubtail *Gomphus modestus*	--	--	Found in medium-sized rivers and stream with a silty sand or rocky bottom. Adults forage in trees.	No	No
Reptiles					
Hawksbill sea turtle *Eretmochelys imbricata*	E	E	Gulf and bay systems.	No	No
Green sea turtle *Chelonia mydas*	E,T	T	Gulf and bay systems.	No	No
Gulf saltmarsh snake	--	--	Inhabits saline flats, coastal bays, and brackish river mouths.	No	No
Kemp's Ridley sea turtle *Lepidochelys kempii*	E	E	Gulf and bay systems.	No	No
Leatherback sea turtle *Dermochelys coriacea*	E	E	Gulf and bay systems.	No	No
Loggerhead sea turtle *Caretta caretta*	T	T	Gulf and bay systems.	No	No

TABLE 4
Federal and State Threatened and Endangered Species in Matagorda County, Texas.

Species	Federal Status	State Status	Description of Suitable Habitat	Habitat Present	Species Effect
Smooth green snake *Liochlorophis vernalis*	--	T	Inhabits mesic coastal cordgrass prairies of the Gulf Coastal Plain.	No	No
Texas diamondback terrapin *Malaclemys terrapin littoralis*	--	--	Inhabits coastal marshes, tidal flats, coves, estuaries, and lagoons behind barrier beaches. May venture into lowlands at high tide.	No	No
Texas horned lizard *Phrynosoma cornutum*	--	T	Open, arid and semi-arid regions with sparse vegetation.	No	No
Texas scarlet snake *Cemophora coccinea lineri*	--	T	Mixed hardwood scrub on sandy soils; feeds on reptile eggs; semi-fossorial.	No	No
Texas tortoise *Gopherus berlandieri*	--	T	Open brush with a grass understory is preferred; open grass and bare ground are avoided; when inactive occupies shallow depressions at base of bush or cactus.	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.	No	No
Mammals					
Louisiana black bear *Ursus americanus luteolus*	--	T	Possible as transient, bottomland hardwoods and large tracts of inaccessible forested areas.	No	No
Ocelot *Leopardus pardalis*	--	E	Inhabits dense chaparral thickets and mesquite-thorn scrub and live oak mottes; avoids open 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 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
West Indian manatee *Trichechus manatus*	--	E	Gulf and bay systems.	No	No

TABLE 4
Federal and State Threatened and Endangered Species in Matagorda 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
Smooth pimpleback *Quadrula houstonensis*	--	T	Small to moderate streams and rivers with mixed mud, sand, and fine gravel bottoms. Lower Trinity, Brazos, and Colorado river basins.	Yes	Not likely to adversely affect. Impacts to potential habitat would be temporary and minor
Texas fawnsfoot *Truncilla macrodon*	--	T	Possibly rivers, large streams, and rice irrigation canals over sand and gravel substrates. Brazos and Colorado river basins.	No	No
Plants					
Coastal gayfeather *Liatris bracteata*	--	--	Found in various types of coastal prairie grasslands, from salty prairie on low-lying saline clay loams to upland prairie on non-saline clayey to sandy loams. Flowers in fall.	Yes	Not likely to adversely affect. Impacts to potential habitat would be temporary and minor
Shinner's sunflower *Helianthus occidentalis spp. plantagineus*	--	--	Prairies on the coastal plain.	No	No
Threeflower broomweed *Thurovia triflora*	--	--	Found near the coast in sparse, low vegetation on silt or fine sand over saline clay. Found further inland in vegetative slick spots on prairie mima mounds. Flowers September through November.	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 two jurisdictional streams and five potentially jurisdictional wetlands in the Project area. Four of the five 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 Galveston District of the USACE pursuant to Section 404 of the Clean Water Act.[1] The Galveston District of USACE is within the Fifth Circuit Court

[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.

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 Galveston 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 Galveston 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-Galveston 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 (NWPs) are available through the USACE, each with its own criteria that must be followed to qualify for authorization. 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 0.5 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 Galveston District. The Project will also be required 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.

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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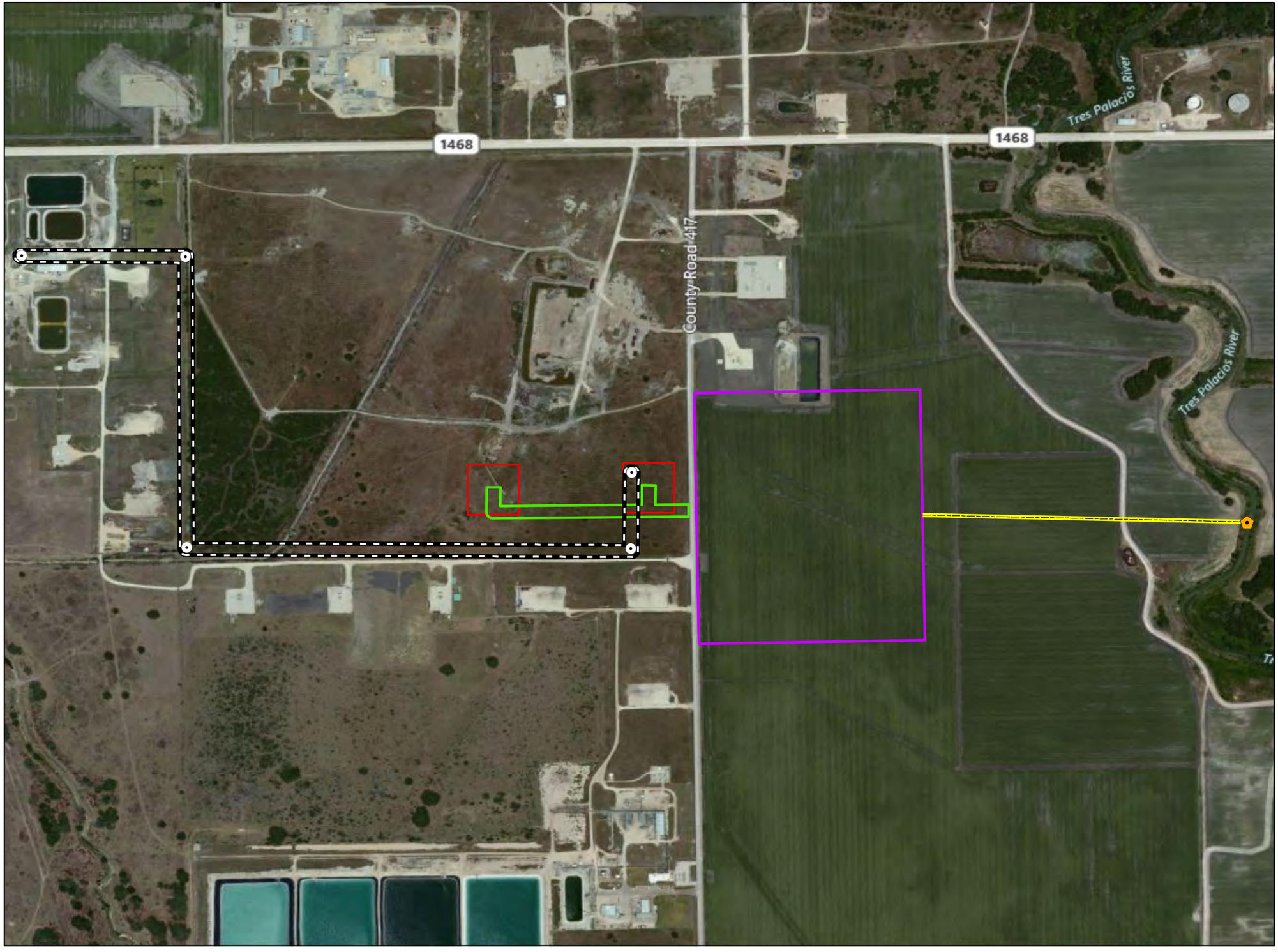
Appendix A
Figures



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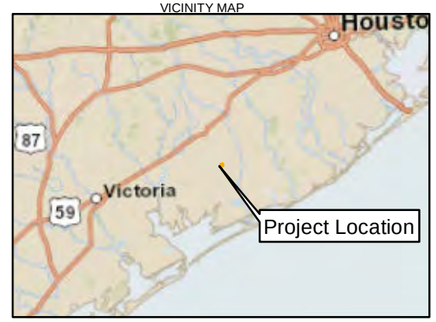


LEGEND

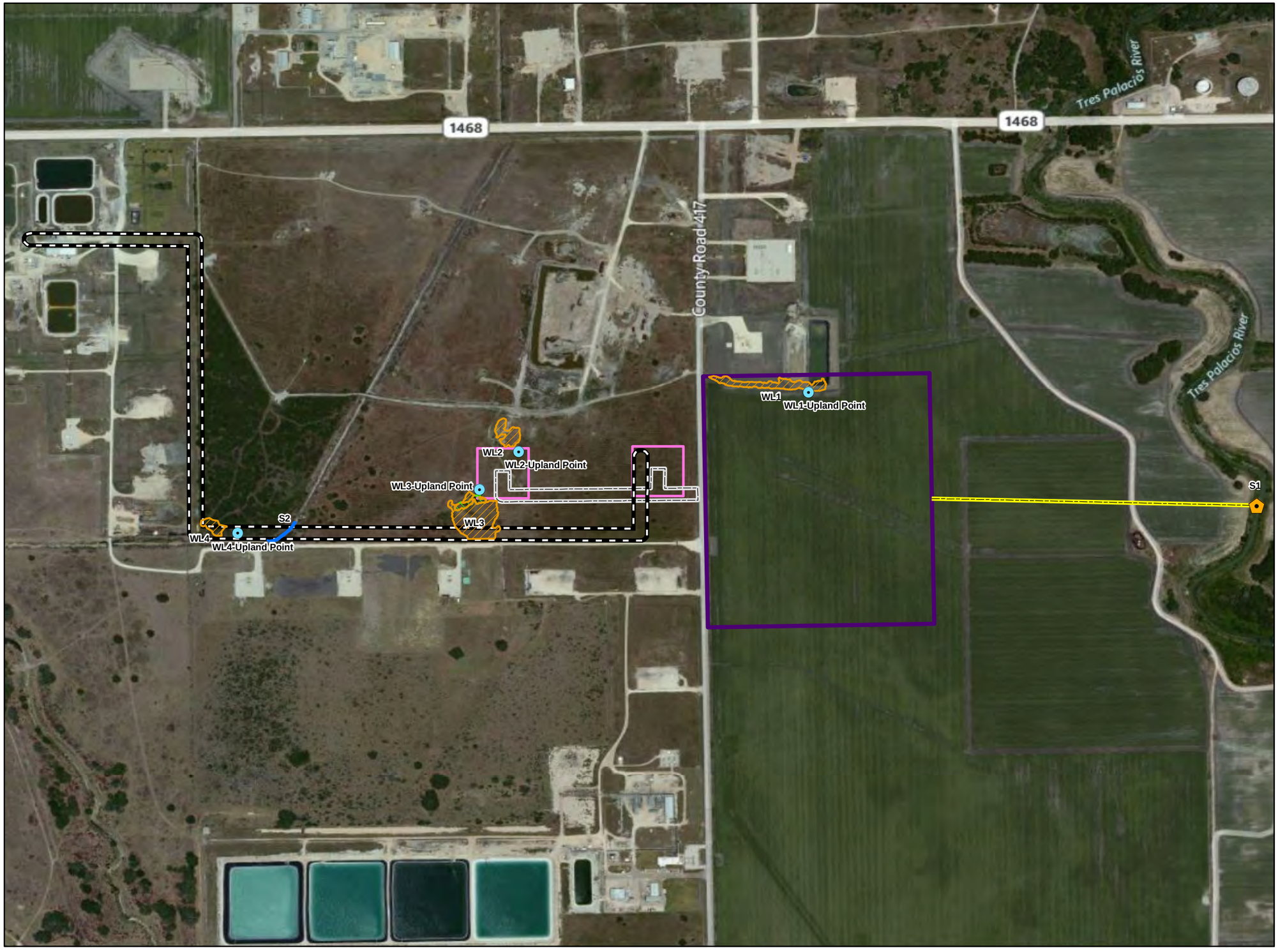
- Point of Discharge
- Proposed Corridor for Freshwater/Brine Water Pipeline
- Proposed Wastewater Pipeline Corridor
- Proposed Air Pipeline Corridor
- Proposed Site
- APEX Designated CAES Well Location

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

N

0 200 400 800
Feet

FIGURE 1
Project Area
Proposed Energy Development Site
Matagorda County, Texas



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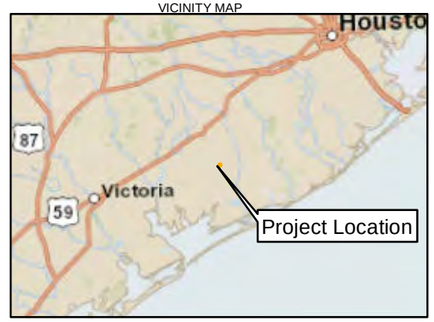


LEGEND

- Upland Point
- Point of Discharge
- Stream Line
- Proposed Corridor for Freshwater/Brine Water Pipeline
- Proposed Wastewater Pipeline Corridor
- Proposed Site
- Proposed Air Pipeline Corridor
- Apex Designated CAES Well Locations

Wetland Type

- PEM
- PSS

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

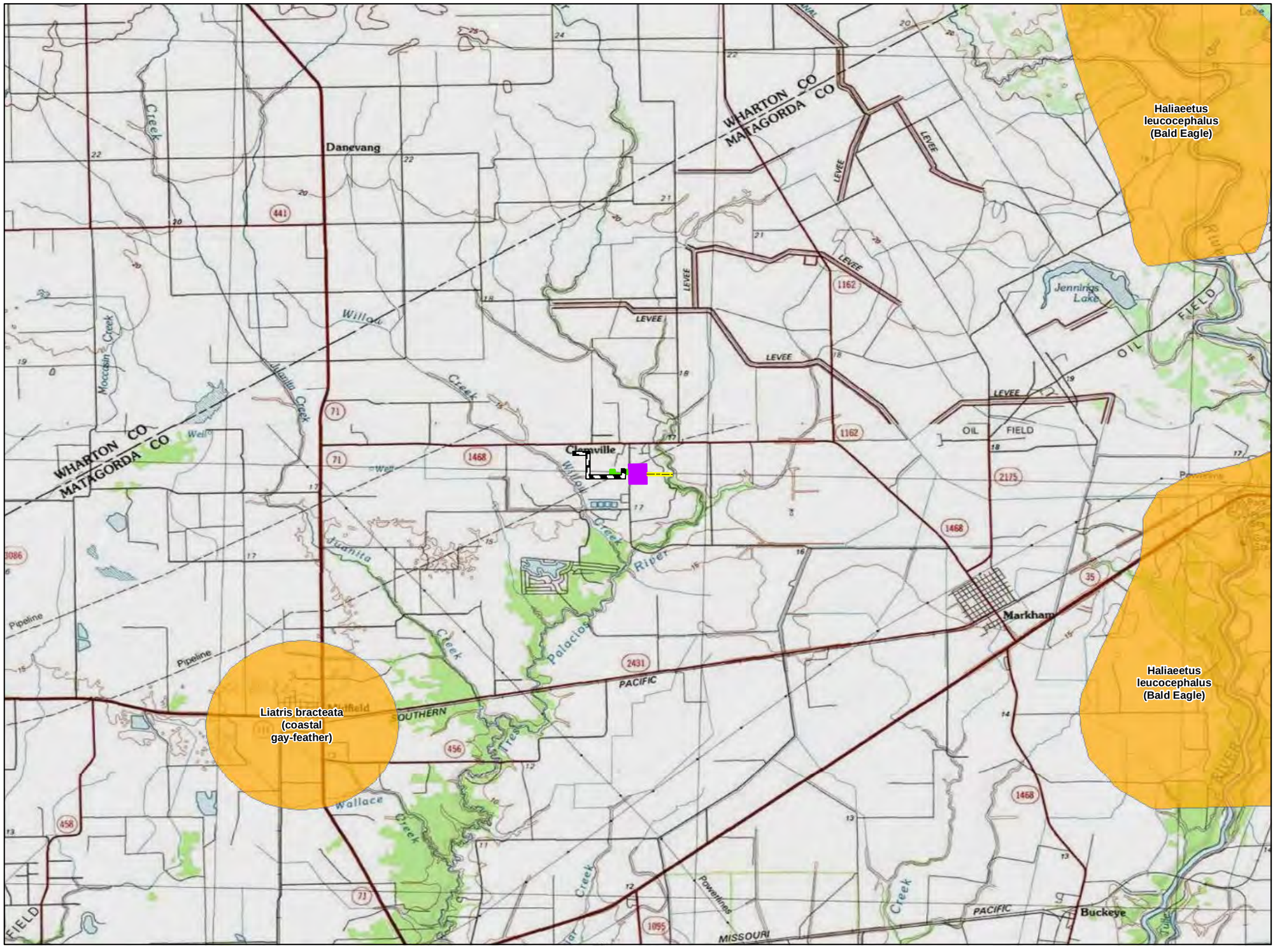
N

0 150 300 600
Feet

FIGURE 2
Wetlands and Other Waters of the US
Proposed Energy Development Site
Matagorda County, Texas

R:\GIS\HOU\APEX_Matagorda\MapFiles\Wetlands_Waterbodies_FieldData.mxd bthomson 3/27/2013 9:07:53 AM

CH2MHILL



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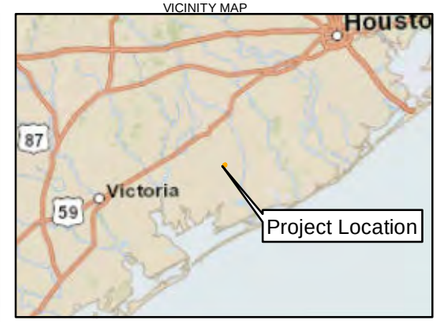


LEGEND

- Proposed Wastewater Pipeline Corridor
- Proposed Corridor for Freshwater/Brine Water Pipeline
- Well Pad Areas
- Proposed Air Pipeline Corridor
- Proposed Site
- Wildlife Occurrence

N

0 0.5 1 2
Miles

Figure 3
Reports of State /Federal Listed Species Within 10-miles of the Proposed Matagorda Energy Center
Matagorda County, Texas

Appendix B
Data Sheets

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Matagorda CAES Facility City/County: Matagorda County Sampling Date: 11/1/2012

Applicant/Owner: APEX CAES, LLC State: TX Sampling Point: WL1_PEM

Investigator(s): Jason Speights, Jake Trahan Section, Township, Range: NA

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): None Slope (%): 0-1%

Subregion (LRR or MLRA): LRR T Lat: 28° 59' 29.228" N Long: 96° 8' 29.742" W Datum: WGS 1984

Soil Map Unit Name: Laewest clay, 0 to 1% slopes NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X	No _____	
Wetland Hydrology Present?	Yes X	No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☑ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☑ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes _____	No X	Depth (inches): _____
Water Table Present?	Yes _____	No X	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No X	Depth (inches): _____

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: WL1_PEM

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Herb Stratum (Plot size: 30' x 30')			
1. Amaranthus tuberculatus	20	Y	OBL
2. Cyperus virens	10	Y	FACW
3. Echinochloa colona	10	Y	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	40 = Total Cover		

50% of total cover: 20 20% of total cover: 8

Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ☑ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** _____

Remarks: (If observed, list morphological adaptations below).

Amaranthus tuberculosis is listed as NI for Region 6. Used Region 5 status. Vegetation had been disturbed due to agricultural practices and repeated tilling.

SOIL

Sampling Point: WL1_PEM

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 3/1	7	10YR 5/6	93	C	PL	Clay	
6-16	10YR 3/1	100					Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☑ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Matagorda CAES Facility City/County: Matagorda County Sampling Date: 11/1/2012

Applicant/Owner: APEX CAES, LLC State: TX Sampling Point: WL1_UPL

Investigator(s): Jason Speights, Jake Trahan Section, Township, Range: NA

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): None Slope (%): 0-1%

Subregion (LRR or MLRA): LRR T Lat: 28° 59' 28.683" N Long: 96° 8' 27.890" W Datum: WGS 1984

Soil Map Unit Name: Laewest clay, 0 to 1% slopes NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No X	**Is the Sampled Area within a Wetland?** Yes _____ No X
Hydric Soil Present?	Yes _____	No X	
Wetland Hydrology Present?	Yes _____	No X	

Remarks:

Upland point is within a tilled agricultural field that was planted with cotton during a site visit in August 2012. Field had been harvested at the time of wetland survey.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes _____	No X	Depth (inches): _____
Water Table Present?	Yes _____	No X	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No X	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Hydrology does not appear to be altered. No signs of drainage ditches in the immediate area.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: WL1_UPL

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
= Total Cover			

50% of total cover: _____ 20% of total cover: _____

Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
= Total Cover			

50% of total cover: _____ 20% of total cover: _____

Herb Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
= Total Cover			

50% of total cover: _____ 20% of total cover: _____

Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
= Total Cover			

50% of total cover: _____ 20% of total cover: _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: _____ (A)

Total Number of Dominant Species Across All Strata: _____ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: _____ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☐ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** _____ **No** X

Remarks: (If observed, list morphological adaptations below).

Vegetation had been disturbed due to agricultural practices and repeated tilling. Field was planted with cotton during a site visit in August 2012, but had been harvested at the time of survey.

SOIL

Sampling Point: WL1_UPL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 3/1	100					Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** X

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Matagorda CAES Facility City/County: Matagorda County Sampling Date: 12/13/2012

Applicant/Owner: APEX CAES, LLC State: TX Sampling Point: WL2_PEM

Investigator(s): Jake Trahan Section, Township, Range: NA

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): None Slope (%): 0-1%

Subregion (LRR or MLRA): LRR T Lat: 28° 59' 26.674" N Long: 96° 8' 46.696" W Datum: WGS 1984

Soil Map Unit Name: Laewest clay, 0 to 1% slopes NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X	No _____	
Wetland Hydrology Present?	Yes X	No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☑ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☑ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes _____	No X	Depth (inches): _____
Water Table Present?	Yes _____	No X	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No X	Depth (inches): _____

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: WL2_PEM

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Herb Stratum (Plot size: 30' x 30')			
1. Cyperus articulatus	30	Y	OBL
2. Typha latifolia	20	Y	OBL
3. Sesbania herbacea	20	Y	FACW
4. Cyperus virens	10	N	FACW
5. Andropogon glomeratus	10	N	FACW
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	90 = Total Cover		

50% of total cover: 45 20% of total cover: 18

Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals: (A)		(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ☑ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** _____

Remarks: (If observed, list morphological adaptations below).

Dead unidentifiable aster species comprised 50% of the upper herbaceous layer. Only stems remained intact.

SOIL

Sampling Point: WL2_PEM

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	7.5YR 3/2						Sandy Loam	
3-16	10YR 6/2	90	5YT 5/8	10	C	PL	Sandy Loam	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☑ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Matagorda CAES Facility City/County: Matagorda County Sampling Date: 12/13/2012

Applicant/Owner: APEX CAES, LLC State: TX Sampling Point: WL2_UPL

Investigator(s): Jake Trahan Section, Township, Range: NA

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): None Slope (%): 0-1%

Subregion (LRR or MLRA): LRR T Lat: 28° 59' 25.046" N Long: 96° 8' 45.625" W Datum: WGS 1984

Soil Map Unit Name: Laewest clay, 0 to 1% slopes NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No X
Hydric Soil Present?	Yes _____	No X	
Wetland Hydrology Present?	Yes _____	No X	

Remarks:

Upland point paired with WL2-PEM. Located in an abandoned agricultural field previously disturbed.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes _____	No X	Depth (inches): _____
Water Table Present?	Yes _____	No X	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No X	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Hydrology does not appear to be altered. No signs of drainage ditches in the immediate area.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: WL2_UPL

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: 20% of total cover:

Sapling/Shrub Stratum (Plot size:)			
1. Rosa bracteata	80	Yes	UPL
2. Baccharis halimifolia	10	No	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	90 = Total Cover		

50% of total cover: 45 20% of total cover: 18

Herb Stratum (Plot size:)			
1. Symphyotrichum subulatum	30	Yes	OBL
2. Andropogon glomeratus	10	Yes	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	40 = Total Cover		

50% of total cover: 20 20% of total cover: 8

Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

50% of total cover: 20% of total cover:

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 67 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☐ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No**

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WL2_UPL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Redox Features Type[1]	Redox Features Loc[2]	Texture	Remarks
0-16	10YR 2/2	100					Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** X

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Matagorda CAES Facility City/County: Matagorda County Sampling Date: 12/13/2012

Applicant/Owner: APEX CAES, LLC State: TX Sampling Point: WL3_PEM

Investigator(s): Jake Trahan Section, Township, Range: NA

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): None Slope (%): 0-1%

Subregion (LRR or MLRA): LRR T Lat: 28° 59' 20.141" N Long: 96° 8' 47.969" W Datum: WGS 1984

Soil Map Unit Name: Laewest clay, 0 to 1% slopes NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X No _____	
Wetland Hydrology Present?	Yes X No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☑ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☑ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes X No _____ Depth (inches): 8"

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: WL3_PEM

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Sapling/Shrub Stratum (Plot size:)			
1. Baccharis halimifolia	10	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	10 = Total Cover		

50% of total cover: 5 20% of total cover: 2

Herb Stratum (Plot size: 30' x 30')			
1. Paspalum pubiflorum	40	Y	FACW
2. Cyperus articulatus	30	Y	OBL
3. Elocharis parvula	10	N	OBL
4. Cyperus virens	10	N	FACW
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	90 = Total Cover		

50% of total cover: 45 20% of total cover: 18

Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ☑ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** _____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WL3_PEM

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/2	95	10YR 5/6	5	C	PL	Clay	
4-16	10YR 4/2	95	10YR 5/6	5	C	PL	Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☑ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☑ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Matagorda CAES Facility City/County: Matagorda County Sampling Date: 12/13/2012

Applicant/Owner: APEX CAES, LLC State: TX Sampling Point: WL3_PSS

Investigator(s): Jake Trahan Section, Township, Range: NA

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): None Slope (%): 0-1%

Subregion (LRR or MLRA): LRR T Lat: 28° 59' 21.997" N Long: 96° 8' 49.008" W Datum: WGS 1984

Soil Map Unit Name: Laewest clay, 0 to 1% slopes NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X	No _____	
Wetland Hydrology Present?	Yes X	No _____	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☑ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☑ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: WL3_PSS

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: 20% of total cover:

Sapling/Shrub Stratum (Plot size:)			
1. Baccharis halimifolia	60	Yes	FAC
2. Sesbania herbacea	10	No	FACW
3.			
4.			
5.			
6.			
7.			
8.			
	70 = Total Cover		

50% of total cover: 35 20% of total cover: 14

Herb Stratum (Plot size: 30' x 30')			
1. Cyperus virens	10	Y	FACW
2. Cyperus articulatus	10	Y	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	20 = Total Cover		

50% of total cover: 10 20% of total cover: 4

Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

50% of total cover: 20% of total cover:

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A =

Hydrophytic Vegetation Indicators:

- ☑ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No**

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WL3_PSS

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 3/2	95	10YR 5/6	5	C	PL	Clay	
4-16	10YR 4/2	95	10YR 5/6	5	C	PL	Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☑ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☑ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Matagorda CAES Facility City/County: Matagorda County Sampling Date: 12/13/2012

Applicant/Owner: APEX CAES, LLC State: TX Sampling Point: WL3_UPL

Investigator(s): Jake Trahan Section, Township, Range: NA

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): None Slope (%): 0-1%

Subregion (LRR or MLRA): LRR T Lat: 28° 59' 22.711" N Long: 96° 8' 48.012" W Datum: WGS 1984

Soil Map Unit Name: Laewest clay, 0 to 1% slopes NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes _____	No X	**Is the Sampled Area within a Wetland?** Yes _____ No X
Hydric Soil Present?	Yes X	No _____	
Wetland Hydrology Present?	Yes _____	No X	

Remarks:

Upland point paired with WL3-PEM/PSS. Located in an abandoned agricultural field previously disturbed.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☐ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes _____	No X	Depth (inches): _____
Water Table Present?	Yes _____	No X	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No X	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Hydrology does not appear to be altered. No signs of drainage ditches in the immediate area.

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: WL3_UPL

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: 20% of total cover:

Sapling/Shrub Stratum (Plot size:)			
1. Rosa bracteata	10	Yes	UPL
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	10 = Total Cover		

50% of total cover: 5 20% of total cover: 2

Herb Stratum (Plot size:)			
1. Symphyotrichum subulatum	50	Yes	OBL
2. Bothriochloa ischaemum	10	No	NL
3. Cyperus virens	`10	No	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	70 = Total Cover		

50% of total cover: 35 20% of total cover: 14

Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

50% of total cover: 20% of total cover:

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	50	x 1 =	50
FACW species	10	x 2 =	20
FAC species		x 3 =	
FACU species		x 4 =	
UPL species	10	x 5 =	50
Column Totals:	70 (A)		120 (B)

Prevalence Index = B/A = 1.71

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☐ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ☐ **No** X

Remarks: (If observed, list morphological adaptations below).

Although the prevalence index is 1.71, the area lacks hydrology indicators, and therefore does not pass the prevalence index test.

SOIL

Sampling Point: WL3_UPL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 5/2	100					Clay loam	
6-16	10YR 4/2	90	10YR 4/8	10	C	PL	Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☑ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Matagorda CAES Facility City/County: Matagorda County Sampling Date: 3/13/2013

Applicant/Owner: APEX CAES, LLC State: TX Sampling Point: WL4_PEM

Investigator(s): Jennifer Speights, Jason Speights Section, Township, Range: NA

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): Concave Slope (%): 0-1%

Subregion (LRR or MLRA): LRR T Lat: 28° 59' 20.703" N Long: 96° 9' 4.697" W Datum: WGS 1984

Soil Map Unit Name: Laewest clay, 0 to 1% slopes NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____	**Is the Sampled Area within a Wetland?** Yes X No _____
Hydric Soil Present?	Yes X	No _____	
Wetland Hydrology Present?	Yes X	No _____	

Remarks:

Wetland has been disturbed recently by clearing and off-road vehicle use, creating ruts and bare disturbed soil

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☑ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☑ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present? Yes _____ No X Depth (inches): _____

Water Table Present? Yes _____ No X Depth (inches): _____

Saturation Present? (includes capillary fringe) Yes _____ No X Depth (inches): _____

Wetland Hydrology Present? Yes X No _____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: WL4_PEM

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Herb Stratum (Plot size: 30' x 30')			
1. Symphyotrichum subulatum	70	Y	OBL
2. Cyperus virens	15	N	FACW
3. Rosa bracteata	10	N	UPL
4. Eleocharis parvula	5	N	OBL
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	100 = Total Cover		

50% of total cover: 50 20% of total cover: 20

Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species		x 1 =	
FACW species		x 2 =	
FAC species		x 3 =	
FACU species		x 4 =	
UPL species		x 5 =	
Column Totals:	(A)		(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ☑ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** _____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WL4_PEM

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	10YR 3/1	95	7.5YR 3/4	5	C	PL	Sandy Clay	
5-16	10YR 3/1	80	7.5YR 3/4	20	C	PL	Sandy Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☑ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☑ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** _____

Remarks:

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: Matagorda CAES Facility City/County: Matagorda County Sampling Date: 3/13/2013

Applicant/Owner: APEX CAES, LLC State: TX Sampling Point: WL4_UPL

Investigator(s): Jennifer Speights, Jason Speights Section, Township, Range: NA

Landform (hillslope, terrace, etc.): _____ Local relief (concave, convex, none): None Slope (%): 0-1%

Subregion (LRR or MLRA): LRR T Lat: 28° 59' 20.039" N Long: 96° 9' 2.820" W Datum: WGS 1984

Soil Map Unit Name: Laewest clay, 0 to 1% slopes NWI classification: NA

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No _____ (If no, explain in Remarks.)

Are Vegetation _____, Soil _____, or Hydrology _____ significantly disturbed? Are "Normal Circumstances" present? Yes X No _____

Are Vegetation _____, Soil _____, or Hydrology _____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No _____	**Is the Sampled Area within a Wetland?** Yes _____ No X
Hydric Soil Present?	Yes _____	No X	
Wetland Hydrology Present?	Yes _____	No X	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ☐ Surface Water (A1)
- ☐ High Water Table (A2)
- ☐ Saturation (A3)
- ☐ Water Marks (B1)
- ☐ Sediment Deposits (B2)
- ☐ Drift Deposits (B3)
- ☐ Algal Mat or Crust (B4)
- ☐ Iron Deposits (B5)
- ☐ Inundation Visible on Aerial Imagery (B7)
- ☐ Water-Stained Leaves (B9)
- ☐ Aquatic Fauna (B13)
- ☐ Marl Deposits (B15) **(LRR U)**
- ☐ Hydrogen Sulfide Odor (C1)
- ☐ Oxidized Rhizospheres along Living Roots (C3)
- ☐ Presence of Reduced Iron (C4)
- ☐ Recent Iron Reduction in Tilled Soils (C6)
- ☐ Thin Muck Surface (C7)
- ☐ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ☑ Surface Soil Cracks (B6)
- ☐ Sparsely Vegetated Concave Surface (B8)
- ☐ Drainage Patterns (B10)
- ☐ Moss Trim Lines (B16)
- ☐ Dry-Season Water Table (C2)
- ☐ Crayfish Burrows (C8)
- ☐ Saturation Visible on Aerial Imagery (C9)
- ☐ Geomorphic Position (D2)
- ☐ Shallow Aquitard (D3)
- ☐ FAC-Neutral Test (D5)
- ☐ Sphagnum moss (D8) **(LRR T, U)**

Field Observations:

Surface Water Present?	Yes _____	No X	Depth (inches): _____
Water Table Present?	Yes _____	No X	Depth (inches): _____
Saturation Present? (includes capillary fringe)	Yes _____	No X	Depth (inches): _____

Wetland Hydrology Present? Yes _____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: WL4_UPL

Tree Stratum (Plot size:)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Sapling/Shrub Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Herb Stratum (Plot size: 30' x 30')			
1. Rubus trivialis	80	Y	FAC
2. Baccharis halimifolia	12	N	FAC
3. Cyperus virens	2	N	FACW
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	94 = Total Cover		

50% of total cover: 47 20% of total cover: 18.8

Woody Vine Stratum (Plot size:)			
1.			
2.			
3.			
4.			
5.			
	= Total Cover		

50% of total cover: _____ 20% of total cover: _____

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:	
OBL species	x 1 =	
FACW species	x 2 =	
FAC species	x 3 =	
FACU species	x 4 =	
UPL species	x 5 =	
Column Totals: (A)		(B)

Prevalence Index = B/A = _____

Hydrophytic Vegetation Indicators:

- ☐ 1 - Rapid Test for Hydrophytic Vegetation
- ☑ 2 - Dominance Test is >50%
- ☐ 3 - Prevalence Index is ≤3.0[1]
- ☐ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** _____

Remarks: (If observed, list morphological adaptations below).

SOIL

Sampling Point: WL4_UPL

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	%	Redox Features Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-16	10YR 3/1						Sandy Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains.

[2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ☐ Histosol (A1)
- ☐ Histic Epipedon (A2)
- ☐ Black Histic (A3)
- ☐ Hydrogen Sulfide (A4)
- ☐ Stratified Layers (A5)
- ☐ Organic Bodies (A6) **(LRR P, T, U)**
- ☐ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ☐ Muck Presence (A8) **(LRR U)**
- ☐ 1 cm Muck (A9) **(LRR P, T)**
- ☐ Depleted Below Dark Surface (A11)
- ☐ Thick Dark Surface (A12)
- ☐ Coast Prairie Redox (A16) **(MLRA 150A)**
- ☐ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ☐ Sandy Gleyed Matrix (S4)
- ☐ Sandy Redox (S5)
- ☐ Stripped Matrix (S6)
- ☐ Dark Surface (S7) **(LRR P, S, T, U)**
- ☐ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ☐ Thin Dark Surface (S9) **(LRR S, T, U)**
- ☐ Loamy Mucky Mineral (F1) **(LRR O)**
- ☐ Loamy Gleyed Matrix (F2)
- ☐ Depleted Matrix (F3)
- ☐ Redox Dark Surface (F6)
- ☐ Depleted Dark Surface (F7)
- ☐ Redox Depressions (F8)
- ☐ Marl (F10) **(LRR U)**
- ☐ Depleted Ochric (F11) **(MLRA 151)**
- ☐ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ☐ Umbric Surface (F13) **(LRR P, T, U)**
- ☐ Delta Ochric (F17) **(MLRA 151)**
- ☐ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ☐ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ☐ 1 cm Muck (A9) **(LRR O)**
- ☐ 2 cm Muck (A10) **(LRR S)**
- ☐ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ☐ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ☐ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ☐ Red Parent Material (TF2)
- ☐ Very Shallow Dark Surface (TF12)
- ☐ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** _____ **No** X

Remarks:

Appendix C
Photo Log

Site: Matagorda County, TX Photo: 1 Date: 11/1/2012 Direction: North
Subject: Representative photo of plowed agricultural field within proposed CAES facility property boundary.

Site: Matagorda County, TX Photo: 2 Date: 11/1/2012 Direction: East
Subject: Representative photo of WL1_PEM, located along the north central boundary of the proposed CAES facility.

Site: Matagorda County, TX Photo: 3 Date: 11/1/2012 Direction: North
Subject: Tres Palacios River discharge location, facing upstream.

Site: Matagorda County, TX Photo: 4 Date: 11/1/2012 Direction: South
Subject: Tres Palacios River discharge location, facing downstream.

Site: Matagorda County, TX Photo: 5 Date: 12/13/2012 Direction: North
Subject: Representative photo of WL2_PEM, located along the northwestern boundary of the proposed air pipeline corridor.

Site: Matagorda County, TX Photo: 6 Date: 12/13/2012 Direction: East
Subject: Representative photo of WL3_PEM, located along the western extent of the proposed air pipeline corridor.

Site: Matagorda County, TX Photo: 7 Date: 12/13/2012 Direction: North
Subject: Representative photo of WL3_PSS, located along the western extent of the proposed air pipeline corridor within the delineated boundary of WL3.

Site: Matagorda County, TX Photo: 8 Date: 3/13/2013 Direction: East
Subject: Representative photo of WL4_PEM.

Site: Matagorda County, TX Photo: 9 Date: 3/13/2013 Direction: Southwest
Subject: Representative photo of S2, facing downstream

Appendix B
Letters from CH2M HILL to TPWD (January 14, 2013)

CH2M HILL
14701 St. Mary's Lane
Suite 300
Houston, TX
77079
Tel 281.721.8400
Fax 281.721.8401

January 11, 2013

Mrs. Kathy Boydston
Texas Parks and Wildlife Department
Wildlife Division
Wildlife Habitat Assessment Program
4200 Smith School Road
Austin, TX 78744

Subject: Consultation Request for Matagorda County, Texas Site

Dear Mrs. Boydston:

On behalf of Apex Matagorda Energy Center, LLC, CH2M HILL has prepared this letter as a request for concurrence from the Texas Parks and Wildlife Department (TPWD) for activities associated with energy facility development of a 52-acre tract near Clemville in Matagorda County, Texas. The location of the proposed site is shown on the attached site aerial photograph (Figure 1) and Midfield USGS 7.5 minute quadrangle topographic map (Figure 2).

The U.S. Fish and Wildlife Service (USFWS) Threatened and Endangered Species System internet database and the TPWD Lists of Rare Species database were reviewed to determine if any federally or state-listed endangered, threatened, or candidate species have the potential to occur in the proposed project area. The database search identified 49 rare, threatened, or endangered species to occur in the County. In addition to the database search, a search of the TPWD's Natural Diversity Database (NDD) Elemental Occurrence (Mimic Version 10/1/08) in conjunction with the Geographical Information System (GIS) was performed on September 19, 2012, and no occurrences of any rare or protected species (or managed areas) were found within the 1.5-mile buffer zone of the proposed project (Figure 3).

The current land use for the site and eastern wastewater pipeline corridor (located east for County Road 417) is predominately agricultural. During an August 15 site visit, this area was planted in cotton but was completely tilled during the November wetland/waterbody and habitat survey. The existing land use along the air pipeline corridor that extends west of the proposed plant site and County Route 417 is abandoned agricultural with adjacent gas pipeline facilities. During the November 1 and 2 and December 13 site wetland/waterbody and habitat survey, the area west of County Road was characterized by low scrub/shrub and grassland habitat with a plant assemblage typical of highly disturbed areas and abandoned pastureland. Site photographs 1 through 5 (attached following this letter) show site conditions at the time of wetland/waterbody and habitat surveys.

Both areas were surveyed by a qualified biologist on November 1 and 2, 2012, and December 13, 2012, and only two small wetlands were present within the proposed site and pipeline corridor. Based on review of published sources and field observations, it was determined that the proposed project area provides potentially suitable habitat for the smooth pimpleback, plains spotted skunk, bald eagle, and coastal gay-feather. However, no evidence of these species was observed during the site wetland/waterbody and habitat surveys.

The smooth pimpleback (Quadrula houstonensis) is a state threatened mullosk found in small to medium sized streams with mud, sand, or gravel substrates. This species is known to occur in the Colorado and Brazos river basins. However, all live specimens found in recent history have been far north and west of this Project site. A search of the Natural Diversity Database did not indicate any known occurrences of smooth pimplebacks in the

Tres Palacios River near the Project. Also within the reach of the stream that this project will influence, the stream is very narrow (approximately 10 ft) and shallow (approximately 1 ft), possibly going dry during drought years.

The plains spotted skunk (Spilogale putorius interrupta), a state species of concern, is most commonly found in open fields, croplands, and forested areas, and is generally associated with streams or rivers. The proposed project area contains suitable habitat for the plains spotted skunk; however, the general project area is highly disturbed due to grazing livestock, farming, and human activity associated with the industrial facilities on or adjacent to the property. Although its occurrence within the proposed project is possible, no impacts are anticipated for this species due to the disturbed nature of the property.

The bald eagle is a state listed threatened raptor that is most often found near large rivers and lakes. It is known to scavenge for carrion or pirate food from other birds. The Natural Diversity Database indicates two known occurrences of nesting bald eagles along the Colorado River in Matagorda County as recent as 2007. Habitat within the project site and surrounding areas would only be suitable for bald eagles that were in search of carrion. There are no large water bodies and very few tall trees for nesting within or near the site. Therefore, no impacts to bald eagle habitat are anticipated as a result of this project.

The coastal gay-feather is a state listed species of conservation concern. This Texas endemic herbaceous plant is found in coastal prairie grassland habitats, and is adapted to a range of soil salinities and textures, from somewhat saline clay loam soils to nonsaline clay and sand loams. The Natural Diversity Database indicates one occurrence within the Midfield 7.5 minute topographic map area with the individuals located in a roadside bank near the intersection of TX 71 and Co Rd 2431 (see figures 2 and 3). The last observation recorded for this occurrence is November, 1957, and it is highly likely roadside mowing and agricultural practices have altered the plant community since this observed occurrence. No occurrences have been recorded within approximately 4 miles of the Project site. At the time of the November, 2012 field visit no coastal gay-feather were observed.

CH2M HILL respectfully requests that your office review the information provided and provide us with your written concurrence that the proposed project is not likely to adversely affect state protected species. Because of the expedited schedule for this project, we would appreciate a response at your earliest possible convenience. If you have any questions concerning this project, please feel free to contact me at (979) 270-2055.

Sincerely,

CH2M HILL

Jason Speights
CH2M HILL Biologist

Attachments: Site Photographs
Aerial Photography of the proposed development site
Midfield USGS 7.5 minute Topographic Map of the proposed development site
NDD Sensitive Areas in relation to the proposed development site

c: S. Naeve/APEX
P. Barth/CH2M HILL

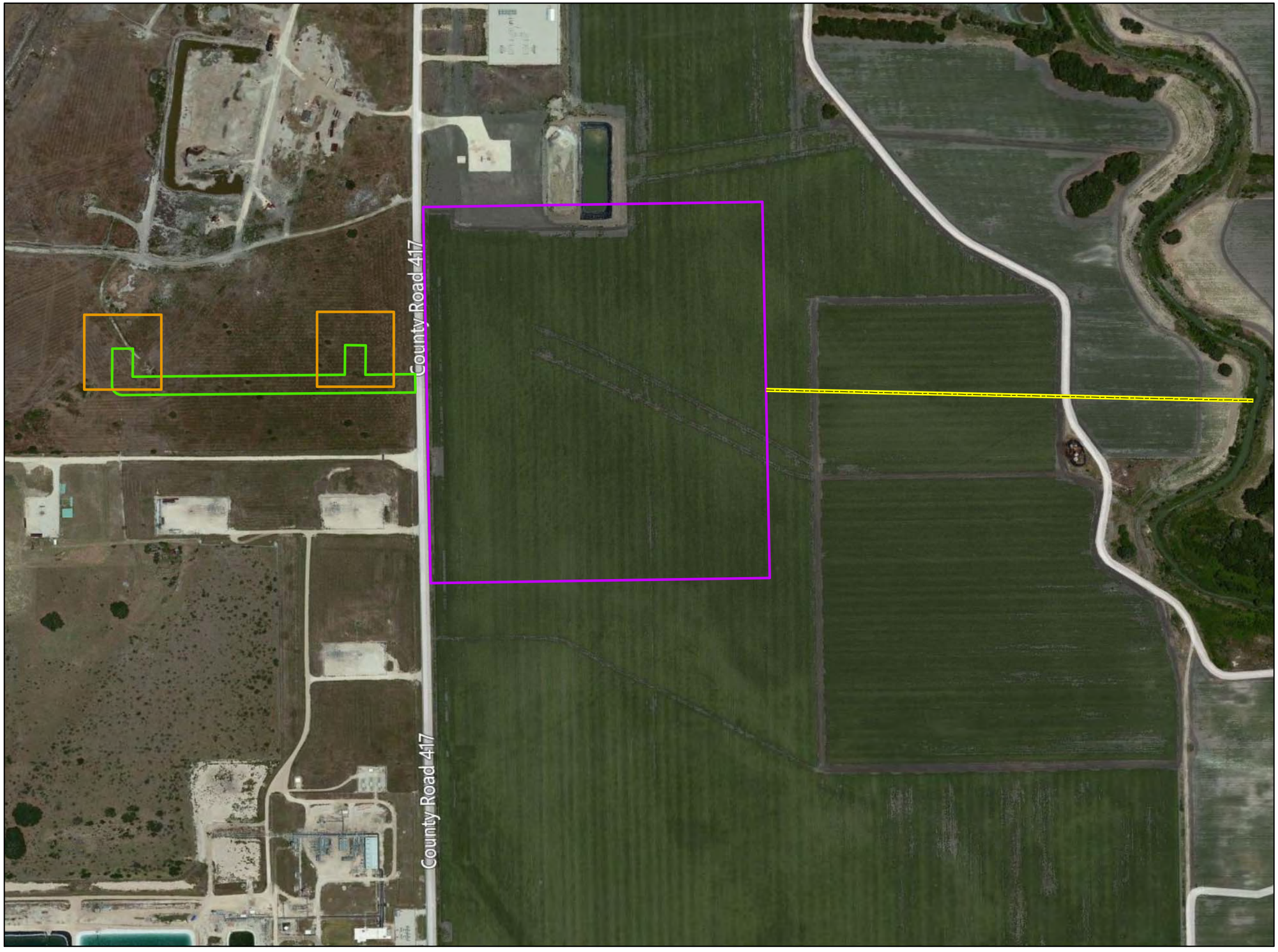
Photo 1: Representative photo of tilled cotton field within the proposed Project site facing north.

Photo 2. Representative photo of the Tres Palacios River at the eastern terminus of the wastewater pipeline.

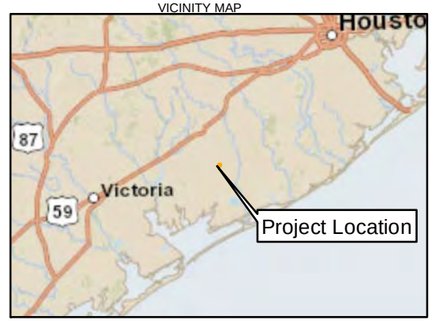
Photo 3. Representative of a small PEM wetland located on the northern boundary of the Project site.

Photo 4. Representative photo of habitat located within the air pipeline corridor. This area is grazed by cattle.

Photo 5. Representative photo of habitat located within the air pipeline corridor. This area is grazed by cattle.



VICINITY MAP



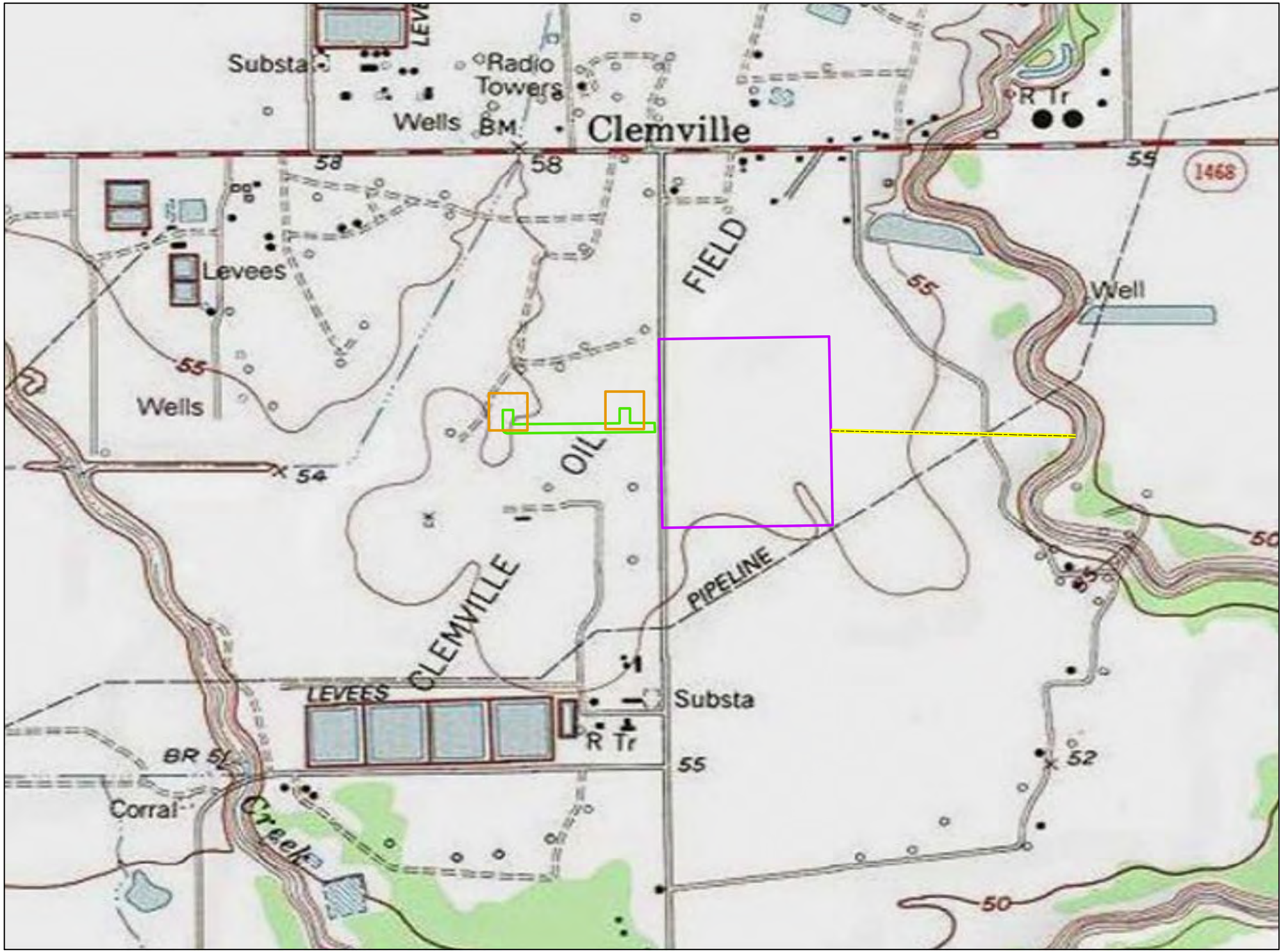
LEGEND

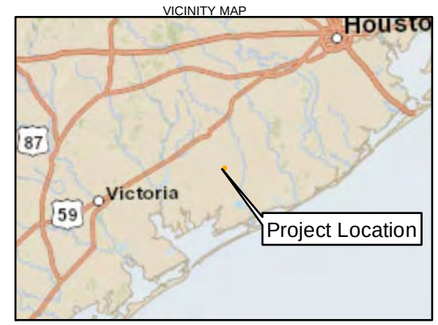
- Pipeline
- Well Pad Areas
- Proposed Air Pipeline Corridor
- Proposed Site

N

0 50 100 200 300
Feet

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





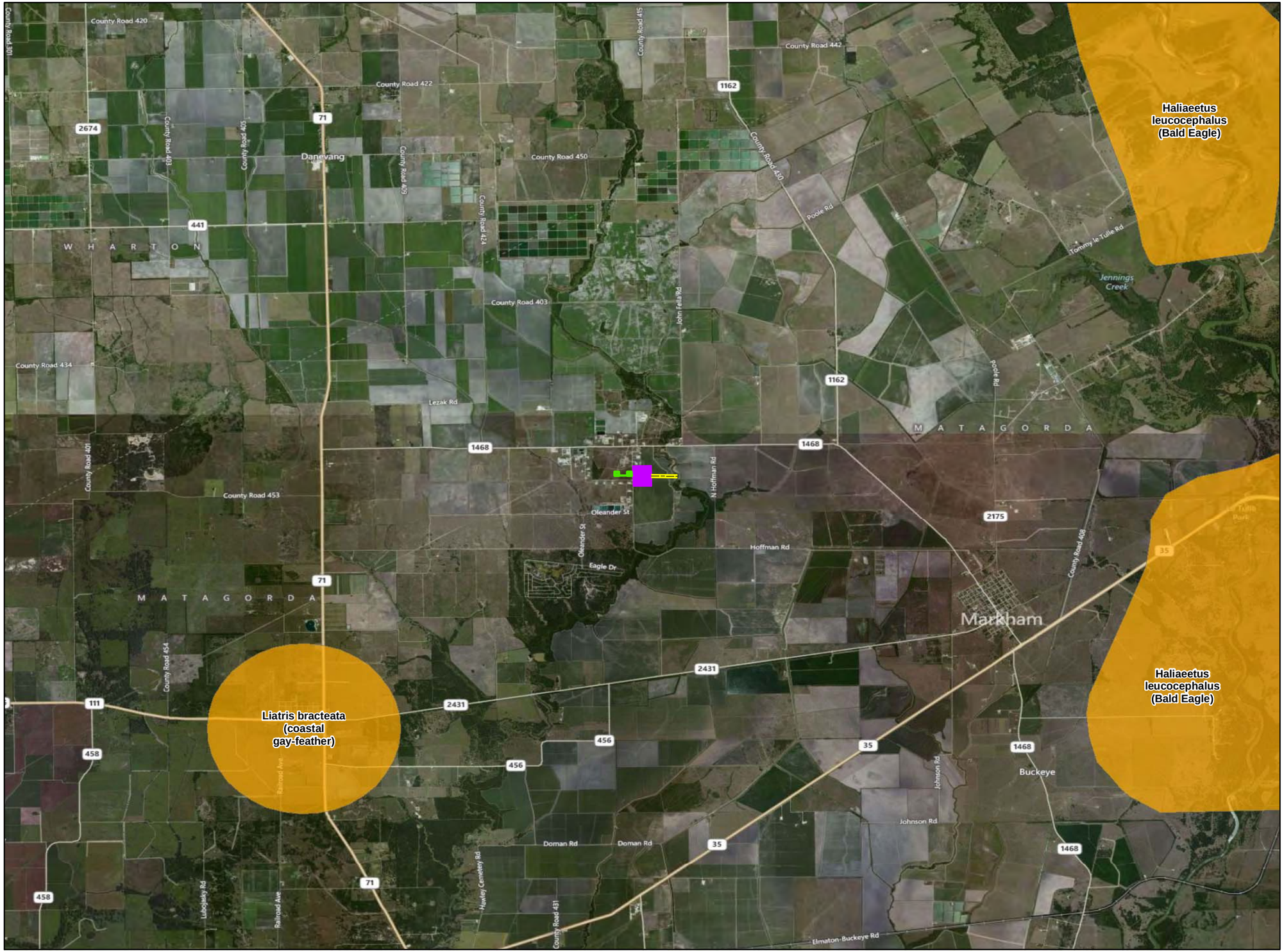
LEGEND

- Pipeline
- Well Pad Areas
- Proposed Air Pipeline Corridor
- Proposed Site

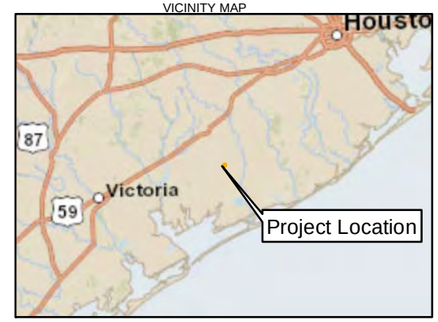
N

0 250 500 1,000 1,500
Feet

FIGURE 2
Site Map - Proposed Property Boundary
Proposed Energy Development Site
Matagorda County, Texas



VICINITY MAP



LEGEND

- Proposed Wastewater Pipeline Corridor
- Well Pad Areas
- Proposed Air Pipeline Corridor
- Proposed Site
- Wildlife Occurrence

N

0 0.5 1 2
Miles

FIGURE 3
Site Map - Proposed Property Boundary
Proposed Energy Development Site
Matagorda County, Texas

R:\GIS\HOU\APEX_Matagorda\MapFiles\NND_DATA_MAP.mxd flondon 1/10/2013 2:43:52 PM

CH2MHILL

Appendix C
Air Deposition Calculations

Nitrogen Deposition calculation for APEX Matagorda 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 Bay City, TX: 48.98 inches x (1m/39.37in.) = 1.24 m/yr

(Source: The weather channel website: http://www.weather.com/weather/wxclimatology/monthly/77414)

So, for every m^2 of space, volume of precipitation per year is 1.244 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 = 1.244 m^3/yr x $10^6 g/m^3$ x 1kg/10^3g = **1244 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(1244 kg H_2O/yr/m^2)

= 0.077 g/m^2/yr

Converting to mg/m^2/yr:

Deposition Rate of N (as NO_2) = 0.077 g/m^2/yr x 10^3mg/g = 77 mg/m^2/yr

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