



Xe-100 Dow Seadrift Site Phase I Intensive Archaeological Survey, Calhoun County, Texas Negative Finding Short Report.

FINAL REPORT

WSP Project No.: 325223319
WSP Cultural Report of Investigations No.: 2023-039
WSPDC - XES04
TC# - 008122



Prepared for:

X-Energy

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February 19, 2024

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Prepared by:



WSP USA Environment & Infrastructure, Inc.

A handwritten signature in black ink, which appears to read 'John A. Hunter', is written over a solid black horizontal line.

John A. Hunter, MA, RPA
Principal Investigator

Authored by:
John A. Hunter MA, RPA, and Clay Cantrell

February 2024

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MANAGEMENT SUMMARY

From July 10 to 19, 2023, WSP USA Environment & Infrastructure, Inc. (WSP) conducted a Phase I intensive archaeological survey of 1,277 acres in support of the Environmental Report (ER) for the Xe-100 Dow Seadrift Site in Calhoun County, Texas. This report details a 617.4-acre portion (0.96 square miles or 249.85 hectares) of the larger 1,277-acre (1.99 square miles or 516.78 hectares) survey area to support requirements identified in the Department of Energy's (DOE) National Environmental Policy Act (NEPA) Implementing Regulations (10 CFR Part 1021) to support DOE's NEPA review of siting activities for the Xe-100 advanced nuclear reactor. For this report, the 617.4-acre portion is the Area of Potential Effect (APE). The remaining 659.6 acres of the entire survey area will be consulted on with the Texas Historical Commission (THC) at a later date.

The survey was conducted under contract with X-Energy, LLC (X-Energy) to facilitate compliance with Section 106 of the National Historic Preservation Act and the Antiquities Code of Texas (Natural Resources Code, Title 9, Chapter 191, Subchapter A). Per the provisions of the Texas Cultural Resources Code, Title 9, Chapter 191, WSP initiated a review of the Scope of Work (SOW) with the THC on May 12, 2023, with the concurrence of the proposed SOW received from the THC on June 7, 2023 (THC Tracking No. 202308205).

The APE consists of portions of agricultural fields containing unharvested corn as well as portions of open scrub growth, railroad tracks, and a railyard. The ground surface visibility varied across the APE, and as such the Phase I intensive survey was completed over the entire APE using a combination of systematic shovel test probe excavation (STPs) coupled with pedestrian survey.

A total of 203 STPs were excavated across the APE. None of the excavated STPs contained cultural material. Additionally, no evidence of deeply buried cultural deposits suggesting buried A-horizons or cultural artifacts were identified in any of the excavations. As a result of the intensive archaeological survey, no archaeological sites or cultural materials were identified. It is recommended that the project will have no effect on historic properties and that no additional archaeological work is required within the APE.

Additionally, WSP conducted an aboveground cultural resource eligibility and effects survey to support the requirements identified in the DOE's NEPA Implementing Regulations (10 CFR Part 1021) to support DOE's NEPA review of siting activities for the Xe-100 advanced nuclear reactor. The APE for aboveground cultural historic resources includes an additional 0.5-mile buffer from the project area boundary to account for impacts to aboveground historic architectural resources. Based upon the nature of work addressed by this report, there is no potential for direct or indirect visual effects of the undertaking on historic resources within the project APE. A report detailing the complete survey of architectural resources related to the full scope of work of the proposed undertaking will follow this report of findings.

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1.0 INTRODUCTION

1.1 Overview

X-Energy, LLC (X-Energy) contracted with WSP USA Environment & Infrastructure, Inc. (WSP) to conduct a Phase I intensive archaeological survey in support of the Environmental Report (ER) for the Proposed Xe-100 advanced nuclear reactor project at the Xe-100 Dow Seadrift Site in Calhoun County, Texas (**Figures 1-1 – 1-3**). This report details a 617.4-acre portion (0.96 square miles or 249.85 hectares) of the larger 1,277-acre (1.99 square miles or 516.78 hectares) survey area to support requirements identified in the Department of Energy's (DOE) National Environmental Policy Act (NEPA) Implementing Regulations (10 CFR Part 1021) to support DOE's NEPA review of siting activities for the Xe-100 advanced nuclear reactor. For this report, the 617.4-acre portion is the Area of Potential Effect (APE). The results of the survey of the remaining 659.6 acres of the entire survey area will be submitted to the Texas Historical Commission (THC) at a later date.

The survey was conducted under contract with X-Energy to facilitate compliance with Section 106 of the National Historic Preservation Act and the Antiquities Code of Texas (Natural Resources Code, Title 9, Chapter 191, Subchapter A). Per the provisions of the Texas Cultural Resources Code, Title 9, Chapter 191, WSP initiated a review of the Scope of Work (SOW) with the THC on May 12, 2023, with the concurrence of the proposed SOW received from the THC on June 7, 2023 (THC Tracking No. 202308205). The purpose of the survey was to determine if archaeological resources would be impacted by the proposed undertaking.

The archaeological survey was completed between July 10 to 19, 2023. John A. Hunter, MA, RPA served as the project principal investigator for the project. He was assisted in the field by archaeologists Patrick Cantrell, Steve Lucas, Nickolas Brown, and Gideon Hoekstra. Report graphics were produced by Daniel Conn. The architectural viewshed survey was completed between July 10 to 14, 2023. Carolyn Andrews, RA, AIA served at the architectural lead and was assisted in the field by Mekenzie Davis.



Figure 1-1. Project Location in Calhoun County, Texas.

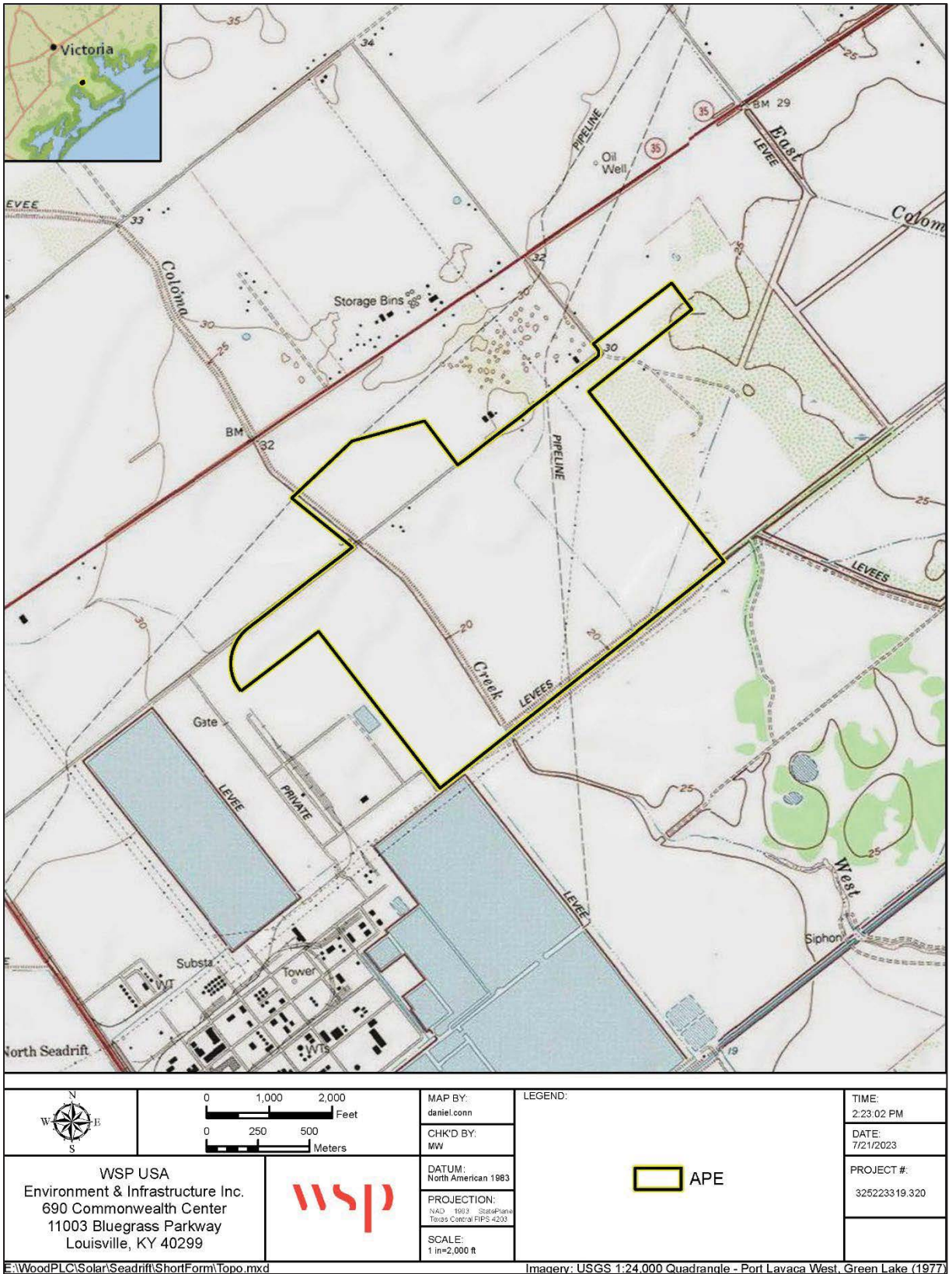


Figure 1-2. The APE shown on the 1977 Port Lavaca West 7.5-minute quadrangle.

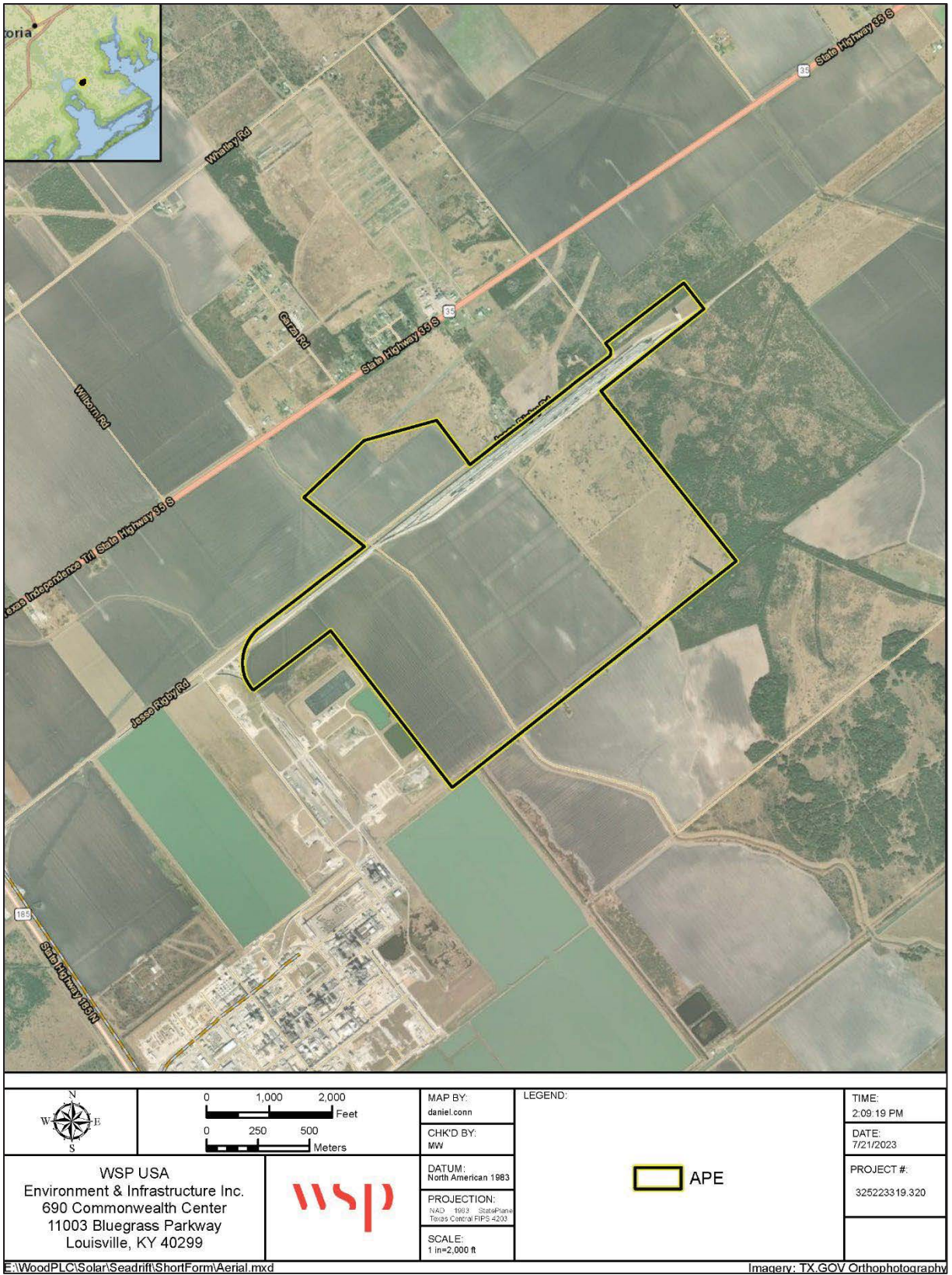


Figure 1-3. The APE shown on a 2020 aerial photograph.

1.2 Intensive Archaeological Survey Summary

From July 10 to 19, 2023, WSP conducted a Phase I intensive archaeological survey for the Proposed Xe-100 Dow Seadrift Site in Calhoun County, Texas. This report details a 617.4-acre portion (0.96 square miles or 249.85 hectares) of the larger 1,277 acres (1.99 square miles or 516.78 hectares) survey area to support DOE's NEPA Implementing Regulations (10 CFR Part 1021) to support DOE's NEPA review of initial ground disturbance activities. For this report, the 617.4-acre portion is the APE. For this report, the 617.4-acre portion is the Area of Potential Effect (APE). The results of the survey of the remaining 659.6 acres of the project site will be submitted to the Texas Historical Commission (THC) at a later date.

The APE consists of portions of agricultural fields which contained unharvested corn at the time of the survey, as well as portions of open scrub growth, railroad tracks, and a railyard. The ground surface visibility varied across the APE and as such the Phase I intensive survey was completed over the entire APE using a combination of systematic shovel test probe excavation (STPs) coupled with pedestrian survey. No archaeological sites or cultural material was identified during the investigation.

Prior to fieldwork, a desktop geomorphological assessment of the APE was conducted. Three soil associations, encompassing seven soils are mapped within the survey area: Dacosta-Contee Complex with 0 to 1 percent slopes, Laewest clay with 0 to 1 percent slopes, and Contee-Dacosta complex (USDA/NRCS 2023). Overall, the soil's defined horizons, coupled with the project's location along a relatively straight portion of a low-level waterway (West Coloma Creek) and relatively flat topographic landform, suggest the area is unlikely to contain deeply buried archaeological deposits. The A-Bt upper soil horizon suggests a fairly stable landform allowing for pedogenesis, not one subjected to frequent, large depositional events such as flooding. While the occurrence of the Bt-horizon deposits does not preclude cultural materials, the shallow nature of these deposits suggests any buried cultural deposits can be reached during shovel test excavations.

A total of 203 STPs were excavated within the APE. None of the excavated STPs contained cultural material. Additionally, no evidence of deeply buried cultural deposits suggesting buried A-horizons or cultural artifacts were identified in any of the excavations. As a result of the intensive archaeological survey, no archaeological sites or cultural materials were identified. It is recommended that the project will have no effect on historic properties and that no additional archaeological work is required within the APE.

2.0 ENVIRONMENTAL SETTING

2.1 Physiography, Geology, and Soils

The project area falls within the Coastal Plains physiographic region. This Coastal Plain is an extension of the Coastal Plain region lining the Atlantic Ocean in the eastern United States (Bureau of Economic Geology 1996). More specially, the APE is located within the Northern Humid Gulf Coastal Prairies (**Figure 2-1**). The characteristics of this physiographic region is characterized by its association with the ocean and wind and rain associated with the ocean. This region contains shallow bays, estuaries, salt marshes, dunes, and tidal flats (TSHA 2023).

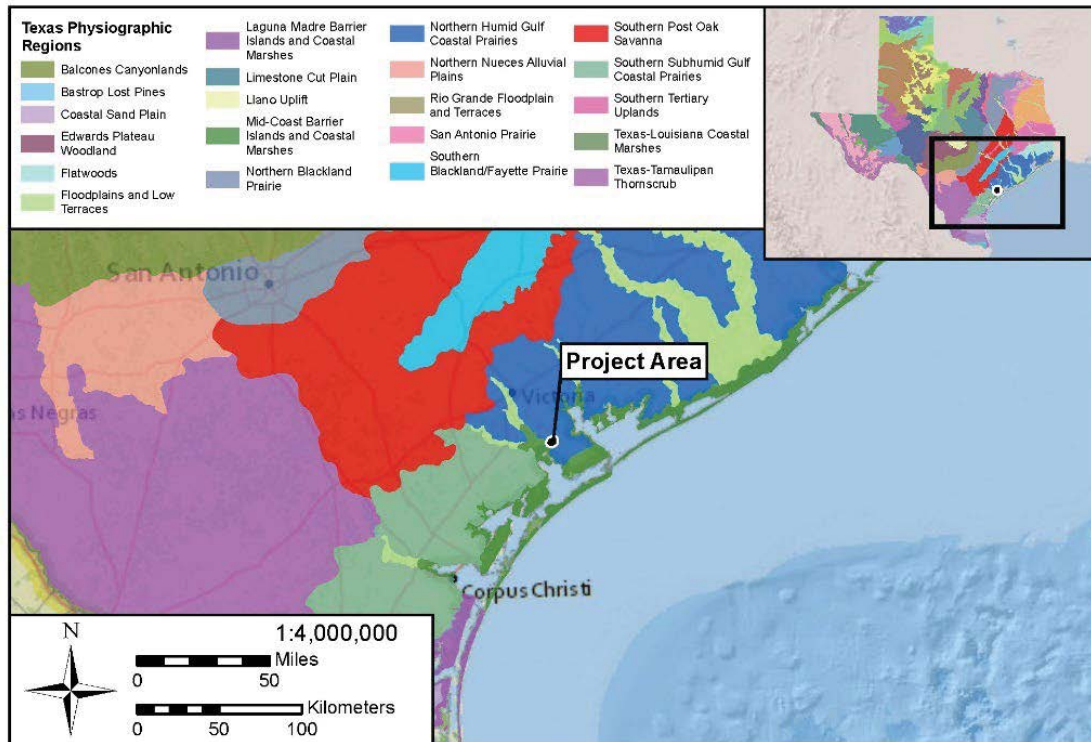


Figure 2-1. A physiographic map of Texas showing the project area location.

Three soil associations, encompassing seven soils are defined within the APE: Dacosta – Contee complex 0 – 1 percent slopes (Dc), Edna loam 0 -1 percent slopes (ed), Laewest clay 0 – 1 percent slopes (La), Dacosta sandy clay loam 0 – 1 percent slopes (Mb), Dacosta clay loam 0 – 1 percent slopes (Mc), Contee-Dacosta complex 0 – 1 percent slopes (Md), and Telferner fine sandy loam 0 – 1 percent slopes (Te) (**Figure 2-2**). Common traits attributed to these soil types are summarized below in **Table 2-1**, including texture, soil horizon designation of a typical soil profile, parent material (material from which the soil type has formed), and drainage. Information concerning the soil type was compiled using the information available on the United States Department of Agriculture (USDA), National Resource Conservation Service (NRCS) Web Soil Survey (USDA/NRCS 2023).

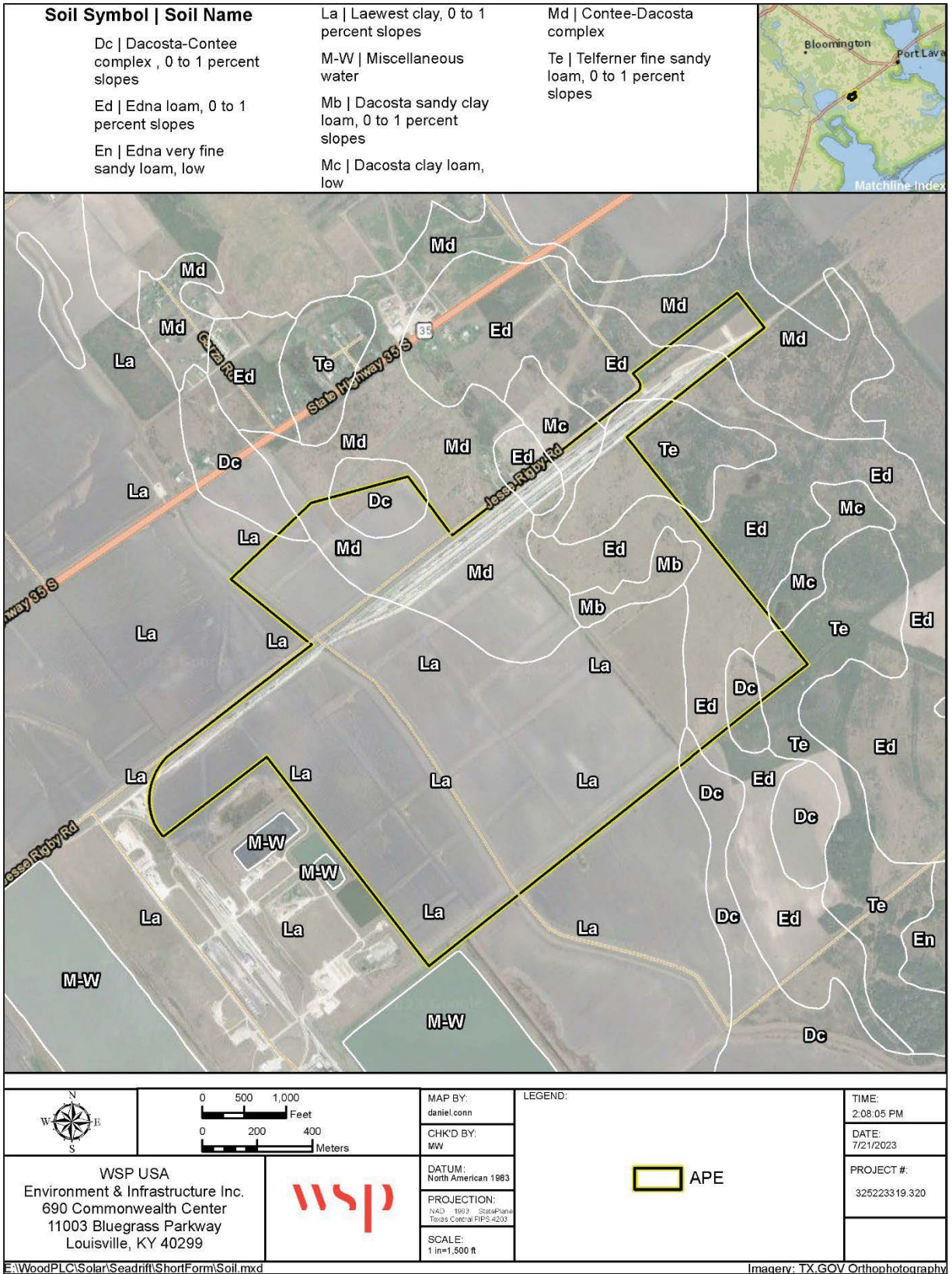


Figure 2-2. Soils located within and surrounding the APE.

Table 2-1. Summary of Soil Types Found within the APE.					
Soil Type	Typical Soil Profile	Drainage	Parent Material	Landform	% of APE
Dacosta – Contee complex (Dc)	A - 0 to 9 inches: sandy clay loam Bt1 - 9 to 13 inches: sandy clay loam Bt2 - 13 to 47 inches: clay Btk - 47 to 74 inches: sandy clay 2Bct - 74 to 80 inches: sandy clay loam	Moderately well drained	Clayey fluviomarine deposits	Flats	3.6
Edna loam (Ed)	A - 0 to 9 inches: loam Bt1 - 9 to 38 inches: clay Bt2 - 38 to 50 inches: clay Btk - 50 to 80 inches: sandy clay loam	Poorly drained	Loamy fluviomarine deposits	Flats	12.4
Laewest clay (La)	A - 0 to 17 inches: clay Bss1 - 17 to 40 inches: clay Bss2 - 40 to 59 inches: clay Bkss - 59 to 80 inches: clay	Moderately well drained	Clayey fluviomarine deposits	Flats	60.6
Dacosta sandy clay loam (Mb)	A - 0 to 10 inches: sandy clay loam Bt1 - 10 to 22 inches: sandy clay loam Bt2 - 22 to 43 inches: clay Btk - 43 to 74 inches: sandy clay 2Bct - 74 to 80 inches: sandy clay loam	Moderately well drained	Loamy fluviomarine deposits	Flats	2.3
Dacosta clay loam (Mc)	A - 0 to 4 inches: clay loam Bt1 - 4 to 15 inches: sandy clay loam Bt2 - 15 to 36 inches: clay Btk - 36 to 50 inches: sandy clay 2Bct - 50 to 80 inches: sandy clay loam	Moderately well drained	Loamy fluviomarine deposits	Flats	1.5
Contee-Dacosta complex (Md)	H1 - 0 to 8 inches: clay loam H2 - 8 to 62 inches: clay H3 - 62 to 80 inches: clay	Poorly drained	Clayey fluviomarine deposits	Flats	14.5
Telferner fine sandy loam (Te)	A - 0 to 14 inches: fine sandy loam E - 14 to 18 inches: fine sandy loam Bt - 18 to 55 inches: clay Bk - 55 to 80 inches: sandy clay loam	Moderately well drained	Loamy fluviomarine deposits	Meander scrolls	5.1

* Soil horizon sequence inferred from national soil series descriptions (USDA/NRCS Web Soil Staff 2023)

2.2 Geoarchaeological Assessment

Before conducting fieldwork, WSP conducted a geomorphological assessment of the APE. Three soil associations, encompassing seven soils are mapped within the survey area: Dacosta-Contee Complex with 0 to 1 percent slopes, Laewest clay with 0 to 1 percent slopes, and Contee-Dacosta complex (USDA/NRCS 2023). Overall, the soil's defined horizons, coupled with the APE location along a relatively straight portion of a low-level waterway (West Coloma Creek) and relatively flat topographic landform, suggest an area is unlikely to contain deeply buried archaeological

deposits. The A-Bt upper soil horizon suggests a fairly stable landform allowing for pedogenesis, not one subjected to frequent, large depositional events such as flooding. While the occurrence of the Bt-horizon deposits does not preclude cultural materials, the shallow nature of these deposits suggests any buried cultural deposits can be reached during shovel test excavations.

The notation of slickenslides (ss) in the soil horizon profile speaks to the general environment of the landform. Slickenslides in soil are defined as well-worn (smoothed) sides on soil peds that form in clay soils that have significant amounts of shrinking and swelling. Such traits are often attributed to frequently flooded or poorly drained soils, ones which are heavily inundated, then left to dry causing the shrinking and swelling activity. This suggests that the landform was likely frequently wet or inundated before the construction of the numerous ponds and drainage canals currently present in the region.

2.3 Prehistoric and Historic Environment

The central coast of Texas (the shoreline and coastal plain 40-50 km inland) is unified by the presence of five similar, major bay estuarine systems inside a continuous barrier chain (Ricklis 2004). The coastal plain is composed of sandy clays and clayey sands deposited by major fluvial-deltaic systems during the Pleistocene interglacials and rises very gradually toward the interior. During the last glacial maximum, the sea level was as much as 100 m lower than current sea levels, thus human encampments and activity areas along the coast are deeply submerged. By about 9000 years ago the melted waters formed bays comparable to those presently in existence, and they reached their present elevations by 3000 years ago. The barrier islands probably reached their present form about 2500-2000 years ago. The resource-rich shallow water estuaries were protected from strong wave activity by these islands and were increasingly suitable for exploitation by the aboriginal populations.

Calhoun County is located in the southwestern section of the Gulf Coast Prairie and encompasses a broad flat plain that is broken up by natural rain and inland bays. Elevation in the county ranges from sea level to approximately 55 feet above mean sea level (amsl). The average rainfall is approximately 39 inches (Mowery and Bower 1978).

3.0 CULTURAL AND ARCHAEOLOGICAL BACKGROUND

The history of human activity in Calhoun County and the surrounding region spans thousands of years. The earliest groups to leave a definitive material record of their presence were early Paleoindians who entered the region during the Late Pleistocene glacial epoch, more than 11,000 years ago. Their descendants and the descendants of other Native American groups who migrated to the region lived in the region until the arrival of the first European explorers.

While cultural change is a slow and continual process, archaeologists and other researchers divide the human history of a region into distinct cultural periods. Archaeologists and historians recognize four broadly defined periods, Paleoindian, Archaic, Late Prehistoric, Protohistoric, and Historic. Due to the lack of cultural material identified during the current investigations, the following sections have been abbreviated.

3.1 Prehistoric Context

Previous archaeological research in the project region has defined five distinct time periods that include, Paleoindian: 11,500 BP to 8,800 BP, Archaic: 8,800 BP to 1,200 BP, Late Prehistoric/Protohistoric: 1,200 BP to 500 BP, and Historic: 500 BP to present. The distinction between these periods relies heavily on the different types of subsistence practices utilized and the cultural traits present. However, it should be noted that discussion of the prehistory of Coastal Texas is largely restricted to the Central Texas Coast because the Lower Texas coast is relatively unknown (Ricklis 2004).

3.1.1 Paleoindian

The Paleoindian of Coastal Texas is not discussed by Ricklis (2004) because it is known only from scattered surface finds of diagnostic projectile points. No intact subsurface components have been explored. Because of the significantly lower water levels at the time, the Pleistocene coastline is deeply submerged. The cultural material that is present on land is related to terrestrial riverine environments.

3.1.2 Archaic (7,500 – 950 BP)

Early Archaic (7,500 – 4,200 BP)

Despite the lower and rapidly rising sea levels during the initial part of the Early Archaic period, the period is well represented in Coastal Texas. Ricklis (2004) divides the period into two segments: 7,500-6,800 BP and 5,800-4,200 BP, with a gap of about a millennium when there was little use of the shoreline, perhaps because of rapid rises in the water level that upset the ecology of the shoreline. The earlier portion of the period is represented by several sites in the Nueces Bay area that yielded radiocarbon dates but little cultural material. Surface finds of projectile points, particularly Uvalde-like points, are common. Distinctive edge-flaked shell scrapers/knives have been identified in good context. Estuarine shellfish were exploited, but it remains to be determined whether fishing was a significant part of the economy.

The second portion of the period is much better represented; sites are considerably more numerous, and a comparatively large number of radiocarbon dates have been obtained. Most of the deposits consist of shell middens with very few lithic items present. Deposits at one site [REDACTED] spanned about 600 years and produced a variety of diagnostic projectile points (Bell, Tortugas, early triangular, and round-based) and several shell tools; another site [REDACTED] had deposits built up over several hundred years and a sizable number of early triangular points, as well as an arc of postmolds from a structure. A variety of saltwater and freshwater fish compose the limited faunal assemblage from the various sites.

Middle Archaic (4,200 – 3,100 BP)

There are virtually no components and dates attributable to this time span despite investigations of earlier and later sites. It is feasible that there was minimal use of the shoreline during this period (Ricklis 2004).

Late Archaic (3,100 – 950 BP)

The Late Archaic began at about the time the sea level stabilized. There are dates from shoreline sites that span this period, and the sites are more numerous and larger, and deposits are thicker and have larger quantities of cultural material and more diverse assemblages (Ricklis 2004). This seems to indicate a larger population and more numerous and more intensive occupations. There is evidence of more concentrated exploitation of estuarine shellfish, in addition to hunting of white-tailed deer. The earlier deposits are marked by the presence of Kent points, and later deposits have Ensor points, and Catan and Matamoros points typify the terminal Archaic at about 950 BP. The shoreline sites show a diverse array of shell tools, perhaps necessitated by the distance from chert sources. The shell middens promoted the preservation of bone tools and non-functional items, which were found at many sites. By 2,000 BP there is evidence of much more intensive fishing, and moderate to high salinity mollusks were found in massive middens at the seaward end of bays. At least one site [REDACTED] showed relatively steady deposition of shell for about 1,300 years (Ricklis 1994). It is possible that the shoreline was occupied during cold weather and interior riverine areas were used during warmer months. Cemeteries are documented for the first time in the area, perhaps as a response to more established territories and increased populations.

3.1.3 Late Prehistoric (950 – 250 BP)

The advent of the Late Prehistoric is marked by the shift to the bow and arrow and the associated subsistence changes, and the period is divided into two segments on the bases of the changes in diagnostic tools and economic patterns (Ricklis 2004). The Initial Late Prehistoric (950-700/650 BP) is indicated by the presence of Scallorn points and by pottery with sandy paste at some locales. The Final Late Prehistoric (700/650-250 BP) is marked by Perdiz and other arrowheads, unifacial end scrapers, thin bifacial knives, small drills, and prismatic blade-core technology and Rockport pottery--ceramics with bowls, jars, and ollas often coated or decorated with asphaltum, incised rims, or notched lips. Fishing became an even more important subsistence source, while shellfish declined in importance. Bison provided the majority of the meat and white-tailed deer was secondary. The Rockport phase parallels the Toyah phase of the interior of the state in many aspects and appears to have adopted the same lithic technology at the same time, perhaps to facilitate the exploitation of bison. The subsistence system seems to continue the practice of occupying the interior lands to hunt during the warm months and movement to the shoreline during the winter but may add group aggregation to the system during the fishing season and dispersal into small camps for gathering plants and hunting (Ricklis 1996).

3.1.4 Protohistoric/Early Historic

In the sixteenth and seventeenth centuries, before the Spanish explorers and mission system impacted the economy of native groups, trade goods appeared in the region. The native groups of this area became culturally extinct in the eighteenth century because of diseases introduced by the Spanish and the movement of people into missions and the adoption of farming livelihoods (Hester 1989).

3.2 Historic Context

Calhoun County is located on the Gulf Coast, between Corpus Christi and Houston. In 1846, the Texas legislature established Calhoun County from portions of Victoria and Jackson Counties (McCarty 1910). The bodies of water that surround and drain from the county include Espiritu Santo Bay, Lavaca Bay, Matagorda Bay, and the San Antonio and Guadalupe Rivers.

Calhoun County's economy and significance are directly related to its position along the coast. The area is low-lying, flat, and, historically, has been used for cattle grazing. In 1875, a large gulf storm destroyed much of the county seat—Indianola—and its port (McCarty 1910). As a result, a decline in commerce and population occurred, lasting into the twentieth century. In the 1880s, the San Antonio and Mexican Gulf Railway was constructed, which connected the port towns to Victoria to the north and other centers of commerce (McCarty 1910). Its county seat, now, is Port Lavaca, on Lavaca Bay.

Matagorda Island, just south of the county, is mostly comprised of deep shell sand. The area's climate is mild, with an average rainfall of approximately 40 inches; the growing season, likewise, lasts most of the year. Native flora include grasses, coastal scrub, live oak, and sedges, while local fauna includes game birds, deer, jackrabbits, raccoons, and coyotes (Kleiner 1952).

3.3 Archaeological Background Research

Archaeological background research was compiled by reviewing the Texas Archaeological Sites Atlas. This review included the APE and a 1-km (0.6 miles) buffer surrounding the APE. The purpose of the research was to identify previous archaeological surveys and recorded archaeological sites within or near the APE. Reports of prior investigations are reviewed to gain an understanding of the archaeological research in the project area and vicinity. According to the review, no archaeological sites are located within the APE or the 1-km buffer surrounding the APE. No previously conducted surveys are located within the APE; however, two previously conducted archaeological surveys [REDACTED] are located within the 1-km buffer surrounding the APE (**Figure 3-1**). Little information regarding surveys [REDACTED] and [REDACTED] was available, except that they were conducted in May 2001. No archaeological sites were associated with these surveys within the 1-km buffer surrounding the APE.

3.4 Historic Map Review

The reviewed historic maps included the 1953 USGS 7.5' Seadrift, Port Lavaca West, Green Lake, and Austwell, Texas topographic quadrangles (**Figure 3-2**). A review of these historic maps revealed nine likely residential and outbuildings observed along Jesse Rigby Road. The areas surrounding these identified historic structures were treated as high-probability areas to contain historic cultural deposits.

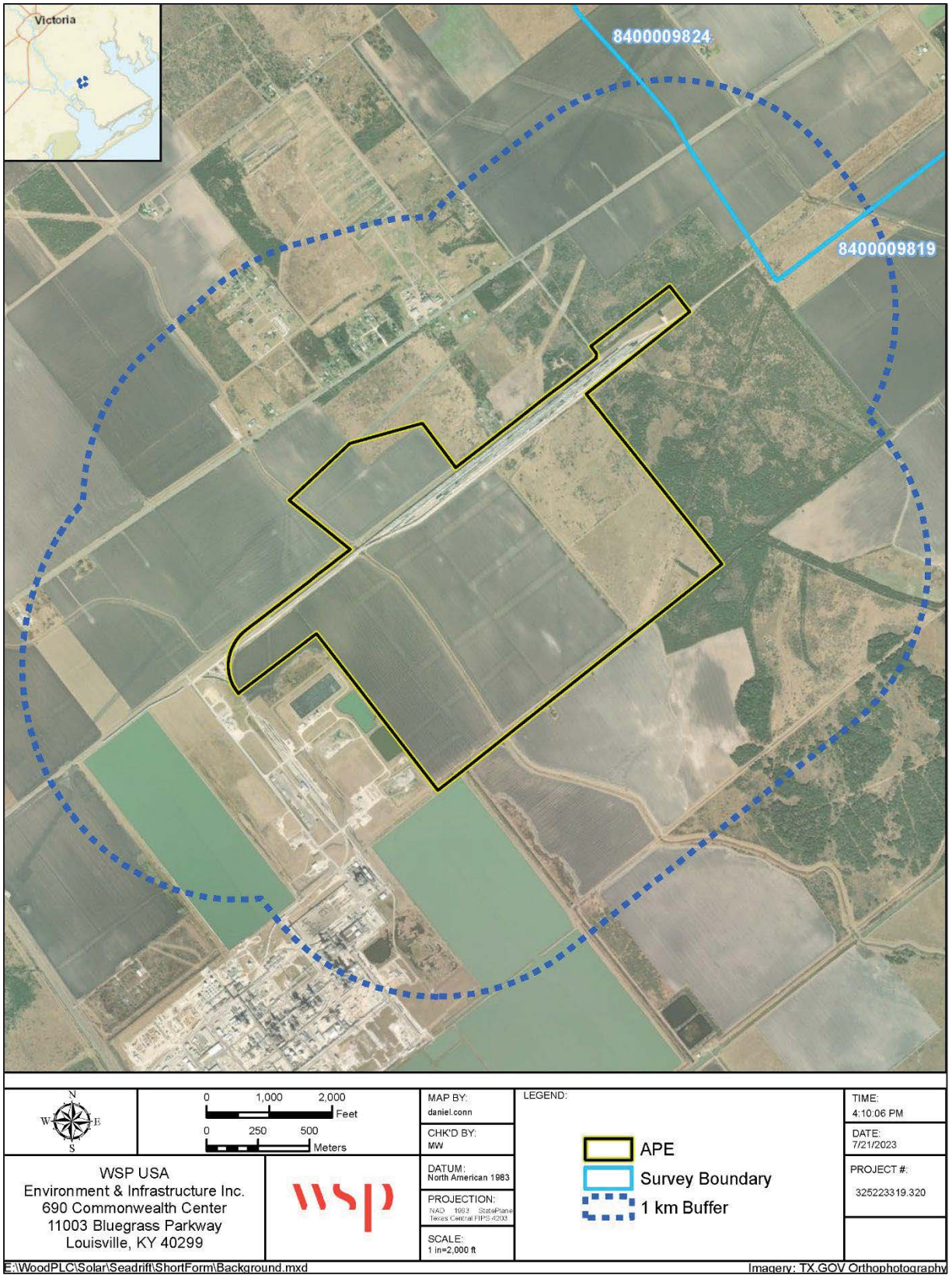


Figure 3-1. Texas Site Atlas background data within 1-km of the APE.

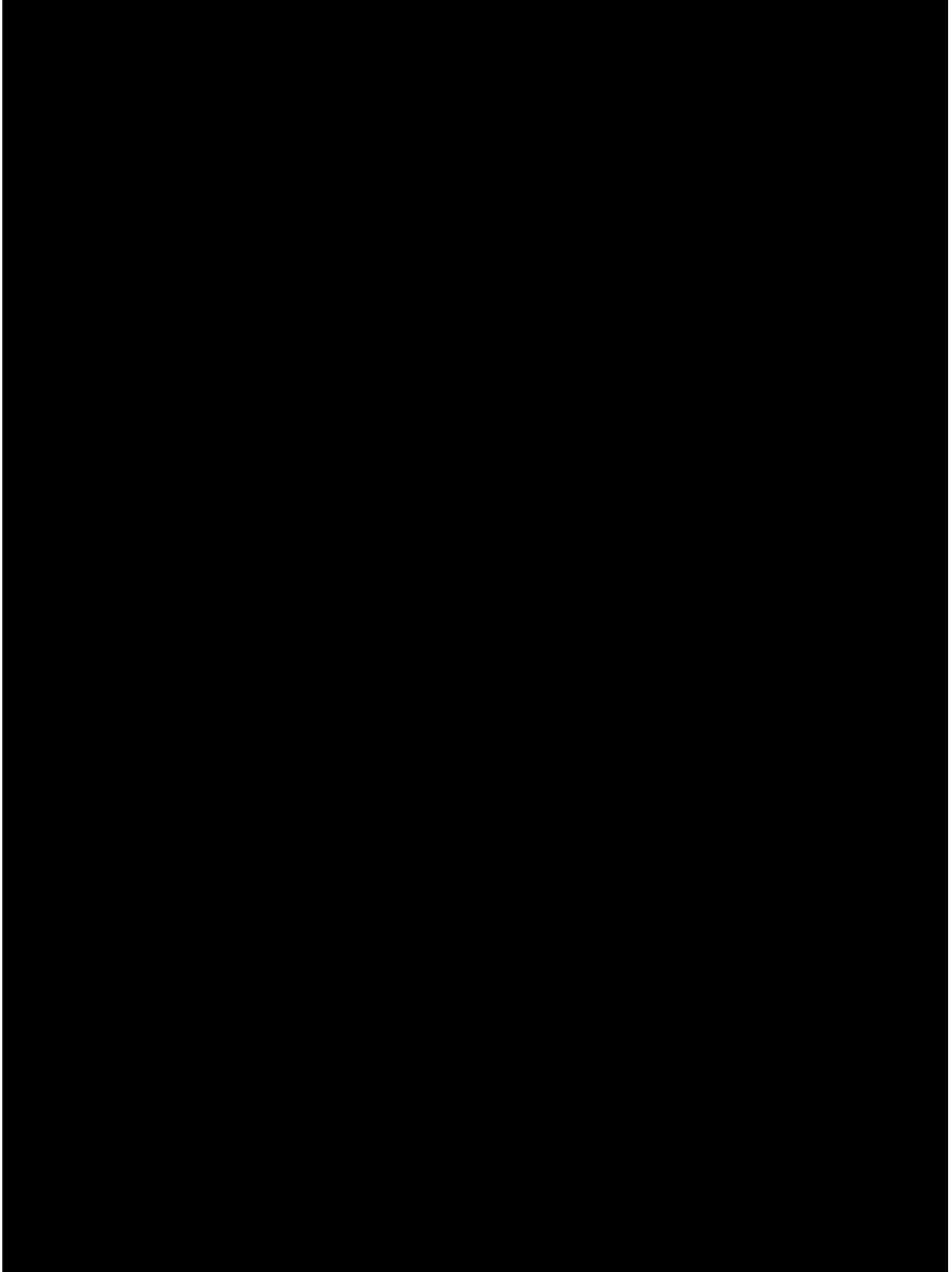


Figure 3-2. APE shown on the 1953 24k topographic quadrangles.

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4.0 METHODS

Field investigations were conducted according to guidelines established by the Council of Texas Archaeologists Standards and Guidelines Committee Intensive Terrestrial Survey Guidelines (2020). The goals of the project were to:

- Identify the presence of previously unrecorded archaeological sites;
- Identify the presence of any deeply buried cultural deposits; and
- Establish recommendations regarding the potential for sites within the APE to be eligible for listing on the National Register of Historic Places (NRHP), as well as for designation as State Antiquities Landmarks.

The APE consists of portions of agricultural fields containing unharvested corn (at the time of the survey), as well as portions of open scrub growth, railroad tracks, and a railyard. The ground surface visibility varied across the APE and as such the Phase I intensive survey was completed over the entire APE using a combination of systematic shovel test probe excavation (STPs) coupled with pedestrian survey. The entire APE was visually inspected (pedestrian survey at 10-meter intervals) for above-ground historic or prehistoric features or other surface areas of cultural interest that may be present in the area. The entire APE was visually inspected for above-ground historic or prehistoric features or other surface areas of cultural interest that may be present in the area.

Shovel tests were excavated at intervals ranging between 75 – 100 meters, based on the surface conditions, and were offset from ditches, utilities, or other obvious areas of surface disturbance. Opportunistic STPs were excavated to further explore for cultural deposits, at the field director's discretion. All STPs were 30 cm in diameter and were excavated at least 10 cm into the sterile subsoil, to bedrock, or a maximum of 90 centimeters below the ground surface (cmbs). Soil from the STPs was screened through a 0.25- in hardware cloth. Measurements were recorded using the metric system, and shovel test forms and soil profile information was recorded for each test. Soils were described using the Munsell color chart and appropriate terminology. Photographs were taken of representative soil profiles throughout the APE to document the general conditions within the APE.

Mapping for the project was completed using a hand-held submeter Geographic Positioning System (GPS). Location data was collected for all STPs. Detailed notes were maintained daily regarding methods employed and environmental conditions within the APE. Digital photographs showing general views, survey conditions, and specific areas of interest within the survey area were taken as needed. It should be noted that photography of the entire APE was limited based on the rules and regulations of the Dow Seadrift Operations facility. The entire APE is located on Dow property. Photography was not permitted within the APE facing any of the infrastructure of the Dow Seadrift Operations facility. As such, every effort was made to adequately document the APE facing away from the facility.

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5.0 RESULTS

From July 10 to 19, 2023, WSP conducted a Phase I intensive archaeological survey in support of the ER for the Proposed Xe-100 SMR project in Calhoun County, Texas. This report details a 617.4-acre portion (0.96 square miles or 249.85 hectares) of the larger 1,277 acres (1.99 square miles or 516.78 hectares) survey area to support requirements identified in the DOE's NEPA Implementing Regulations (10 CFR Part 1021) to support DOE's NEPA review of siting activities for the Xe-100 Sow Seadrift Site. For this report, the 617.4-acre portion is the APE. As a result of the investigation, no archaeological sites, cultural material, or buried cultural deposits were identified. No additional archaeological work is recommended for the APE.

5.1 APE Survey Results

The APE consists of portions of agricultural fields containing unharvested corn (**Figure 5-1**) as well as portions of open scrub growth (**Figure 5-2**), railroad tracks, and a railyard (**Figures 5-3 – 5-4**). The ground surface visibility varied across the APE (**Figure 5-5**) and as such the Phase I intensive survey was completed over the entire APE using a combination of systematic STPs coupled with pedestrian survey.

A total of 203 shovel tests were excavated within the APE (see **Appendix A**), all of which were void of cultural material (**Figure 5-6**). All observed soils within the APE were similar and consisted of very compact 10YR 3/1 silt clay loam Zone I, from the ground surface down to approximately 10 – 25 cmbs, underlain by a 10YR 4/1 clay Zone II, from 10/25 – 50 cmbs (**Figures 5-7 – 5-9**).



Figure 5-1. Overview of APE showing corn, facing southwest.



Figure 5-2. Overview of the APE showing scrub growth, facing north.



Figure 5-3. Overview of the APE showing railroad tracks, facing north.



Figure 5-4. Overview of the APE showing railyard, facing northeast.



Figure 5-5. Overview of the ground surface, facing west.

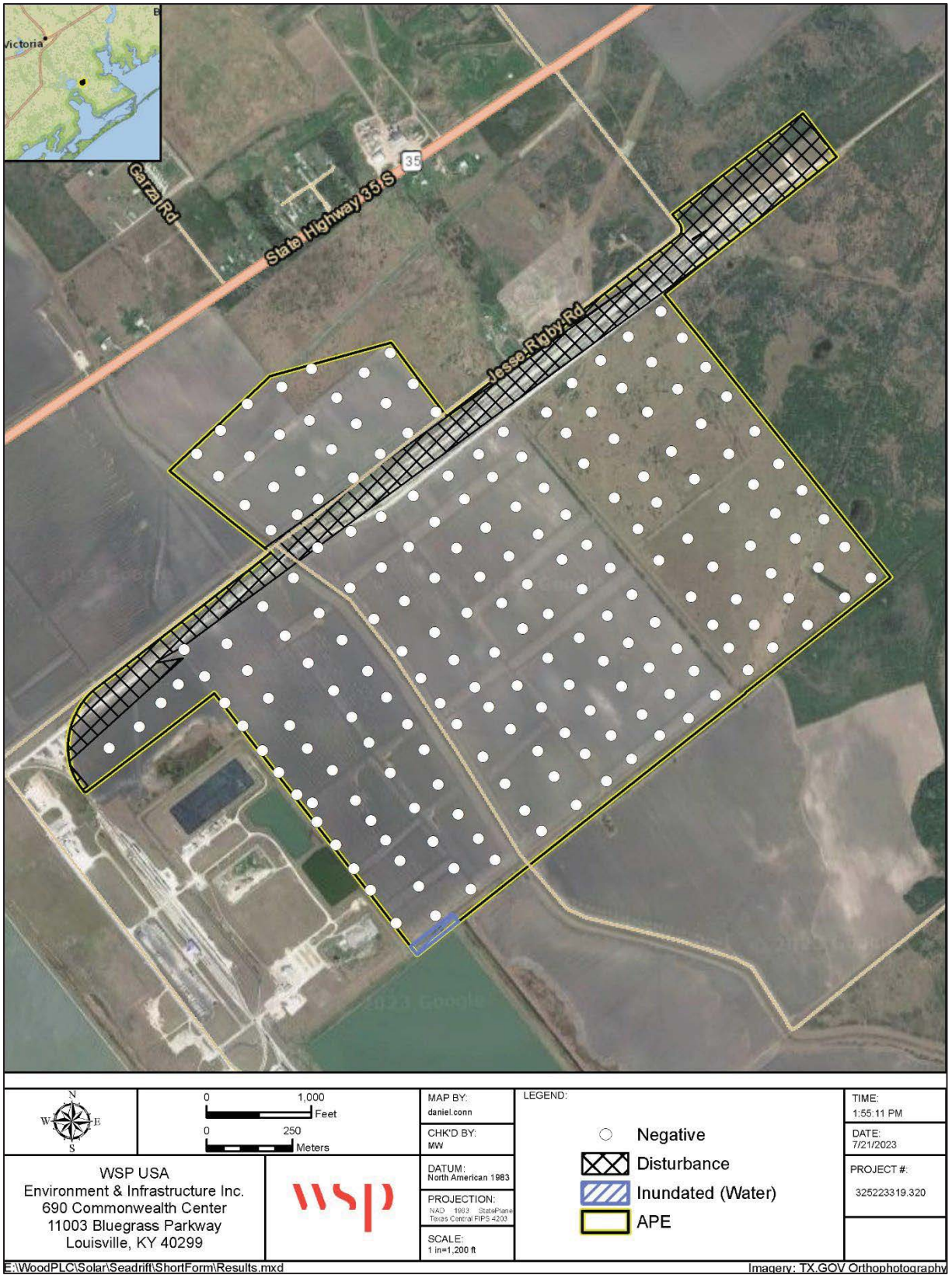


Figure 5-6. Survey Results, showing STP locations.



Figure 5-7. Observed soil profile.



Figure 5-8. Observed soil profile.



Figure 5-9. Observed soil profile.

5.2 High probability areas

Based on the historic map research (see **Section 3.4**), nine locations were determined to be a high probability to contain historic cultural material (see **Figure 3-2**). Field investigations revealed that the construction and subsequent maintenance of the railroad and railyard along Jesse Rigby Road (see **Figures 5-3 – 5-4**) have severely disturbed the area surrounding all nine of the high probably areas within the APE. No historic cultural material was identified in any of these high-probability locations.

5.3 Offsite surface water monitoring station

A proposed offsite stream gage (WCC-3), located in West Coloma Creek, along FM 2235, was also investigated for cultural resources (**Figures 5-10 – 5-11**). A surface water level monitoring station will be installed at this location to assist in the characterization of water level fluctuations. A pressure transducer and data logger will be installed within a 2-in diameter well casing that will be mounted in the stream channel, either attached to the existing culvert or the stream bottom via temporary support. The survey of the offsite stream gage included visual inspection, as the offsite stream gage will be installed within the stream. No cultural resources were identified.

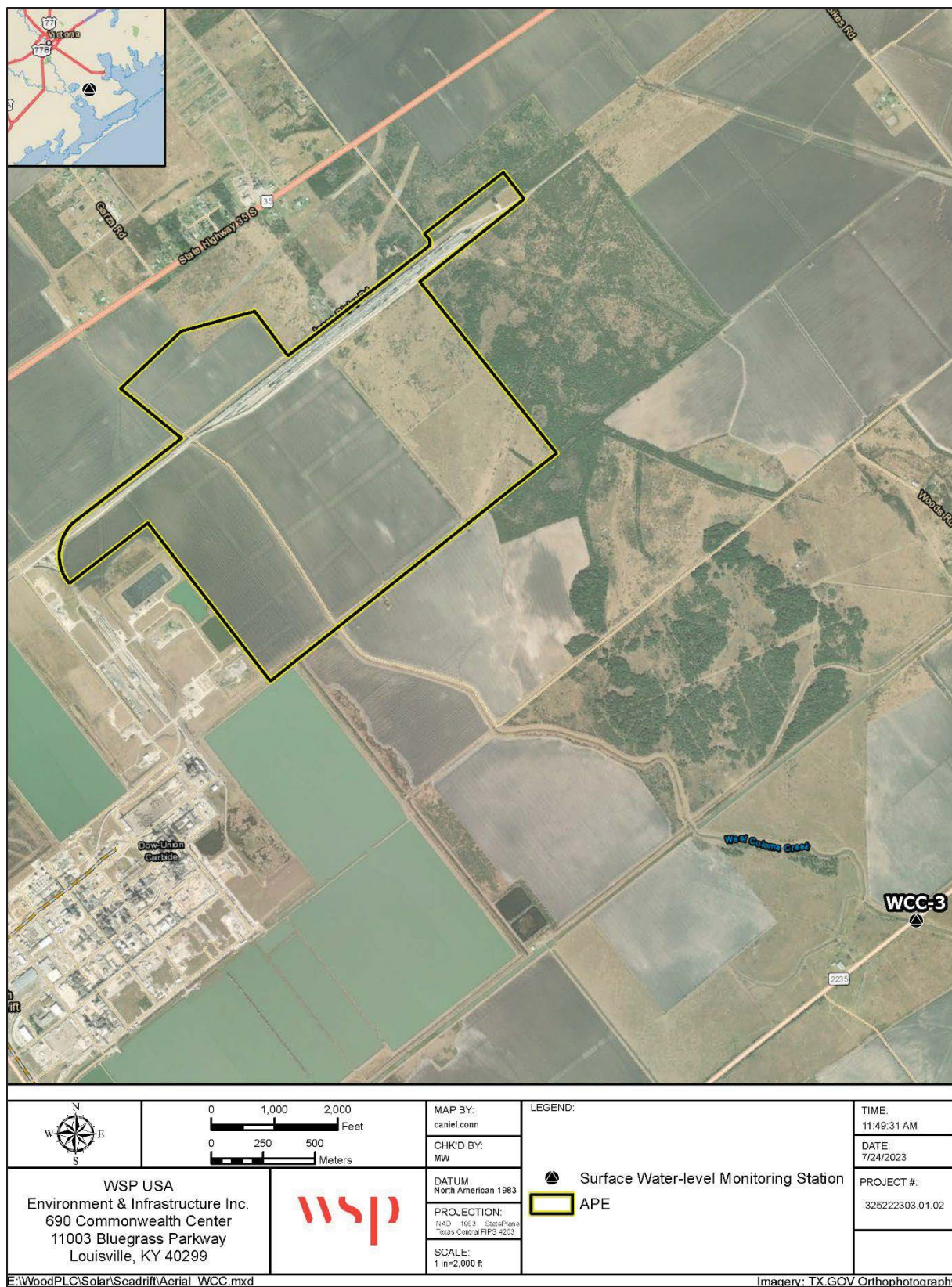


Figure 5-10. Offsite surface water monitoring (WCC-3) location.



Figure 5-11. Offsite surface water monitoring (WCC-3); facing southeast.

5.4 Aboveground Cultural Resource Survey

Additionally, WSP conducted an aboveground cultural resource eligibility and effects survey to support the requirements identified in the DOE's NEPA Implementing Regulations (10CFR Part 1021) to support DOE's NEPA review of siting activities for the Xe-100 DOW Seadrift Site. The purpose of the survey was to identify aboveground historic resources over 50 years of age within the APE, to evaluate these resources relative to their eligibility for listing in the NRHP, and to assess the potential direct and indirect visual effects of the proposed undertaking upon these resources.

The APE for the aboveground cultural historic resource survey was determined in consultation with X-Energy, the THC, and the State Historic Preservation Office. The APE includes an additional 0.5-mile buffer radiating out from the project area extents to account for impacts to aboveground historic architectural resources that are adjacent to the project area.

Based upon the nature of work addressed by this report, there is no potential for direct or indirect visual effects of the undertaking on historic resources within the project APE. A report detailing the complete survey of architectural resources related to the full scope of work of the proposed undertaking will follow this report of findings.

6.0 SUMMARY AND RECOMMENDATIONS

From July 10 to 19, 2023, WSP conducted a Phase I intensive archaeological survey of 1,277 acres in support of the ER for the Proposed Xe-100 SMR project in Calhoun County, Texas. This report details a 617.4-acre portion (0.96 square miles or 249.85 hectares) of the larger 1,277 acres (1.99 square miles or 516.78 hectares) survey area to support requirements identified in the DOE's NEPA Implementing Regulations (10 CFR 1021) to support DOE's NEPA review of siting activities for the Xe-100 Dow Seadrift Site. For this report, the 617.4-acre portion is the APE. The remaining 659.6 acres of the entire survey area will be submitted to the THC at a later date.

The survey was conducted under contract with X-Energy to facilitate compliance with Section 106 of the National Historic Preservation Act and the Antiquities Code of Texas (Natural Resources Code, Title 9, Chapter 191, Subchapter A). Per the provisions of the Texas Cultural Resources Code, Title 9, Chapter 191, WSP initiated a review of the SOW with the THC on May 12, 2023, with the concurrence of the proposed SOW from the THC on June 7, 2023 (THC Tracking No. 202308205).

The APE consists of portions of agricultural fields containing unharvested corn as well as portions of open scrub growth, railroad tracks, and a railyard. The ground surface visibility varied across the APE and as such the Phase I intensive survey was completed over the entire APE using a combination of systematic STPs coupled with pedestrian survey.

Before fieldwork, WSP conducted a geomorphological desktop assessment of the APE. Overall, the soil's defined horizons, coupled with the project's location along a relatively straight portion of a low-level waterway (West Coloma Creek) and relatively flat topographic landform, suggest the area is unlikely to contain deeply buried archaeological deposits. The shallow nature of these deposits suggests any buried cultural deposits can be reached during shovel test probe excavations.

A total of 203 STPs were excavated across the APE. None of the excavated STPs contained cultural material. Additionally, no evidence of deeply buried cultural deposits suggesting buried A-horizons or cultural artifacts were identified in any of the excavations. As a result of the intensive archaeological survey, no archaeological sites or cultural materials were identified. It is recommended that the project will have no effect on historic properties and that no additional archaeological work is required within the APE.

Additionally, WSP conducted an aboveground cultural resource eligibility and effects survey to support the requirements identified in the DOE's NEPA Implementing Regulations (10 CFR 1021) to support DOE's NEPA review of siting activities for the Xe-100 Dow Seadrift Site. The purpose of the survey was to identify aboveground historic resources over 50 years of age within the APE, to evaluate these resources relative to their eligibility for listing in the NRHP, and to assess the potential direct and indirect visual effects of the proposed undertaking upon these resources.

The APE for the aboveground cultural historic resource survey was determined in consultation with X-Energy, the THC, and the State Historic Preservation Office. The APE includes an additional 0.5-mile buffer radiating out from the project area extents to account for impacts to aboveground historic architectural resources that are adjacent to the project area. Based upon the nature of work addressed by this report, there is no potential for direct or indirect visual effects of the undertaking on historic resources within the project APE. A report detailing the complete survey of architectural resources related to the full scope of work of the proposed undertaking will follow this report of findings.

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Appendix A

Shovel Test Probe (STP) Log and STP Location Map

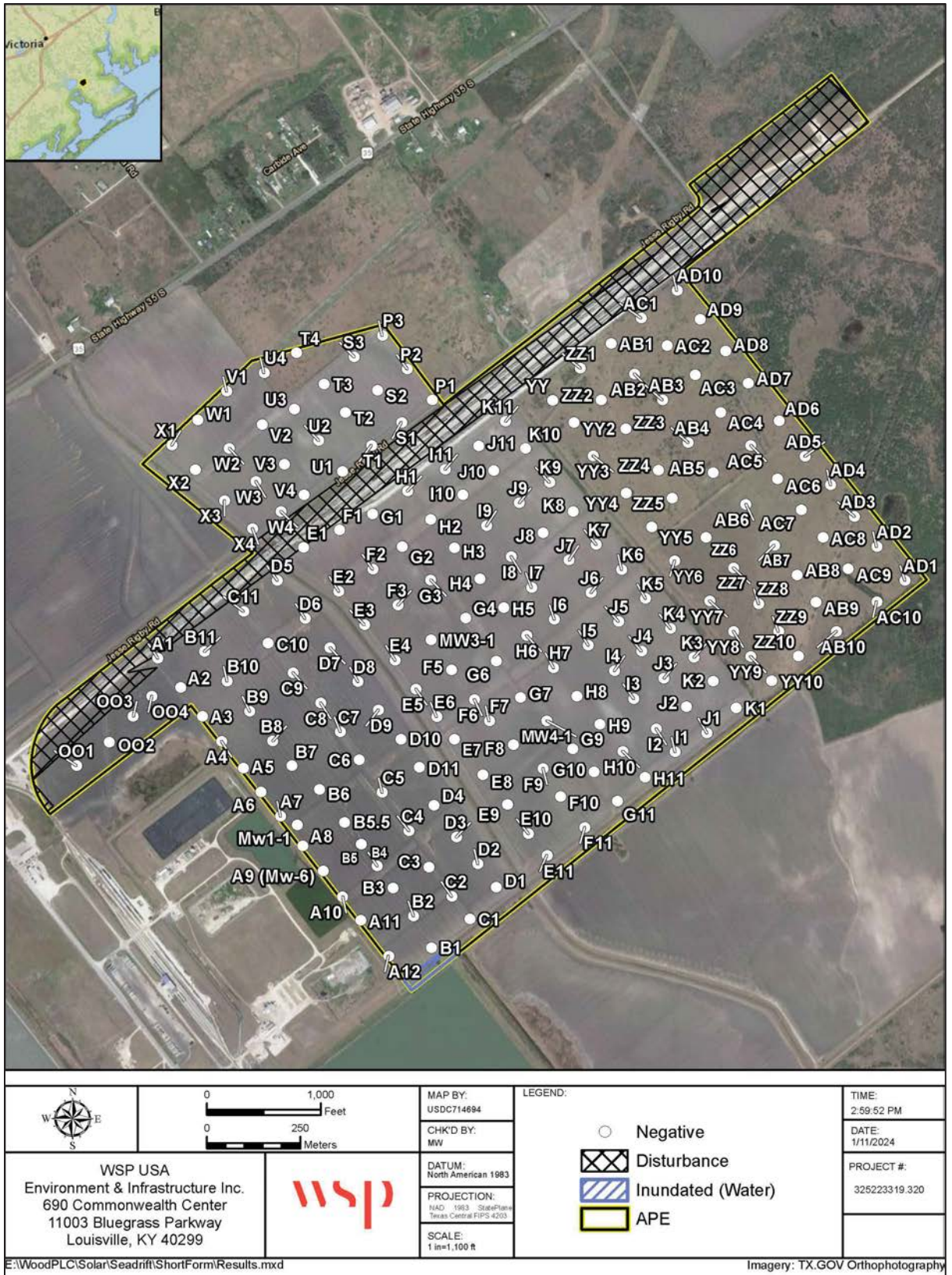
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STP #	Total STP Depth (cmbs)	Artifacts (Pos/Neg)	Date	Recorder
A1	50	Negative	7/12/23	PCC/ SL /GH / NB
A2	49	Negative	7/12/23	PCC/ SL /GH / NB
A3	50	Negative	7/12/23	PCC/ SL /GH / NB
A4	50	Negative	7/12/23	PCC/ SL /GH / NB
A5	30	Negative	7/12/23	PCC/ SL /GH / NB
A6	28	Negative	7/12/23	PCC/ SL /GH / NB
A7	50	Negative	7/12/23	PCC/ SL /GH / NB
A8	36	Negative	7/12/23	PCC/ SL /GH / NB
A9	50	Negative	7/12/23	PCC/ SL /GH / NB
A10	21	Negative	7/12/23	PCC/ SL /GH / NB
A11	50	Negative	7/12/23	PCC/ SL /GH / NB
A12	40	Negative	7/12/23	PCC/ SWL
B1	30	Negative	7/12/23	PCC/ SWL
B2	34	Negative	7/12/23	PCC/ SWL
B3	40	Negative	7/12/23	PCC/ SWL
B4	30	Negative	7/12/23	PCC/ SWL
B5	40	Negative	7/12/23	PCC/ SWL
B5.5	40	Negative	7/12/23	PCC/SWL
B6	30	Negative	7/12/23	PCC/ SWL
C1	35	Negative	7/12/23	PCC/ SWL
C2	30	Negative	7/12/23	PCC/ SWL
C3	27	Negative	7/12/23	PCC/ SWL
C4	32	Negative	7/12/23	PCC/ SWL
C5	30	Negative	7/12/23	PCC/ SWL
C6	30	Negative	7/12/23	PCC/ SWL
C7	28	Negative	7/12/23	PCC/ SWL
C8	31	Negative	7/12/23	PCC/ SWL
C9	31	Negative	7/12/23	PCC/ SWL
C10	30	Negative	7/12/23	PCC/ SWL
C11	30	Negative	7/12/23	PCC/ SWL
D1	30	Negative	7/12/23	PCC/ SWL
D2	40	Negative	7/12/23	PCC/ SWL
D3	30	Negative	7/12/23	PCC/ SWL
D4	30	Negative	7/12/23	PCC/ SWL
D5	20	Negative	7/13/23	PCC/ SWL
D6	40	Negative	7/13/23	PCC/ SWL
D7	30	Negative	7/13/23	PCC/ SWL
D8	30	Negative	7/13/23	PCC/ SWL
D9	40	Negative	7/13/23	PCC/ SWL
D11	36	Negative	7/13/23	PCC/ SWL
E1	40	Negative	7/13/23	PCC/ SWL
E2	40	Negative	7/13/23	PCC/ SWL
E3	40	Negative	7/13/23	PCC/ SWL
E4	40	Negative	7/13/23	PCC/ SWL
E5	50	Negative	7/13/23	PCC/ SWL
E6	40	Negative	7/13/23	PCC/ SWL
E7	40	Negative	7/13/23	PCC/ SWL
E8	40	Negative	7/13/23	PCC/ SWL
E9	40	Negative	7/13/23	PCC/ SWL
E10	40	Negative	7/13/23	PCC/ SWL
E11	40	Negative	7/13/23	PCC/ SWL
F1	28	Negative	7/13/23	PCC/ SWL
F2	32	Negative	7/13/23	PCC/ SWL
F3	36	Negative	7/12/23	PCC/ SWL

STP #	Total STP Depth (cmbs)	Artifacts (Pos/Neg)	Date	Recorder
F4	30	Negative	7/12/23	PCC/ SWL
F5	30	Negative	7/12/23	PCC/ SWL
F6	35	Negative	7/12/23	PCC/ SWL
F7	38	Negative	7/12/23	PCC/ SWL
F8	33	Negative	7/12/23	PCC/ SWL
F9	31	Negative	7/12/23	PCC/ SWL
F10	34	Negative	7/12/23	PCC/ SWL
F11	31	Negative	7/12/23	PCC/ SWL
G1	30	Negative	7/13/23	PCC/ SWL
G2	30	Negative	7/13/23	PCC/ SWL
G3	37	Negative	7/13/23	PCC/ SWL
G4	40	Negative	7/13/23	PCC/ SWL
G5	30	Negative	7/13/23	PCC/ SWL
G6	30	Negative	7/13/23	PCC/ SWL
G7	30	Negative	7/13/23	PCC/ SWL
G8	30	Negative	7/13/23	PCC/ SWL
G9	30	Negative	7/13/23	PCC/ SWL
G10	30	Negative	7/13/23	PCC/ SWL
G11	30	Negative	7/13/23	PCC/ SWL
H1	30	Negative	7/14/23	PCC/ SWL
H2	27	Negative	7/14/23	PCC/ SWL
H3	25	Negative	7/14/23	PCC/ SWL
H4	31	Negative	7/14/23	PCC/ SWL
H5	30	Negative	7/14/23	PCC/ SWL
H6	30	Negative	7/14/23	PCC/ SWL
H7	25	Negative	7/14/23	PCC/ SWL
H8	28	Negative	7/14/23	PCC/ SWL
H9	30	Negative	7/14/23	PCC/ SWL
H10	30	Negative	7/14/23	PCC/ SWL
H11	30	Negative	7/14/23	PCC/ SWL
I1	29	Negative	7/13/23	SWL/ NB
I2	32	Negative	7/13/23	SWL/ NB
I3	30	Negative	7/13/23	SWL/ NB
I4	31	Negative	7/13/23	SWL/ NB
I5	30	Negative	7/13/23	PCC/ SWL
I6	35	Negative	7/13/23	PCC/ SWL
I7	31	Negative	7/13/23	PCC/ SWL
I8	30	Negative	7/13/23	PCC/ SWL
I9	30	Negative	7/13/23	PCC/ SWL
I10	31	Negative	7/13/23	PCC/ SWL
I11	34	Negative	7/13/23	PCC/ SWL
J1	40	Negative	7/13/23	PCC/ SWL
J2	40	Negative	7/13/23	PCC/ SWL
J3	40	Negative	7/13/23	PCC/ SWL
J4	40	Negative	7/13/23	PCC/ SWL
J5	40	Negative	7/13/23	PCC/ SWL
J6	40	Negative	7/13/23	PCC/ SWL
J7	40	Negative	7/13/23	PCC/ SWL
J8	40	Negative	7/13/23	PCC/ SWL
J9	40	Negative	7/13/23	PCC/ SWL
J10	40	Negative	7/13/23	PCC/ NB/ GH
J11	40	Negative	7/13/23	PCC/ NB/ GH
K1	35	Negative	7/13/23	PCC/ SWL/ NB
K2	40	Negative	7/13/23	PCC/ SWL/ NB

STP #	Total STP Depth (cmbs)	Artifacts (Pos/Neg)	Date	Recorder
K2.5	30	Negative	7/13/23	PCC/ SWL/ NB
K3	30	Negative	7/13/23	PCC/ SWL/ NB
K4	30	Negative	7/13/23	PCC/ SWL/ NB
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K6	30	Negative	7/13/23	PCC/ SWL/ NB
K7	30	Negative	7/13/23	PCC/ SWL/ NB
K8	30	Negative	7/13/23	PCC/ SWL/ NB
K9	30	Negative	7/13/23	PCC/ SWL/ NB
K10	30	Negative	7/13/23	PCC/ SWL/ NB
K11	30	Negative	7/13/23	PCC/ SWL/ NB
P1	35	Negative	7/14/23	PCC/ SWL
P2	32	Negative	7/14/23	PCC/ SWL
P3	27	Negative	7/14/23	PCC/ SWL
S1	30	Negative	7/14/23	PCC/ SWL
S2	25	Negative	7/14/23	PCC/ SWL
S3	25	Negative	7/14/23	PCC/ SWL
T1	40	Negative	7/14/23	PCC/ GH
T2	40	Negative	7/14/23	PCC/ GH
T3	40	Negative	7/14/23	PCC/ GH
U1	22	Negative	7/14/23	PCC
U2	30	Negative	7/14/23	PCC
U3	25	Negative	7/14/23	PCC
U4	30	Negative	7/14/23	PCC
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V2	17	Negative	7/14/23	PCC/ SWL
V3	19	Negative	7/14/23	PCC/ SWL
V4	30	Negative	7/14/23	PCC
W1	30	Negative	7/14/23	PCC/ SWL
W2	30	Negative	7/14/23	PCC/ SWL
W3	30	Negative	7/14/23	PCC/ SWL
W4	30	Negative	7/14/23	PCC/ SWL
X1	25	Negative	7/14/23	PCC/ SWL
X2	30	Negative	7/14/23	PCC/ SWL
X3	25	Negative	7/14/23	PCC/ SWL
X4	25	Negative	7/14/23	PCC/ SWL
OO1	35	Negative	7/16/23	PCC/ SWL
OO1.5	35	Negative	7/16/23	PCC/ SWL
OO2	32	Negative	7/16/23	PCC/ SWL
OO2.5	35	Negative	7/16/23	PCC/ SWL
OO3	40	Negative	7/14/23	PCC/ GH
OO3.5	30	Negative	7/16/23	PCC/ SWL
OO4	28	Negative	7/16/23	PCC/ SWL
OO4.5	32	Negative	7/16/23	PCC/ SWL
YY1	5	Negative	7/17/23	PCC/ SWL
YY2	31	Negative	7/17/23	PCC/ SWL
YY3	26	Negative	7/17/23	PCC/ SWL
YY4	36	Negative	7/17/23	PCC/ SWL
YY5	28	Negative	7/17/23	PCC/ SWL
YY6	25	Negative	7/17/23	PCC/ SWL
YY7	27	Negative	7/17/23	PCC/ SWL
YY8	34	Negative	7/17/23	PCC/ SWL
YY9	34	Negative	7/17/23	PCC/ SWL
YY10	37	Negative	7/17/23	PCC/ SWL
ZZ1	30	Negative	7/17/23	GH

STP #	Total STP Depth (cmbs)	Artifacts (Pos/Neg)	Date	Recorder
ZZ2	40	Negative	7/17/23	GH
ZZ3	30	Negative	7/17/23	GH
ZZ4	30	Negative	7/17/23	GH
ZZ5	30	Negative	7/17/23	GH
ZZ6	30	Negative	7/17/23	GH
ZZ7	30	Negative	7/17/23	GH
ZZ8	30	Negative	7/17/23	GH
ZZ9	30	Negative	7/17/23	GH
ZZ10	30	Negative	7/17/23	GH
AB1	25	Negative	7/17/23	SWL
AB2	20	Negative	7/17/23	SWL
AB3	25	Negative	7/17/23	SWL
AB4	25	Negative	7/17/23	SWL
AB5	30	Negative	7/17/23	SWL
AB6	30	Negative	7/17/23	SWL
AB7	30	Negative	7/17/23	SWL
AB8	30	Negative	7/17/23	SWL
AB9	30	Negative	7/17/23	SWL
AB10	30	Negative	7/17/23	SWL
AB11	30	Negative	7/17/23	SWL
AC1	30	Negative	7/17/23	PCC
AC2	27	Negative	7/17/23	PCC
AC3	31	Negative	7/17/23	PCC
AC4	25	Negative	7/17/23	PCC
AC5	28	Negative	7/17/23	PCC
AC6	25	Negative	7/17/23	PCC
AC7	30	Negative	7/17/23	PCC
AC8	30	Negative	7/17/23	PCC
AC9	28	Negative	7/17/23	PCC
AC10	25	Negative	7/17/23	PCC
AD1	27	Negative	7/17/23	PCC/ SWL
AD2	39	Negative	7/17/23	PCC/ SWL
AD3	50	Negative	7/17/23	GH
AD4	25	Negative	7/17/23	SWL
AD5	25	Negative	7/17/23	PCC/ SWL
AD6	26	Negative	7/17/23	PCC/ SWL
AD7	30	Negative	7/17/23	GH
AD8	25	Negative	7/17/23	PCC/ SWL
AD9	30	Negative	7/17/23	PCC/ SWL
AD10	31	Negative	7/17/23	PCC/ SWL
AE1	15	Negative	7/17/23	SWL
AE2	15	Negative	7/17/23	SWL
AE3	25	Negative	7/17/23	SWL
AE4	30	Negative	7/17/23	SWL
AE5	30	Negative	7/17/23	SWL
AE6	30	Negative	7/17/23	SWL
AE7	30	Negative	7/17/23	SWL
Disturbed at Surface	N/A	N/A	7/15/23	PCC
Disturbed at Surface	N/A	N/A	7/15/23	PCC
Water at Surface	N/A	N/A	7/15/23	PCC



STP locations within the APE.

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