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A Phase I Cultural Resources Survey of the Fentress Johnson West Bay Mitigation Bank Project, Brazoria County, Texas

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FINAL
A PHASE I CULTURAL RESOURCES SURVEY OF THE FRENTRESS JOHNSON WEST BAY MITIGATION BANK PROJECT, BRAZORIA COUNTY, TEXAS

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ABSTRACT

Alluvion Resource Company (Alluvion) is proposing to establish and operate the Fentress-Johnson West Bay Mitigation Bank (FJWBMB) located in Brazoria County, Texas. Specifically, the development activities will consist of the construction of weir structures and the re-establishment of contours to meet existing marsh elevations of adjacent wetlands. In all, the FJWBMB totals approximately 5,377-acres (ac) (2,175.9 hectares [ha]), however impacts associated with the development of the FJWBMB would only occur within select areas totaling approximately 150.0 ac (60.7-ha), with intensive cultural resources surveys conducted across a broader environmental survey area (ESA) totaling approximately 300.0 ac (121.4-ha) centered on these development areas.

Alluvion retained Perennial Environmental Services, LLC (Perennial) to conduct an intensive Phase I cultural resources investigation for the proposed Project to at the request of the US Army Corps of Engineers (USACE) in correspondence dated March 20, 2020. Archaeological investigations for the Project were conducted in accordance with Section 106 of the *National Historic Preservation Act* (NHPA), the Texas State Historical Preservation Office (SHPO) survey standards, as well as an approved scope of work.

Consistent with the USACE application requirements, and in accordance with Section 106 of the NHPA of 1966, as amended and implementing regulations (36 Code of Federal Regulations [CFR] 800), the proposed Project must make a reasonable and good faith effort to identify historic properties within the Area of Potential Effect (APE) and to take into account any direct or indirect effects the proposed undertaking could have on properties listed or considered eligible for listing in the National Register of Historic Places (NRHP). For purposes of this report, the APE is considered to be equivalent to the ESA totaling 300.0 ac (121.4-ha), with depths of impact anticipated to range from 0.5 to 1.5 feet (ft) (0.15 to 0.45 meters [m]).

Abby Peyton served as the Principal Investigator (PI) for the Project, while Wyatt Ellison and Wade Griffith led the field efforts. The Phase I survey investigations for the Project, as presented herein, were conducted between May 27, 2020 and May 29, 2020, and included the excavation of a total of 191 shovel tests. The survey investigations resulted in entirely negative findings. No artifacts were encountered as a result of these efforts, and so site delineation or artifact collection protocols were not implemented. Similarly, no curation is warranted for the Project.

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INTRODUCTION

Alluvion Resource Company (Alluvion) is proposing to establish and operate the Fentress-Johnson West Bay Mitigation Bank (FJWBMB) located in Brazoria County, Texas (Figure 1). Specifically, the development activities will consist of the construction of weir structures and the re-establishment of contours to meet existing marsh elevations of adjacent wetlands. In all, the FJWBMB totals approximately 5,377-acres (ac) (2,175.9 hectares [ha]), however impacts associated with the development of the FJWBMB would only occur within select areas totaling approximately 150.0 ac (60.7-ha), with intensive cultural resources surveys conducted across a broader environmental survey area (ESA) totaling approximately 300.0 ac (121.4-ha) centered on these development areas.

Alluvion retained Perennial Environmental Services, LLC (Perennial) to conduct an intensive Phase I cultural resources investigation for the proposed Project to comply with anticipated US Army Corps of Engineers (USACE) permitting requirements. Archaeological investigations for the Project were conducted in accordance with Section 106 of the *National Historic Preservation Act* (NHPA), the Texas State Historical Preservation Office (SHPO) survey standards, as well as an approved scope of work.

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The following sections provide an overview of the environmental and cultural setting, methods, results of background review and field studies, following by conclusions and recommendations. Agency correspondence records are presented in Appendix A, with Project mapping provided in Appendix B, and shovel test data provided in Appendix C.

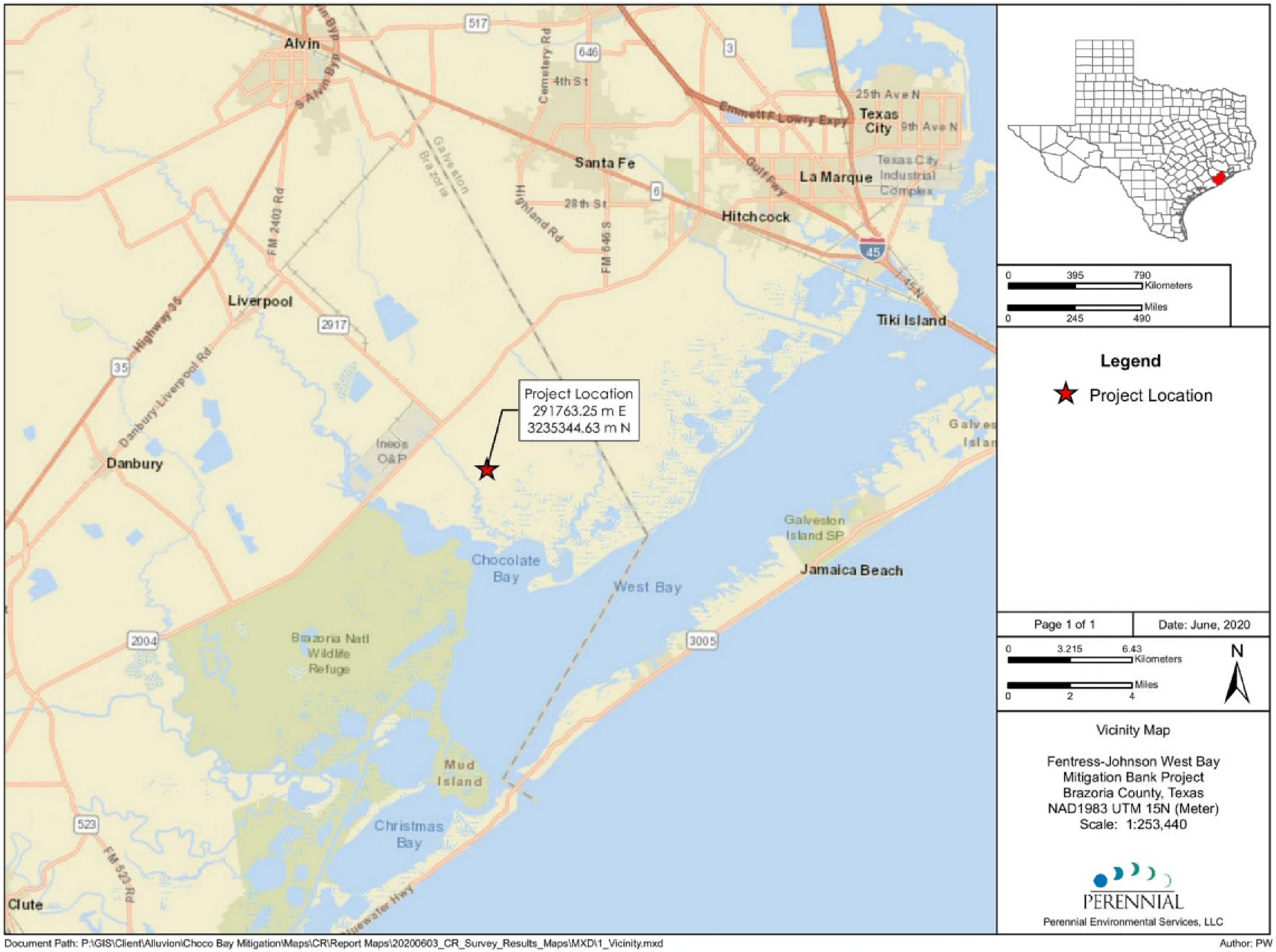

Figure 1. Project vicinity map.

PROJECT DESCRIPTION

ENVIRONMENTAL SETTING

The Project is within the Northern Humid Gulf Coastal Plains of the Western Gulf Coastal Plain of Texas (Griffith et al. 2007). The Western Gulf Coast Plain ecoregion is represented by relatively flat topography and savanna vegetation. Fertile soils in this region are widely used for soybean, cotton, and rice production (Griffith et al. 2007). The Northern Humid Gulf Coastal Prairies subregion is characterized by poorly drained Quaternary-age deltaic soils with diverse grasslands including big bluestem, little bluestem, Indiangrass, brownseed paspalum, and switchgrass and marginal forested areas including loblolly pine and historical longleaf pines in the northern portion of the region (Griffith et al. 2007). The majority of the coastal prairies in this subregion have been converted to agricultural and aquacultural land, with some urban areas.

Native vegetation in the region includes clusters of hardwoods including sweetgum, sugarberry, and loblolly pine interspersed among grasslands of bluestem, switchgrass, and yellow Indiangrass (Griffith et al. 2007, 74). The invasive species Chinese tallow accounts for a large percentage of the vegetation in this area (Griffith et al. 2007, 74-75). This region has an extended history of modification and the majority of the area has been converted to cropland, rangeland, and urban and industrial uses. As the soils are poorly drained, and the region remains inundated for extended periods, while expansive networks of drainage channels and canals crisscross the landscape (Griffith 2007, 74).

GEOLOGY AND SOILS

Geologically, the Project ESA is predominately underlain by the Beaumont Formation (Qbs). Qbs deposits span from the Phanerozoic to the Late Pleistocene and are made up of intermixed and interbedded quartz, sand, silt, and fine gravel. Additionally, some deposits consist of predominantly low permeability clay and mud along with intermixed and interbedded clay and silt; this intermixed and interbedded clay and silt contains lenses of fine sand, decayed organic matter, and many buried organic-rich, oxidized soil zones. Qbs includes plastic and compressible clay and mud deposited in flood basins, coastal lakes, and former stream channels on a deltaic plain (USGS 2020).

The six soil map units that make up the soils mapped within the Project ESA are presented in **Appendix B – Aerial Soils Map** and listed in **Table 1** (Natural Resources Conservation Service [NRCS] 2020).

Table 1. Mapped Soil Units within the Project ESA (NRCS 2020).						
Soil Series	**Texture and Drainage**	**General Location**	**Horizon**	**Depth (cm)**	**Depth (in)**	**Geoarchaeological Potential (Abbott 2001)**
Edna loam, 0 to 1 percent slopes (13)	The Edna series consists of very deep, somewhat poorly drained soils that formed in loamy fluviomarine deposits. Slope ranges from 0 to 5 percent but most less than 1 percent.	Flats	A- Dark gray (10YR 4/1) loam	0-23	0-9	Low
			Bt1- Gray (10YR 5/1) clay	23-48	9-19	
			Bt2- Gray (5Y 6/1) clay	48-97	19-38	
			Bt3-Light brownish gray (2.5Y 6/2) clay loam	97-127	38-50	
			Btk-Light olive gray (5Y 6/2) sandy clay loam	127-203	50-80	
Veston fine sandy loam, 0 to 1 percent slopes, frequently flooded (43)	The Veston series consists of very deep, poorly drained soils. These soils formed in sandy and loamy alluvial sediments. Slopes range from 0 to 1 percent	Barrier flats	A - Very dark gray (2.5Y 3/1) loamy very fine sand	0-8	0-3	Low-Moderate
			C - Grayish brown (10YR 5/2) loamy very fine sand	8-13	3-5	
			Ab - Dark gray (2.5Y 4/1) very fine sandy loam	13-20	5-8	
			Cg1 - Gray (2.5Y 5/1) loamy very fine sand	20-41	8-16	
			Cg2 - Gray (2.5Y 5/1) very fine sandy loam	41-66	16-26	
			A'b - Black (2.5Y 2/1) clay loam	66-97	26-38	
			C'gl - Gray (2.5Y 5/1) and gray (2.5Y 6/1) loam	97-130	38-51	
			C'g2 - Light gray (2.5Y 7/1) and gray (2.5Y 6/1) loam	130-152	51-60	
			C'g3 - White (2.5Y 8/1) clay loam	152-191	60-75	
			C'g4 - White (2.5Y 8/1) clay loam	191-203	75-80	
Francitas clay loam, 0 to 1 percent slopes, rarely flooded (17)	The Francitas series consists of very deep, somewhat poorly drained, very slowly permeable soils derived from clayey fluviomarine deposits. Slope ranges from 0 to 1 percent.	Flats	A - Black (10YR 2/1) clay loam	0-41	0-16	Low
			Bss - Very dark gray (10YR 3/1) clay	41-97	16-38	
			Bkss1 - Dark gray (10YR 4/1) clay	97-150	38-59	
			Bkss2 - Pale brown (10YR 6/3) clay	150-175	59-69	
			Bkss3 - Light yellowish brown (10YR 6/4) clay	175-274	69-108	

Table 1. Mapped Soil Units within the Project ESA (NRCS 2020).

Soil Series	Texture and Drainage	General Location	Horizon	Depth (cm)	Depth (in)	Geoarchaeological Potential (Abbott 2001)
Narta fine sandy loam, 0 to 1 percent slopes, rarely flooded (32)	The Narta series consists of very deep, poorly drained, very slowly permeable soils that formed in loamy fluviomarine sediments. Slope ranges from 0 to 1 percent.	Low flats	A - Dark gray (10YR 4/1) loam	0-14	0-5	Low-Moderate
			Btn1 - Very dark gray (10YR 4/1) loam	14-33	5-13	
			Btn2 - Dark gray (10YR 4/1) clay loam	33-52	13-21	
			Btkng1 - Gray (10YR 5/1) clay loam	52-100	21-39	
			Btkng2 - Gray (10YR 6/1) clay loam	100-125	39-49	
			Btkng3 - Light brownish gray (2.5Y 6/2) clay loam	125-144	49-57	
			Btkng4 - Light yellowish brown (2.5Y 6/3) and light brownish gray (2.5Y 6/2) clay loam	144-163	57-64	
			Btkng5 - Olive yellow (2.5Y 6/6) sandy clay loam	163-203	64-80	
Bernard clay loam, 0 to 1 percent slopes (7)	The Bernard series consists of very deep, somewhat poorly drained soils that formed in clayey fluviomarine deposits	Flats	Ap - Very dark gray (10YR 3/1) clay loam	0-15	0-6	Low
			Bt1 - Very dark gray (10YR 3/1) clay	15-56	6-22	
			Bt2- Very dark gray (10YR 3/1) clay	56-79	22-31	
			Btk1- Dark gray (2.5Y 4/1) clay	79-127	31-50	
			Btk2- Grayish brown (2.5Y 5/2) clay	127-152	50-60	
			Btk3 - Brown (10YR 5/3) clay loam	152-203	60-80	
Aris fine sandy loam (1)	The Aris series consists of very deep, poorly drained soils. Slope ranges from 0 to 1 percent	Flats	Ap- Grayish brown (10YR 5/2) silt loam	0-12	0-5	Low
			AE- Gray (2.5Y 5/1) loam	12-26	5-10	
			Bt1- Dark gray (10YR 4/1) loam	26-41	10-16	
			Bt2- Dark gray (10YR 4/1) clay loam	41-79	16-31	
			Bt3- Gray (2.5Y 5/1) clay loam	79-103	31-41	
			Btg1- Gray (N 6/) clay	103-124	41-49	
			Btg2- Light greenish gray (5GY 7/1) clay loam	124-165	49-65	
			Btg3 - Light greenish gray (10Y 7/1) sandy clay loam	165-203	49-80	

METHODS

BACKGROUND REVIEW

Prior to initiating fieldwork, Perennial conducted a records and literature review of the THC's Texas Archeological Sites Atlas (Atlas) online database and the NRHP database to identify previously recorded cultural resource sites, historic structures, properties listed in the NRHP, designated historic districts, or State Antiquities Landmarks (SAL) which could potentially be affected by the proposed undertaking. Previously recorded cultural resource site forms, reports of archaeological investigations, general historical documents, and secondary sources concerning the background of the area were also reviewed. The records search included a review of all site records and previous surveys on file within 1.0 mi (1.6 km) of the Project.

In addition to a records and literature search, archaeologists gathered information from secondary sources concerning the prehistoric and historic background of the area. Documents associated with the history of the area were used to model prehistoric and historic settlement patterns in relation to the landscape and terrain characteristics, as well as cultural patterns and regional trends. NRCS soil data, US Geological Survey (USGS) 7.5-minute topographic quadrangles, aerial photographs, and contemporary geologic and physiographic features were also examined.

FIELD METHODS

The objectives of the cultural surveys were four-fold: (1) locate cultural resource sites within Project ESA, (2) delineate the vertical and horizontal extents of any newly identified sites and reassess the horizontal and vertical extents of any previously recorded sites within the Project ESA; (3) provide a preliminary evaluation of each site's eligibility for listing in the NRHP; and (4) assess any potential for the Project to directly or indirectly affect historic properties or other sensitive cultural resources.

Cultural resource investigations were conducted in compliance with Section 106 of the NHPA of 1966 (Public Law [PL] 89-665), as amended; its implementing regulations, "Protection of Historic and Cultural Properties" (36 CFR 800); the National Environmental Policy Act of 1969 (NEPA) (PL 91-190. 83 Stat. 852), the guidelines set forth by the CTA and the SHPO/ THC, as well as an approved scope of work (see Appendix A).

The cultural resources survey was performed for 100% of the Project ESA by one field crew comprised of two archaeologists, with logistical and technical support provided by the Principal Investigator. The survey methods employed across the Project varied according to setting, with shovel testing conducted at fixed intervals according to THC/CTA survey standards and based on archaeological site probability, ground surface visibility, and prevalence of modern disturbances (i.e, industrial infrastructure, agricultural cultivation). Specifically, during the scoping process the Principal Investigator classified the Project ESA as combination of moderate and low probability areas (i.e, MPAs and LPAs).

The MPAs consist of those portions of the Project ESA underlain by soils classified by Abbott (2001) as having a low to moderate probably for buried cultural materials (see Table 1). The remainder of the Project ESA was classified as LPAs and are primarily comprised of inundated marsh, or wetlands.

In practice, shovel tests were conducted on a 30-meter grid across MPA settings, and on a 75- to – 100-m grid across LPA settings. Marshy or waterlogged areas were shovel tested where feasible, subjected to pedestrian surveys, and photo-documented. For Projects under 200 acres, the THC/CTA reporting standards require the excavation of 50 shovel tests for the first 25 acres, and one shovel test per five additional acres. While the Project ESA exceeds this acreage threshold, the same basic minimum survey standards were applied requiring a minimum of 105 shovel tests across the Project ESA. Perennial exceeded these standards by excavating a total of 191 shovel tests.

In general, shovel tests measured approximately 12.0 inches (in) (30.0 centimeters [cm]) in diameter and were excavated by natural strata. Shovel tests were excavated to a depth commiserate with the project impacts (i.e., 1.5-ft [0.45-m]) where possible per the THC/CTA survey standards, but were often terminated at shallower depths due to the infiltrating water table or the presence of the clayey substratum. All soil matrices were screened through 6.3-millimeter (mm) (0.25-inch) mesh hardware cloth unless dominated by clay. Clayey matrix was finely divided by trowel and visually inspected.

For each of the shovel tests, the following information were recorded on shovel test logs: location, maximum depth, and the number of soil strata. For each soil stratum, thickness, texture, color, and the presence or absence and nature of cultural materials were recorded. The field crew recorded all shovel test locations and archaeological sites and associated features using a handheld GPS device. The crew was equipped with topographic maps and aerial photographs of the survey corridor, a digital camera, and a cellular telephone to maintain contact with the Principal Investigator (terrain permitting). Each archaeologist was also equipped with a compass, shovel test and photographic logs, daily journal forms, and appropriate state site forms.

No artifacts were encountered as a result of these efforts, and so site delineation or artifact collection protocols were not implemented. Similarly, no curation is warranted for the Project.

CULTURAL SETTING

The Texas archeological record spans the breadth of documented human occupation in North America from approximately 13,500 B.P. to the present. Over the course of thousands of years, people within the modern state of Texas experienced immense cultural development and diversification of subsistence strategies. The following overview draws heavily from Perttula (2013) and Ricklis (2004), and attempts to chronicle the wide-breadth of cultural experience across Southeastern Texas. Discussion of the prehistoric and historic occupational periods is included below in order to provide a cultural context relevant to the findings of the Phase I survey efforts.

THE PALEOINDIAN PERIOD (CA. 13,500 TO 8,000 B.P.)

The Paleoindian Period encompasses the earliest signs of human presence in North America and includes massive ecological changes from the close of the Pleistocene to the Early Holocene transition (Abbott 2001; Aten 1983; Hester 1980; Meltzer 1989; Patterson 1980; Ricklis 2004). Generally, Paleoindians are characterized as a migratory hunting and gathering people that traveled across the Americas in small bands following mega-fauna, such as mammoths, mastodons, giant bison, and giant sloths. The long-held belief that the Clovis Complex was associated with the earliest people in the Americas was redefined by the discovery of the Debra L. Friedkin site. This site, located in Salado, Texas, includes a stone tool assemblage that dates between approximately 13.2 and 15.5 thousand years old, and was identified as the Buttermilk Creek Complex (Waters et al. 2011).

A number of Paleoindian projectile points and other artifacts have been encountered in the coastal plain region of Texas; however, none of these were identified within discrete Paleoindian contexts. Evidence is sparse due to the fluctuating nature of the sea level during the terminal Pleistocene to Early Holocene transition caused by glacial advancement and subsequent retreat (Ricklis 2004; Simms et al. 2007). Providing a detailed assessment of Texas coast Paleoindian lifeways is difficult because of a lack of contextualized cultural material, which can be attributed to a combination of various site formation processes such as sea level fluctuation, Holocene erosion, and alluvium deposition (Abbott 2001; Aten 1983; Hester 1980; Patterson 1980; Ricklis 2004). Understanding the cultural patterns of people from elsewhere in Texas and beyond provides a fair indication that the coastal inhabitants were also hunters-gatherers. Moreover, the material used to make projectile points found along the Texas coast was procured from elsewhere based on the high-quality of stone (Bousman et al. 2004; Brown 2009; Ricklis 2004). This indicates that the Paleoindian people of the Texas coast engaged in long-distance trade networks and/or large-scale migratory rounds (Ricklis 2004).

THE ARCHAIC PERIOD (CA. 8,000 TO 2,000 B.P.)

Generally, the Archaic period in Texas is characterized by hunting and gathering lifeways, stylistic changes to projectile points and tools, distinctive distribution of site types, and the introduction of groundstone technology (Turner et al. 2011). Details of the Archaic period vary regionally, but is chronologically divided into Early Archaic (8,000 to 6,000 B.P.), Middle Archaic (6,000 to 3,000 B.P.), and Late Archaic (3,000 to 2,000 B.P.) (Aten 1983; Milliken et al. 2008; Turner et al. 2011). The Archaic period on the upper Texas coast is marked by sea-level rise and climatic fluctuation during the middle to late Holocene (9,000 to 2,000 B.P.) (Aten 1983; Milliken et al. 2008). Occupation and site patterning change during this time. Sites are more frequent and are found along stream courses and shorelines indicating a rise in population. The Archaic period is further characterized by reduced group mobility and well-defined social territories, as exemplified by a significant increase in the representation of local chert in tool manufacture (Ricklis 2004; Story et al. 1990). Specialized hunting and gathering represented the main subsistence strategy for inhabitants of the central Texas coast during the Archaic period. For example, Archaic sites near the coastline demonstrate a dietary focus on marine resources, while the remains of terrestrial mammals are better represented at sites further inland.

EARLY ARCHAIC (CA. 8,000 TO 6,000 B.P.)

The Early Archaic is poorly understood, but in general, settlement patterning is scattered and broader relationships between groups are recognized by the widespread occurrence of points such as Martindale, Uvalde, early Triangular, and Bell (Turner et al. 2011). Many of the mega-fauna species in the Americas became extinct during this time period, highlighting more reliance on smaller game, such as bison (Foster 2009). Technologically, new biface styles appeared to be shifting away from lanceolate forms to stemmed, notched, and barbed broad blade bifaces (Chapman 1975). In Texas this period is reflected by early side-notched and corner-notched projectile point types that include Keithville, Neches River, and Trinity types (Ricklis 2004). Subsistence activities during the Early Archaic remained dominated by hunting large game, but there was a greater focus on foraging and small game hunting, relative to the Paleoindian period (Chapman 1975).

MIDDLE ARCHAIC (CA. 6,000 TO 3,500 B.P.)

Tool types continue to diversify during the Middle Archaic subperiod. In Texas, the new tool types include new projectile point styles, such as the Carrollton, Morhiss, Palmillas, and Travis points (Ensor and Ricklis 1998; Turner et al. 2011). The Middle Archaic subperiod is also noteworthy for the introduction of groundstone artifacts, such as adzes, axes, manos, and metates.

Generally, cemeteries begin to appear and specific types of sites are observed during this time period, including burned rock middens in central Texas and shell middens near the coast (Turner et al. 2011). However, the period between 4,000 to 3,000 B.P. is marked by a distinguishable break in the deposition of shell middens in certain portions of the Texas coastal region. While inland sites, such as Eagle's Ridge (41CH252), are continuously occupied or utilized through the Middle Archaic subperiod and beyond, sites close to the shoreline, such as the portion of the coast between Galveston Bay and Baffin Bay in particular, may have experienced fluctuating sea levels

(Perttula 2013). These sea level variations likely disrupted the coastal biome, and caused the depletion of food resources commonly exploited by Middle Archaic peoples. Sea levels ultimately stabilized in 3,000 B.P. (Perttula 2013).

LATE ARCHAIC (CA. 3,000 TO 2,000 B.P.)

The Late Archaic continues to be characterized by hunting and gathering lifeways and the beginning of settlements in east Texas (Foster 2009; Turner et al. 2011). Central and coastal Texas areas see a significant increase in the population as demonstrated by the proliferation of shell midden sites along the shores of bays and in estuarine zones (Ricklis 2004). This population increase was likely facilitated by the stabilization of the sea level around 3,000 B.P. and the subsequent strengthening of the regional biome, which provided a plentiful and reliable source of food for the inhabitants of the area (Perttula 2013). In addition to estuarine and marine resources, reptiles and mammals were an additional a source of subsistence, further diversifying the Archaic diet (Ricklis 2004).

Sites in this period show variability among each other in terms of occupational intensity and size in addition to evidence of people having distinct affiliation with social groups in discrete territories (Dillehay 1975; Ricklis 2004). The territorialization of the landscape is further supported by the establishment and continued use of earlier cemeteries, such as the Ernest Witte site, which has been interpreted to indicate the expression of distinct social identities and territorial ties between discrete social units along the Texas coast (Perttula 2013; Ricklis 2004; Story 1985).

Technologically, the Late Archaic is characterized by the adoption of dart points, such as Yarbrough, Kent, and Gary types, which are found in both shoreline and inland sites (Gadus and Howard 1990; Perttula 2013; Turner 2011). It has been suggested that the development and application of technologies such as fisheries may have also allowed for higher levels of efficiency in the exploitation of coastal and riverine food resources, although empirical evidence for such devices is lacking in the region (Aten 1983; Ricklis 2004; Perttula 2013). Significant Late Archaic sites in the vicinity of the Project Study Area include sites 41HR80 and 41HR85, known collectively as Harris County Boys' School, which are located approximately 4.2 miles southeast of the proposed Project in Harris County. This site is defined by an extensive midden and a cemetery, established and occupied from approximately 3,500 to 1,500 B.P. The midden is comprised mainly of Rangia shell, with a significant quantity of lithic debitage and broken or reworked bifacial stone tools, bone tools, and beads (Aten 1983). Other significant Late Archaic sites include the Ernest Witte site and the Eagle's Ridge site, which, although established in earlier periods, grew in size in the Late Archaic (Ricklis 2004).

THE CERAMIC PERIOD (2,000–300 B.P.)

The Ceramic period of Southeastern Texas is differentiated form earlier periods by the emergence and wide-spread use two new technologies, pottery and the bow and arrow. Ceramics first appear in the archaeological record in the upper and central Texas coastal regions in 2,000 B.P., potentially through cultural diffusion from the east, most likely the Lower Mississippi Valley region (Ricklis 2004). The adoption of ceramic technology is largely interpreted to have represented a development in cooking and storage efficiency in comparison to earlier periods. However, the extent to which ceramics influenced other aspects of life and community in the Ceramic Period is still contested, as the majority of material culture found in Ceramic period sites does not seem to differ greatly from that of the Archaic period (Ricklis 2004: 189; Shafer et al. 1975; Takac et al. 2000: 17). The bow and arrow are first identified in the archaeological record in the second half of the Ceramic period around 1,200 B.P., replacing the atlatl and spear as the dominant projectile technology and thus, mirroring technological developments elsewhere in inland Texas and beyond (Ricklis 2004: 194). The Ceramic Period is generally divided into Early Ceramic and Late Prehistoric periods, after Ensor and colleagues (1990) and Story and colleagues (1990).

Although the Ceramic period differs from earlier periods in technological terms, the high degree of occupational permanence observed in many sites established in the Archaic period has led to the suggestion that Ceramic period communities largely followed subsistence and settlement practices established in previous periods (Ricklis 2004: 189). Two perspectives have been proposed. The first perspective, advocated by Shafer (1975) and Aten (1984), proposes that coastal Texas communities in the Ceramic period were largely affiliated with the pre-Mississippian Woodland cultures of eastern United States, an association that is supported by perceived ceramic stylistic and technological similarities between the two groups (Ricklis 2004: 189). The second perspective positions upper and central Texas groups in the Ceramic period as part of the more circumscribed, archaeologically distinct Mossy Grove cultural tradition (Story 1990), with closer ties to coastal Louisiana groups than to eastern Woodland cultural traditions.

EARLY CERAMIC PERIOD (CIRCA 2000–1200 B. P.)

As there is a high degree of occupation continuity between the Late Archaic and Early Ceramic period, Early Ceramic period sites in the central and upper Texas coast are generally characterized by rangia shell middens along coastal bays or river margins, with noticeable regional population increase (Ricklis 204, 192). Early Ceramic sites are identified in the archaeological record by the recovery of sandy or clay paste Tchefuncte and Mandeville ceramics and dart points, such as, Gary and Kent types (Aten 1983, 303; Ricklis 2004). As sandy-paste ceramics are associated with cultural traditions prior to the development and adoption of horticultural practices at the larger regional scale in places such as East Texas, it is thought that the subsistence strategies of the Early Ceramic period in the Texas coast was largely dependent on hunting and gathering, similar to earlier periods (Ricklis 2004, 193).

LATE PREHISTORIC PERIOD (1200 B.P.–300 B.P.)

The Last Prehistoric period is marked by the appearance of small and expanded-stem arrow points such as the Alba, Cathoula, Perdiz, and Scallorn types (Ensor et al. 1990: 8; Ricklis 2004: 194). The development and adoption of arrow technology also coincides with the appearance of bison faunal remains in the archaeological record of the Texas coast, which indicates the exploitation of bison as a subsistence strategy, a cultural practice also observed elsewhere in Texas (Ricklis 2004: 194). Similarly, ceramic technology underwent changes in this period with the introduction of grog-tempered and bone-tempered ceramics in addition to sandy-paste ceramics. While ceramic forms remain largely the same (bowls, jars, and constricted-neck ollas), surface treatments of these vessels become more elaborate: decorative bands on rim exteriors become wider, with a greater variety of incision patterns (Aten 1983: 288, 303: Ricklis 2004: 195). Ethnohistoric documents and archaeological research in the central and upper Texas coast have suggested that occupation of the coastal areas was seasonal in nature, with island settlements inhabited during the fall and winter periods, while inland locations were favored during the spring and summer (Ricklis 2004: 196).

There is evidence of population growth during the Late Prehistoric period, as many of the barrier island sites are either established or grow significantly during this period. This has led to suggestions that as higher population numbers in the mainland coastal areas grew and exploitable resources were strained, people began to move towards the extreme coastal areas for the purpose of utilizing the resources present there.

BRAZORIA COUNTY HISTORICAL PERIOD

According to ethnohistorical documents and archaeological investigations, numerous historic American Indian tribes, including the Karankawa and Tonkawa, were known to have inhabited the Brazoria County region (Aten 1983; Bolton 1915; Morfi 1967; Newcomb 1961). Cabeza de Vaca and his associated expeditionary forces are believed to have landed at the mouth of Oyster Creek, directly northeast of Freeport in Brazoria County, following the ill-fated Narvaéz expedition in 1527 (Wharton 1939). Cabeza de Vaca is posited to have remained in the area for a period of time, and traveled with the local native groups around the Oyster Creek area. Cabeza de Vaca may have encountered the inhabitants of Mitchell Ridge during his reconnaissance of the region (Ricklis 2004; Texas Beyond History 2013).

In the early decades of the nineteenth century, Anglo-American immigration into Brazoria County began under the leadership of empresario Stephen F. Austin, who was empowered by the Mexican government to promote settlement and grant lands in the fertile Brazos River Valley. Between 1823 and 1827 Austin's "Old Three Hundred" colonists settled in the rich bottomlands of the San Bernard, Colorado, and Brazos rivers to farm and ranch (Long 2014). Homesteads were established along the fertile agricultural lands of the Brazos River, along the banks of Big Creek to the south, and along Oyster Creek to the east, in Brazoria, Fort Bend, and Harris counties

(Wharton 1939). During this initial period in Anglo-American settlement in the region, cotton was the main crop, grown for commercial purposes. Sugar was also cultivated but to a lesser degree (Creighton 1975). Both cotton and sugar cultivation required intensive labor commitments throughout most of the year, and although the Mexican government prohibited the importation of slaves from Africa, a number of Anglo-American settlers brought African and African-American slaves into the region to work on the plantations (Wharton 1939).

Brazoria County was an important setting for many of the major events of the Texas Revolution. On September 8, 1835, Stephen F. Austin, at a meeting held in Brazoria, announced the Texians opposition to Santa Anna and the Mexican government (Kleiner 2010). After the Battle of San Jacinto on April 21, 1836, Santa Anna and his army were moved to Velasco, where he signed the Treaties of Velasco, surrendering and recognizing the Republic of Texas. During this time Columbia was the capital of the republic and the location of the ad interim government. After Stephen F. Austin died during the first session of the first Texas congress, the capital was moved to Houston (Kleiner 2010).

ECONOMIC HISTORY

By 1861, amid increasing tensions between northern and southern states, the residents of southeastern Texas counties generally strongly favored secession (Creighton 1975, 230). The economy of southeastern Texas during the nineteenth century was founded on the slave-holding plantation lifestyle. Locally, Terry's Texas Rangers was formed under the direction of Colonel B.F. Terry. Many men from Fort Bend and Brazoria counties joined the Confederate districts of Texas, New Mexico, and Arizona, headquartered in Houston (Creighton 1975, 232). Confederate blockade-runners also operated on the Brazos River, exporting cotton and sugar in exchange for supplies to support the Southern war effort (Creighton 1975, 240-1).

Following the end of the Civil War, a postbellum pattern of agriculture developed composed of smaller-scale farms operated by individuals or single-family units, often as sharecropping, where the landowner provided housing, tools, and grain for planting in exchange for one-half to two-thirds of the crop produced by the sharecropper, an individual who was often a former slave of the landowner. Tenant farming was also practiced, which required that the tenant be somewhat better off financially and thereby able to provide his or her own tools and grain (Wharton 1939).

The region suffered under the destructive forces of a hurricane in 1900, but between 1900 and 1940 the counties of the central and upper Texas coast underwent rapid economic changes due to the discovery and availability of oil within the counties' boundaries. The discovery of seemingly abundant mineral wealth spurred a shift from a primarily agricultural economy to a diversified economy, as the means for extraction and refining of oil and sulphur were vigorously adopted and developed within these three counties (Creighton 1975: 320). Agricultural production in the region continued to expand in this period, with emphasis on rice, cotton, and corn as the main commercial crops (Creighton 1975: 347-352). The cattle population in southeastern Texas counties likewise increased, particularly after the introduction of the Brahman breed, which could withstand the long periods of heat and salinity of the grasses of the Texas coastal regions (Creighton 1975, 343). Brahman cattle were bred with breeds that were looked upon more favorably for their meat or hide, such as the Angus or Hereford breeds, to jointly increase the resilience and marketability of the cattle herds (Creighton 1975, 344). Along with oil-related industry, agriculture and cattle-husbandry spurred the migration of people from elsewhere in Texas and beyond into the central and upper coastal regions of Texas. The counties of the central and upper Texas coast would see their populations expand rapidly in this era. Harris County in particular became the most densely populated county in Texas, with Houston, its county seat, becoming the most populous urban center in Texas by 1930.

RESULTS

BACKGROUND REVIEW RESULTS

Background research conducted at the THC's Atlas website showed that no previously recorded archaeological sites or cemeteries are located within or directly adjacent to the Project ESA. Additionally, no archaeological sites or cemeteries are located within a 1.0-mi (1.6-km) radius of the Project ESA (Atlas 2020; **Appendix B – Topographic Map**). The background review found that three previous surveys have been conducted within a 1.0-mi (1.6-km) radius of the Project ESA, although none provide overlapping coverage (**Table 2**; **Appendix B – Topographic Map)** (Atlas 2020).

Table 2. Previously recorded surveys within a 1-mi radius of the Project

Atlas Number	Date	TAC Permit	P.I.	Sponsor Agency	Within Project Area
8400008561	1985	N/A	N/A	N/A	No
8500022413	2012	6246	Tony Scott	USACE – Galveston District	No
8500065113	2014	N/A	Tony Scott	USACE – Galveston District	No

A review of historic USGS Topographic maps (USGS 1943a, 1943b, 1963a, 1963b) and historic aerial imagery (NETR 1962), there are no historic structures recorded in the Project ESA. Additionally, historic aerial imagery shows that the Project area was subject to major alteration due to agricultural terracing and landscape modification at least since 1962 (**Figures 2 to 4**) (NETR 1962).

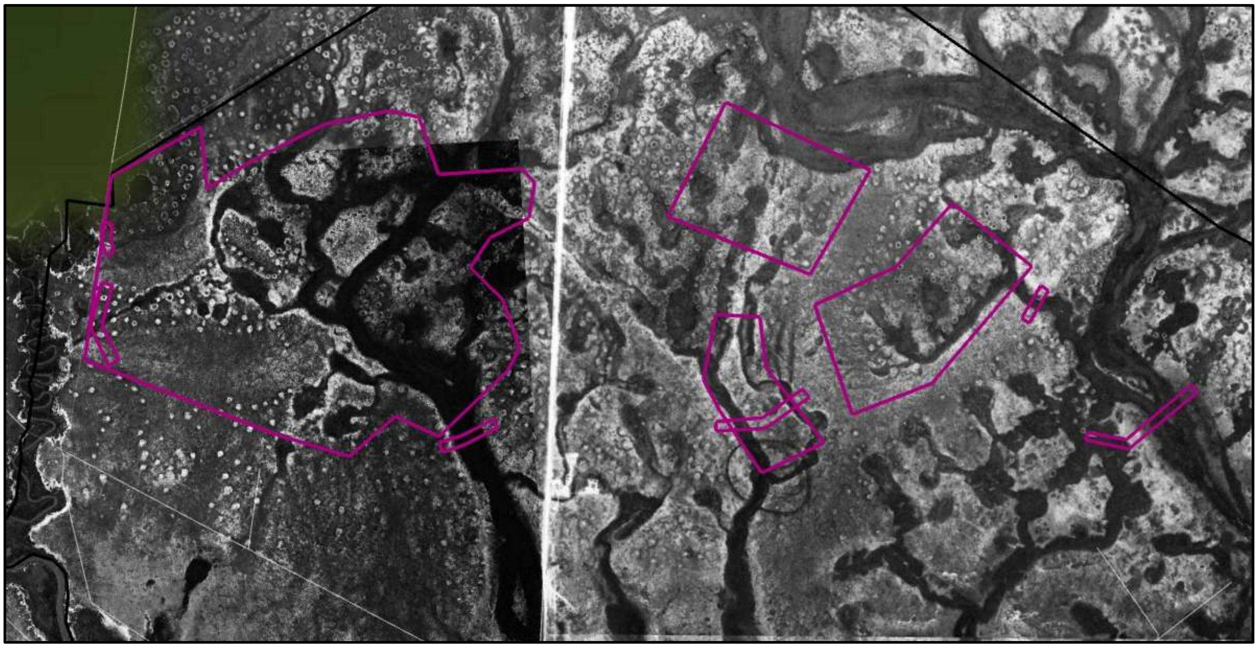

Figure 2. Aerial imagery from 1944 of the Project ESA (Google Earth 2020).

Figure 3. Aerial imagery from 1965 of the Project ESA (Google Earth 2020).

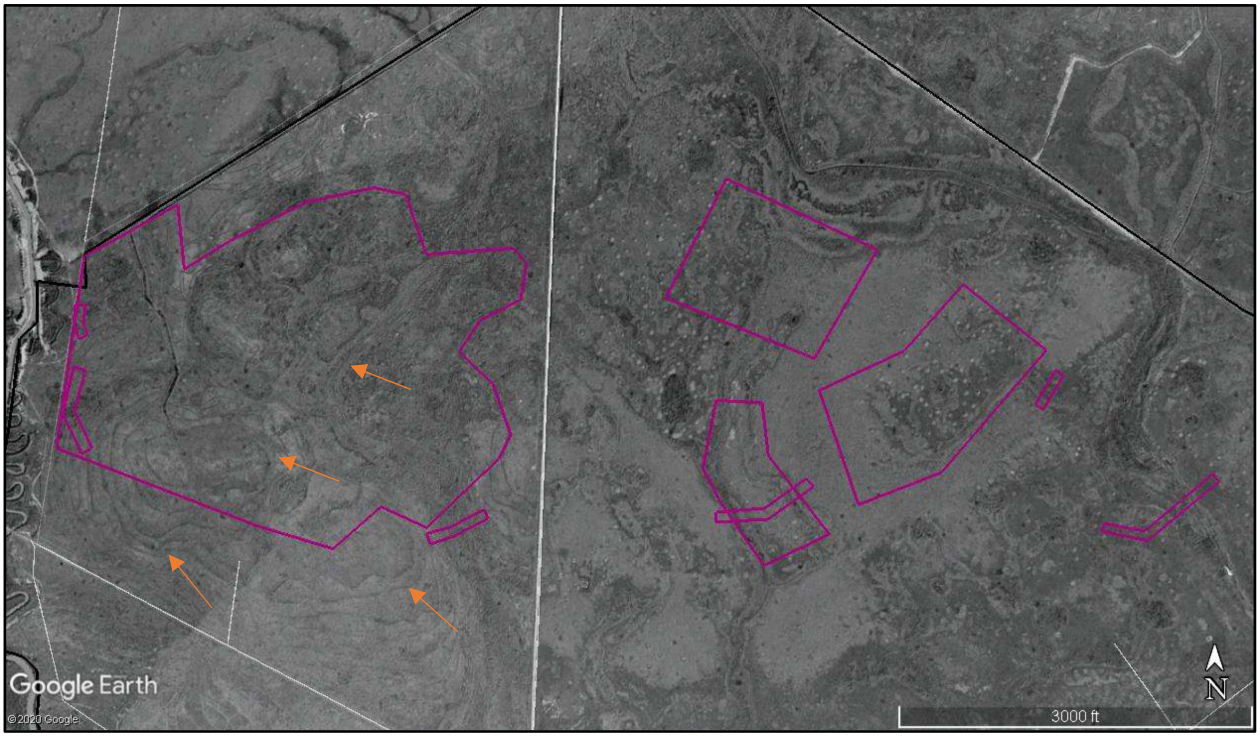

Figure 4. Aerial Imagery from 1962; arrows showing examples of agricultural terracing; Project ESA outlined in pink (NETR 1962).

FIELD SURVEY RESULTS

Perennial archaeologists conducted intensive surface and subsurface cultural resources investigations within Project ESA between May 27, 2020 and May 29, 2020. The survey efforts were designed to inventory and assess cultural resources within the Project ESA per the request of USACE in correspondence dated March 20, 2020 (Appendix A). The Project ESA is comprised of seven survey areas of varying sizes centered on specific locations where contouring or weir construction will be conducted within the broader FJWBMB. These survey areas are situated within a lowland marshy setting where waterways such as Persimmon and Halls Bayou flow into Chocolate Bay located to the south. Surface visibility was generally low (0 to 15%) across much of the ESA, with pockets of areas with no ground vegetation interspersed throughout (Figure 5).

As mentioned previously, the majority of the Project ESA is considered to have a low probability for containing cultural resources based on factors such as the presence of expansive marshy wetlands and low geoarchaeological potential (Abbott 2001, 2011) (**Appendix B – Aerial Map**). Broader site patterning indicates that the majority of previously recorded prehistoric archeological sites in the region are situated along the shoreline of Chocolate Bay and consist primarily of shell middens. Select areas across the ESA had soil profiles that are defined as having low-moderate geoarchaeological potential (Abbott 2001). Therefore, those areas were classified as MPA settings, and shovel tests were excavated at 30.0-m (98.4-ft) intervals across these areas. Soils documented in these areas generally conformed to the NRCS soil data consisting of sandy loam underlain by sandy clay loam with the clayey substratum noted frequently at 50.0 cm (19.6-in) below the surface. The remainder of the ESA was classified as LPA settings, and shovel tests were excavated at intervals ranging from 75.0 to 100.0 m (246.0 to 328.0 ft) and soils consisted primarily of saturated sandy loam and clay loam (Figures 6 to 8). In all, 191 shovel tests were excavated across the ESA resulting in negative findings. Shovel test data is presented in **Appendix C**.

Figure 5. Overview of areas with high and low surface visibility within the ESA

Figure 6. View of saturated conditions frequently noted across LPA settings

Figure 7. Example of inundated areas within Project ESA

Figure 8. Overview of flat, grassy areas within Project ESA.

CONCLUSIONS AND RECOMMENDATIONS

Alluvion is proposing to establish and operate the FJWBMB located in Brazoria County, Texas. Specifically, the development activities will consist of the construction of weir structures and the re-establishment of contours to meet existing marsh elevations of adjacent wetlands.

Alluvion retained Perennial to conduct an intensive Phase I cultural resources investigation for the proposed Project to comply with anticipated USACE permitting requirements. Archaeological investigations for the Project were conducted in accordance with Section 106 of the NHPA, the Texas SHPO survey standards, as well as an approved scope of work.

For purposes of this report, the APE is considered to be equivalent to the ESA totaling 300.0 ac (121.4-ha), with depths of impact anticipated to range from 0.5 to 1.5 ft (0.15 to 0.45 m).

Abby Peyton served as the Principal Investigator (PI) for the Project, while Wyatt Ellison and Wade Griffith led the field efforts. The Phase I survey investigations for the Project, as presented herein, were conducted between May 27, 2020 and May 29, 2020, and included the excavation of a total of 191 shovel tests. The survey investigations resulted in entirely negative findings.

Based on the negative results of the survey effort detailed herein, no historic properties will be affected and no further investigations are warranted within the Project APE. In accordance with Section 106 of the NHPA (36 CFR 800) and the guidelines set forth by the THC/SHPO, it is Perennial's opinion that no further cultural resources investigations are warranted for the proposed Project.

HUMAN REMAINS

In the event that human remains are encountered during any part of the Phase I survey effort, work will stop immediately and the appropriate local law enforcement personnel and medical examiner's office will be notified of the discovery. Should the medical examiner determine that the human remains are older than 50 years, then the State Archeologist will claim jurisdiction of the discovery and will commence consultation with any concerned parties including landowners, appropriate Tribes, and living descendants to ensure compliance with existing state laws. No remains will be removed from the site until jurisdiction has been established and the appropriate permits have been obtained. All activities will adhere to the Texas Health and Safety Code (8 THSC § 711.010).

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APPENDIX A – AGENCY CORRESPONDENCE

Abby Peyton

From: noreply@thc.state.tx.us
Sent: Wednesday, July 15, 2020 10:25 AM
To: Abby Peyton; reviews@thc.state.tx.us
Subject: Project Review: 202014463

TEXAS HISTORICAL COMMISSION
real places telling real stories

Re: Project Review under Section 106 of the National Historic Preservation Act and/or the Antiquities Code of Texas
THC Tracking #202014463
Fentress Johnson West Bay Mitigation Banks Project
16 mi SW of La Marque
La Marque,TX

Dear Abby Peyton:
Thank you for your submittal regarding the above-referenced project. This response represents the comments of the State Historic Preservation Officer, the Executive Director of the Texas Historical Commission (THC), pursuant to review under Section 106 of the National Historic Preservation Act.

The review staff led by Jeff Durst and Caitlin Brashear has completed its review and has made the following determinations based on the information submitted for review:

Above-Ground Resources

- No historic properties are present or affected by the project as proposed. However, if historic properties are discovered or unanticipated effects on historic properties are found, work should cease in the immediate area; work can continue where no historic properties are present. Please contact the THC's History Programs Division at 512-463-5853 to consult on further actions that may be necessary to protect historic properties.

Archeology Comments

- No identified historic properties, archeological sites, or other cultural resources are present or affected. However, if cultural materials are encountered during project activities, work should cease in the immediate area; work can continue where no cultural materials are present. Please contact the THC's Archeology Division at 512-463-6096 to consult on further actions that may be necessary to protect the cultural remains.
- THC/SHPO concurs with information provided.
- This draft report is acceptable. Please submit a final report: one restricted version with any site location information (if applicable), and one public version with all site location information redacted. To facilitate review and make project information and final reports available through the Texas Archeological Sites Atlas, we appreciate submitting abstracts online at http://xapps.thc.state.tx.us/Abstract and e-mailing survey area shapefiles to archeological_projects@thc.texas.gov if this has not already occurred. Please note that these steps are required for projects conducted under a Texas Antiquities Permit.

We look forward to further consultation with your office and hope to maintain a partnership that will foster effective historic preservation. Thank you for your cooperation in this review process, and for your efforts to preserve the irreplaceable heritage of Texas. If you have any questions concerning our review or if we can be of further assistance, please email the following reviewers: Jeff.Durst@thc.texas.gov, caitlin.brashear@thc.texas.gov

This response has been sent through the electronic THC review and compliance system (eTRAC). Submitting your project via eTRAC eliminates mailing delays and allows you to check the status of the review, receive an electronic response, and generate reports on your submissions. For more information, visit http://thc.texas.gov/etrac-system.

Sincerely,

For Mark Wolfe, State Historic Preservation Officer
Executive Director, Texas Historical Commission

Please do not respond to this email.

DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1229
GALVESTON, TEXAS 77553-1229

March 20, 2020

Policy Branch

SUBJECT: Department of the Army Permit Application SWG-2019-00169

Alluvion Resource Company, LLC
Attn: Keith Webb
8010 FM 699
Joaquin, Texas 75954

Dear Mr. Webb:

This is in reference to your permit application requesting authorization to establish and operate a 5,377-acre mitigation bank named the Frentress-Johnson West Bay Mitigation Bank (FJWBMB). The U.S. Army Corps of Engineers, Galveston District (Corps) Staff Archeologist has reviewed the permit area in accordance with 33 CFR Part 325, Appendix C (Processing Department of Army Permits: Procedures for the Protection of Historic Properties; Final Rule 1990; with current Interim Guidance Document dated April 25, 2005), and has determined that the permit area is likely to yield archeological sites eligible for listing in the National Register of Historic Places (historic properties).

The proposed activity has the potential to adversely affect historic properties. Therefore, a cultural resources investigation is required to determine if historic properties exist within the permit area. The investigation must take the form of field survey and must take place prior to any ground breaking, ground clearing, or construction activities. You are requested to hire a qualified professional archeologist to conduct the survey. A list of contractors is available online at the following Internet address:

http://www.counciloftexasarcheologists.org/index.php?option=content&task=view&id=9&Itemid=56

Prior to the field survey, a scope of work (SOW) must be submitted to the Corps Staff Archeologist and to the Texas State Historic Preservation Officer (SHPO) for approval. In the event that the archeologist hired by the applicant does not submit a SOW or coordinate with the Corps and the SHPO, additional survey work may be required. If you do not submit the SOW within 30 days from the date of this letter, we will assume that you no longer wish to pursue this permit and your application will be withdrawn.

The archeologist contracted by the applicant must submit a draft report of the cultural resources investigations for review and approval to both the Corps Staff Archeologist and the SHPO. The Corps Staff Archeologist's approval of the final report and formal concurrence from the SHPO will document completion of the cultural resources review. Your permit application will not be considered complete until the cultural resource review is completed.

Please contact our Staff Archeologist, Mr. Jerry Androy at 409-766-3821 or Jerry.L.Androy@usace.army.mil with your Corps Permit Application Number (SWG-2019-00169) for specific instructions regarding the requirements of this investigation. For questions regarding the permit process, please contact Lynne Ray at 409-766-6322. Please send a copy of this letter to the archeologist you contract.

Sincerely,

Jerry Androy
Regulatory Archeologist and
Tribal Liaison

Copies Furnished:

TSHPO - Mr. Mark Wolfe

Chocolate Bay Conservation Holdings LLC
C/o Eco-Capital Advisors, LLC
3414 Peachtree Road NE, Suite 990
Atlanta, Georgia 30326

Abby Peyton

Subject: RE: Fentress-Johnson West Bay Mitigation Bank (SWG-2019-00169)

-----Original Message-----
From: Androy, Jerry L CIV USARMY CESWG (USA) <Jerry.L.Androy@usace.army.mil>
Sent: Thursday, April 30, 2020 1:54 PM
To: Abby Peyton <APeyton@perennialenv.com>
Cc: Ray, Diana Lynne CIV USARMY CESWG (USA) <Diana.L.Ray@usace.army.mil>
Subject: RE: Fentress-Johnson West Bay Mitigation Bank (SWG-2019-00169)

Thanks Abby,

The SOW looks good to me as submitted. Good luck (stay safe)!

Jerry Androy
Regulatory Archeologist and Tribal Liaison U.S. Army Corps of Engineers
2000 Fort Point Road
Galveston, TX 77550
(409) 766-3821
Jerry.L.Androy@usace.army.mil

-----Original Message-----
From: Abby Peyton [mailto:APeyton@perennialenv.com]
Sent: Friday, April 17, 2020 1:26 PM
To: Androy, Jerry L CIV USARMY CESWG (USA) <Jerry.L.Androy@usace.army.mil>
Subject: [Non-DoD Source] Fentress-Johnson West Bay Mitigation Bank (SWG-2019-00169)

Good afternoon Jerry - please find attached the Scope of Work detailing proposed survey methods for the proposed Fentress-Johnson West Bay Mitigation Bank per correspondence received from your office dated March 20, 2020 (SWG-2019-00169). This SOW was also submitted to the THC for review via eTrac (tracking ID referenced below).

Thank you,

Working from home -

Abby Peyton, MA, RPA

Cultural Resources Director

Perennial Environmental Services, LLC

Cell: 512-558-1111

From: Info_Tech@thc.state.tx.us <Info_Tech@thc.state.tx.us>
Sent: Friday, April 17, 2020 1:22 PM
To: Abby Peyton <APeyton@perennialenv.com>
Subject: Project Review Submission

Thank you for submitting project: Fentress-Johnson West Bay Mitigation Bank

Tracking Number: 202011728

Due Date: 5/17/2020 8:48:42 AM

TEXAS HISTORICAL COMMISSION

Abby Peyton

From: noreply@thc.state.tx.us
Sent: Wednesday, May 13, 2020 7:40 AM
To: Abby Peyton; reviews@thc.state.tx.us
Subject: Project Review: 202011728

TEXAS HISTORICAL COMMISSION
real places telling real stories

Re: Project Review under Section 106 of the National Historic Preservation Act and/or the Antiquities Code of Texas
THC Tracking #202011728
Fentress-Johnson West Bay Mitigation Bank
22 mi NE of Lake Jackson
Lake Jackson,TX

Dear Abby Peyton:
Thank you for your submittal regarding the above-referenced project. This response represents the comments of the State Historic Preservation Officer, the Executive Director of the Texas Historical Commission (THC), pursuant to review under Section 106 of the National Historic Preservation Act.

The review staff led by Jeff Durst and Caitlin Brashear has completed its review and has made the following determinations based on the information submitted for review:

Archeology Comments

- THC/SHPO concurs with information provided.

We have the following comments: THC concurs with proposed SOW.

We look forward to further consultation with your office and hope to maintain a partnership that will foster effective historic preservation. Thank you for your cooperation in this review process, and for your efforts to preserve the irreplaceable heritage of Texas. If you have any questions concerning our review or if we can be of further assistance, please email the following reviewers: Jeff.Durst@thc.texas.gov, caitlin.brashear@thc.texas.gov

This response has been sent through the electronic THC review and compliance system (eTRAC). Submitting your project via eTRAC eliminates mailing delays and allows you to check the status of the review, receive an electronic response, and generate reports on your submissions. For more information, visit http://thc.texas.gov/etrac-system.

Sincerely,

For Mark Wolfe, State Historic Preservation Officer

SCOPE OF WORK

A PHASE I CULTURAL RESOURCES SURVEY OF THE FENTRESS JOHNSON WEST BAY MITIGATION BANK PROJECT, BRAZORIA COUNTY, TEXAS

Prepared For:

Alluvion Resource Company, LLC

Prepared By:

Perennial Environmental Services, LLC
5424 W. US Hwy 290, Suite 208
Austin, TX 78735
April 2020

Principal Investigator:
Abby Peyton, MA, RPA

USACE – Galveston District Permit Application SWG-2019-00169

Introduction

Alluvion Resource Company (Alluvion) is proposing to establish and operate the Fentress-Johnson West Bay Mitigation Bank (FJWBMB) located in Brazoria County, Texas (Figure 1). In all, the FJWBMB totals approximately 5,377-acres, however impacts associated with the development of the FJWBMB would only occur within select areas totaling approximately 150.0 acres (ac), with intensive cultural resources surveys proposed for broader area totaling 300.0 ac (i.e, Environmental Survey Area [ESA]) centered on these development areas (Attachment 1). Specifically, the development activities will consist of the construction of weir structures and the re-establishment of contours to meet existing marsh elevations of adjacent wetlands. Depths of impact associated with these activities are anticipated to range to 0.5 to 1.5 feet (ft).

The following scope of work has been prepared in response to correspondence from the US Army Corps of Engineers (USACE) dated March 20, 2020 in order to comply with permit application requirements. On behalf of Alluvion, Perennial Environmental Services, LLC (Perennial) has outlined the proposed the field survey methods, artifact collection and site recordation strategies, and reporting protocols that will be utilized by Perennial for the Project to ensure compliance with Section 106 of the NHPA of 1966 (Public Law [PL] 89-665), as amended; its implementing regulations, "Protection of Historic and Cultural Properties" (36 CFR 800); the National Environmental Policy Act of 1969 (NEPA) (PL 91-190. 83 Stat. 852), and the guidelines set forth by the Council or Texas Archeologists (CTA) and the Texas Historical Commission (THC).

The comprehensive survey plan detailed herein includes an inventory of previously documented cultural resources and archaeological surveys within a 1.0-mile radius of the Project area, as well as a detailed survey methodology. The objectives of this survey are four-fold: (1) locate and/or reassess cultural resource sites within ESA totaling approximately 300.0 acres; (2) delineate the vertical and horizontal extents of any newly identified sites and reassess the horizontal and vertical extents of any previously recorded sites within the Project boundaries; (3) provide a preliminary evaluation of each site's eligibility for listing in the NRHP; and (4) assess any potential for the Project to directly or indirectly affect historic properties, or other sensitive cultural resources.

In the event that surveys are proposed on land owned or operated by a political subdivision of the State of Texas, that portion of the Project would also fall under the jurisdiction of the Antiquities Code of Texas (ACT) (Texas Natural Resource Code, Title 9, Chapter 191) and accompanying Rules of Practice and Procedure (Texas Administrative Code, Title 13, Chapter 26). Under the ACT, a Texas Antiquities Committee (TAC) Permit would be obtained prior to conducting cultural resources surveys within these public lands.

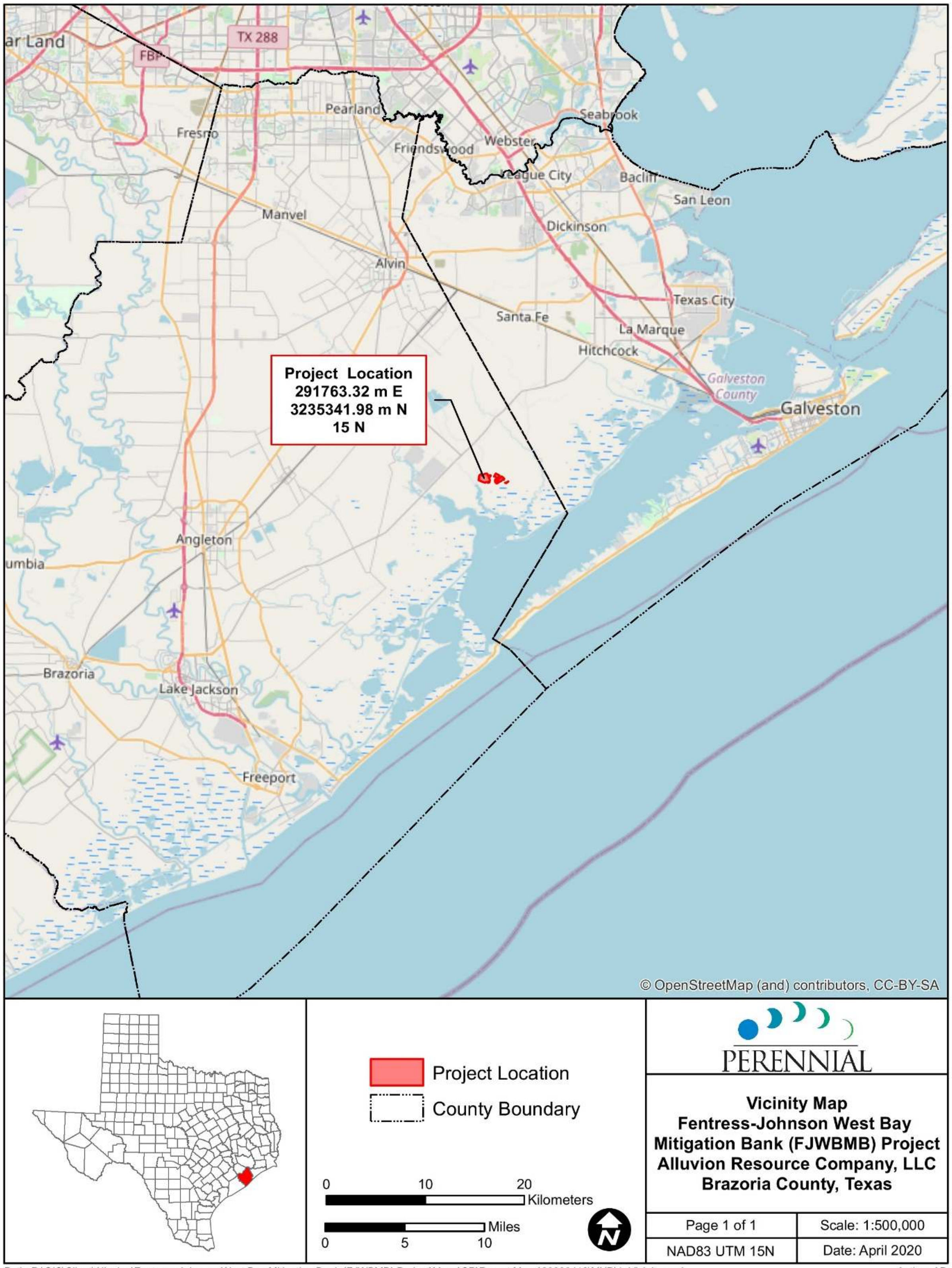

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Figure 1. Project Vicinity Map

Previously Recorded Cultural Resources

Perennial conducted a records and literature review of the THC's Texas Archeological Sites Atlas (Atlas) online database and the NRHP database to identify previously recorded cultural resource sites, historic structures, properties listed in the NRHP, designated historic districts, or State Antiquities Landmarks (SAL) which could potentially be affected by the proposed undertaking. Previously recorded cultural resource site forms, reports of archaeological investigations, general historical documents, and secondary sources concerning the background of the area were reviewed. The records search included a review of all site records and previous surveys on file within 1.0 mi (1.6 km) of the Project ESA.

In addition to a records and literature search, archaeologists gathered information from secondary sources concerning the prehistoric and historic background of the area. Documents associated with the history of the area were used to model prehistoric and historic settlement patterns in relation to the landscape and terrain characteristics as well as cultural patterns and regional trends. National Resources Conservation Service (NRCS) soil data, US Geological Survey (USGS) 7.5-minute topographic quadrangles, aerial photographs, and contemporary geologic and physiographic features were also examined.

Previously Recorded Sites

According to the Atlas, there are no previously recorded sites within 1.0-mile radius of the Project ESA (Atlas 2020). The closest previously recorded archeological sites are mapped approximately 2.0 miles to the south situated on the northern shore of Chocolate Bay (41BO76 and 41BO2). Sites in this setting mostly commonly consist of prehistoric shell middens that have been impacted to varying degrees by erosion, dredging, as well as industrial development.

The 1943 USGS Chocolate Bay, Texas topographic maps show a unmodified channel for New Bayou, and depicts an expansive undeveloped wetland for the broader FJWBMB.

By 1963, as depicted on the Hoskins Mounds USGS topographic map, New Bayou has been diverted, to form Persimmon Bayou, which closely coincides with the western Project ESA boundary. No historic structures or features are noted within the Project ESA on these historic maps.

The historic aerial imagery from the 1940s through the present reveals a highly dynamic hydrologic setting comprised of in-cut tidal marshes with evidence of historic landscape terracing (Figures 2 and 3). Eolian dunal feature signatures diminish significantly over time as well demonstrating landscape variation throughout the modern era that is not conducive to the preservation of archeological materials.

Previously Conducted Surveys

There is a single survey conducted within the research radius of this project. However, little information about it is recorded in the Atlas. All that is known is that it was some form of archaeological study and that the results were negative.

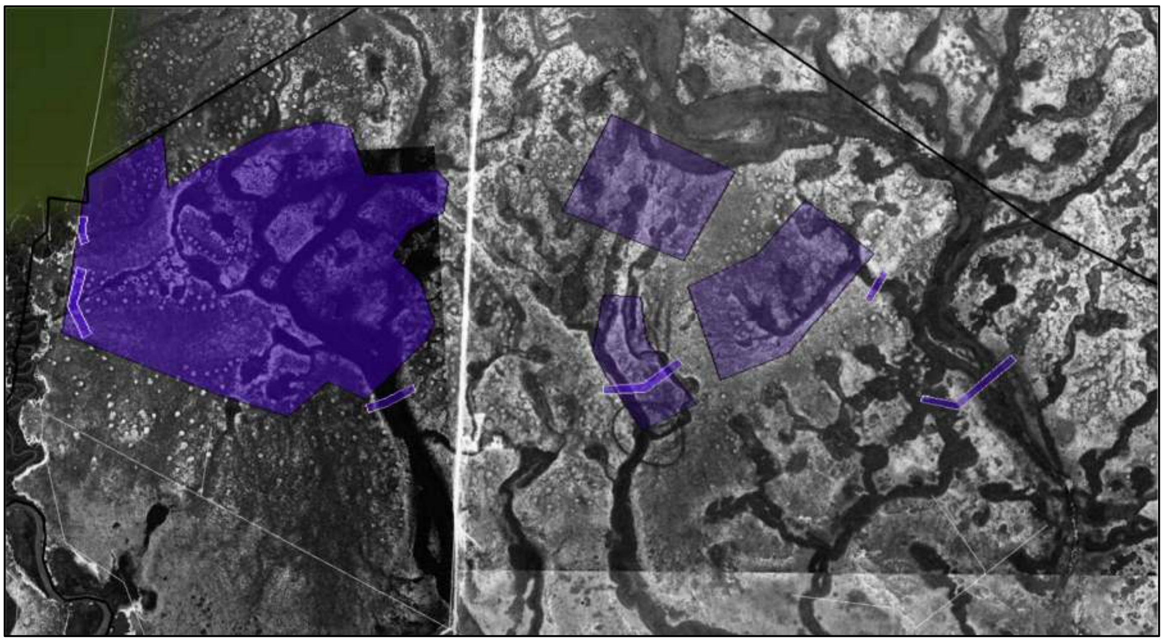


Figure 2. 1944 imagery of the Project survey areas

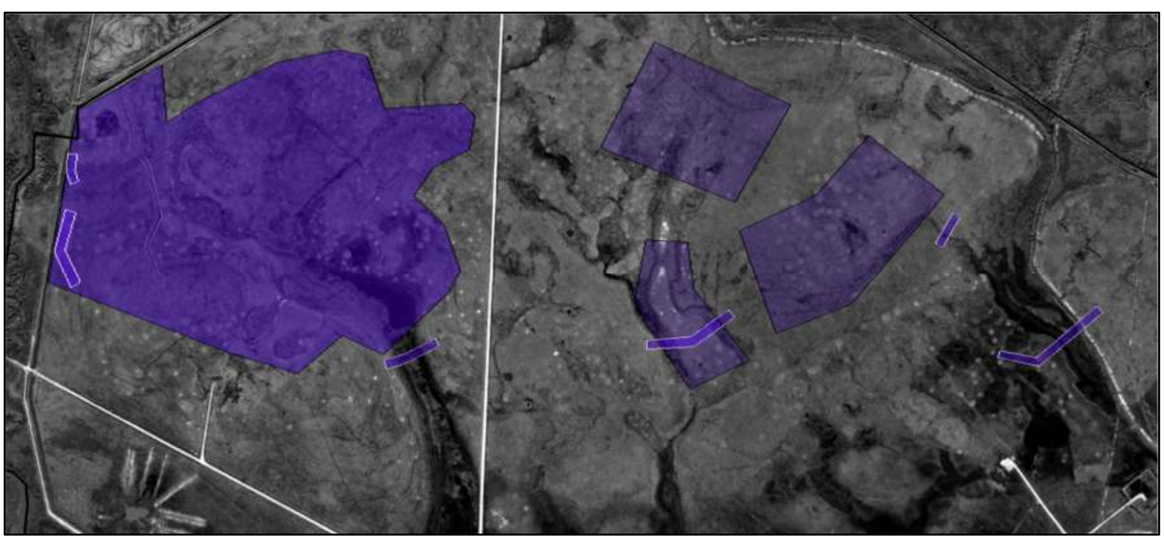


Figure 3. 1995 imagery of the Project survey areas

Soils and Geology

Geologically, the Project area is underlain by the Beaumont Formation (Qbs) (US Geological Survey [USGS] 2020). Qbs deposits span from the Quaternary to the Late Pleistocene and are made up of sand, silt, clay, and minor amounts of gravel.

According to the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Web Soil Survey for Brazoria County, Texas, the Project ESA is underlain by four soil map units (Table 1).

Table 1. Soil data for the Project area

Soil Series	Depth (cm)	Description (NRCS 2020)	Archeological Probability
Edna Loam, 0 to 1 percent slopes	0-23 cm	The Edna series consists of very deep, somewhat poorly drained soils that formed in loamy fluviomarine deposits derived from the Beaumont Formation of Pleistocene age. These nearly level to gently sloping soils are on ancient meander ridges.	Moderate
Francitas clay loam, 0 to 1 percent slopes, rarely flooded	0-41 cm	The Francitas series consists of very deep, somewhat poorly drained, very slowly permeable soils derived from clayey fluviomarine deposits of the Beaumont Formation. These nearly level soils occur on flats on low coastal plains.	Low to moderate
Narta fine sandy loam, 0 to 1 percent slopes, rarely flooded	0-14 cm	The Narta series consists of very deep, poorly drained, very slowly permeable soils that formed in loamy fluviomarine sediments derived from the Beaumont Formation of Late Pleistocene age. These nearly level soils are on the South Texas Coastal Plain.	Low
Veston fine sandy loam, 0 to 1 percent slopes, frequently flooded	0-8 cm	The Veston series consists of very deep, poorly drained soils. These soils formed in sandy and loamy alluvial sediments of Holocene age.	Low

Field Methods

The cultural resources survey will be performed for 100% of the Project ESA by one field crew comprised of three archaeologists that will be supervised by a Project Archeologist, with logistical and technical support provided by the Principal Investigator for the Project. The survey methods employed across the Project will vary according to setting, with shovel testing conducted at fixed intervals according to THC/CTA survey standards and based on archaeological site probability, ground surface visibility, and prevalence of modern disturbances (i.e, industrial infrastructure, agricultural cultivation). The Principal Investigator and Project Archeologist will designate high-probability areas (HPAs), medium-probability areas (MPAs), and low-probability areas (LPAs) for containing undocumented cultural resources within the proposed Project. Based on there review of soil data, the Project ESA can be classified as a combination of MPA and LPA settings. The MPAs consist of those areas by the Edna soil series, which comprises an approximately 12.0-acre area located in the northwestern portion of the Project ESA. The Francitas soil series may also constitute a MPA setting, however ground truthing of the soil profile would need to be conducted to confirm this classification. LPA settings comprise the remainder of the Project ESA.

In practice, shovel tests will be conducted on a 50-meter grid across MPA settings, and one a 75- to – 100-m grid across LPA settings. Marshy or waterlogged areas will be shovel tested where feasible, subjected to pedestrian surveys, and photodocumented. Any deviations from the state survey standards will be thoroughly documented. For Projects under 200 acres, the THC/CTA reporting standards require the excavation of 50 shovel tests for the first 25 acres, and one shovel test per five additional acres. While the Project ESA exceeds this acreage threshold, the same basic minimum survey standards would be applied requiring a minimum of 105 shovel tests across the Project ESA.

In general, shovel tests will measure approximately 30-cm (12-in) in diameter and will be excavated by natural strata. Shovel tests will be excavated to a depth of 80 cm where possible per the THC/CTA survey standards. All soil matrices will be sifted through 6.3-millimeter (¼-inch) mesh hardware cloth unless dominated by clay. Clayey matrix will be finely divided by trowel and visually inspected. For each of the shovel tests, the following information will be recorded on shovel test logs: location, maximum depth, and the number of soil strata. For each soil stratum, thickness, texture, color, and the presence or absence and nature of cultural materials will be recorded.

The field crew will record all shovel test locations, isolated finds, archaeological sites and associated features using a handheld GPS device. Also, each archaeologist will be equipped with a compass, shovel test and photographic logs, daily journal forms, and appropriate state site forms. The crew will be equipped with topographic maps and aerial photographs of the survey corridor, a digital camera, and a cellular telephone to maintain contact with the Principal Investigator (terrain permitting).

If an archaeological site is identified, the appropriate delineation techniques will be systematically applied to identify the horizontal and vertical limits of each site's boundary. Site boundaries may be determined based on both surface artifact density and the presence or lack of subsurface components. For subsurface sites, a series of shovel tests will be excavated radiating in the four cardinal directions or, if more appropriate, along perceived major and minor topographic and site axis. In practice, shovel tests within potential sites will be placed along transects at 10.0-m (33.0-ft) intervals to determine the depth and potential integrity of cultural deposits, and to carefully examine for the presence of intact archaeological features and/or discrete episodes of occupation. In the absence of subsurface deposits, controlled pedestrian surface inspections will be conducted and site boundaries defined based on a marked reduction in surface artifact density. Shovel testing or pedestrian surveys will not be conducted beyond the project ESA boundary. Perennial's survey strategy for artifact collection will varying according site size, density of artifacts, setting, presence/absence of subsurface assemblages, site type, and feasibility constraints. At a minimum, representative samples of artifacts by category and diagnostic artifacts will be collected from each newly recorded or revisited site and housed temporarily at Perennial's laboratory for analysis. Any collected artifacts will then be catalogued, analyzed, and prepared for submittal to an approved permanent curatorial facility or returned to the landowner upon request at the completion of the Section 106 consultation process. Trenching investigations are not currently proposed for the Project ESA based on the nature of the soils and geology, which are not considered conducive for harboring deeply buried cultural materials. Additionally, depths of impact would not exceed 1.5-ft (45.0 cm), thus shovel testing would serve as an adequate method for assessing the vertical APE.

Reporting

Following the completion of the field surveys, Perennial will prepare a draft report of the investigations. The format of the report will adhere to review guidelines suitable to the State Historic Preservation Officer (SHPO) in accordance with the THC's Rules of Practice and Procedure, Chapter 26, Section 27, and the CTA *Guidelines for Cultural Resources Management Reports*. The report will document previous investigations in the area, background cultural setting, the methodology used during the investigations, the general nature and extent of cultural resources encountered during the cultural resource survey, and management recommendations for of any documented cultural resources per all applicable state and federal laws. Once the client approves the report, the draft report will be submitted to the THC review. Following the agency review period, any appropriate edits or comments will be incorporated, and a final draft will be produced and distributed appropriately.

Laboratory Methods

The artifact collection procedure employed by Perennial is meant to be flexible to accommodate variations in site size, density of artifacts, setting, presence/absence of subsurface assemblages, site type, and feasibility constraints. In general, the artifact collection strategy is designed to procure comprehensive inventory-level information to facilitate NRHP evaluations and avoidance strategies, as well as adhere to property restrictions. Specifically, the artifact collection policy may vary between 100% collection of observed artifacts, and a representative sample collection strategy. In practice, the 100% collection strategy would most commonly be applied to sites with subsurface assemblages. For surficial sites, the Principal Investigator in consultation with the field supervisor would determine the collection strategy based on the site type and setting. In the event that a sample collection policy is implemented for a site, field staff will inventory and describe the characteristics, material, type, decoration, and other descriptive traits; and photograph all observed artifacts whenever feasible. Meanwhile, Perennial will also collect representative samples of each diagnostic artifact type and variety. All artifacts that are collected will be brought back to Perennial's laboratory to be cleaned, sorted, cataloged, photo-documented, and analyzed. Standard analytical techniques and existing typologies, as appropriate for Southeastern prehistoric and historic archaeological studies, will be employed. Artifacts collected on private land will be curated in Perennial's laboratory in Austin, unless requested otherwise by the landowner.

Human Remains

In the event that human remains are encountered during any part of the Phase I survey effort, work will stop immediately and the appropriate local law enforcement personnel and coroner's office will be notified of the discovery. Should the coroner determine that the human remains are not forensic in nature, then the lead federal agency will claim jurisdiction of the discovery and will commence consultation with any concerned parties including landowners, appropriate tribes, and/or living descendants to ensure compliance with existing state and federal laws. No remains will be removed from the site until jurisdiction has been established and the appropriate permits have been obtained. All activities will adhere to the Texas Health and Safety Code (8 THSC § 711.010) and the ACT (13 TAC §§ 22.1-22.6).

References

(Atlas) Texas Archaeological Sites Atlas

2020 Texas Archaeological Site Atlas restricted database, Texas Historical Commission. http://nueces.thc. state.tx.us/. Accessed April 2020.

(NRCS) Natural Resources Conservation Service

2020 Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Electronic resource, http://websoilsurvey.nrcs.usda.gov, accessed April 2020,

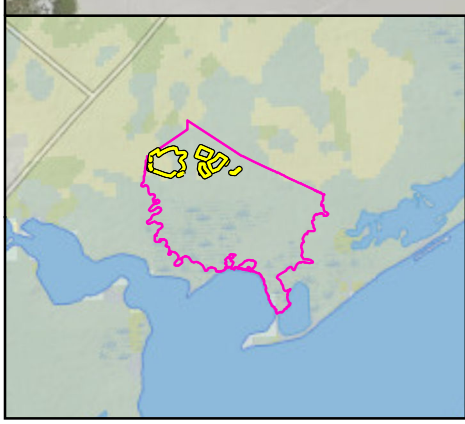
(USGS) United States Geological Survey

2020 U.S. Geological Survey, United States Department of the Interior. Electronic resource, Information and graphics available at http://mrdata.usgs.gov/sgmc/tx.html, accessed July11, 2019

1943 Chocolate Bay, Texas, 1:24,000 series topographic quadrangle. United States Department of the Interior, Washington, D.C.

1963 Hoskins Mound, 1:24,000 series topographic quadrangle. United States Department of the Interior, Washington, D.C.

ATTACHMENT 1 – Mapping Exhibits



ESA

FJWBMB Property Boundary

0 500 1,000 Meters

0 1,450 2,900 Feet

N

PERENNIAL

Aerial Map
Fentress-Johnson West Bay Mitigation Bank (FJWBMB) Project
Alluvion Resource Company, LLC
Brazoria County, Texas

Page 1 of 1	Scale: 1:35,000
NAD83 UTM 15N	Date: April 2020

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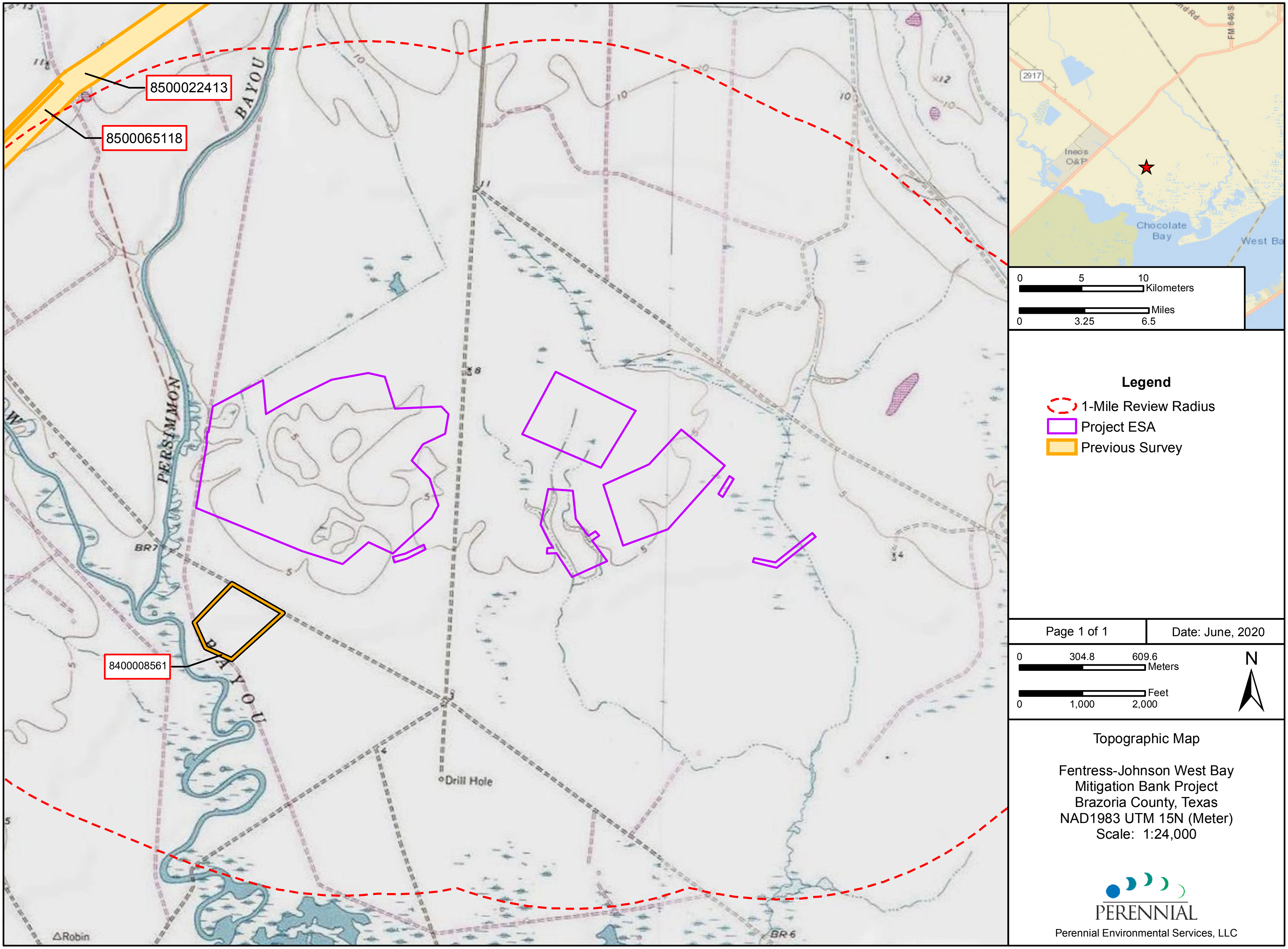
APPENDIX B – MAPPING



Legend

1-Mile Review Radius
Project ESA
Previous Survey

Page 1 of 1 | Date: June, 2020

0 304.8 609.6 Meters
0 1,000 2,000 Feet
N

Topographic Map

Fentress-Johnson West Bay
Mitigation Bank Project
Brazoria County, Texas
NAD1983 UTM 15N (Meter)
Scale: 1:24,000

PERENNIAL
Perennial Environmental Services, LLC

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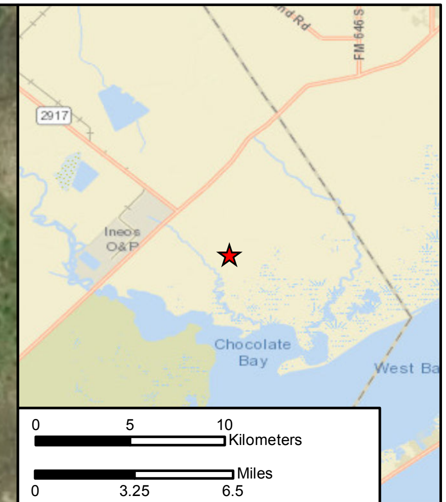
Author: PW



Legend

- Negative Shovel Test
- Project ESA
- Medium Probability Area
- Inundation Area

Page 1 of 2 | Date: June, 2020

0 95.25 190.5 Meters

0 312.5 625 Feet

N

Aerial Map

Fentress-Johnson West Bay
Mitigation Bank Project
Brazoria County, Texas
NAD1983 UTM 15N (Meter)
Scale: 1:7,500

PERENNIAL
Perennial Environmental Services, LLC

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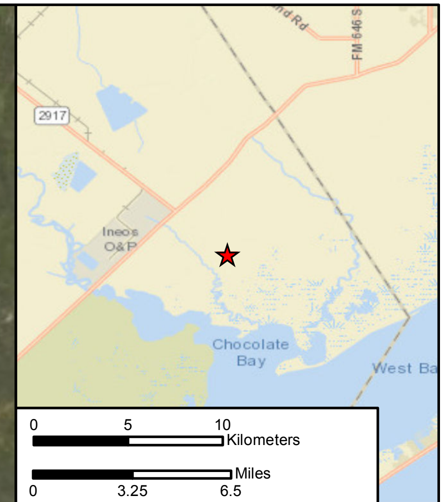
Author: PW



0 5 10 Kilometers

0 3.25 6.5 Miles

Legend

- Negative Shovel Test
- Project ESA
- Medium Probability Area
- Inundation Area

Page 2 of 2 | Date: June, 2020

0 95.25 190.5 Meters

0 312.5 625 Feet

N

Aerial Map

Fentress-Johnson West Bay
Mitigation Bank Project
Brazoria County, Texas
NAD1983 UTM 15N (Meter)
Scale: 1:7,500

PERENNIAL
Perennial Environmental Services, LLC

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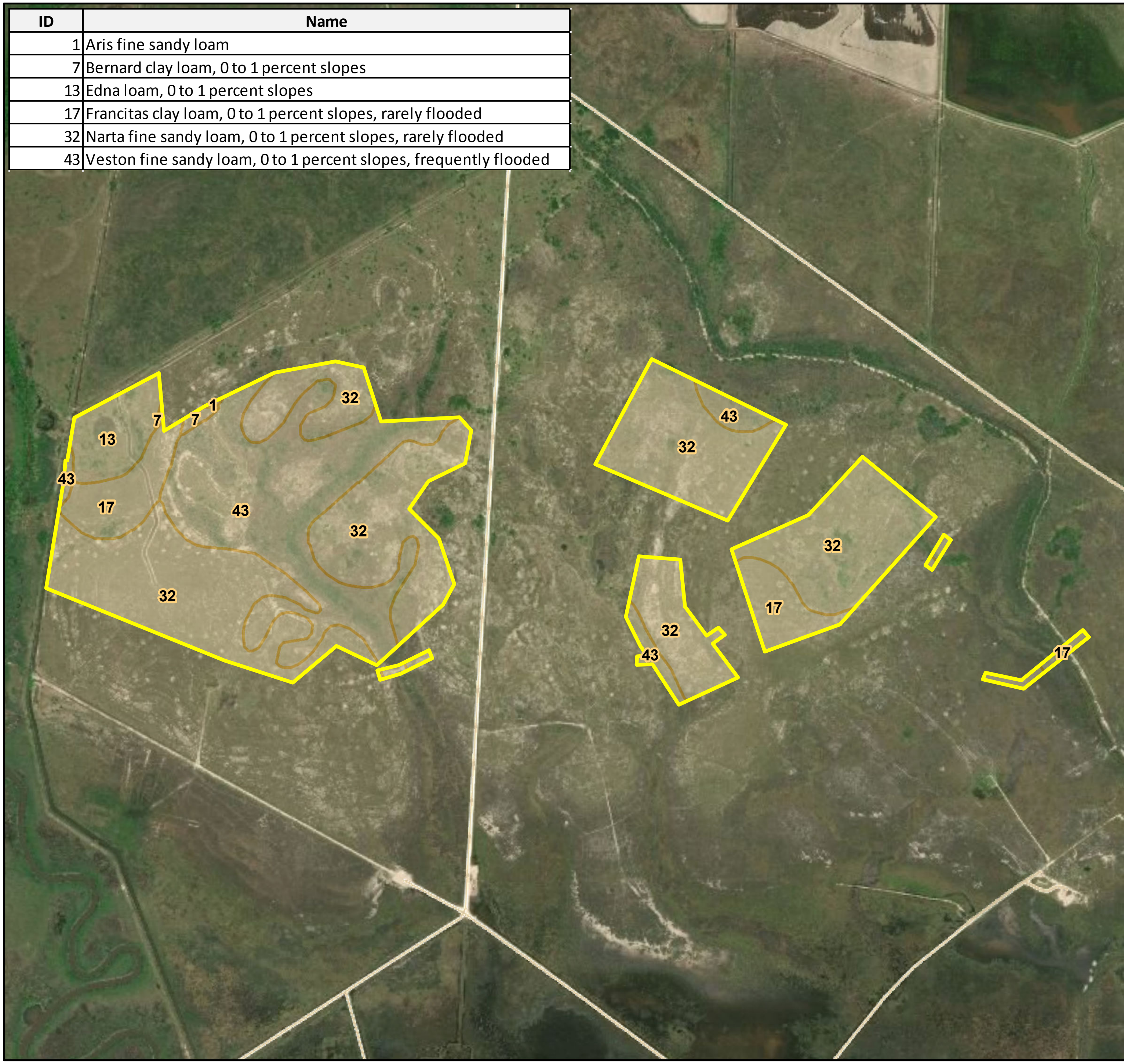
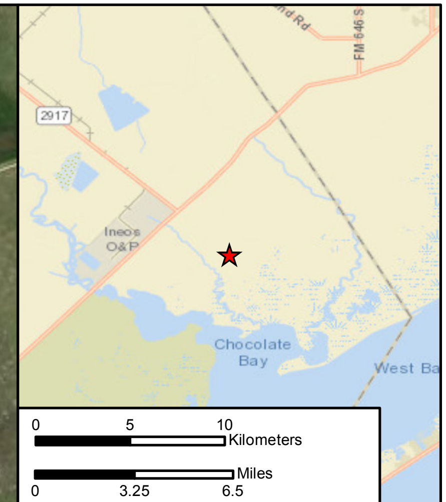
Author: PW

ID	Name
1	Aris fine sandy loam
7	Bernard clay loam, 0 to 1 percent slopes
13	Edna loam, 0 to 1 percent slopes
17	Francitas clay loam, 0 to 1 percent slopes, rarely flooded
32	Narta fine sandy loam, 0 to 1 percent slopes, rarely flooded
43	Veston fine sandy loam, 0 to 1 percent slopes, frequently flooded





0 5 10 Kilometers

0 3.25 6.5 Miles

Legend

Project ESA

NRCS Soils

Page 1 of 1

Date: June, 2020

0 121.92 243.84 Meters

0 650 1,300 Feet

N

Aerial Soils Map

Fentress-Johnson West Bay
Mitigation Bank Project
Brazoria County, Texas
NAD1983 UTM 15N (Meter)
Scale: 1:16,000

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Perennial Environmental Services, LLC

APPENDIX C – SHOVEL TEST DATA

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
1	I	0-50	0%	Negative	10YR 4/1	Clay	Marshland, medium grasses	Subsoil
2	I	0-15	0%	Negative	10YR 2/1	Clay	Marshland, medium grasses	Soil Change
2	II	15-50	0%	Negative	10YR 4/1	Clay	Marshland, medium grasses	Subsoil
3	I	0-20	0%	Negative	10YR 2/1	Clay	Marshland, medium grasses, near stream	Water table
4	I	0-15	0%	Negative	10YR 2/1	Clay	Marshland, medium grasses	Soil Change
4	II	15-50	0%	Negative	10YR 4/1	Clay	Marshland, medium grasses	Subsoil
5	I	0-15	0%	Negative	10YR 5/2	Clay Loam	Open field, short grasses	Soil Change
5	II	15-40	0%	Negative	10YR 5/4	Silty Clay	Open field, short grasses	Soil Change
5	III	40-50	0%	Negative	10YR 4/1	Clay	Open field, short grasses	Subsoil
6	I	0-15	0%	Negative	10YR 5/2	Clay Loam	Open field, short grasses	Soil Change
6	II	15-40	0%	Negative	10YR 5/4	Silty Clay	Open field, short grasses	Soil Change

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
6	III	40-50	0%	Negative	10YR 4/1	Clay	Open field, short grasses	Subsoil
7	I	0-40	100%	Negative	10YR 3/1	Loam	Open field, short grasses	Soil Change
7	II	40-50	100%	Negative	10YR 4/1	Clay	Open field, short grasses	Subsoil
8	I	0-20	100%	Negative	10YR 3/2	Clay Loam	Open field, short grasses	Soil Change
8	II	20-40	100%	Negative	10YR 4/1	Clay	Open field, short grasses, yellowish brown mottling	Subsoil
9	I	0-20	100%	Negative	10YR 2/2	Clay	Open field, short grasses	Soil Change
9	II	20-40	100%	Negative	10YR 4/1	Clay	Open field, short grasses, yellowish brown mottling	Subsoil
10	I	0-30	0%	Negative	10YR 4/1	Clay	Open field, short grasses	Water table
11	I	0-20	0%	Negative	10YR 2/2	Clay	Marshland, medium grasses	Soil Change
11	II	20-40	0%	Negative	10YR 4/1	Clay	Marshland, medium grasses	Subsoil
12	I	0-35	0%	Negative	10YR 4/1	Clay	Marshland, medium grasses	Water table

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
13	I	0-35	50%	Negative	10YR 2/2	Clay Loam	Marshland, sparse grasses	Soil Change
13	II	35-45	50%	Negative	10YR 4/1	Clay	Marshland, sparse grasses	Subsoil
14	I	0-35	50%	Negative	10YR 2/2	Clay	Marshland, sparse grasses	Soil Change
14	II	35-45	50%	Negative	10YR 4/1	Clay	Marshland, sparse grasses	Subsoil
15	I	0-35	100%	Negative	10YR 2/2	Clay	Marshland, sparse grasses	Soil Change
15	II	35-45	100%	Negative	10YR 4/1	Clay	Marshland, sparse grasses	Subsoil
16	I	0-35	0%	Negative	10YR 2/2	Clay	Marshland, short grasses	Soil Change
16	II	35-45	0%	Negative	10YR 4/1	Clay	Marshland, short grasses	Subsoil
17	I	0-35	50%	Negative	10YR 2/2	Clay	Marshland, sparse grasses	Soil Change
17	II	35-45	50%	Negative	10YR 4/1	Clay	Marshland, sparse grasses	Subsoil
18	I	0-35	0%	Negative	10YR 2/2	Clay	Marshland, medium grasses	Soil Change

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
18	II	35-45	0%	Negative	10YR 4/1	Clay	Marshland, medium grasses	Subsoil
19	I	0-20	50%	Negative	10YR 2/2	Clay Loam	Marshland, sparse grasses	Soil Change
19	II	20-40	50%	Negative	10YR 4/1	Clay	Marshland, sparse grasses, yellowish brown mottling	Subsoil
20	I	0-20	50%	Negative	10YR 2/2	Clay Loam	Marshland, sparse grasses	Soil Change
20	II	20-40	50%	Negative	10YR 4/1	Clay	Marshland, sparse grasses	Subsoil
21	I	0-20	50%	Negative	10YR 2/2	Clay Loam	Marshland, short grasses	Soil Change
21	II	20-40	50%	Negative	10YR 4/1	Clay	Marshland, short grasses	Subsoil
22	I	0-20	0%	Negative	10YR 2/2	Clay Loam	Marshland, short grasses	Soil Change
22	II	20-40	0%	Negative	10YR 4/1	Clay	Marshland, short grasses	Subsoil
23	I	0-20	0%	Negative	10YR 3/1	Clay	Marshland, medium grasses	Soil Change
23	II	20-40	0%	Negative	10YR 4/1	Clay	Marshland, medium grasses, yellowish brown mottling	Subsoil

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
24	I	0-20	0%	Negative	10YR 3/1	Clay	Marshland, medium grasses	Soil Change
24	II	20-40	0%	Negative	10YR 4/1	Clay	Marshland, medium grasses, yellowish brown mottling	Subsoil
25	I	0-20	0%	Negative	10YR 2/2	Clay Loam	Marshland, medium grasses	Soil Change
25	II	20-40	0%	Negative	10YR 4/1	Clay	Marshland, medium grasses	
26	I	0-20	0%	Negative	10YR 4/1	Clay Loam	Open field, tall grass, cow pasture	Soil Change
26	II	20-40	0%	Negative	10YR 6/1	Clay Loam	Open field, tall grass, cow pasture	Soil Change
26	III	40-55	0%	Negative	10YR 7/1	Clay Loam	Open field, tall grass, cow pasture	Innundated
27	I	0-20	0%	Negative	10YR 5/1	Clay Loam	Open field, tall grass, cow pasture	Soil Change
27	II	20-55	0%	Negative	10YR 4/1	Clay	Open field, tall grass, cow pasture	Subsoil
28	I	0-20	0%	Negative	10YR 7/1	Clay Loam	Open field, tall grass, cow pasture	Soil Change
28	II	20-30	0%	Negative	10YR 5/1	Clay Loam	Open field, tall grass, cow pasture	Soil Change

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
28	III	30-50	0%	Negative	10YR 4/1	Clay Loam	Open field, tall grass, cow pasture. Hydric soil/redox	Innundated
29	I	0-25	0%	Negative	10YR 4/1	Clay Loam	Open field, tall grass, cow pasture. Hydric soil/redox	Soil Change
29	II	25-50	0%	Negative	10YR 6/1	Clay Loam	Open field, tall grass, cow pasture. Hydric soil/redox	Subsoil
30	I	0-35	0%	Negative	10YR 4/1	Clay Loam	Open field, Medium grass, cow pasture	soil Change
30	II	35-55	0%	Negative	10YR 5/6	Clay	Open field, Medium grass, cow pasture	Subsoil
31	I	0-30	0%	Negative	10YR 6/1	Sandy Loam	Short and medium grass, cow pasture, redox	soil Change
31	II	30-50	0%	Negative	10YR 5/1	Sandy Clay Loam	Short and medium grass, cow pasture, redox	Subsoil
32	I	0-30	0%	Negative	10YR 6/1	Sandy Clay Loam	Short and medium grass, cow pasture, redox, next to wetland	Inundation
33	I	0-25	0%	Negative	10YR 5/1	Sandy Loam	Medium grass, cover pasture	soil Change
33	II	25-55	0%	Negative	10YR 4/1	Sandy Clay Loam	Medium grass, cover pasture	Subsoil
34	I	0-20	25%	Negative	10YR 4/1	Clay Loam	Short grass, cow pasture	Soil Change

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
34	II	20-50	25%	Negative	10YR 5/4	Clay	Short grass, cow pasture	Subsoil
35	I	0-20	0%	Negative	10YR 4/1	Clay Loam	Short grass, cow pasture	Soil Change
35	II	20-35	0%	Negative	10YR 3/4	Clay Loam	Short grass, cow pasture	Soil Change
35	III	35-50	0%	Negative	10YR 5/4	Clay	Short grass, cow pasture	Subsoil
36	I	0-20	25%	Negative	10YR 4/1	Clay Loam	Short grass, cow pasture	Soil Change
36	II	20-50	25%	Negative	10YR 6/4	Clay	Short grass, cow pasture	Subsoil
37	I	0-25	25%	Negative	10YR 4/1	Clay Loam	Short grass, cow pasture	Soil Change
37	II	25-40	25%	Negative	10YR 6/4	Clay	Short grass, cow pasture	Soil Change
37	III	40-50	25%	Negative	10YR 6/7	Clay	Short grass, cow pasture	Subsoil
38	I	0-30	0%	Negative	10YR 4/1	Sandy Clay Loam	Short grass, cow pasture	Soil Change
38	II	30-50	0%	Negative	10YR 6/4	Clay	Short grass, cow pasture	Subsoil

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
39	I	0-35	0%	Negative	10YR 4/1	Clay Loam	Short grass, cow pasture	Soil Change
39	II	35-50	0%	Negative	10YR 6/4	Clay	Short grass, cow pasture	Subsoil
40	I	0-20	15%	Negative	10YR 5/1	Sandy Clay Loam	Short grass, cow pasture	Soil Change
40	II	20-35	15%	Negative	10YR 4/4	Clay	Short grass, cow pasture	Soil Change
40	III	35-50	15%	Negative	10YR 3/1	Clay	Short grass, cow pasture	Subsoil
41	I	0-25	0%	Negative	10YR 5/1	Sandy Clay Loam	Short grass, cow pasture	Soil Change
41	II	25-35	0%	Negative	10YR 4/4	Clay	Short grass, cow pasture	Soil Change
41	III	35-50	0%	Negative	10YR 3/1	Clay	Short grass, cow pasture	Subsoil
42	I	0-25	0%	Negative	10YR 5/1	Sandy Loam	Short grass, cow pasture	Soil Change
42	II	25-50	0%	Negative	10YR 6/4	Clay Loam	Short grass, cow pasture	Subsoil
43	I	0-20	0%	Negative	10YR 5/1	Clay Loam	Short grass, cow pasture	Soil Change

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
43	II	20-35	0%	Negative	10YR 6/4	Clay	Short grass, cow pasture	Soil Change
43	III	35-50	0%	Negative	10YR 5/1	Clay	Short grass, cow pasture	Subsoil
44	I	0-30	0%	Negative	10YR 4/1	Clay Loam	Short grass, cow pasture	Soil Change
44	II	30-50	0%	Negative	10YR 5/1	Clay Loam	Short grass, cow pasture	Subsoil
45	I	0-25	0%	Negative	10YR 4/1	Clay Loam	Short grass, cow pasture	Soil Change
45	II	25-40	0%	Negative	10YR 3/4	Clay	Short grass, cow pasture	Soil Change
45	III	40-55	0%	Negative	10YR 6/4	Clay	Short grass, cow pasture, next to wetland	Subsoil
46	I	0-25	0%	Negative	10YR 4/1	Clay Loam	Tall Grass, Cow Pasture	Soil Change
46	II	25-35	0%	Negative	10YR 3/4	Clay	Tall Grass, Cow Pasture	Soil Change
46	III	35-50	0%	Negative	10YR 6/4	Clay	Tall Grass, Cow Pasture	Subsoil
47	I	0-35	0%	Negative	10YR 5/1	Clay Loam	Short grass, cow pasture	Soil Change

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
47	II	35-50	0%	Negative	10YR 5/4	Clay	Short grass, cow pasture	Subsoil
48	I	0-35	0%	Negative	10YR 5/1	Clay Loam	Short grass, cow pasture	Soil Change
48	II	35-50	0%	Negative	10YR 5/4	Clay	Short grass, cow pasture	Subsoil
49	I	0-35	0%	Negative	10YR 4/1	Clay	Short grass, cow pasture	Soil Change
49	II	35-50	0%	Negative	10YR 6/4	Clay	Short grass, cow pasture	Subsoil
50	I	0-35	0%	Negative	10YR 4/1	Clay	Short grass, cow pasture	Soil Change
50	II	35-50	0%	Negative	10YR 6/4	Clay	Short grass, cow pasture	Subsoil
51	I	0-30	0%	Negative	10YR 7/1	Clay Loam	Light scrub, med grass, cow pasture	Soil Change
52	I	0-30	0%	Negative	10YR 6/1	Clay Loam	Short grass, cow pasture	Soil Change
52	II	30-50	0%	Negative	10YR 7/1	Clay Loam	Short grass, cow pasture	Subsoil
53	I	0-20	0%	Negative	10YR 4/1	Clay Loam	Short grass, cow pasture	Soil Change

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
53	II	20-50	0%	Negative	10YR 5/4	Clay	Short grass, cow pasture	Subsoil
54	I	0-25	0%	Negative	10YR 5/1	Clay Loam	Short grass, cow pasture	Soil Change
54	II	25-50	0%	Negative	10YR 4/1	Clay	Short grass, cow pasture	Subsoil
55	I	0-25	0%	Negative	10YR 5/1	Clay Loam	Short grass, cow pasture	Soil Change
55	II	25-50	0%	Negative	10YR 4/1	Clay	Short grass, cow pasture	Subsoil
56	I	0-25	0%	Negative	10YR 5/1	Sandy Loam	Short grass, cow pasture	Soil Change
56	II	25-50	0%	Negative	10YR 6/4	Clay Loam	Short grass, cow pasture	Subsoil
57	I	0-20	0%	Negative	10YR 5/1	Loam	Short grass, cow pasture	Soil Change
57	II	20-50	0%	Negative	10YR 4/1	Clay Loam	Short grass, cow pasture	Subsoil
58	I	0-20	0%	Negative	10YR 5/1	Clay Loam	Short grass, cow pasture	Soil Change
58	II	20-50	0%	Negative	10YR 4/1	Clay	Short grass, cow pasture	Subsoil

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
59	I	0-20	0%	Negative	10YR 5/1	Clay Loam	Short grass, cow pasture	Soil Change
59	II	20-50	0%	Negative	10YR 4/1	Clay	Short grass, cow pasture	Subsoil
60	I	0-20	0%	Negative	10YR 5/1	Clay Loam	Short grass, cow pasture	Soil Change
60	II	20-40	0%	Negative	10YR 4/1	Clay	Short grass, cow pasture	Soil Change
60	III	40-50	0%	Negative	10YR 5/4	Clay	Short grass, cow pasture	Subsoil
61	I	0-20	0%	Negative	10YR 5/1	Clay Loam	Short grass, cow pasture	Soil Change
61	II	20-50	0%	Negative	10YR 4/1	Clay	Short grass, cow pasture	Subsoil
62	I	0-20	0%	Negative	10YR 5/1	Clay Loam	Short grass, cow pasture	Soil Change
62	II	20-40	0%	Negative	10YR 4/1	Clay	Short grass, cow pasture	Soil Change
62	III	40-50	0%	Negative	10YR 5/4	Clay	Short grass, cow pasture	Subsoil
63	I	0-20	0%	Negative	10YR 4/1	Sandy Loam	Short grass, cow pasture	Soil Change

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
63	II	20-40	0%	Negative	10YR 4/4	Sandy Clay Loam	Short grass, cow pasture	Inundation
64	I	0-20	0%	Negative	10YR 5/4	Sandy Loam	Short grass, cow pasture, mixed 2nd and 3rd horizons	Soil Change
64	II	20-40	0%	Negative	10YR 4/1	Sandy Clay Loam	Short grass, cow pasture, mixed 2nd and 3rd horizons	Soil Change
64	III	40-50	0%	Negative	10YR 5/4	Sandy Clay Loam	Short grass, cow pasture, mixed 2nd and 3rd horizons	Subsoil
65	I	0-25	0%	Negative	10YR 6/1	Clay Loam	Cow pasture, short grass	Soil Change
65	II	25-55	0%	Negative	10YR 4/1	Clay	Cow pasture, short grass	Subsoil
66	I	0-25	0%	Negative	10YR 5/1	Clay Loam	Cow pasture, short grass	Soil Change
66	II	25-45	0%	Negative	10YR 4/1	Clay Loam	Cow pasture, short grass	Soil Change
66	III	45-55	0%	Negative	10YR 6/1	Clay	Cow pasture, short grass	Subsoil
67	I	0-25	0%	Negative	10YR 5/1	Clay Loam	Cow pasture, short grass	Soil Change
67	II	25-45	0%	Negative	10YR 4/1	Clay Loam	Cow pasture, short grass	Soil Change

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
67	III	45-55	0%	Negative	10YR 6/1	Clay	Cow pasture, short grass	Subsoil
68	I	0-25	0%	Negative	10YR 6/1	Clay	Cow pasture, short grass	Soil Change
68	II	25-50	0%	Negative	10YR 5/1	Clay	Cow pasture, short grass	Subsoil
69	I	0-25	0%	Negative	10YR 5/1	Clay Loam	Cow pasture, short grass	Soil Change
69	II	25-40	0%	Negative	10YR 4/1	Clay	Cow pasture, short grass	Soil Change
69	III	40-50	0%	Negative	10YR 6/2	Clay	Cow pasture, short grass	Subsoil
70	I	0-20	0%	Negative	10YR 5/1	Clay Loam	Cow pasture, short grass	Soil Change
70	II	20-40	0%	Negative	10YR 4/1	Clay	Cow pasture, short grass	Soil Change
70	III	40-50	0%	Negative	10YR 6/2	Clay	Cow pasture, short grass	Subsoil
71	I	0-30	0%	Negative	10YR 5/1	Sandy Loam	Cow pasture, med-short grass	Soil Change
71	II	30-50	0%	Negative	10YR 6/1	Sandy Clay Loam	Cow pasture, med-short grass	Subsoil

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
72	I	0-25	0%	Negative	10YR 5/6	Clay Loam	Cow pasture, med-short grass	Soil Change
72	II	25-40	0%	Negative	10YR 4/2	Clay	Cow pasture, med-short grass	Soil Change
72	III	40-55	0%	Negative	10YR 3/6	Clay	Cow pasture, med-short grass	Subsoil
73	I	0-25	0%	Negative	10YR 5/1	Sandy Loam	Cow pasture, short grass	Soil Change
73	II	25-40	0%	Negative	10YR 4/4	Sandy Clay Loam	Cow pasture, short grass	Soil Change
73	III	40-55	0%	Negative	10YR 6/2	Sandy Clay	Cow pasture, short grass	Subsoil
74	I	0-25	0%	Negative	10YR 5/1	Sandy Loam	Cow pasture, short grass	Soil Change
74	II	25-40	0%	Negative	10YR 4/4	Sandy Clay Loam	Cow pasture, short grass	Soil Change
74	III	40-55	0%	Negative	10YR 6/2	Sandy Clay	Cow pasture, short grass	Subsoil
75	I	0-20	0%	Negative	10YR 5/1	Clay Loam	Cow pasture, short grass	Soil Change
75	II	20-50	0%	Negative	10YR 6/1	Clay	Cow pasture, short grass	Subsoil

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
76	I	0-20	0%	Negative	10YR 5/2	Clay	Cow pasture, short grass	Soil Change
76	II	20-30	0%	Negative	10YR 3/1	Clay	Cow pasture, short grass	Inundation
77	I	0-20	0%	Negative	10YR 5/1	Clay Loam	Cow pasture, short grass	Soil Change
77	II	20-50	0%	Negative	10YR 6/4	Clay	Cow pasture, short grass	Subsoil
78	I	0-25	0%	Negative	10YR 5/1	Sandy Loam	Cow pasture, short grass	Soil Change
78	II	25-50	0%	Negative	10YR 6/4	Sandy Clay Loam	Cow pasture, short grass	Subsoil
79	I	0-20	0%	Negative	10YR 5/1	Sandy Clay Loam	Cow pasture, short grass	Soil Change
79	II	20-40	0%	Negative	10YR 4/1	Clay Loam	Cow pasture, short grass	Soil Change
79	III	40-55	0%	Negative	10YR 6/2	Clay	Cow pasture, short grass	Subsoil
80	I	0-30	0%	Negative	10YR 5/1	Sandy Clay Loam	Cow pasture, short grass	Soil Change
80	II	30-50	0%	Negative	10YR 4/1	Clay	Cow pasture, short grass	Subsoil

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
81	I	0-20	0%	Negative	10YR 5/1	Sandy Clay Loam	Cow pasture, short grass	Soil Change
81	II	20-40	0%	Negative	10YR 4/4	Clay	Cow pasture, short grass	Soil Change
81	III	40-55	0%	Negative	10YR 6/4	Clay	Cow pasture, short grass	Subsoil
82	I	0-20	0%	Negative	10YR 5/1	Sandy Clay Loam	Cow pasture, short grass	Soil Change
82	II	20-40	0%	Negative	10YR 4/4	Clay	Cow pasture, short grass	Soil Change
82	III	40-55	0%	Negative	10YR 6/4	Clay	Cow pasture, short grass	Subsoil
83	I	0-25	0%	Negative	10YR 5/1	Clay Loam	Cow pasture, short grass	Soil Change
83	II	25-50	0%	Negative	10YR 6/4	Clay	Cow pasture, short grass	Subsoil
84	I	0-20	0%	Negative	10YR 5/1	Clay Loam	Cow pasture, short grass	Soil Change
84	II	20-40	0%	Negative	10YR 4/4	Clay	Cow pasture, short grass	Soil Change
84	III	40-50	0%	Negative	10YR 6/2	Clay	Cow pasture, short grass	Subsoil

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
85	I	0-20	0%	Negative	10YR 4/4	Clay Loam	Cow pasture, short grass	Soil Change
85	II	20-40	0%	Negative	10YR 4/1	Clay	Cow pasture, short grass	Soil Change
85	III	40-50	0%	Negative	10YR 6/2	Clay	Cow pasture, short grass	Subsoil
86	I	0-20	0%	Negative	10YR 4/4	Clay Loam	Cow pasture, short grass	Soil Change
86	II	20-40	0%	Negative	10YR 4/1	Clay	Cow pasture, short grass	Soil Change
86	III	40-50	0%	Negative	10YR 6/2	Clay	Cow pasture, short grass	Subsoil
87	I	0-20	0%	Negative	10YR 4/1	Clay Loam	Cow pasture, short grass	Soil Change
87	II	20-50	0%	Negative	10YR 3/1	Clay	Cow pasture, short grass	Subsoil
88	I	0-20	0%	Negative	10YR 4/4	Clay Loam	Cow pasture, short grass	Soil Change
88	II	20-50	0%	Negative	10YR 3/1	Clay	Cow pasture, short grass	Subsoil
89	I	0-25	0%	Negative	10YR 6/1	Sandy Loam	Cow pasture, short grass	Soil Change

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
89	II	25-50	0%	Negative	10YR 4/1	Clay	Cow pasture, short grass	Subsoil
90	I	0-35	0%	Negative	10YR 6/1	Sandy Loam	Cow pasture, short grass	Soil Change
90	II	35-55	0%	Negative	10YR 4/1	Clay	Cow pasture, short grass	Subsoil
91	I	0-35	0%	Negative	10YR 6/1	Sandy Loam	Cow pasture, short grass, 10YR 5/4 mottle in subsoil	Soil Change
91	II	35-55	0%	Negative	10YR 4/1	Clay	Cow pasture, short grass, 10YR 5/4 mottle in subsoil	Subsoil
92	I	0-35	0%	Negative	10YR 4/1	Sandy Loam	Cow pasture, short grass	Soil Change
92	II	35-55	0%	Negative	10YR 4/4	Clay	Cow pasture, short grass	Subsoil
93	I	0-25	0%	Negative	10YR 5/1	Clay Loam	Cow pasture, short grass	Soil Change
93	II	25-40	0%	Negative	10YR 4/1	Clay	Cow pasture, short grass	Soil Change
93	III	40-55	0%	Negative	10YR 6/1	Clay	Cow pasture, short grass	Subsoil
94	I	0-20	0%	Negative	10YR 6/6	Clay Loam	Cow pasture, short grass	Soil Change

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
94	II	20-50	0%	Negative	10YR 3/1	Clay	Cow pasture, short grass	Subsoil
95	I	0-30	0%	Negative	10YR 6/6	Clay Loam	Cow pasture, short grass	Soil Change
95	II	30-55	0%	Negative	10YR 3/1	Clay	Cow pasture, short grass	Subsoil
96	I	0-20	0%	Negative	10YR 5/1	Clay Loam	Cow pasture, short grass	Soil Change
96	II	20-40	0%	Negative	10YR 4/1	Clay	Cow pasture, short grass	Soil Change
96	III	40-55	0%	Negative	10YR 6/1	Clay	Cow pasture, short grass	Subsoil
97	I	0-35	0%	Negative	10YR 5/1	Sandy Clay Loam	Cow pasture, short grass	Soil Change
97	II	35-50	0%	Negative	10YR 3/1	Clay	Cow pasture, short grass	Subsoil
98	I	0-20	0%	Negative	10YR 5/1	Sandy Loam	Cow pasture, short grass	Soil Change
98	II	20-40	0%	Negative	10YR 4/1	Sandy Clay Loam	Cow pasture, short grass	Soil Change
98	III	40-55	0%	Negative	10YR 3/4	Clay	Cow pasture, short grass	Subsoil

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
99	I	0-20	0%	Negative	10YR 5/1	Sandy Loam	Cow pasture, short grass	Soil Change
99	II	20-40	0%	Negative	10YR 4/1	Sandy Clay Loam	Cow pasture, short grass	Soil Change
99	III	40-55	0%	Negative	10YR 3/4	Clay	Cow pasture, short grass	Subsoil
100	I	0-35	0%	Negative	10YR 5/1	Sandy Loam	Cow pasture, short grass	Soil Change
100	II	35-50	0%	Negative	10YR 4/1	Sandy Clay Loam	Cow pasture, short grass	Subsoil
101	I	0-35	0%	Negative	10YR 5/1	Sandy Loam	Cow pasture, short grass	Soil Change
101	II	35-40	0%	Negative	10YR 4/1	Sandy Clay Loam	Cow pasture, short grass	Inundation
102	I	0-25	0%	Negative	10YR 4/4	Clay Loam	Cow pasture, short grass	Soil Change
102	II	25-50	0%	Negative	10YR 4/1	Clay	Cow pasture, short grass	Subsoil
103	I	0-50	0%	Negative	10YR 4/1	Clay	Cow pasture, short grasses	Subsoil
104	I	0-50	50%	Negative	10YR 4/1	Clay	Cow pasture, short sparse grasses	Subsoil

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
105	I	0-30	0%	Negative	10YR 2/2	Clay	Cow pasture, short grasses	Soil Change
105	II	30-50	0%	Negative	10YR 4/1	Clay	Cow pasture, short grasses	Subsoil
106	I	0-30	0%	Negative	10YR 2/2	Clay	Cow pasture, short grasses	Soil Change
106	II	30-50	0%	Negative	10YR 4/1	Clay	Cow pasture, short grasses	Subsoil
107	I	0-30	0%	Negative	10YR 2/2	Clay	Cow pasture, short grasses	Soil Change
107	II	30-50	0%	Negative	10YR 4/1	Clay	Cow pasture, short grasses	Subsoil
108	I	0-30	0%	Negative	10YR 2/2	Clay	Cow pasture, short grasses	Soil Change
108	II	30-50	0%	Negative	10YR 4/1	Clay	Cow pasture, short grasses	Subsoil
109	I	0-30	0%	Negative	10YR 2/2	Clay	Cow pasture, short grasses	Soil Change
109	II	30-50	0%	Negative	10YR 4/1	Clay	Cow pasture, short grasses	Subsoil
110	I	0-30	0%	Negative	10YR 2/2	Clay	Cow pasture, short grasses	Soil Change

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
110	II	30-50	0%	Negative	10YR 4/1	Clay	Cow pasture, short grasses	Subsoil
111	I	0-30	0%	Negative	10YR 2/2	Clay	Cow pasture, short grasses	Soil Change
111	II	30-50	0%	Negative	10YR 4/1	Clay	Cow pasture, short grasses	Subsoil
112	I	0-35	0%	Negative	10YR 3/3	Clay Loam	Cow pasture, short grasses	Soil Change
112	II	35-50	0%	Negative	10YR 4/1	Clay	Cow pasture, short grasses, yellowish brown mottling	Subsoil
113	I	0-35	0%	Negative	10YR 3/3	Clay Loam	Cow pasture, short grasses	Soil Change
113	II	35-50	0%	Negative	10YR 4/1	Clay	Cow pasture, short grasses, yellowish brown mottling	Subsoil
114	I	0-30	0%	Negative	10YR 2/2	Clay	Cow pasture, short grasses	Soil Change
114	II	30-50	0%	Negative	10YR 4/1	Clay	Cow pasture, short grasses	Subsoil
115	I	0-35	0%	Negative	10YR 3/3	Clay Loam	Cow pasture, short grasses	Soil Change
115	II	35-50	0%	Negative	10YR 4/1	Clay	Cow pasture, short grasses, yellowish brown mottling	Subsoil

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
116	I	0-30	0%	Negative	10YR 2/2	Clay	Cow pasture, short grasses	Soil Change
116	II	30-50	0%	Negative	10YR 4/1	Clay	Cow pasture, short grasses	Subsoil
117	I	0-30	50%	Negative	10YR 4/1	Clay	Cow pasture, short grasses	Soil Change
117	II	30-50	50%	Negative	10YR 6/3	Clay	Cow pasture, short grasses	Subsoil
118	I	0-15	0%	Negative	10YR 2/2	Clay	Cow pasture, short grasses, near trees and stream	Root Impasse
119	I	0-30	50%	Negative	10YR 4/1	Clay	Cow pasture, short grasses	Soil Change
119	II	30-50	50%	Negative	10YR 6/3	Clay	Cow pasture, short grasses	Subsoil
120	I	0-40	50%	Negative	10YR 3/3	Clay Loam	Cow pasture, short grasses	Soil Change
120	II	40-50	50%	Negative	10YR 2/2	Clay	Cow pasture, short grasses	Subsoil
121	I	0-15	0%	Negative	10YR 3/3	Clay Loam	Cow pasture, short grasses	Soil Change
121	II	15-40	0%	Negative	10YR 2/2	Clay	Cow pasture, short grasses	Subsoil

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
122	I	0-15	0%	Negative	10YR 3/3	Clay Loam	Cow pasture, short grasses	Soil Change
122	II	15-40	0%	Negative	10YR 2/2	Clay	Cow pasture, short grasses	Subsoil
123	I	0-15	0%	Negative	10YR 3/3	Clay Loam	Cow pasture, short grasses	Soil Change
123	II	15-40	0%	Negative	10YR 2/2	Clay	Cow pasture, short grasses	Subsoil
124	I	0-15	0%	Negative	10YR 3/3	Clay Loam	Cow pasture, medium grasses, near trees	Soil Change
124	II	15-40	0%	Negative	10YR 2/2	Clay	Cow pasture, medium grasses, near trees	Subsoil
125	I	0-15	0%	Negative	10YR 3/3	Clay Loam	Cow pasture, medium grasses, near pond	Soil Change
125	II	15-40	0%	Negative	10YR 6/1	Sandy Loam	Cow pasture, medium grasses, near pond	Soil Change
125	III	40-50	0%	Negative	10YR 4/1	Clay	Cow pasture, medium grasses, near pond, yellowish brown mottling	Subsoil
126	I	0-15	0%	Negative	10YR 3/3	Clay Loam	Cow pasture, medium grasses	Soil Change
126	II	15-40	0%	Negative	10YR 4/1	Clay	Cow pasture, medium grasses, yellowish brown mottling	Subsoil

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
127	I	0-40	0%	Negative	10YR 3/3	Clay Loam	Cow pasture, medium grasses	Soil Change
127	II	40-50	0%	Negative	10YR 2/2	Clay	Cow pasture, medium grasses, yellowish brown mottling	Subsoil
128	I	0-40	50%	Negative	10YR 5/1	Loam	Cow pasture, medium grasses	Soil Change
128	II	40-50	0%	Negative	10YR 4/1	Clay	Cow pasture, medium grasses	Subsoil
129	I	0-20	0%	Negative	10YR 3/1	Clay	Cow pasture, short grasses	Soil Change
129	II	20-40	0%	Negative	10YR 2/2	Clay	Cow pasture, short grasses, yellowish brown mottling	Subsoil
130	I	0-20	0%	Negative	10YR 3/3	Clay Loam	Cow pasture, short grasses	Soil Change
130	II	20-40	0%	Negative	10YR 2/2	Clay	Cow pasture, short grasses	Subsoil
131	I	0-20	0%	Negative	10YR 3/3	Clay Loam	Cow pasture, short grasses	Soil Change
131	II	20-40	0%	Negative	10YR 2/2	Clay	Cow pasture, short grasses, yellowish brown mottling	Subsoil
132	I	0-20	0%	Negative	1YR 5/1	Clay Loam	Cow Pasture, Short Grasses	Soil Change

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
132	II	20-50	0%	Negative	10YR 6/4	Clay	Cow Pasture, Short Grasses	Subsoil
133	I	0-20	0%	Negative	10YR 4/4	Loam	Cow Pasture, Short Grasses	Inundation
134	I	0-20	0%	Negative	10YR 5/1	Clay Loam	Cow Pasture, Short Grasses	Soil Change
134	II	20-40	0%	Negative	10YR 4/1	Clay	Cow Pasture, Short Grasses	Soil Change
134	III	40-55	0%	Negative	10YR 5/4	Clay	Cow Pasture, Short Grasses	Subsoil
135	I	0-20	0%	Negative	10YR 4/1	Loam	Cow Pasture, Short Grasses	Inundation
136	I	0-20	0%	Negative	10YR 5/1	Loam	Cow Pasture, Short Grasses	Soil Change
136	II	20-40	0%	Negative	10YR 5/4	Clay	Cow Pasture, Short Grasses	Inundation
137	I	0-20	0%	Negative	10YR 5/1	Clay Loam	Cow Pasture, Short Grasses	Soil Change
137	II	20-40	0%	Negative	10YR 4/1	Clay Loam	Cow Pasture, Short Grasses	Soil Change
137	III	40-55	0%	Negative	10YR 6/4	Clay	Cow Pasture, Short Grasses	Subsoil

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
138	I	0-20	0%	Negative	10YR 7/1	Sandy Loam	Cow Pasture, Short Grasses	Soil Change
138	II	20-40	0%	Negative	10YR 5/1	Sandy Clay Loam	Cow Pasture, Short Grasses	Soil Change
138	III	40-55	0%	Negative	10YR 6/1	Clay	Cow Pasture, Short Grasses	Subsoil
139	I	0-20	0%	Negative	10YR 5/1	Clay Loam	Cow Pasture, Short Grasses	Soil Change
139	II	20-50	0%	Negative	10YR 4/1	Clay	Cow Pasture, Short Grasses	Subsoil
140	I	0-20	0%	Negative	10YR 5/1	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
140	II	20-40	0%	Negative	10YR 4/4	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
140	III	40-55	0%	Negative	10YR 6/1	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Subsoil
141	I	0-20	0%	Negative	10YR 5/1	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
141	II	20-40	0%	Negative	10YR 4/1	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
141	III	40-55	0%	Negative	10YR 6/1	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Subsoil

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
142	I	0-20	0%	Negative	10YR 5/1	Sandy Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
142	II	20-50	0%	Negative	10YR 4/1	Candy Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Inundation
143	I	0-20	0%	Negative	10YR 5/1	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
143	II	20-40	0%	Negative	10YR 4/1	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
143	III	40-55	0%	Negative	10YR 6/1	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Subsoil
144	I	0-20	0%	Negative	10YR 5/1	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
144	II	20-45	0%	Negative	10YR 4/1	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
144	III	45-55	0%	Negative	10YR 6/1	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Subsoil
145	I	0-15	15%	Negative	10YR 5/1	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
145	II	15-40	15%	Negative	10YR 4/4	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
145	III	40-55	15%	Negative	10YR 5/1	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Subsoil

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
146	I	0-15	0%	Negative	10YR 5/1	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
146	II	15-40	0%	Negative	10YR 4/4	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
146	III	40-55	0%	Negative	10YR 5/1	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Subsoil
147	I	0-25	0%	Negative	10YR 4/4	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
147	II	25-50	0%	Negative	10YR 3/1	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Subsoil
148	I	0-25	0%	Negative	10YR 5/1	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
148	II	25-40	0%	Negative	10YR 4/4	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
148	III	40-55	0%	Negative	10YR 6/1	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Subsoil
149	I	0-30	0%	Negative	10YR 5/1	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
149	II	30-50	0%	Negative	10YR 4/2	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Subsoil
150	I	0-25	0%	Negative	10YR 4/1	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
150	II	25-50	0%	Negative	10YR 5/4	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Subsoil
151	I	0-20	0%	Negative	10YR 5/1	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
151	II	20-40	0%	Negative	10YR 4/1	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest, Mixed Soils	Soil Change
151	III	40-50	0%	Negative	10YR 6/1	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest, Mixed Soils	Subsoil
152	I	0-20	0%	Negative	10YR 5/1	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
152	II	20-40	0%	Negative	10YR 4/1	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest, Mixed Soils	Soil Change
152	III	40-50	0%	Negative	10YR 6/1	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest, Mixed Soils	Subsoil
153	I	0-20	0%	Negative	10YR 4/4	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Inundation
154	I	0-25	0%	Negative	10YR 4/1	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
154	II	25-50	0%	Negative	10YR 7/4	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Subsoil
155	I	0-20	0%	Negative	10YR 5/1	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
155	II	20-40	0%	Negative	10YR 4/1	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
155	III	40-50	0%	Negative	10YR 6/1	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Subsoil
156	I	0-30	0%	Negative	10YR 5/1	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
156	II	30-50	0%	Negative	10YR 5/4	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Subsoil
157	I	0-25	0%	Negative	10YR 4/1	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
157	II	25-50	0%	Negative	10YR 3/1	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Subsoil
158	I	0-20	0%	Negative	10YR 4/1	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
158	II	20-40	0%	Negative	10YR 4/1	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
158	III	40-50	0%	Negative	10YR 5/1	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Subsoil
159	I	0-20	0%	Negative	10YR 6/1	Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
160	I	0-20	0%	Negative	10YR 5/1	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Inundation

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
160	II	20-35	0%	Negative	10YR 4/4	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
160	III	35-50	0%	Negative	10YR 5/4	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Subsoil
161	I	0-20	0%	Negative	10YR 4/4	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
161	II	20-50	0%	Negative	10YR 3/1	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Subsoil
162	I	0-20	5%	Negative	10YR 4/4	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
162	II	20-50	5%	Negative	10YR 3/1	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Subsoil
163	I	0-20	0%	Negative	10YR 5/1	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
163	II	20-40	0%	Negative	10YR 4/1	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
163	III	40-55	0%	Negative	10YR 5/4	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Subsoil
164	I	0-25	0%	Negative	10YR 5/1	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
164	II	25-50	0%	Negative	10YR 4/1	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Subsoil

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
165	I	0-20	5%	Negative	10YR 6/1	Sandy Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
165	II	20-30	5%	Negative	10YR 5/1	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
165	III	30-50	5%	Negative	10YR 7/4	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Subsoil
166	I	0-20	5%	Negative	10YR 5/1	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
166	II	20-40	5%	Negative	10YR 3/1	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
166	III	40-55	5%	Negative	10YR 6/1	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Subsoil
167	I	0-30	0%	Negative	10YR 4/4	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
167	II	30-50	0%	Negative	10YR 4/1	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Subsoil
168	I	0-30	0%	Negative	10YR 4/4	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
168	II	30-50	0%	Negative	10YR 3/1	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Subsoil
169	I	0-20	0%	Negative	10YR 4/1	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
169	II	20-40	0%	Negative	10YR 3/1	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
169	III	40-50	0%	Negative	10YR 6/4	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Subsoil
170	I	0-20	0%	Negative	10YR 5/1	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
170	II	20-40	0%	Negative	10YR 5/4	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
170	III	40-50	0%	Negative	10YR 4/1	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Subsoil
171	I	0-20	0%	Negative	10YR 4/1	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
171	II	20-50	0%	Negative	10YR 5/4	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Subsoil
172	I	0-25	0%	Negative	10YR 6/1	Clay Loam	Cow Pasture, Short Grasses, Scattered Scrub Forest	Soil Change
172	II	25-40	0%	Negative	10YR 7/4	Clay	Cow Pasture, Short Grasses, Scattered Scrub Forest	Inundation
173	I	0-40	0%	Negative	10YR 4/1	Clay	Cow pasture, medium grasses	Subsoil
174	I	0-10	0%	Negative	10YR 3/1	Clay	Cow pasture, medium grasses	Soil Change

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
174	II	10-40	0%	Negative	10YR 4/1	Clay	Cow pasture, medium grasses, yellowish brown mottling	Subsoil
175	I	0-10	0%	Negative	10YR 3/1	Clay	Cow pasture, medium grasses	Soil Change
175	II	10-40	0%	Negative	10YR 4/1	Clay	Cow pasture, medium grasses, yellowish brown mottling	Subsoil
176	I	0-20	0%	Negative	10YR 2/2	Clay	Cow pasture, medium grasses	Soil Change
176	II	20-45	0%	Negative	10YR 4/1	Clay	Cow pasture, medium grasses	Subsoil
177	I	0-10	0%	Negative	10YR 2/2	Clay	Cow pasture, medium grasses	Water table
178	I	0-20	0%	Negative	10YR 2/2	Clay	Cow pasture, medium grasses	Soil Change
178	II	20-45	0%	Negative	10YR 4/1	Clay	Cow pasture, medium grasses	Subsoil
179	I	0-20	0%	Negative	10YR 2/2	Clay	Cow pasture, medium grasses	Soil Change
179	II	20-45	0%	Negative	10YR 4/1	Clay	Cow pasture, medium grasses	Subsoil
180	I	0-10	0%	Negative	10YR 2/2	Clay	Cow pasture, medium grasses	Water table

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
181	I	0-30	100%	Negative	10YR 2/2	Clay	Cow pasture, medium grasses, on dirt track	Soil Change
181	II	30-50	100%	Negative	10YR 4/1	Clay	Cow pasture, medium grasses, on dirt track	Subsoil
182	I	0-40	50%	Negative	10YR 3/3	Sandy Loam	Cow pasture, sparse medium grasses	Soil Change
182	II	40-50	50%	Negative	10YR 4/1	Clay	Cow pasture, sparse medium grasses, yellowish brown mottling	Subsoil
183	I	0-30	50%	Negative	10YR 3/3	Clay Loam	Cow pasture, sparse medium grasses	Soil Change
183	II	30-50	50%	Negative	10YR 4/1	Clay	Cow pasture, sparse medium grasses, yellowish brown mottling	Subsoil
184	I	0-30	0%	Negative	10YR 4/1	Clay	Cow pasture, medium grasses, near wetland	Soil Change
184	II	30-50	0%	Negative	10YR 5/1	Clay	Cow pasture, medium grasses, near wetland, yellowish brown mottling	Subsoil
185	I	0-30	0%	Negative	10YR 3/3	Clay Loam	Cow pasture, medium grasses	Soil Change
185	II	30-50	0%	Negative	10YR 8/1	Clay	Cow pasture, medium grasses	Subsoil
186	I	0-10	0%	Negative	10YR 2/2	Clay	Cow pasture, medium grasses, near wetland	Water table

Shovel Test Number	Level (Strat)	Depth (cmbs)	GSV%	Status	Munsell Color	Soil Texture Description	Description (Area, Vegetation)	Reason for Termination
187	I	0-30	0%	Negative	10YR 2/1	Clay	Cow pasture, medium grasses	Soil Change
187	II	30-50	0%	Negative	10YR 4/1	Clay	Cow pasture, medium grasses	Subsoil
188	I	0-30	0%	Negative	10YR 2/1	Clay	Cow pasture, medium grasses	Soil Change
188	II	30-50	0%	Negative	10YR 4/1	Clay	Cow pasture, medium grasses	Subsoil
189	I	0-30	0%	Negative	10YR 3/3	Clay Loam	Cow pasture, medium grasses	Soil Change
189	II	30-50	0%	Negative	10YR 4/1	Clay	Cow pasture, medium grasses	Subsoil
190	I	0-30	0%	Negative	10YR 2/1	Clay	Cow pasture, medium grasses	Soil Change
190	II	30-50	0%	Negative	10YR 4/1	Clay	Cow pasture, medium grasses	Subsoil
191	I	0-30	50%	Negative	10YR 3/3	Clay Loam	Cow pasture, sparse medium grasses	Soil Change
191	II	30-50	50%	Negative	10YR 4/1	Clay	Cow pasture, sparse medium grasses	Subsoil