A Phase I Archaeological Investigation for Site 4, Port Bienville Industrial Park, Hancock County, Mississippi

Submitted to:

Hancock County Port and Harbor Commission
and
Neel-Schaffer, Inc.

Technical Report 17-139
June 2017

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A PHASE I ARCHAEOLOGICAL INVESTIGATION FOR SITE 4, PORT BIENVILLE INDUSTRIAL PARK, HANCOCK COUNTY, MISSISSIPPI

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MANAGEMENT SUMMARY

Project Name: Environmental Due Diligence for Site 4, Port Bienville Industrial Park

PaleoWest Project Number: 17-098

Phase of Survey: Phase 1 Archaeological Investigation

Location: Hancock County, Mississippi

Survey Area: 35 acres (14.16 hectares)

USGS 7.5-minute Topographic Quadrangle: English Lookout, MS (1993)

Section, Township, Range: S23 and 26 T9S R16W

Results: A search of the Mississippi Department of Archives and History (MDAH) Historic Resources Inventory Database for a 1-mile radius of the project area found a total of 11 previously identified sites and 11 previously conducted surveys. There are no National Historic Register (NHR) eligible sites or properties, or historic cemeteries recorded within the direct area of potential effect (APE). Pedestrian survey and subsurface testing of the project area found no archaeological sites or significant cultural remains.

Fieldwork (subsurface testing) revealed extensive disturbance from previous development within the current project area. There was no evidence of intact cultural material, and all previously recorded sites within the APE were deemed ineligible for inclusion in the National Register of Historic Places (NRHP). This report finds that the proposed undertaking will have no effect on the historic resources of the project area.

Report Author(s): T. Roberts, H. Juergens, K. McMahon

Date of Report: June 30, 2017

INTRODUCTION

This report presents the results of a Phase I Archaeological Investigation for Environmental Due Diligence at Site 4, Port Bienville Industrial Park in Hancock County, Mississippi, completed at the request of Neel-Schaffer, Inc. of Biloxi, Mississippi. The impact area is owned and operated by the Hancock County Port and Harbor Commission.

Site 4 is located within the Port Bienville Industrial Park. The Port Bienville Industrial Park is located south of the town of Pearlington, Mississippi, near the Louisiana state line in Hancock County. This 3,600-acre industrial park is owned and operated by the Hancock County Port and Harbor Commission. Site 4 falls within Sections 23 and 26, Township 9S, and Range 16W, as shown on the 1993 English Lookout, MS USGS 7.5-minute topographic quadrangle map (Figure 1). Site 4 measures approximately 708 m (2,323 ft) long and 245 m (804 ft) wide, with an area of 35 acres (14.16 hectares) (Figure 1).

Fieldwork was conducted from May 3 to May 9, 2017. Additional fieldwork for Site 4 was conducted on June 16, 2017.

The context of the archaeological investigations for the proposed Port Bienville Industrial Park project is derived from the statutory requirements outlined in Section 106 of the National Historic Preservation Act (NHPA). Section 106 of the NHPA requires a federal agency with jurisdiction over a federal, federally funded, or federally licensed undertaking to take into account the effects of the agency's undertakings on properties included in, or eligible for listing on the National Register of Historic Places (NRHP).

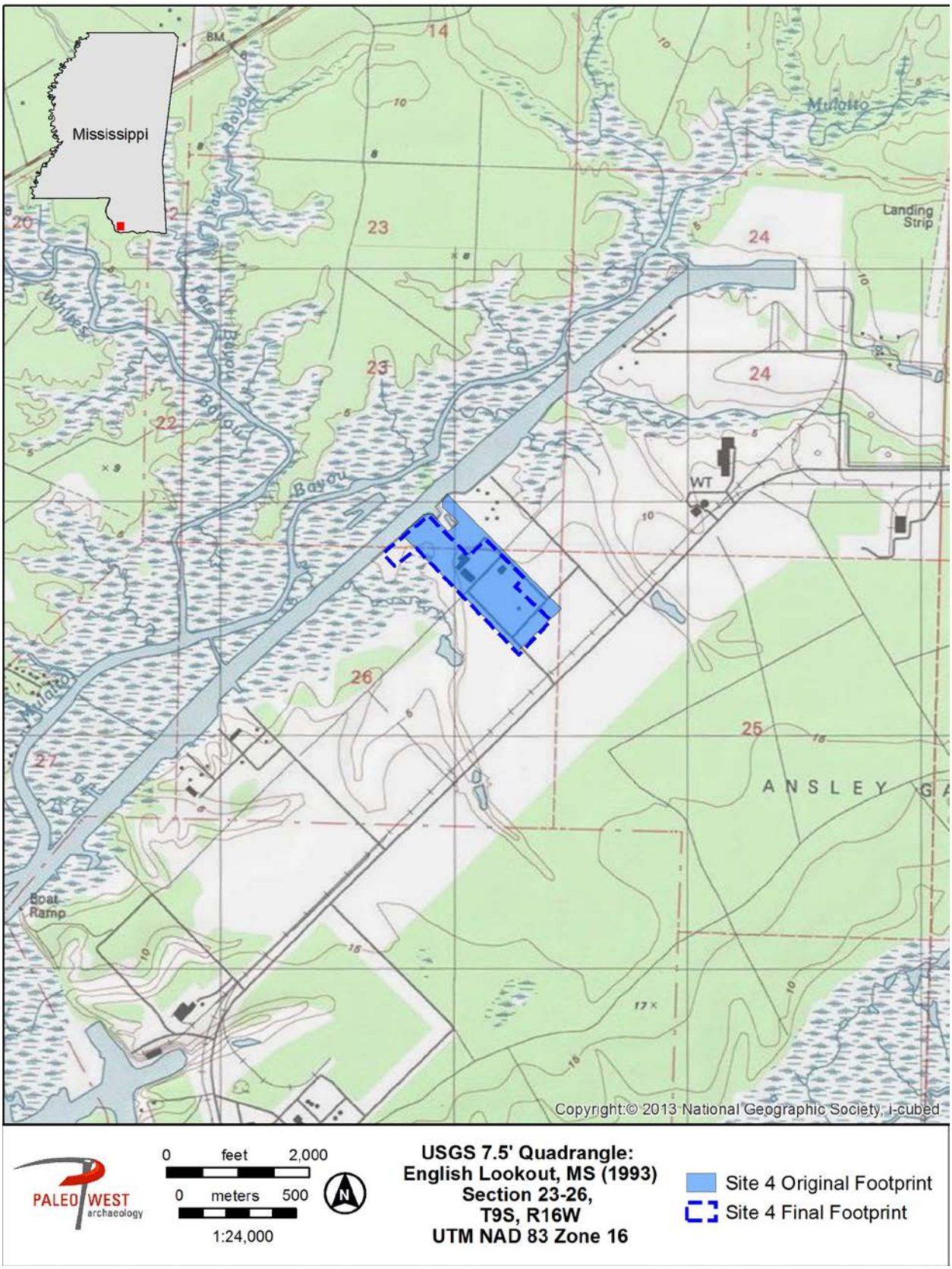

Figure 1. Map showing the vicinity of Site 4.

ENVIRONMENTAL SETTING

PHYSIOGRAPHY

The project area is located in the East Gulf Coastal Plain physiographic zone of south Mississippi. The physiographic zone stretches from the Mississippi River to the Florida Panhandle and from western Tennessee to the Gulf of Mexico. The topography in this region typically ranges from rolling prairie to rugged hills and is characterized by loess bluffs in the west and distinctive lower coastal plain flora.

The project area is situated in the Southern Rolling Plains Physiographic Province of the Mississippi Valley Loess Plains. The Piney Woods region is a high rolling land that was once part of a dense longleaf pine forest that stretched nearly unbroken from Georgia to Texas. According to the MDAH Mississippi Archaeology Trails website, the project area is located in the Pine Hills ecoregion of Mississippi, described as follows:

> Today, almost all of the southern mixed forest and longleaf pine forests are gone, replaced mostly by slash and loblolly pine plantations. The longleaf pine forest provided habitat for now rare or endangered species such as the red-cockaded woodpecker, gopher tortoise, eastern indigo snake, and black pine snake. Wet savannas and bogs contained an array of colorful wildflowers: red lillies, orange milkweeds, yellow pitcher plants, lavender butterworts, and purple sundews. Subsurface materials of the region are composed mostly of the clays and sands of the Hattiesburg and Pascagoula Formations, with some Catahoula Sandstone in the north. Hill summits and higher elevations are composed of Pleistocene and Pliocene-age deposits such as the Citronelle Formation that are generally sandy, gravelly, and porous, and more resistant to erosion than the older underlying Miocene clays and sands.

PALEOENVIRONMENTAL SETTING

Geologically, the project area sits on the Citronelle formation, which consists of tertiary-aged sediments (Omernik and Griffith 2008). Saucier and Sneed (1989) classify the geology as a tertiary upland complex derived from "fluvial sediments from both glacial and non-glacial sources." However, some debate still exists on the origin of these sediments. Though marine fossils are rare throughout the majority of the Citronelle (Isphording and Lamb 1971), a few studies note that certain sections may have been formed, or partially formed, from marine sediments (Means 2009). The Citronelle formation now represents a significant segment of the USGS-defined Gulf Coastal Plain in southern Mississippi, where the project area is located.

Over the last glacial/interglacial cycle, the vegetation in the area has remained largely unchanged. Paleoenvironmental reconstructions conducted with pollen analysis have shown that the vegetation of the region, during the last glacial maximum (ca. 20,000 B.P.), was dominated by southern Diploxylon pines (*Pinus* sp.) (20 to 40 percent), oaks (*Quercus* sp.) (20 percent), and hickories (*Carya* sp.) (20 percent) (Delcourt and Delcourt 1987a). The glacial conditions and the expansion of the Laurentide ice sheet did drive some cold-hearty species like the poplars

(*Populus* sp.) and ash (*Fraxinus* sp.) into the region, but these remained minor components (Delcourt and Delcourt 1987b). As the last glacial cycle ended and climate began to warm, these more northerly vegetation components began to advance back toward the retreating ice sheet. Although there have been several changes in dominance over the last 20,000 years (notably around 8000 B.P., when the percentages of oak pollen briefly surpassed the pines), the major taxa on the landscape have been pines, oaks, and hickories (Delcourt and Delcourt 1987a). In fact, this same study by the Delcourts show that the beta diversity standard deviation (a proxy for species turnover) for the region has remained remarkably low. Today the area falls within Braun's (1950) Southeastern Evergreen region, which once again is dominated by pines, oaks, hickories. Magnolia (*Magnolia* sp.) and hollies (*Ilex* sp.) are also prevalent forest components in this region.

At the local scale, the project area falls within the historic longleaf pine savannah ecosystem (Varner et al. 2005). This ecosystem corresponds with the United States Environmental Protection Agency's Southern Pine Plains and Hills ecoregion (ecoregion #65f) (Omernik and Griffith 2008). A longleaf savannah is an open, fire-dependent forest dominated by longleaf pine (*Pinus palustris*) with a biologically-diverse understory of primarily grasses (*Poaceae* sp.). Varner et al. (2005) and others claim that less than 3 percent of the original longleaf savannah remains today, with logging and fire-suppression being the main sources of loss. In the absence of regular fire, mixed hardwoods and understory shrubs can outcompete the grasses and eventually overtake the landscape (Heuberger and Putz 2003). However, several studies (e.g., Varner et al. 2005) have shown that the reintroduction of fire in these areas can restore the longleaf savannah in a matter of years. In fact, biologists at the University of Southern Mississippi have found similar results on burned test plots of previously fire-suppressed longleaf pine savannah at the Lake Thoreau Environmental Center (Mike Davis, USM biologist, personal communication).

GEOLOGY

Native sedimentary surface rocks such as chert, quartzite and iron stone occur naturally in the region of current study area. Citronelle gravel chert was formed during the Pleistocene and is found in the bluffs above the Mississippi River. Ocola chert is a Gulf Coast Plain agitate that occurs naturally in areas east of the subject property. Tallahatta quartzite is derived from bedrock and commonly found in southeast Mississippi. Prehistoric Native Americans used these surface rocks to manufacture stone tools such as scrapers, knives, and projectile points.

SOILS

The soil type of the project areas varies across the Sites. In the Port Bienville Industrial Park area, Site 4 is primarily Beauregard silt loam (Be) and Poarch fine sandy loam (PoA and B), with minor components of Handsboro association (HA) and Harleston fine sandy loam (HIA). Beauregard silt loam (Be) is formed on the shoulder of coastal plains from loamy alluvium. The typical soil profile is silt loam atop silty clay loam, with a slope of 0 to 1 percent. Poarch fine sandy loam (PoA and B) is formed as interfluve ridges from loamy fluviomarine deposits derived from sedimentary rock. It has a typical profile of fine sandy loam atop loam above finer sandy loam, with a slope of 0 to 5 percent. Handsboro association (HA) is formed as tidal flats of decomposed herbaceous plant remains and alluvium deposits, with a typical profile of mucky silt

loam above stratified muck to loam. This soil type is very poorly drained with a high frequency to ponding. Harleston fine sandy loam (HIA) is described as a loamy alluvium toeslope formed from stream terraces. The typical soil profile is fine sandy loam atop sandy loam atop sandy clay loam.

CULTURE HISTORY

Archaeologists have identified several periods of cultural development throughout the prehistoric southeastern United States. These large-scale horizons are commonly known as Paleoindian, Archaic, Woodland, Mississippi, and Protohistoric or Contact periods, in addition to the region-specific Gulf Formational phase. These periods are often subdivided, temporally and spatially, into smaller regional cultural manifestations. Archaeological cultures are based on a number of characteristics, including technological typologies, settlement patterns, subsistence practices, and other diagnostic attributes such as earthen mound building.

PALEOINDIAN

The Paleoindian period refers to the first people that migrated into North America during the Terminal Pleistocene, at least 12,000 B.P. Paleoindians developed the first culture in the Southeastern United States and are believed to have lived as bands of hunter-gatherers. Paleoindian bands practiced extensive, far-ranging mobility and hunted now-extinct species of megafauna (Bonnichsen and Turnmire 1999). Southeastern Paleoindians used chert to manufacture lanceolate hunting tools such as Clovis (Early Paleoindian) and Dalton (Late Paleoindian) points that have been recovered throughout the state of Mississippi. Other Paleoindian projectile point types found in Mississippi included Suwannee and Simpson point types (McGahey 1992). In fact, more Paleoindian projectile points have been recovered in the Southeast than in any other region of the United States (Bense 1994: 42). While the Clovis complex or culture is well-documented across North America, the Dalton complex is largely confined to the Southeastern United States. Although the Dalton type site is located east of Jefferson City, Missouri (Morse 1997:124), numerous Dalton sites have been identified in Mississippi.

ARCHAIC

The Archaic period represents the most successful and enduring lifeway ever practiced in the Southeast. Archaic cultures date from roughly 10,000 B.P. until 3000 B.P. During this time, Archaic peoples increased the variety of regional point types as foraging territories became smaller through time. This decrease in far-ranging mobility led to an increase in seasonal sedentism, although residential and logistic mobility continued throughout the period (Anderson and Hansen 1988). In turn, such increased sedentism eventually led to a diversification of material culture, represented by the first mound and earthen constructions in the southeast and base camp settlements.

GULF FORMATIONAL

The Gulf Formational period dates from 4500 B.P. through 2100 B.P. Walthall and Jenkins (1976) presented this transitional period between the Late Archaic and Middle Woodland cultures at the 1975 Southeastern Archaeological Conference. In their research, they defined the southern Coastal Plain in Eastern and Western geographic sub-regions. Delineation between the sub-regions begins at the intersection of the Alabama and Florida border, at approximately 31° latitude, and runs north and east to the Tombigbee Waterway drainage (Walthall 1980:78–79). The current study area is situated in the Western Gulf Coastal Plain as defined by Walthall. The appearance of fiber-tempered pottery in the Eastern Coastal Plain along the Atlantic Seaboard marks the beginning of the Gulf Formational stage at approximately 4500 B.P. (Walthall 1980:78) Stallings Island pottery, tempered with vegetable fibers, is considered the earliest ceramics in North America (Walthall 1980:80).

Mineral temper pottery became popular in ceramic manufacturing in the Eastern Coastal Plains during the Middle Gulf Formational period (3200–2500 B.P.). Sand-tempering succeeded the fiber-tempering techniques of the Early Gulf Formational period. The Middle Gulf Formational period experienced advancements, evidenced by the Wheeler Culture, Pickwick Burial Complex, and Bayou La Batre cultures. Archaeologists have characterized this cultural period as a time of interregional trade, population growth, localized environmental adaptations, and developed burial practices (Walthall 1980:91–92).

The Late Gulf Formational period (2500 B.P.–2100 B.P.) is marked by advances in ceramic production including the disappearance of fiber-tempered pottery and the appearance of early Woodland Deptford pottery in the east (Walthall 1980:98).

WOODLAND

The Woodland period dates from 2500 B.P. through 1000 B.P. Native Americans of this time increased earthen mound construction, such as the Bynum Mound Center near Tupelo, Mississippi (Bense 1994:154). In addition, Woodland peoples organized themselves into increasingly complex sociopolitical tribes while intensifying the reliance on maize agriculture. Ceramic production during the Woodland period became more sophisticated as indicated by the Gulf pottery tradition. Pottery designs recovered across Mississippi during the Woodland period include punctuated, brushed, incised, dentate stamped, and rocker stamped, among others (Bense 1994:115). One of the more noteworthy innovations of the Late Woodland period (1500 B.P.–1000 B.P.) was the introduction of the bow and arrow.

MISSISSIPPIAN

The Mississippi period dates from 1000 B.P. until European contact, approximately 500 years ago. Mississippian societies are known for the large platform mound centers such as those seen today at sites in Moundville, Alabama, and Cahokia, Illinois. Native Americans during this time organized themselves into larger, more complex groups known as chiefdoms.

Between 1,000 and 500 years ago, Mississippian cultural traits diffused across the Southeast. Mississippian culture is typically recognized in the archaeological record through the presence of

a series of traits, including but not limited to intensive maize cultivation, settlement in the floodplains of major rivers, shell-tempered pottery, rectangular wall-trench structures, pyramidal earthen mounds, and the long-distance circulation of well-crafted prestige objects. The principle trait that defines Mississippian culture beyond all those previously listed is the emergence of a true ranked society. According to Fried (1967:109), rank societies are those in which positions of elevated status are typically inherited within a single group of elites. In Mississippian society, these ranked social groups were politically integrated at the level of chiefdom. According to Bense (1994: 191), "Chiefdoms usually have two general social classes or ranks: elite and commoner." Mississippian culture, therefore, exhibited a level of social stratification unknown in previous eras.

In addition to the mobilization of material goods and commodities, the chief had the power to mobilize labor, which is then put toward the construction of public works, such as earthen mounds. Between approximately A.D. 900 and 1600, the Southeast was populated by a series of Mississippian chiefdoms that arose and declined across the region at various times. This time period is of particular significance for the cultural continuity of the southeastern United States as much of the inherited trade networks, cultural ties, and technology seen by the European vanguards of exploration were cultivated during this period.

CONTACT PERIOD

Native American culture after European contact and before the Historic period is referred to as the Protohistoric or Contact period. During the Contact period, numerous European inventions were introduced across the Southeastern United States. These items included guns, domesticated livestock, foreign ideas, and catastrophic diseases. The Contact period represents the beginning of a written Southeastern history and the first time European and African influences were felt in South Mississippi.

With the arrival of Spanish explorers on the coasts of Florida, Georgia and South Carolina in the 1520s, expeditions were launched from the Spanish supply base of Cuba to investigate the Gulf Coast. The ill-fated Narvaez expedition of 1527 is believed to have been the first landfall of Europeans in the vicinity of mouth of the Mississippi River. Much of our knowledge of the expedition has been passed down to us through Cabeza de Vaca, a lieutenant of Narvaez who published an account of his experiences following his return to Spain (Covey 1983). Hearing of the "vast riches" found in the interior of southeastern North America, Hernan de Soto sought to capitalize on the wealth identified but not exploited by, Cabeza de Vaca. De Soto was an experienced soldier and veteran of the Pizzaro expedition in South America, an enterprise that provided him with a great deal of personal wealth. He mounted an expedition that would be the first to penetrate the dense woods of North America and would eventually take him through the northern portion of what is now Mississippi. Although de Soto would not return to Spain (he died en route through the Mississippi River Valley), his legacy of contact would continue well into the coming scrabble for territory in the Gulf. By 1600, either directly or indirectly, disease, war, and the introduction of European trade goods rapidly affected traditional regional societies throughout the area (Clayton et al. 1995).

During the seventeenth century, the Muskogean-speaking Choctaw had emerged as a dominant cultural group in Mississippi. The traditional Choctaw territory extended, at the height of their

influence, east of the Tombigbee River, and likely as far east as present-day Paulding County, Georgia. The first known historical reference to the Choctaw appears in a 1675 Spanish text, which warns would-be settlers of the "Chata," depicting the group as "fearsome." It is believed that this depiction of the Choctaw in early Spanish texts was intended to dissuade settlement in the area in favor of established missions in Florida. By the time René-Robert Cavelier descended the Mississippi River Valley in 1682, the Choctaw had developed the cultural and political organization that would be in place for the next 150 years.
During the historic period, the Choctaw Nation was divided into three primary groups, Eastern, Western and Southern, each with their own political leader and, at times, allegiances to European powers. Although La Salle was the first French citizen, along with Italian-born Henri de Tonti, to enter the traditional Choctaw territory in 1682, according to his successor Pierre LeMoyne Sieur D'Iberville he apparently made no attempts to contact the group for diplomatic purposes (Weddle 1991).

HISTORIC PERIOD

Choctaw contact with the French in 1699 established a long-standing relationship with the European power, which was largely based on their allegiance against the English during the Wars of Succession (French and Indian Wars). This relationship lasted 65 years until the end of the Seven Years War (1763) when the French were forced to cede all territory east of the Mississippi River to the English (Bense 1994).

Following the Seven Years War, France ceded Louisiana to Spain. Taking advantage of their newly inherited colony, Spain concerned itself with establishing this portion of the Gulf as a military buffer between British Florida and its own flagship colony of Mexico. Fearing a possible disruption in the flow of trade goods from Mexico, the Spanish government actively recruited colonist from the Canary Islands (known as Islenos) to establish four settlements east of New Orleans to protect the area from potential British invasion. The Islenos were well suited to establish farms and plantations in the area due to their experience with raising sugar cane on the Canary Islands since they were colonized in the fifteenth century. The first Islenos arrived in 1778 and settled La Concepcion, to the southwest of the current project area, opposite the mouth of the Pearl River. The settlement was later renamed San Bernado (St. Bernard) after the patron saint of Louisiana's governor Bernardo de Galvez (Chavez 2002). Also at this time, the Choctaw began a migration to the west in order to better establish themselves as a trading conduit between the Spanish and English settlements. By the 1760s the Choctaws had moved further south and established settlements on the north shore of Lake Pontchartrain, where they found ready allies among French colonists who were resistant to English and Spanish authority. Spanish documents of the time refer to these Choctaws as "wandering Indians" (Usner 1992).

Following repeated attempts by Great Britain to cease Spain's financial support of the Whig cause during the American Revolution, Spain declared war on Great Britain in 1779. As part of the global Anglo-Spanish conflict, Governor Galvez led an expeditionary force against British-held territories along the gulf coast. This offensive, known as the Galvez expedition, led to the successful capture of Mobile in 1780 and Pensacola in 1781. Among Galvez's troops was a large contingent of Islenos. Governor Galvez took a keen interest in the success of the Islenos' settlements after the war and ensured their subsidization from the Spanish treasury until 1785 when they were declared self-sufficient (Chavez 2002). Choctaw warriors were largely divided

among the East, West and Six Towns during the Anglo-Spanish Conflict, with some taking part in the British defense of Pensacola and the remainder siding with the French, Spanish and Whig forces. It is likely, given the French influence on their part of the nation that the Choctaws in the vicinity of the project area would have sided with the Spanish (Coker and Rea 1981). The capture of Mobile and Pensacola ensured Spanish dominance of the gulf coast until Louisiana was sold to the United States following the territories brief transfer to France in 1803.

After the Treaty of Paris (1783), ending the American Revolution, the English were forced to cede all lands east of the Mississippi River to the newly formed United States. With the no other European powers to compete for land, the young nation set its sights on the vast interior of the continent. As was commonly experienced among native tribes in the southeast following the American Revolution, the Choctaw were forced to fight for their lands and sovereignty. A treaty signed in 1786 affirmed the boundaries of the Choctaw and established them as a sovereign nation. However, the largely sympathetic policies of the Washington administration were replaced with those more conducive to expansion and settlement by white interests (Haynes 2010).

Beginning with the Treaty of Fort Adams in 1801, when the land supporting the proposed project area is located, the Choctaw ceded over 23 million acres of land to the United States. The final land cession took place in 1830 at Dancing Rabbit Creek, which also outlined the terms of the Choctaws removal west to the Oklahoma Territory (Brown 2007). On the agreement that they would become United States citizens, the treaty provided a land allotment for any Choctaws that wished to remain in Mississippi. However, among the roughly 4,000 Choctaws that decided to remain in the state, many never received the land, or were forced to sell their allotment in order to survive. The descendants of these people formed the core of the Mississippi Band of Choctaw Indians, which became a federally recognized tribe in 1945.

LOCAL HISTORY

Hancock County is the southernmost county in Mississippi. Founded in 1812, the county is named for John Hancock, the wealthy American merchant and statesman. Bay Saint Louis is the county seat. Bay Saint Louis was claimed in the name of France by Iberville in 1699 as part of an expedition to find the mouth of the Mississippi River. Hancock County has relied on this major water transport point as part of its economy ever since. During the Civil War, Abraham Lincoln strategically blockaded the Mississippi Sound, severing this high traffic channel.

Railroad service came to Mississippi when the New Orleans, Jackson and Great Northern were constructed through the western edge of Pike County. The Great Northern was chartered in 1851 and construction was completed prior to the Civil War. It connected New Orleans, Louisiana to Canton, Mississippi (Estaville 1973). In Canton, it linked with the Mississippi Central, bringing it into Tennessee, and from there it linked with the Illinois Central, bringing service north to Chicago (Wilson and Rehberg 2014). Following the Civil War, the rail line between New Orleans and Mobile, Alabama was completed. In 1870, daily commuter service to New Orleans was available to residents of Bay Saint Louis. An automobile bridge was built across the Bay of Saint Louis in 1928.

Through the nineteenth and early-twentieth centuries, the local economy of Hancock County relied heavily on the sawmill industry. Timber was brought from miles away to the Weston, Poitevent, Eads mill at Logtown. Rail lines served to support the industry. Port Bienville Industrial Park, located in Bay St. Louis, supplies multi-modal warehouse and trans-load facilities to the Port Bienville Railroad, which operates across Mississippi. The Industrial Park can store up to 429 rail cars at one time, serving a variety of industries that make shipments across the Gulf Coast.

In 1963, NASA established the Stennis Space Center in Hancock County bringing with it a significant source of employment and income for the region. The space center serves as the largest rocket engine test complex in the U.S. The Stennis International Airport, which is included in the current project, was originally called the Hancock County airport until it was renamed for Mississippi Senator John C. Stennis.

In recent history, the Mississippi Gulf Coast was impacted by two major hurricanes that severely damaged private property and public infrastructure: Hurricane Camille in 1969 and Hurricane Katrina in 2005.

METHODS

Phase IA investigations included a records review conducted through the Mississippi Department of Archives and History (MDAH) Historic Resources Inventory Map GIS online mapping database for cultural resources within a 1-mile radius of the project area. The GIS data include information about known archaeological sites and surveys and architectural properties. Archaeological sites, historic structures, and cemeteries were provided as point locations and polygons that were digitized into PaleoWest's ArcGIS-based maps. Associated attribute tabular data for the resources and projects derived from the GIS analysis, desktop review, and site file search were incorporated into the following Results section of the report. Soil data were gathered using the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Web Soil Survey (NRCS 2017). The Culture History and Environmental Setting sections were produced using a combination of scholarly, grey, and online resources (see References Cited).

Phase IB investigations consisted of pedestrian survey and subsurface testing in the project area. The interval between shovel test pits (STPs) was not to exceed 30 m (98 ft.). STPs were round and measured no more than 30 cm (12 in.) in size. All excavated soil was screened through ¼ in. hardware cloth to facilitate the recovery of artifacts. STPs were excavated in natural stratigraphic layers to culturally sterile subsoils or to a maximum 1 m (ca. 3 ft.) in depth. Soil texture was recorded using standardized terminology and soil colors were recorded using Munsell© soil color charts. STP locations were recorded using a GPS unit with differential corrections applied.

PaleoWest employed a fully digital data collection workflow during field investigations. All images and data were collected digitally using iPad tablets and smartphones connected to office servers over high-speed cellular data networks. Collecting data in the field over cellular networks allowed data to be available to all members of the crew on-site, as well as all off-site PaleoWest

staff, in real time. As data were entered in the field, a PaleoWest data manager was concurrently checking and cleaning records, allowing us to address potential issues in the datasets while excavations were open, and before crews left the field. The database system used for data collection in the field was used to provide the platform for data collection and management through analysis and reporting.

No artifacts were recovered during this survey. Therefore, no laboratory methods were necessary.

RESULTS

SITE FILE RESEARCH

The Phase IA search of the Mississippi Department of Archives and History (MDAH) found 11 previously identified archaeological sites and 11 prior surveys located within a 1-mile radius of the project area (Figure 2). There are no National Historic Register (NHR) eligible sites or properties, or historic cemeteries recorded within the direct APE. Pedestrian survey and subsurface testing of the project area found no intact cultural material, no archaeological sites or significant cultural remains.

Surveys

All 11 prior surveys are outlined in the table below (Table 1). The area of Site 4 includes one survey (82-011) that closely overlaps the direct APE (Figure 2).

Survey 82-011, entitled Archaeological Survey of Lot 8 and a Portion of Lot 7 Port Bienville Industrial Park, conducted for Hancock County Port and Harbor Commission, was submitted in March of 1982 by Heisler. The study was conducted ahead of a launch ramp installation project located within the APE of Site 4. Spoil (47,500 cubic yards) was spread over a low-lying area of Lots 7 and 8 that were previously marshy. The survey found two prehistoric archaeological sites (Table 2). One site, HA559 Gonzales Marine Site, was classified as Middle Woodland/Late Woodland. A complete surface collection was made of a 40 x 40 m area, centering on the first artifact found. Artifacts consisted of one plain grog tempered potsherd and two pieces of daub. This site was deemed insignificant and ineligible for the NHR due to heavy disturbance from land clearing and large machinery excavation. According to the survey report, its “contextual integrity has been completely destroyed.” Site HA560 was also found, although outside of the survey perimeters. It consisted of a distal fragment of a white chert blade. It was revisited in a later survey by Heisler, and no associated cultural material was found. Soil stratigraphy was consistent throughout the survey with 10 cm of dark organic soil atop culturally sterile sand. A number of very large spoil heaps were scattered across the lot, which are the result of land clearing, trench digging, and large-scale excavations.

The remaining 10 surveys in a 1-mile vicinity do not overlap the immediate project area. All the surveys are included and described in the following table.

Table 1. Surveys Within the Project Vicinity

Survey Number	Survey Title	Date	Author	Summary
03-088	A CR Evaluation of an Emergency Streambacnk Stabilization Project (Section 14), Port Bienville Industrial Park, Hancock County, MS	2003	Sims	46 Acres: 7 judgmental STPs, extensively disturbed drainage corridor, no cultural resources reported
08-279	Phase I CRS of Proposed Wastewater Collection System (Project S3&S4) Pearlington, Hancock County, MS	2008	Lauro	121 Acres: Survey + 296 STPs, relocated previously recorded prehistoric site HA532, recommended Phase II
09-0690	A Phase I CRA of a Proposed Mining Site in S7, 13, 14, and 23 T9S R16W, and a portion of S18 T9S R15W, Hancock County, MS	2008	Thorne	1,414 Acres: Survey + 249 STPs, disturbance from pine plantation activities, no cultural resources reported
12-0251	CRS Port Bienville- Proposed Railroad Spur, 3.5 Acres in Hancock County, Mississippi, S24 T9S R16W	2012	Roberts, McMahon	3.5 Acres: Survey + 27 STPs, disturbance from land altering activities, no cultural resources reported
12-0306	A Phase I CRS of Proposed Dock Dredging Areas of the Port Bienville Industrial Park Canal, Hancock County, MS	2012	Alvey and Baca	20 Acres: Survey + 11 STPs, all areas disturbed by dock construction. Relocated two previously recorded sites: HA506 destroyed by construction activities; 22Ha501 still listed on NRHP.
15-0053	Phase I CRS of the Proposed Anderson Rail Spur, Hancock County, Mississippi	2015	Jackson & Glass	1 Acre: survey conducted by TerraX. No survey report available on MDAH.
82-011	Archaeological Survey of Lot 8 and a Portion of Lot 7 Port Bienville Industrial Park, Conducted for Hancock County Port and Harbor Commission	1982	Heisler	Overlaps APE of Site 4. 89 Acres: Survey + 10 STPs. Two prehistoric sites found, determined not significant due to extensive development disturbance.
83-096	Archaeological Survey of Selected Areas of the Port Bienville Industrial Park	1983	Heisler	Overlaps APE of Site 11. 350 Acres: Survey + test pit + auger holes, prehistoric sites determined ineligible due to clearing and dredging disturbance
93-267	CRS of a Proposed Spoil Pile Site in Hancock County, MS, Preformed at the Request of Mr. Larry Lewis for Brown and Mitchell, Inc.	1993	Mann	9 Acres: Survey + 15-20m interval STPs and auger tests, disturbance from land altering activities , no cultural resources reported
96-056	CRS of Approximately 320 Acres, Hancock County, Mississippi	1996	Lauro	320 Acres: Survey + 30m interval STPs. 1 unknown aboriginal surface scatter and 5 historic sites recorded, all determined not eligible except for 22HA615 Old Powell Home Site.
98-038	CRS of Approximately 25 Acres, Hancock County, MS, Port Bienville Industrial Complex	1998	Lauro	25 Acres: Survey + 30m interval STPs, no cultural resources reported

Sites

Eleven sites are located in the vicinity of the project area, none of which will be affected by the proposed development (Figure 5). Extensive cultural resource assessment has been conducted within the Port of Bienville Industrial Park over the last 50 years because it was the locus of intense prehistoric and historic activity.

One previously recorded site overlaps with the current project area: HA559. Site HA559, known as the Gonzales Marine Site, was a late Middle Woodland/Late Woodland sparse surface scatter. It was not originally recommended for NRHP eligibility, and in 2006 the site was revisited as part of a post-Katrina site assessment survey by CEI for MDAH. Boudreaux reported at that time that the site was heavily damaged by dredge-spoil and destroyed. Site HA559 is not eligible for listing on the NRHP.

The following table summarizes the 11 previously reported sites within a 1-mile radius of the current project area.

Table 2. Sites Within the Project Vicinity

Site Number	Site Name	Period	Material	NRHP
HA539	Ford #6	Unknown Aboriginal	Landform with no archaeological materials	Unevaluated
HA559	Gonzales Marine Site	Middle and Late Woodland	Sparse scatter including 1 buff grog tempered plain sherd, 2 pieces burned daub	Unknown
HA560	Lot 7 Site	Unknown Aboriginal	1distal end of white chert blade	Unevaluated
HA562	Louis Site	Middle/Late Woodland	Oyster shell midden on edge of man-made barge canal	Ineligible
HA584	Unnamed	Unknown Aboriginal	Rangia shell midden covered in dredge spoil	Ineligible
HA615	Old Powell Home Site	Historic 19th-20th C.	Historic ceramic sherds, bottle and window glass, wire and cut nails, brick and metal fragments, 2 marked graves (1904 and 1936)	Ineligible
HA617	Unnamed	Historic 19th-20th C.	Ceramic sherds, bottle glass, wire and cut nails	Ineligible
HA661	Unnamed	Unknown Aboriginal	Bone, shells, 2 flakes, 3 shatter, 1 core, baked clay fragment	Unknown
HA662	Unnamed	Unknown Aboriginal Historic 20th C.	Shell midden, bone fragments, bone pin, baked clay fragments, 3 flakes, modern concrete and nail	Unknown
HA664	Unnamed	Unknown Aboriginal	No material described	Ineligible
HA665	Unnamed	Unknown Aboriginal	12 flakes (1 Novaculite); 2 shatter, 1 bone (calcined antler tip); 1 sandstone fragment; 1 retouched pebble	Ineligible

Figure 2. Previous sites and surveys within a 1-mile vicinity of Site 4.

PEDESTRIAN SURVEY AND SUBSURFACE TESTING

Phase IB consisted of pedestrian survey and subsurface testing. Pedestrian survey of the project area found evidence of extensive disturbance due to previous railway and road construction, backfill and grading for parking areas, and associated ditch construction. Due to this extensive development, the area of Site 4 was considered low probability.

Site 4 was predominately cleared of ground cover, with a small portion of dense vegetation in the northwest corner. Much of the project area is upland and fairly dry.

Subsurface testing investigated 199 STP locations at Site 4. Across the project area, subsurface testing revealed extensive disturbance from previous development. Extremely mottled soils were common at depths down to 30 cm, at which point sterile subsoil was encountered. This disturbance could be reflective of numerous activities associated with industrial park development, ranging from clearing, leveling, and ditch construction, to the deposition of dredged material.

There was no evidence of intact cultural material in the project area, and all previously recorded sites within the APE were no longer evident and deemed ineligible for inclusion in the NRHP. Fieldwork results for Site 4 are described below.

Site 4

Site 4 covers an area of approximately 35 acres. At the time of excavation, the footprint for Site 4 was larger at 43 acres, which was justified slightly to the northeast of its current configuration. Site 4 runs roughly northwest to southeast. It is bounded on the northwest by the canal, to the east and west by access roads, and to the southeast by an industrial building and parking lot. The entire footprint of Site 4 was covered by pedestrian survey at 30 m intervals, running parallel to the area boundaries. Site 4 was fairly dry and evidenced conspicuous development. There was evidence of ground clearing and land manipulation across the entire site. Raised, graded fields were outlined with bermed gravel access roads and drainage ditches (Figure 3). A rail line runs down the middle of the area, terminating near the paved boat launch. Evidence of recent industrial activity between the boat launch and the rail line includes piles of gravel and other materials (Figure 4). Three cracked concrete pads situated just to the northeast of site HA559 appear to be in disuse.

A previous survey, 82-011, overlaps with Site 4 (Figure 2). The survey was conducted ahead of a launch ramp installation, wherein 47,500 cubic yards of dredge spoil was used to grade low-lying marshy areas. The Gonzales Marine site HA559, a Middle Woodland/Late Woodland artifact scatter consisting of one plain grog-tempered potsherd and two pieces of daub, was located within Site 4. This site was deemed insignificant and ineligible for the NRHP due to heavy disturbance from land clearing and large machinery excavation. No trace of site HA559 was evident during the pedestrian survey.

Site 4 was excavated on a 30-m grid, running parallel to the area boundaries (Figure 10). The original 43-acre area was covered by 193 STPs, including STPs 140–323. When the footprint changed to 35 acres, Site 4 was revisited and 6 additional STPs (STPs 665–670) were excavated in the northwest corner. The typical soil profile for the northwest corner was 30 cm of very dark grayish brown silty loam atop dark grayish brown silty loam subsoil. Soils did not appear to be naturally occurring, but previously cleared and graded. Significant portions of the project area adjacent to the canal appeared to be periodically flooded (Figure 5). Modern deposition of Rangia shell was observed on the surface in areas adjacent to the canal, which was most likely put in place to prevent erosion. Thirty-three STPs along the northeast edge of Site 4 are no longer within the 35-acre footprint, but their data is included in the STP results table (Figure 10, Appendix A).

All STPs excavated on the 30-m grid within the vicinity of HA559 were negative for cultural material. STP 323 was excavated as a judgmental within the boundaries of HA559 (Figure 6). It was also negative, with a soil profile of 18 cm of brown sandy clay loam atop sterile yellowish brown sandy clay (Figure 7). A typical soil profile for the graded fields in Site 4 consists of brown loamy sand atop light yellowish brown sandy loam with roots throughout (Figure 8). Some STPs were not excavated when they lay over rail lines or hard gravel or concrete surfaces (Figure 9). See Appendix A for a full list of STP results.

Figure 3**.** Bermed gravel access roads and drainage ditches in southeastern portion of Site 4.

Figure 4. Ongoing industrial activity, central area of Site 4.

Figure 5. Northwest corner of Site 4, cleared and leveled with signs of canal erosion.

Figure 6. STP 323 in progress.

Figure 7. Judgmental STP 323 in HA559 area.

Figure 8. STP 215, typical for leveled fields in Site 4.

Figure 9**.** Typical rail and gravel road disturbance condition in Site 4 (STPs 234–238).

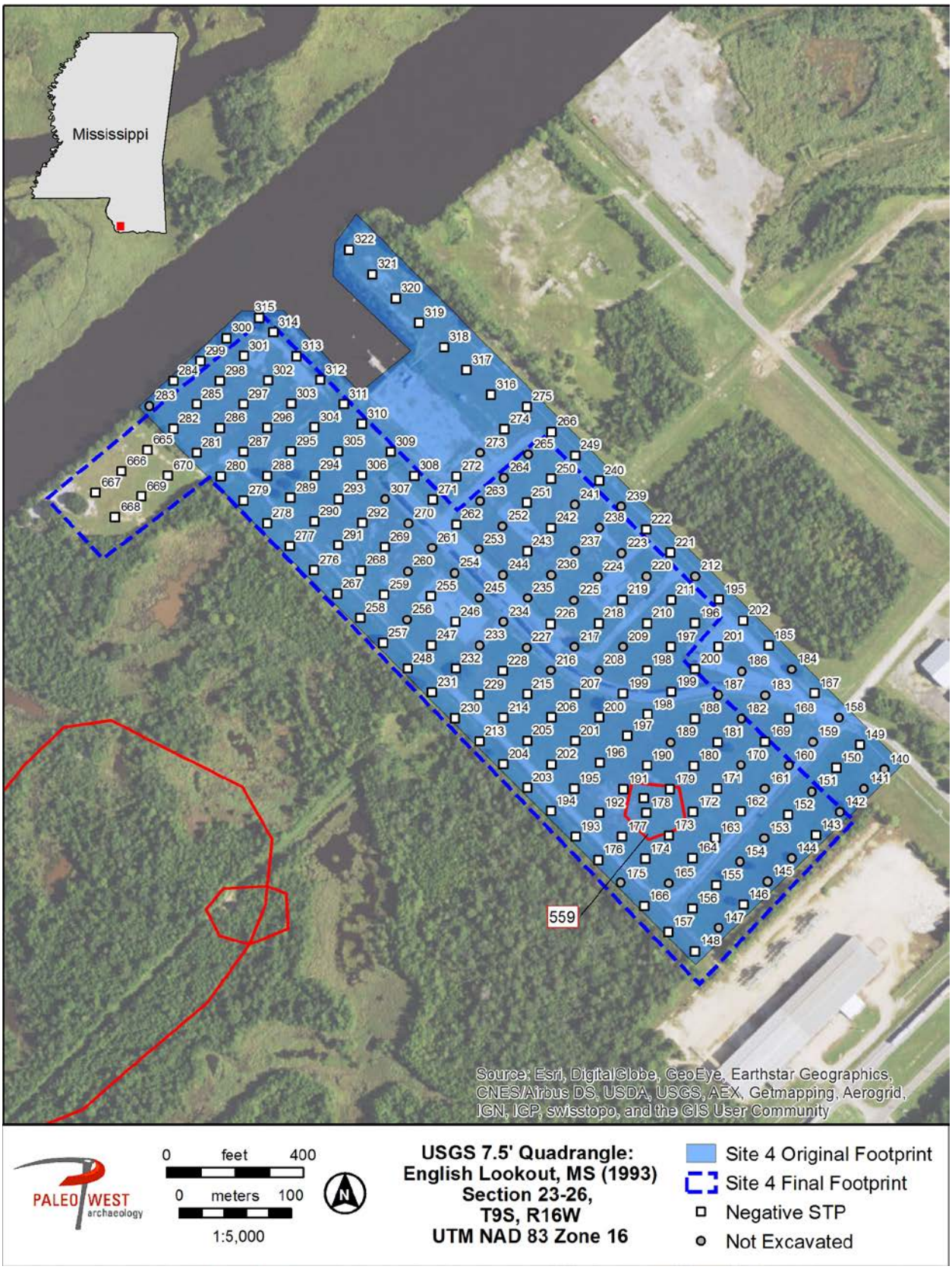

Figure 10. Results map for Site 4.

CULTURAL RESOURCES SENSITIVITY ASSESSMENT

No traces of prehistoric or historic cultural material was found in either the surface survey or subsurface investigations of the project area. There is no evidence to suggest that the project area contains intact prehistoric or historic cultural deposits, and it should not be considered archaeologically sensitive due to industrial development, road construction disturbance, and wetland conditions.

RECOMMENDATIONS

Four criteria are applied during the evaluation of an archeological resource's eligibility for inclusion in the NRHP. Normally, a resource must be at least 50 years of age and meet at least one of the following four criteria to be considered eligible for inclusion in the NRHP:

- Be associated with events that have made a significant contribution to the broad patterns of our history (Criterion A);
- Be associated with the lives of persons significant in our past (Criterion B); or
- Embody the distinct characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction (Criterion C); or
- Yield, or be likely to yield, information important in prehistory or history (Criterion D).

If the significance of a resource is established, then it is necessary to determine if the resource retains the integrity for which it is significant. The integrity of a resource is evaluated in regard to its location, setting, design, materials, workmanship, feeling, and association.

Pedestrian survey and subsurface investigations did not identify any prehistoric or historic cultural material or features within the proposed project area. Previous construction and development resulted in significant ground disturbance, which makes it unlikely for the project area to yield additional information. Based on the results of this archaeological investigation, PaleoWest Archaeology and Gulf South Associates recommends a finding of "no historic properties affected" and that the project be allowed to proceed as designed without further historic review.

If archaeological remains are discovered in course of construction it is recommended that all work in the vicinity should stop immediately, the Mississippi Department of Archives and History should be contacted, and a professional archaeologist brought in to conduct an assessment.

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Appendix A: STP Results

STP Number	Stratum: Depth	Munsell Soil Description	Comments
140	Not Excavated	N/A	Not excavated due to standing water
141	Not Excavated	N/A	Not excavated due to standing water
142	Not Excavated	N/A	Not excavated due to standing water
143	1:0-10	10YR4/4 75% shell dark yellowish brown sandy loam	NCM, Graded
144	Not Excavated	N/A	Not excavated due to standing water
145	Not Excavated	N/A	Not excavated due to standing water
146	1:0-15	10YR4/4 dark yellowish brown loamy sand	NCM
	II:15-25	10YR5/4 yellowish brown loamy sand	NCM
147	Not Excavated	N/A	Not excavated due to standing water
148	I:0-20	10YR4/4 dark yellowish brown sandy loam	NCM
	II:20-30	10YR5/4 yellowish brown loamy sand	NCM
149	I:0-10	10YR4/1 Roots dark gray sandy loam	NCM
150	I:0-10	10YR4/1 Gravel dark gray loamy sand	NCM, high gravel content under first several centimeters
151	Not Excavated	N/A	Not excavated due to standing water
152	I:0-5	10YR4/1 Gravel dark gray loamy sand	NCM, field likely grated and has shell fill
153	Not Excavated	N/A	Not excavated due to standing water
154	Not Excavated	N/A	Not excavated due to standing water
155	I:0-23	10YR4/1 Roots dark gray sandy loam	NCM
	II:23-33	10YR6/6 Roots brownish yellow loamy sand	NCM, mottled with a 10yr 6/1
156	I:0-22	2.5Y6/4 Roots light yellowish brown sandy loam	NCM
	II:22-32	10YR3/2 Roots very dark grayish brown loamy sand	NCM, manganese staining

STP Number	Stratum: Depth	Munsell Soil Description	Comments
157	I:0-20	10YR4/1 Roots gravel dark gray loamy sand	NCM
	II:20-30	2.5Y6/4 Gravel light yellowish brown sandy loam	NCM
158	Not Excavated	N/A	Not excavated due to standing water
159	Not Excavated	N/A	Not excavated due to standing water
160	Not Excavated	N/A	Not excavated due to standing water
161	Not Excavated	N/A	Not excavated due to standing water
162	I:0-20	10YR3/2 very dark grayish brown loam	NCM
	II:20-28	10YR2/1 black sandy loam	NCM
	III:28-40	10YR6/3 pale brown sandy clay loam	NCM, mottled w 10 yr 5/8 hydric
163	I:0-20	10YR3/2 very dark grayish brown loam	NCM
	II:20-34	10YR6/3 pale brown sandy clay loam	NCM, hydric mottled w 10 yr 5/8, water at 29 cm bmgs
164	I:0-17	10YR3/2 very dark grayish brown loam	NCM
	II:17-26	10YR6/4 light yellowish brown sandy clay loam	NCM, water at 29 cm bmgs some traces of hydric iron
165	Not Excavated	N/A	Not excavated due to standing water
166	I:0-15	10YR3/2 very dark grayish brown loam	NCM
	II:15-30	10YR6/4 light yellowish brown sandy clay loam	NCM, hydric soil mottled w 10 yr 5/8
167	I:0-20	10YR4/4 dark yellowish brown sandy loam	NCM
	II:20-30	10YR5/4 W/ ox yellowish brown loamy sand	NCM
168	I:0-15	10YR4/4 dark yellowish brown sandy loam	NCM
	II:15-25	10YR5/3 brown loamy sand	NCM
169	1:0-10	10YR4/4 dark yellowish brown sandy loam	NCM
	II:10-20	10YR5/4 yellowish brown sandy clay	NCM
170	Not Excavated	N/A	Not excavated due to standing water
171	I:0-10	10YR4/4 dark yellowish brown sandy loam	NCM
	II:10-20	10YR5/4 yellowish brown	NCM
172	I:0-5	10YR4/4 dark yellowish brown sandy loam	NCM
173	I:0-10	10YR4/4 dark yellowish brown sandy loam	NCM
	II:10-20	10YR5/4 yellowish brown	NCM
174	I:0-20	10YR4/2 Gravel dark grayish brown loamy sand	NCM

STP Number	Stratum: Depth	Munsell Soil Description	Comments
	II:20-30	2.5Y6/4 Roots light yellowish brown sandy loam	NCM, manganese staining present
175	Not Excavated	N/A	Not excavated due to standing water
176	I:0-10	10YR4/4 dark yellowish brown sandy loam	NCM
	II:10-20	10YR5/4 yellowish brown	NCM
177	I:0-12	10YR4/2 Gravel dark grayish brown loamy sand	NCM
	II:12-18	10YR5/3 Gravel brown sand	NCM
	III:18-28	2.5Y6/4 Gravel light yellowish brown sandy loam	NCM, manganese staining present
178	I:0-18	10YR4/3 brown sandy clay loam	NCM
	II:18-34	10YR5/6 yellowish brown sandy clay	NCM, some hydric striations
179	I:0-12	10YR4/1 Roots dark gray loamy sand	NCM
	II:12-22	10YR5/6 yellowish brown sandy clay	NCM
180	I:0-15	10YR4/1 Roots dark gray loamy sand	NCM, immediately adjacent to a concrete pad
	II:15-28	10YR5/6 yellowish brown sandy clay	NCM
181	I:0-20	10YR4/1 Roots dark gray loamy sand	NCM
	II:25-35	10YR6/4 Roots light yellowish brown sandy loam	NCM
182	Not Excavated	N/A	Not excavated due to standing water
183	Not Excavated	N/A	Not excavated due to standing water
184	Not Excavated	N/A	Not excavated due to standing water
185	I:0-5	10YR4/4 dark yellowish brown sandy loam	NCM
	II:5-15	10YR5/4 yellowish brown loamy sand	NCM
186	Not Excavated	N/A	Not excavated, Railroad
187	Not Excavated	N/A	Not excavated due to standing water
188	I:0-10	10YR4/4 dark yellowish brown sandy loam	NCM
	II:10-20	10YR5/3 brown	NCM
189	Not Excavated	N/A	Not excavated due to standing water
190	I:0-10	10YR4/4 dark yellowish brown sandy loam	NCM
	II:10-20	10YR5/3 brown loamy sand	NCM
191	I:0-10	10YR4/4 dark yellowish brown sandy loam	NCM, mottled W/ 10YR 6/4 sand
192	I:0-10	10YR5/4 W/. 6/4 sand and shell yellowish brown	NCM
193	I:0-10	10YR4/4 dark yellowish brown sandy loam	NCM
	II:10-20	10YR5/4 yellowish brown loamy sand	NCM

STP Number	Stratum: Depth	Munsell Soil Description	Comments
194	I:0-19	10YR4/3 brown loam	NCM
	II:19-32	10YR6/3 pale brown sandy clay loam	NCM, hydric mottled w 10 yr 5/8
195	I:0-15	10YR4/3 brown loam	NCM
	II:15-38	10YR6/6 brownish yellow sandy clay loam	NCM, some hydric striations
196	I:0-14	10YR3/2 very dark grayish brown loam	NCM
	II:14-30	10YR6/4 light yellowish brown sandy clay loam	NCM, some hydric striations
197	I:0-18	10YR4/3 brown loam	NCM
	II:18-32	10YR6/4 light yellowish brown sandy clay loam	NCM, some hydric striations, water at 32 cm bmgs
198	I:0-10	10YR3/2 very dark grayish brown loam	NCM, filled with water immediately
199	I:0-19	10YR4/3 Roots brown loamy sand	NCM
	II:19-29	10YR5/6 Roots yellowish brown sandy loam	NCM
200	I:0-21	10YR4/3 Gravel brown loamy sand	NCM
	II:21-31	10YR5/6 Roots yellowish brown sandy loam	NCM
201	I:0-18	10YR4/3 Roots brown loamy sand	NCM
	II:18-28	10YR6/6 Roots brownish yellow sandy loam	NCM
202	I:0-9	10YR3/4 dark yellowish brown loam	NCM
	II:9-26	10YR5/6 Gravel yellowish brown sandy clay	NCM, layer of Sandy clay fill atop a layer of road gravel
	III:26-40	10YR3/2 very dark grayish brown sandy clay loam	NCM
203	I:0-17	10YR4/3 Roots brown loamy sand	NCM
	II:17-27	10YR5/6 Roots yellowish brown sandy loam	NCM
204	I:0-20	10YR4/3 brown sandy loam	NCM
	II:20-30	10YR5/4 yellowish brown	NCM
205	I:0-10	10YR4/4 dark yellowish brown sandy loam	NCM
	II:10-20	10YR5/4 yellowish brown loamy sand	NCM
206	I:0-10	10YR4/4 dark yellowish brown sandy loam	NCM, mottled W/ 10 yr 5/4 loamy sand
207	I:0-5	10YR4/4 dark yellowish brown sandy loam	NCM
	II:5-15	10YR5/3 W/ ox brown loamy sand	NCM
208	Not Excavated	N/A	Not excavated due to standing water
209	Not Excavated	N/A	Not excavated due to standing water
210	1:0-5	10YR4/4 dark yellowish brown sandy loam	NCM
	II:5-15	10YR5/3 W/ ox brown sandy clay	NCM
211	I:0-10	10YR5/3 W/ ox brown	NCM

STP Number	Stratum: Depth	Munsell Soil Description	Comments
212	Not Excavated	N/A	Not excavated due to standing water
213	I:0-23	10YR4/3 Roots brown loamy sand	NCM
	II:23-33	10YR5/6 Roots yellowish brown sandy loam	NCM
214	I:0-16	10YR4/2 Roots dark grayish brown loamy sand	NCM
	II:16-26	10YR5/6 Roots yellowish brown sandy loam	NCM
215	I:0-24	10YR4/3 Roots brown loamy sand	NCM
	II:24-34	2.5Y6/4 Roots light yellowish brown sandy loam	NCM
216	Not Excavated	N/A	Not excavated due to standing water
217	Not Excavated	N/A	Not excavated, gravel pile
218	I:0-20	10YR3/2 Roots very dark grayish brown loamy sand	NCM
	II:20-30	10YR5/6 Roots yellowish brown sandy loam	NCM
219	I:0-11	10YR4/3 Roots brown sandy loam	NCM
	II:11-21	10YR5/6 Roots yellowish brown sandy clay loam	NCM, mottled with 7.5yr5/8 and 10yr7/1 and 7.5yr6/6
220	Not Excavated	N/A	Not excavated due to standing water
221	I:0-10	10YR5/6 Gravel yellowish brown sandy clay loam	NCM, mottled with 10yr7/1 and 10yr7/6
222	I:0-13	10YR4/3 Gravel brown loamy sand	NCM
	II:13-23	10YR5/6 Gravel yellowish brown sandy clay loam	NCM, adjacent to existing pipeline
223	Not Excavated	N/A	Not excavated due to standing water
224	Not Excavated	N/A	Not excavated due to standing water
225	Not Excavated	N/A	Not excavated due to standing water
226	I:0-10	7.5YR5/4 W/ 10 yr 4/4 brown clay	NCM
227	Not Excavated	N/A	Not excavated due to standing water
228	I:0-10	10YR4/4 dark yellowish brown sandy loam	NCM
	II:10-20	10YR5/3 brown loamy sand	NCM
229	I:0-10	10YR5/4 W/ 10 yr 4/4 yellowish brown sandy loam	NCM
230	I:0-20	10YR4/3 brown sandy loam	NCM
	II:20-30	10YR5/3 brown loamy sand	NCM
231	I:0-10	10YR5/4 W/ 7.5 yr 5/4 clay yellowish brown loamy sand	NCM
232	I:0-10	10YR5/3 brown loamy sand	NCM, mottled W/ 7.5 yr 5/4 clay
233	Not Excavated	N/A	Not excavated, gravel access road
234	Not Excavated	N/A	Not excavated, gravel access road
235	Not Excavated	N/A	Not excavated, gravel access road
236	Not Excavated	N/A	Not excavated, gravel access road
237	Not Excavated	N/A	Not excavated, gravel access road
238	Not Excavated	N/A	Not excavated, gravel access road
239	Not Excavated	N/A	Not excavated, gravel access road
240	I:0-6	10YR4/3 Roots brown loamy sand	NCM

STP Number	Stratum: Depth	Munsell Soil Description	Comments
	II:6-16	10YR5/6 Roots yellowish brown sandy clay loam	NCM
241	Not Excavated	N/A	Not excavated, concrete pad
242	I:0-7	10YR4/1 Gravel dark gray loamy sand	Metal (Indeterminate) wire nail noted but discarded due to proximity to modern concrete pad
	II:7-17	2.5Y6/2 Gravel light brownish gray silty clay loam	NCM
243	I:0-19	10YR4/1 Gravel dark gray loamy sand	NCM
	II:19-29	10YR5/6 Gravel yellowish brown silty clay loam	NCM
244	Not Excavated	N/A	Not excavated, gravel access road adjacent to railroad
245	Not Excavated	N/A	Not excavated, located on modern concrete pad
246	I:0-8	10YR4/3 Gravel brown loamy sand	NCM
	II:8-18	10YR5/6 Gravel yellowish brown silty clay loam	NCM, mottled with 10yr 7/6 and 10yr4/3
247	Not Excavated	N/A	Not excavated, on gravel access road
248	I:0-30	10YR4/3 Roots brown loamy sand	NCM
	II:30-40	10YR5/6 Roots yellowish brown sandy loam	NCM
249	I:0-10	10YR5/6 yellowish brown	NCM, In pipeline embankment
250	I:0-10	10YR4/4 Shell dark yellowish brown sandy loam	NCM
	II:10-20	10YR5/4 yellowish brown loamy sand	NCM
251	I:0-5	10YR4/4 5% shell dark yellowish brown sandy loam	NCM
	II:5-20	10YR5/4 yellowish brown loamy sand	NCM
252	Not Excavated	N/A	Not excavated, on gravel access road
253	Not Excavated	N/A	Not excavated, on gravel access road
254	Not Excavated	N/A	Not excavated, on gravel access road
255	I:0-10	10YR5/3 brown sandy clay	NCM
256	Not Excavated	N/A	Not excavated, on gravel access road
257	I:0-10	10YR4/4 Gravel dark yellowish brown sandy loam	NCM
258	I:0-10	10YR4/1 Roots dark gray loamy sand	NCM
259	I:0-21	10YR4/3 Gravel brown loamy sand	NCM
	II:21-26	10YR5/6 Gravel yellowish brown loamy sand	NCM
	III:26-36	10YR4/1 Gravel dark gray silt loam	NCM
260	Not Excavated	N/A	Not excavated, on gravel access road
261	Not Excavated	N/A	Not excavated, railroad tracks
262	I:0-10	10YR5/6 Gravel yellowish brown sandy clay loam	NCM, mottled with 10yr 4/3 and 10 yr 5/8

STP Number	Stratum: Depth	Munsell Soil Description	Comments
263	Not Excavated	N/A	Not excavated, shoulder of access road with gravel on ground surface - disturbed
264	Not Excavated	N/A	Note excavated, on shoulder of access road with abundant gravel on ground surface
265	Not Excavated	N/A	Not excavatd, access road
266	I:0-23	10YR4/3 Roots brown loamy sand	NCM
	II:23-33	10YR5/6 Roots yellowish brown sandy loam	NCM, mottled with a 7.5yr 5/8 and 10yr7/1
267	I:0-10	10YR6/2 W/ ox light brownish gray clay	NCM
268	I:0-10	10YR4/4 dark yellowish brown sandy loam	NCM
	II:10-20	10YR6/2 light brownish gray loamy sand	NCM, w/ oxidation
269	I:0-10	10YR6/2 light brownish gray clay	NCM, mottled W/ 5/4 sand
270	Not Excavated	N/A	Not excavated, concrete pad
271	I:0-5	10YR4/4 dark yellowish brown sandy loam	NCM
	II:5-15	10YR5/4 yellowish brown loamy sand	NCM
272	I:0-10	10YR5/4 yellowish brown sandy loam	NCM, mottled W/ 7.5 5/4 clay
273	Not Excavated	N/A	Not excavated, Boat ramp
274	I:0-15	10YR5/4 yellowish brown loamy sand	NCM
	II:15-25	10YR6/2 light brownish gray clay	NCM
275	I:0-10	10YR5/6 yellowish brown loamy sand	NCM
276	I:0-10	10YR4/3 brown silty clay loam	NCM
	II:10-20	10YR6/2 light brownish gray clay	NCM, w/ oxidation
277	I:0-10	10YR5/3 brown sand	NCM, mottled W/ 4/3 sandy loam
278	I:0-30	10YR4/3 brown silty clay loam	NCM
279	I:0-30	10YR4/3 brown silty clay loam	NCM
280	I:0-10	10YR6/2 light brownish gray clay	NCM, mottled W/ 5/4 sandy loam
281	I:0-10	10YR4/4 dark yellowish brown sandy loam	NCM, mottled W/ clay 6/2
282	I:0-10	10YR4/4 dark yellowish brown sandy clay loam	NCM, mottled W/ 6/2 clay
283	Not Excavated	N/A	Not excavated due to slope
284	I:0-15	10YR4/4 dark yellowish brown silty clay loam	NCM
	II:15-30	10YR5/4 yellowish brown silty clay	NCM
285	1:0-20	10YR5/4 yellowish brown sandy loam	NCM, mottled W/ 6/2 clay
286	I:0-5	10YR4/4 dark yellowish brown sandy loam	NCM
	II:5-15	10YR6/2 W/ ox light brownish gray sandy clay	NCM

STP Number	Stratum: Depth	Munsell Soil Description	Comments
287	I:0-10	10YR5/4 yellowish brown sandy loam	NCM
	II:10-20	10YR5/6 yellowish brown sandy clay	NCM, w/ oxidation
288	I:0-10	10YR6/2 light brownish gray clay	NCM, w/ oxidation
289	I:0-19	10YR5/6 Roots yellowish brown sandy loam	NCM
	II:19-33	10YR7/4 Roots very pale brown sandy loam	NCM
290	I:0-10	10YR6/2 light brownish gray	NCM, w/ oxidation
291	I:0-10	10YR5/4 yellowish brown silty clay loam	NCM
	II:10-20	10YR6/2 light brownish gray silty clay	NCM, w/ oxidation
292	I:0-25	10YR4/3 Roots brown clay loam	NCM
	II:25-35	10YR7/4 Roots very pale brown loam	NCM
293	I:0-10	10YR5/6 Gravel yellowish brown clay	NCM, mottled with 10yr6/1 and 10yr 5/8
294	I:0-19	10YR5/6 Roots yellowish brown sandy loam	NCM
	II:19-23	10YR7/4 Roots very pale brown sandy loam	NCM
	III:23-33	10YR5/6 Roots yellowish brown sand	NCM
295	I:0-12	10YR4/2 Roots dark grayish brown loamy sand	NCM
	II:12-20	10YR7/4 Roots very pale brown sand	NCM
	III:20-30	10YR6/8 Roots brownish yellow sandy clay loam	NCM
296	I:0-10	10YR4/2 Roots dark grayish brown loamy sand	NCM
	II:10-20	10YR6/6 Roots brownish yellow sandy loam	NCM
297	I:0-16	10YR5/6 Roots yellowish brown sandy loam	NCM
	II:16-26	2.5Y6/2 Roots light brownish gray sandy clay loam	NCM, mottled with 10yr5/8
298	I:0-24	10YR5/6 Roots yellowish brown loamy sand	NCM
	II:24-34	2.5Y6/2 Roots light brownish gray sandy clay loam	NCM, mottled with 10yr5/8
299	I:0-15	10YR5/6 Roots yellowish brown loamy sand	NCM
	II:15-20	10YR6/2 Roots light brownish gray sandy loam	NCM
	III:20-30	10YR5/8 Roots yellowish brown sandy clay loam	NCM

STP Number	Stratum: Depth	Munsell Soil Description	Comments
300	I:0-23	10YR6/8 Roots brownish yellow loamy sand	NCM
	II:23-33	2.5Y6/2 Roots light brownish gray sandy clay loam	NCM, mottled with 7.5yr5/8
301	I:0-13	10YR5/3 Roots brown sand	NCM
	II:13-20	10YR7/1 Roots light gray sand	NCM
	III:20-30	2.5Y7/1 Roots light gray clay	NCM, mottled with 10yr 5/8
302	I:0-10	10YR5/1 Roots gray silty clay	NCM, mottled with 10yr 5/8
303	I:0-15	2.5Y6/4 Roots light yellowish brown sand	NCM, mottled with 10yr8/3 and 7.5yr5/8
304	I:0-15	10YR5/4 yellowish brown sandy clay loam	NCM, mottled W/ 10YR 6/4 sand and 7.5 yr clay
305	I:0-8	10YR4/2 Gravel dark grayish brown loamy sand	NCM
	II:8-18	10YR5/6 Gravel yellowish brown clay	NCM, mottled with a 7.5yr5/8
306	I:0-10	10YR4/3 Gravel brown loamy sand	NCM
	II:10-20	10YR5/6 Gravel yellowish brown sandy clay loam	NCM, mottled with 10yr5/8
307	Not Excavated	N/A	Not excavatd, part of shoulder for railroad, abundant gravel on ground surface
308	I:0-18	10YR5/6 yellowish brown sandy clay	NCM, terminated at buried concrete pad
309	I:0-20	10YR5/6 Gravel yellowish brown sandy loam	NCM
	II:20-30	2.5Y6/2 Gravel light brownish gray sandy clay loam	NCM, mottled with 7.5yr 5/8
310	I:0-24	10YR5/6 yellowish brown sandy clay	NCM
	II:27-32	2.5Y5/4 light olive brown clay	NCM, hydric
311	I:0-21	10YR5/6 yellowish brown sandy clay	NCM
	II:21-30	2.5Y5/4 light olive brown clay	NCM, hydric
312	I:0-27	10YR8/2 very pale brown sand	NCM, mottled W/ 7.5yr 6/4 clay and 10YR 5/4 sandy loam
313	I:0-20	10YR8/2 very pale brown sand	NCM, mottled W/ 7.5yr 6/4 clay and 10YR 5/4 sandy loam
314	I:0-20	10YR6/2 light brownish gray sand	NCM, mottled W/ 7.5 yr 6/4 clat
315	I:0-20	10YR5/6 yellowish brown sandy clay loam	NCM, mottled W/ 7.5 yr clay and 10 yr 6/2 sand
316	I:0-10	10YR3/2 very dark grayish brown loam	NCM
	II:10-24	10YR5/4 yellowish brown sandy clay	NCM, hydric mottled with 10 yr 5/8
	III:24-43	2.5Y6/2 light brownish gray clay	NCM, hydric mottled w 10 yr 5/8
317	I:0-10	10YR3/2 very dark grayish brown loam	NCM
	II:10-35	10YR5/4 yellowish brown sandy clay	NCM, hydric mottled with 10 yr 5/8

STP Number	Stratum: Depth	Munsell Soil Description	Comments
318	I:0-10	10YR4/3 brown sandy loam	NCM
	II:10-30	10YR5/6 yellowish brown sandy clay	NCM, probably fill (dredge?) hydric with 10yr 5/8 spots
319	I:0-8	10YR4/3 brown sandy loam	NCM
	II:8-32	10YR5/6 yellowish brown sandy clay	NCM, hydric 10 yr 5/8, probable fill
320	I:0-10	10YR4/3 brown sandy loam	NCM
	II:10-30	10YR5/6 yellowish brown sandy clay	NCM, hydric 10 yr 5/8, probable fill-lacking in natural strata
321	I:0-6	10YR5/4 yellowish brown sandy loam	NCM
321	II:6-32	10YR6/2 light brownish gray sandy clay	NCM, hydric mottled w 10 yr 5/8
321	III:32-43	10YR8/2 very pale brown sand	NCM, hydric mottled w 10 yr 5/8
322	I:0-8	10YR5/3 brown sandy loam	NCM
322	II:8-21	10YR6/6 brownish yellow sandy clay	NCM
322	III:21-40	10YR8/2 very pale brown sand	NCM, hydric mottled w 10yr 7/8, 10 yr 5/8, 10yr 5/2
323	I:0-18	10YR4/3 brown sandy clay loam	NCM
	II:18-34	10YR5/6 yellowish brown sandy clay	NCM, some hydric striations
665	I:0-30	10YR3/2 very dark grayish brown silty loam	NCM
	II:30-50	10YR4/2 dark grayish brown silty loam	NCM, grading disturbance
666	I:0-30	10YR3/2 very dark grayish brown silty loam	NCM, periodic flooding from canal evident
	II:30-50	10YR4/2 dark grayish brown silty loam	NCM
667	I:0-30	10YR3/2 very dark grayish brown silty loam	NCM
	II:30-50	10YR4/2 dark grayish brown silty loam	NCM
668	I:0-30	10YR3/2 very dark grayish brown silty loam	NCM
	II:30-50	10YR4/2 dark grayish brown silty loam	NCM
669	I:0-30	10YR3/2 very dark grayish brown silty loam	NCM
	II:30-50	10YR4/2 dark grayish brown silty loam	NCM
670	I:0-30	10YR3/2 very dark grayish brown silty loam	NCM
	II:30-50	10YR4/2 dark grayish brown silty loam	NCM

Appendix B: STP Locations

Area	STP	Easting	Northing
Site 4	140	253444	3347742
Site 4	141	253426	3347725
Site 4	142	253404	3347704
Site 4	143	253383	3347683
Site 4	144	253361	3347662
Site 4	145	253339	3347642
Site 4	146	253318	3347621
Site 4	147	253296	3347600
Site 4	148	253274	3347579
Site 4	149	253422	3347764
Site 4	150	253401	3347743
Site 4	151	253379	3347722
Site 4	152	253358	3347701
Site 4	153	253336	3347680
Site 4	154	253315	3347659
Site 4	155	253293	3347638
Site 4	156	253272	3347617
Site 4	157	253251	3347596
Site 4	158	253403	3347788
Site 4	159	253380	3347766
Site 4	160	253358	3347745
Site 4	161	253337	3347725
Site 4	162	253315	3347704
Site 4	163	253293	3347681
Site 4	164	253272	3347663
Site 4	165	253251	3347640
Site 4	166	253229	3347620
Site 4	167	253381	3347810
Site 4	168	253358	3347788
Site 4	168	253361	3347791
Site 4	169	253337	3347767
Site 4	170	253316	3347746
Site 4	171	253294	3347725
Site 4	172	253273	3347704
Site 4	173	253251	3347683
Site 4	174	253230	3347662
Site 4	175	253208	3347641
Site 4	176	253188	3347661
Site 4	177	253209	3347682
Site 4	178	253231	3347703
Site 4	179	253252	3347724
Site 4	180	253273	3347745
Site 4	181	253295	3347766
Site 4	182	253316	3347787
Site 4	183	253337	3347808
Site 4	184	253361	3347831

Area	STP	Easting	Northing
Site 4	185	253340	3347853
Site 4	186	253317	3347830
Site 4	187	253295	3347809
Site 4	188	253274	3347787
Site 4	189	253253	3347766
Site 4	190	253231	3347745
Site 4	191	253210	3347724
Site 4	192	253189	3347703
Site 4	193	253168	3347682
Site 4	194	253146	3347705
Site 4	195	253166	3347725
Site 4	195	253296	3347894
Site 4	196	253274	3347873
Site 4	196	253189	3347748
Site 4	197	253253	3347852
Site 4	197	253214	3347772
Site 4	198	253231	3347831
Site 4	198	253232	3347791
Site 4	199	253210	3347810
Site 4	199	253253	3347811
Site 4	200	253189	3347789
Site 4	200	253274	3347832
Site 4	201	253167	3347767
Site 4	201	253295	3347852
Site 4	202	253146	3347746
Site 4	202	253317	3347875
Site 4	203	253124	3347725
Site 4	204	253103	3347747
Site 4	205	253124	3347768
Site 4	206	253146	3347789
Site 4	207	253167	3347810
Site 4	208	253189	3347831
Site 4	209	253210	3347852
Site 4	210	253232	3347873
Site 4	211	253253	3347894
Site 4	212	253275	3347915
Site 4	213	253082	3347767
Site 4	214	253103	3347788
Site 4	215	253124	3347809
Site 4	216	253146	3347830
Site 4	217	253167	3347851
Site 4	218	253188	3347873
Site 4	219	253210	3347894
Site 4	220	253231	3347915
Site 4	221	253252	3347936
Site 4	222	253230	3347956

Area	STP	Easting	Northing
Site 4	223	253209	3347935
Site 4	224	253188	3347914
Site 4	225	253166	3347893
Site 4	226	253145	3347872
Site 4	227	253124	3347851
Site 4	228	253102	3347830
Site 4	229	253081	3347809
Site 4	230	253060	3347788
Site 4	231	253039	3347811
Site 4	232	253061	3347832
Site 4	233	253082	3347853
Site 4	234	253103	3347874
Site 4	235	253125	3347895
Site 4	236	253146	3347916
Site 4	237	253168	3347937
Site 4	238	253189	3347958
Site 4	239	253209	3347977
Site 4	240	253189	3348000
Site 4	241	253167	3347979
Site 4	242	253146	3347958
Site 4	243	253124	3347937
Site 4	244	253103	3347916
Site 4	245	253082	3347895
Site 4	246	253060	3347874
Site 4	247	253039	3347853
Site 4	248	253017	3347832
Site 4	249	253167	3348023
Site 4	250	253145	3348002
Site 4	251	253124	3347981
Site 4	252	253103	3347960
Site 4	253	253081	3347939
Site 4	254	253060	3347918
Site 4	255	253038	3347897
Site 4	256	253017	3347876
Site 4	257	252995	3347855
Site 4	258	252975	3347877
Site 4	259	252996	3347898
Site 4	260	253018	3347919
Site 4	261	253039	3347940
Site 4	262	253061	3347961
Site 4	263	253082	3347982
Site 4	264	253104	3348003
Site 4	265	253125	3348024
Site 4	266	253146	3348044
Site 4	267	252954	3347899
Site 4	268	252976	3347920

Area	STP	Easting	Northing
Site 4	269	252997	3347941
Site 4	270	253018	3347962
Site 4	271	253040	3347983
Site 4	272	253061	3348004
Site 4	273	253082	3348025
Site 4	274	253104	3348046
Site 4	275	253124	3348066
Site 4	276	252934	3347920
Site 4	277	252912	3347942
Site 4	278	252892	3347962
Site 4	279	252871	3347982
Site 4	280	252850	3348004
Site 4	281	252829	3348025
Site 4	282	252808	3348047
Site 4	283	252787	3348067
Site 4	284	252808	3348089
Site 4	285	252828	3348069
Site 4	286	252850	3348047
Site 4	287	252871	3348026
Site 4	288	252892	3348005
Site 4	289	252913	3347985
Site 4	290	252934	3347964
Site 4	291	252955	3347942
Site 4	292	252977	3347963
Site 4	293	252955	3347984
Site 4	294	252934	3348005
Site 4	295	252913	3348026
Site 4	296	252892	3348047
Site 4	297	252871	3348069
Site 4	298	252850	3348089
Site 4	299	252832	3348107
Site 4	300	252855	3348128
Site 4	301	252871	3348112
Site 4	302	252892	3348090
Site 4	303	252913	3348069
Site 4	304	252934	3348048
Site 4	305	252955	3348026
Site 4	306	252976	3348005
Site 4	307	252997	3347984
Site 4	308	253023	3348004
Site 4	309	253002	3348026
Site 4	310	252976	3348051
Site 4	311	252960	3348069
Site 4	312	252939	3348090
Site 4	313	252918	3348112
Site 4	314	252897	3348133

Area	STP	Easting	Northing
Site 4	315	252881	3348150
Site 4	316	253092	3348077
Site 4	317	253070	3348099
Site 4	318	253050	3348120
Site 4	319	253028	3348141
Site 4	320	253007	3348163
Site 4	321	252986	3348185
Site 4	322	252965	3348207
Site 4	323	253224	3347714
Site 4	665	252785	3348028
Site 4	666	252762	3348009
Site 4	667	252739	3347989
Site 4	668	252756	3347967
Site 4	669	252780	3347986
Site 4	670	252803	3348005