Salem/ Hope Creek Environmental Audit – Post-Audit Information

Question #: PSEG-1A **Category:** Cultural Resources

Statement of Question: Please provide the following documents that were made available during the Salem and HCGS License Renewal Environmental Audit.

Submerged Cultural Resources Survey of a Proposed Barge Facility and Water Intake .... Panamerican Consultants, Inc, 12/09

Response: The requested document is being provided.

List Attachments Provided:

Panamerican Consultants, Inc. *Submerged Cultural Resources Survey of a Proposed Barge Facility and Water Intake PSEG Early Site Permit Environmental Review, Delaware River, Salem County, New Jersey.* Prepared for MACTEC Engineering and Consulting, Inc. Draft Report. December 2009.

Salem/ Hope Creek Environmental Audit – Post-Audit Information

Question #: PSEG-1B **Category:** Cultural Resources

Statement of Question: Please provide the following documents that were made available during the Salem and HCGS License Renewal Environmental Audit.

> Report of Phase I Archaeological Survey for Selected Portions of Two Access Road Alternatives .... Sargent & Lundy, LLC, 12/09

Response: The document requested is being provided.

List Attachments Provided:

MACTEC Engineering and Consulting, Inc. *Report of Phase I Archaeological Survey for Selected Portions of Two Access Road Alternatives, PSEG Early Site Permit Application, Salem County, New Jersey*. Prepared for PSEG Power, LLC. December 24, 2009.

Salem/ Hope Creek Environmental Audit – Post-Audit Information

Question #: PSEG 1-C **Category:** PSEG

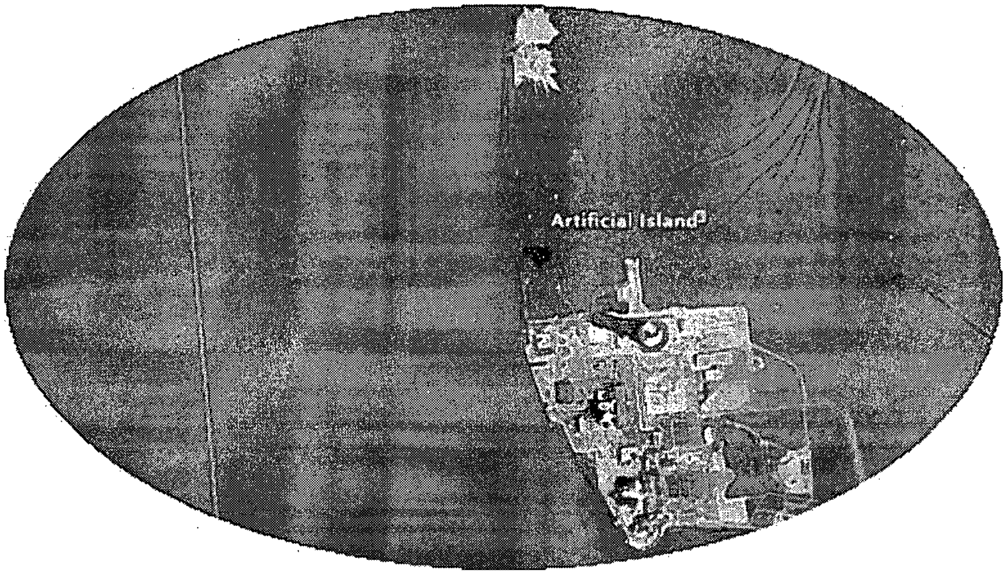
Statement of Question: Please provide the following documents that were made available during the Salem and HCGS License Renewal Environmental Audit.

Information on the extent of the PSEG Property into the Delaware River (low tide property line)

Response:
As noted in the "Property Description" section of the attached survey map, the property line along the Delaware River extends to the high tide line.

List Attachments Provided:
Master Consulting, P.A., Map titled "ALTA/ASCM Land Title Survey (2005) for PSEG Nuclear, LLC. of Block 26, Lots 4, 4.01, 5 & 5.01." Job No. 05001694D. Revised 2/16/2010.

SUBMERGED CULTURAL RESOURCES SURVEY OF A PROPOSED BARGE FACILITY AND WATER INTAKE PSEG EARLY SITE PERMIT ENVIRONMENTAL REVIEW DELAWARE RIVER, SALEM COUNTY, NEW JERSEY



PREPARED FOR:

MACTEC Engineering and Consulting, Inc.
St. Louis, Missouri

PREPARED BY:

Panamerican Consultants, Inc.
Memphis, Tennessee

CONDUCTED UNDER:

MACTEC Work Order No. 200916573
MACTEC Project No. 3250085298/02

DRAFT REPORT ♦ DECEMBER 2009

DRAFT REPORT

SUBMERGED CULTURAL RESOURCES SURVEY OF A PROPOSED BARGE FACILITY AND WATER INTAKE PSEG EARLY SITE PERMIT ENVIRONMENTAL REVIEW DELAWARE RIVER, SALEM COUNTY, NEW JERSEY

Authored by:

Stephen R. James, Jr., Michael Murray, and Gordon P. Watts

Prepared for:

MACTEC Engineering and Consultants, Inc.
3199 Riverport Tech Center Drive
St. Louis, Missouri 63043

Conducted Under:

MACTEC Work Order No. 200916573
MACTEC Project No. 3250085298/02

Prepared by:

Panamerican Consultants, Inc.
91 Tillman Street
Memphis, Tennessee 38111

Stephen R. James, Jr., RPA
Principal Investigator

DECEMBER 2009

ABSTRACT

During October 2009, archaeologists with Panamerican Consultants, Inc. (Panamerican) of Memphis, Tennessee conducted an intensive submerged cultural resources remote sensing survey of a proposed dredging area, as part of work to support the PSEG Early Site Permit Application (ESPA). Situated on the Delaware River in Salem County, New Jersey, the survey area covers approximately 100 acres (ac) and is specifically located immediately adjacent to the western shore of Artificial Island, just north of the Hope Creek Generating Station. Performed under contract to MACTEC Engineering and Consultants, Inc. (MACTEC) of St. Louis, Missouri, the investigation was comprised of a magnetometer, sidescan sonar, and a subbottom profiler survey. The primary focus of the project was to determine the presence or absence of anomalies representative of potentially significant submerged cultural resources that are eligible for listing on the National Register of Historic Places (NRHP).

The results of the survey identified a total of 84 magnetic anomalies, 17 sidescan sonar targets, and no subbottom profiler impedance contrasts within the project area. Three clusters of magnetic anomalies and two associated acoustic images exhibit characteristics indicative of vessel remains. Target Cluster 1 is comprised of two magnetic anomalies that are associated with sonar image DR-14, which has characteristics suggestive of shipwreck remains. While it is possible that the image may be associated with bulkhead material, the image suggests the partially exposed remains of the lower hull of a vessel. It is recommended that the site be avoided. If avoidance is not possible, additional investigation should be conducted to identify material generating the signatures and to assess the NRHP significance of the site. Cluster 2 is comprised of five magnetic anomalies that are associated with sonar image DR-10, which is an area of small debris. The complex nature of the anomalies and debris on the bottom surface should be considered to have a potential association with vessel remains. Cluster 3 is composed of four magnetic anomalies. Although the anomalies have no corresponding sonar image, the complex nature of the magnetic signature should be considered as suggestive of an association with shipwreck remains. It is recommended that both Cluster 2 and 3 also be avoided. If avoidance is not possible, an additional investigation is recommended to identify material generating the signatures and to assess its NRHP significance.

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1. INTRODUCTION

During October 2009, under contract to MACTEC Engineering and Consultants, Inc. of St. Louis, Missouri, archaeologists from Panamerican Consultants, Inc. of Memphis, Tennessee conducted an intensive submerged cultural resources remote sensing survey of a proposed dredging area in support of the PSEG Early Site Permit Application (Figure 1). Situated on the Delaware River, in Salem County, New Jersey, the project area covers approximately 100 ac and is specifically located immediately adjacent to the western shore of Artificial Island, just north of the existing Salem and Hope Creek Generating Stations (Figures 2 and 3).

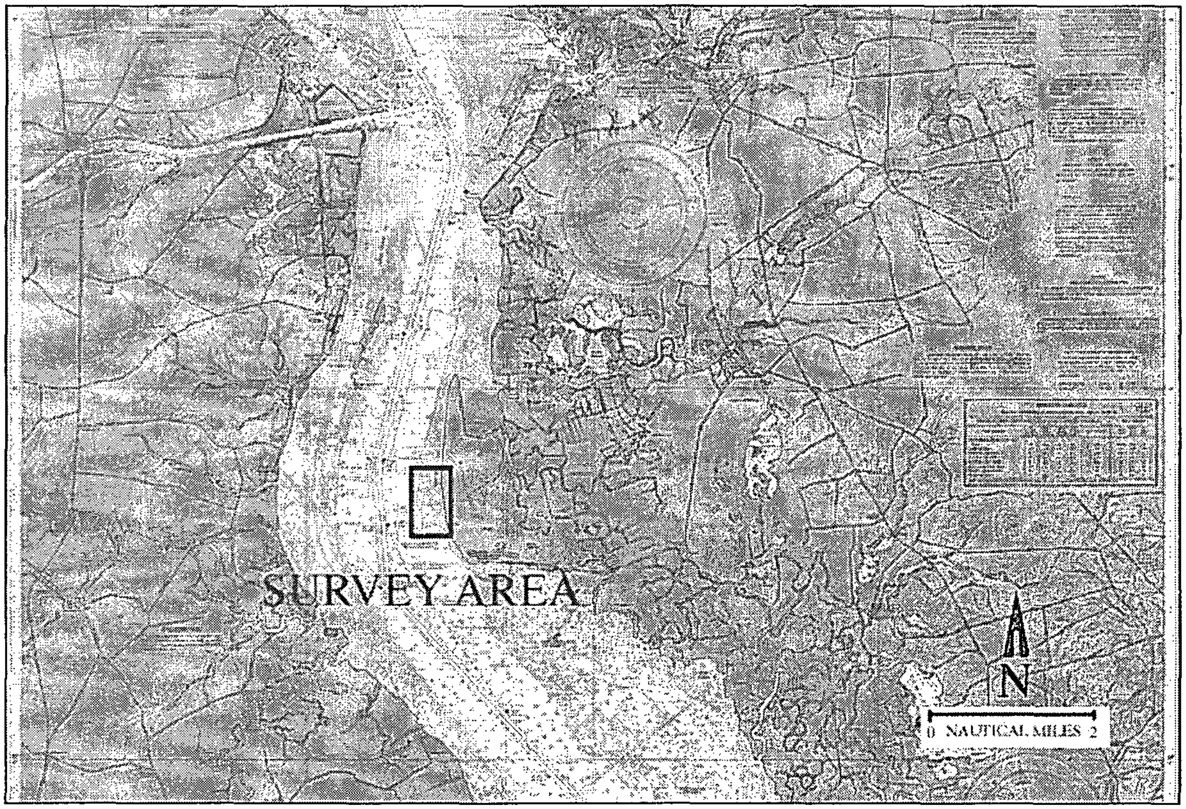

Figure 1. Project area location map (excerpt from NOAA Navigational Chart "Delaware River, Smyrna River to Wilmington," Chart No. 12311).

Comprised of a magnetometer, sidescan sonar, and a subbottom profiler survey, the primary focus of the investigation was to determine the presence or absence of anomalies representative of potentially significant submerged cultural resources eligible for listing on the National Register of Historic Places (NRHP). A secondary aspect of the survey was the identification of hazards to the proposed construction.

The project was conducted relative to responsibilities under various federal and state statutes and was performed in compliance with Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended (36 CFR 800, *Protection of Historic Properties*) and the Abandoned Shipwreck Act of 1987 (*Abandoned Shipwreck Act Guidelines*, National Park Service, *Federal Register*, Vol. 55, No. 3, December 4, 1990, pages 50116-50145).

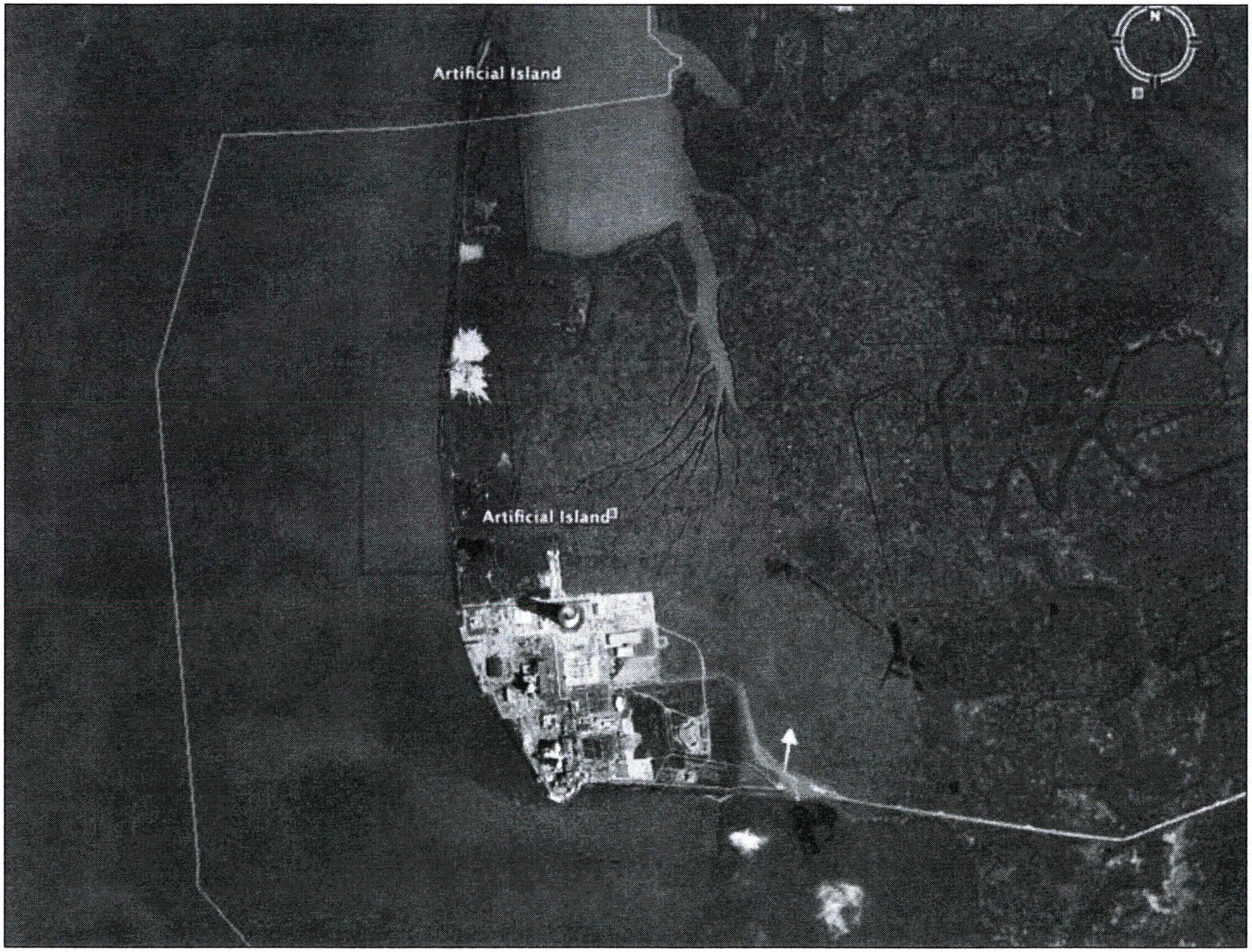

Figure 2. General location of the survey area relative to Artificial Island and the nuclear plant (courtesy of Google Earth).

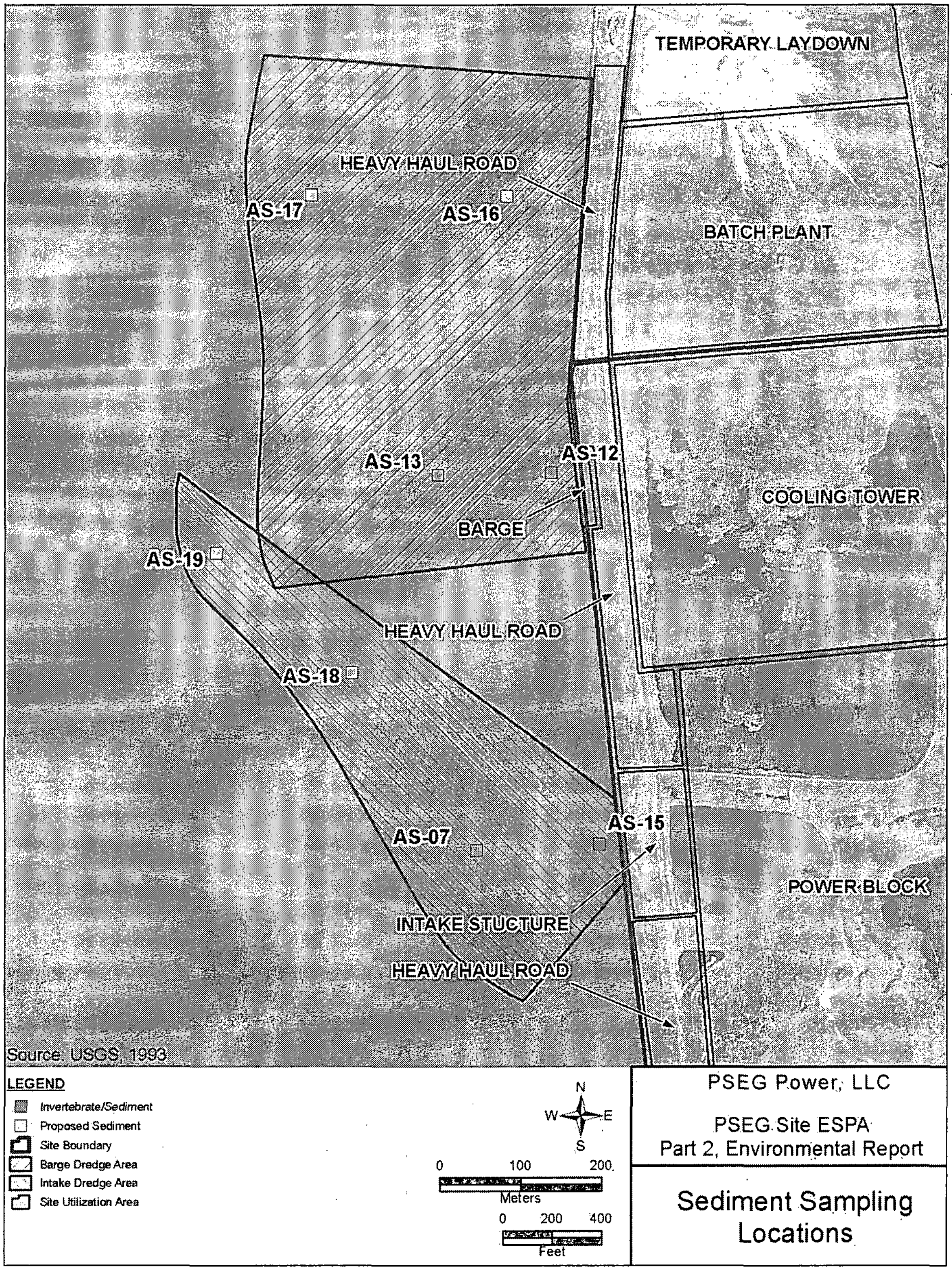

Figure 3. Survey area with proposed barge facility to the north and the proposed intake structure to the south outlined in blue (courtesy of MACTEC, Inc.).

2. HISTORICAL BACKGROUND

RESEARCH METHODOLOGY

An overview of the general history of the survey area, including Artificial Island, the Delaware River, and the Delaware Bay, accompany a discussion of specific research that investigated several maritime subjects. These subjects include: shipping, shipbuilding, naval activity, and navigation of the Delaware Bay and River and area shipwrecks. Both primary and secondary source information, including historic charts and maps were consulted to provide indicators for local and regional maritime historical developments and trends. Of particular importance was the discovery of any lists indicating ship losses or wrecks in and around the mouth of Delaware Bay. Research was conducted online and through local and regional sources, including: the U.S. Army Corps of Engineers, Philadelphia District, Philadelphia, Pennsylvania; Dover, Delaware; and the Salem Historical Society in Salem, New Jersey.

Research of the Delaware River and Bay area provided a context and basis by which submerged cultural resources, if identified, could be evaluated for possible NHPA, Section 106 eligibility. Particularly valuable sources aiding in this investigation included data contained within the two reports by Lee Cox, Jr., *Submerged Cultural Resources Investigations, Delaware River, Main Navigational Channel, Philadelphia, PA to Artificial Island, NJ* and *Phase I and Phase II Underwater Archaeological Investigations Lewes Beach and Roosevelt Inlet Borrow Areas, Delaware Bay, Sussex County, Delaware;* and Frank E. Snyder and Brian Guss' *The District: A History of the Philadelphia District, U.S. Army Corps of Engineers 1866-1971.*

OVERVIEW OF COLONIAL MARITIME HISTORY OF THE DELAWARE RIVER AND BAY

INITIAL CONTACT PERIOD

In 1609, Henry Hudson, under commission from the Dutch East India Company commanded the *Half Moon* on a mission to locate a safe northwest passage to the orient. In doing so, Hudson became the first documented European to discover the Delaware Bay and establish a foundation for colonization. Over the next thirty years, Dutch explorers from New Amsterdam (New York City) ventured up the bay in an effort to establish outposts for a fur-trading network with the Indians. Hendrick Christiaensen, Cornelius Jacobson May, and Cornelius Hendrickson were among the prominent Dutch sailors who explored the Delaware Bay and River during this initial contact period.

As the first settlers to the Delaware Valley, the Dutch built Fort Nassau in 1626 in the vicinity of the present Gloucester Point, New Jersey (Weslager 1988). It represents one of the first outposts constructed to support the developing trade network. However, a major developmental blow for Dutch colonization came in 1630 when Indians destroyed a whaling facility near the modern day Lewes, Delaware. Named Zwaanendael, the fledgling-whaling colony existed for only one year and never recovered. Furthermore, its demise allowed for other eager colonial competitors, such as the Swedes and English, to gain a lucrative foothold in the area.

In 1638, the Swedes, led by Peter Minuit, effectively ended the Dutch monopoly of Delaware Bay by establishing a Swedish stronghold known as Fort Christina. Located on the western shore of the river, near present day Wilmington, Delaware, the introduction of Swedish settlers initiated a twenty-year period of dual occupation of the Delaware Valley before the English assumed control of the region in 1664. Other early settlements or constructed fortifications include the Dutch-built Fort Beversrede and Casimir as well as the Swedish Fort New Gothenburg and Elfsborg (Weslager 1988). The Dutch and the Swedes, although in direct competition with each other for the lucrative fur trade with the Delaware and Schuylkill River

Indians, maintained a cooperative existence. Each country built and supplied several forts and outposts at various locations along the Delaware River and Bay area until 1664 when the English effectively took control of the region.

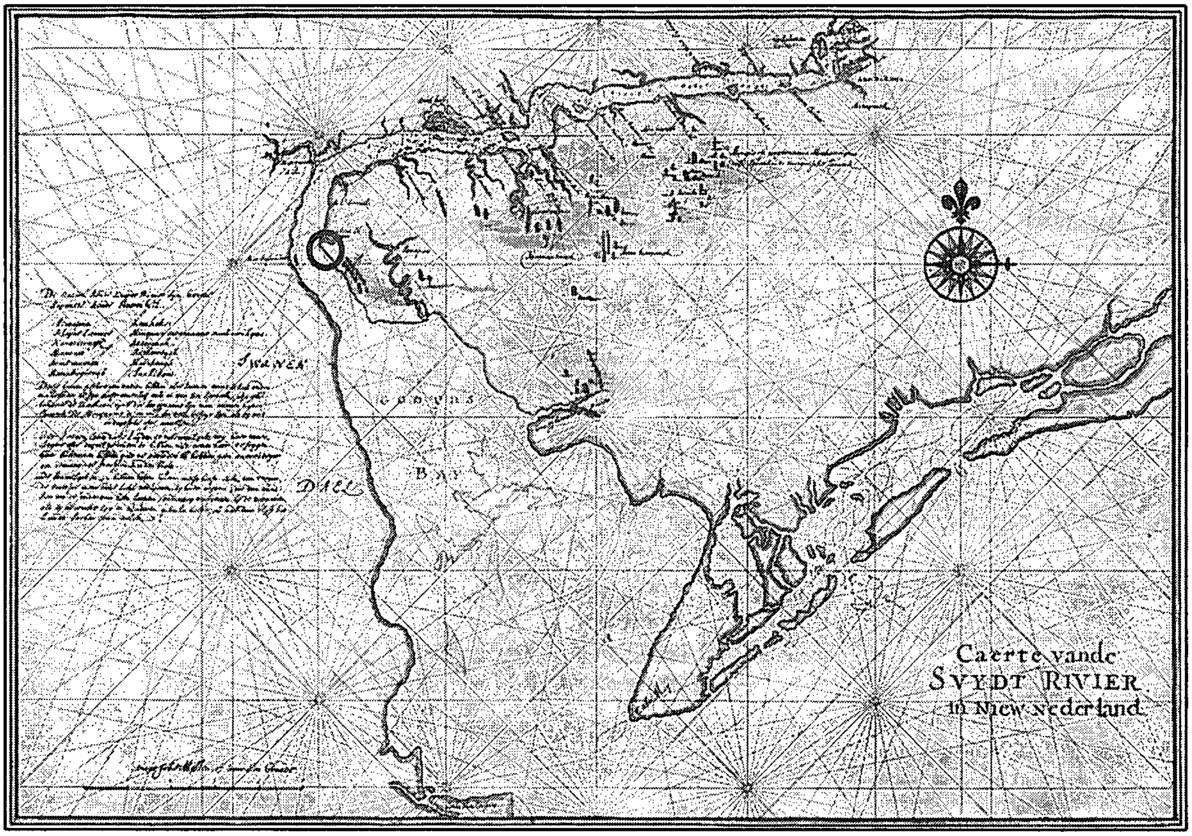

Figure 4. Nautical chart of "Zwaanendael" (1629) illustrating a land claim founded by Samuel Godyn and Godyn's Bay (Delaware Bay) in New Netherland. Approximate location of the survey area circled (courtesy of the Library of Congress).

English Settlement and Control

In 1663, the English began attacking Dutch holdings in the New World as part of the larger Anglo-Dutch Wars. In October of 1664, Sir Robert Carr, under orders from the Duke of York, captured the Dutch and Swedish settlements on the Delaware River (Weslager 1988). This marked the end of the Dutch/Swedish settlement period and ushered in the English era. Eighteen years later in 1862, the English solidified their control of the area when William Penn arrived in the Delaware Valley and formed his colony in Philadelphia.

The Quakers and English Occupation

In 1657, Stuyvesant, who did not tolerate full religious freedom in the colony, and especially the presence of Quakers, ordered the public torture of Robert Hodgson, a 23-year-old Quaker convert, who had become an influential preacher. Stuyvesant then made an ordinance, punishable by fine and imprisonment, against anyone found guilty of harboring Quakers (Weslager 1988). This action led to a strong protest from the citizens of the colony and perhaps paved the way for an easier occupation and transition to English control over Salem in 1664, where religious tolerances were more accepted.

ORIGIN OF SALEM

Fort Nya Elfsborg was established as a Swedish settlement in 1643 and became known as a significant part of the New Sweden colony for its strategic trade location near the mouth of the Delaware Bay. Representing one of the earliest European settlements in the state of New Jersey, the fort was named after the old Älvsborg Fortress offshore from Gothenburg, Sweden (Weslager 1988). The settlement is also situated near Alloway Creek, which is navigable by small watercraft that could easily deliver raw materials by trading with the Lenni-Lenap Indians from the New Jersey interior. In 1655, Peter Stuyvesant, on behalf of the Dutch West India Company, gained control of Fort Nya Elfsborg as well as other settlements in the region from the Swedes to secure this valuable trade location. Later, it was captured by the British in 1664, and then renamed Salem in 1675 by Quaker leader, John Fenwick.

SHIPPING ACTIVITIES IN DELAWARE RIVER AND BAY

The social and economic development of the Delaware Valley region flourished due to the vital transportation artery, which the bay and river conveniently provided for prospective settlers since the seventeenth century. European involvement in maritime trade in the Delaware Valley dates to the early 1600s when Dutch and Swedish fur traders sporadically ventured upstream to exchange goods with the Native American inhabitants. It was not until later in the same century that maritime trade began to proliferate and coalesce into an organized international exchange network. Delaware Valley merchants in the eighteenth Century shipped and imported goods with colonies through coastal trade and engaged in commerce overseas primarily with England, southern Europe, and the Caribbean (Cox 1988). Several key American ports, such as Philadelphia, serviced the network of trade routes within the colonies. Each colony contributed its local products for export, with eastern Pennsylvania, Delaware, and West Jersey primarily shipping lumber, staves, wheat, and flour (Brewington 1939).

Trade between Delaware and English ports was mostly a one-sided venture. The upstart colonies received a wide assortment of products from England, including: manufactured goods, textiles, metals, tea, shoes and tools. Meanwhile, the Delaware ports only exported lumber, foodstuffs, and furs to England (Cox 1988). Increasingly stringent regulations on manufacturing were imposed upon the colonies by the British Parliament in an effort to protect the interests and markets of British manufacturers. Regulatory control and a trade imbalance created by this unequal exchange was alleviated slightly by the development of a triangular trade route that moved items from Philadelphia to the West Indies before the ships crossed over to England. Another trade system involved the southern European nations of Spain and Portugal and delivered wine as a major import into the Delaware Valley.

At the start of the eighteenth century, Gabriel Thomas provides an indication of this trade network and the type of trade goods that came from ports, such as Philadelphia:

> Now the true reason why this flourishing city advance so considerably...is their great and extended traffique and commerce both by sea and land, to New York, New England, Maryland, Carolina, Jamaica, Barbados, Nevis, Montserrat, Antigo, St. Christopher's, Bermudas, New Foundland, Maderus, Saltetudeus, and old England...Their merchandise chiefly consists (of) horses, pipe stoves, pork and beef...bread and flour, all sorts of grain, peas, beans, skins, fur, tobacco and potashes; wax which bartered for rum, sugar, molasses, silver, negroes, salt, wine, linen, household goods ...." [Brandt 1929:87].

Around 1754, a more comprehensive description of trading activity in and out of Philadelphia is provided by Israel Acrelius, an eighteenth century Swedish clergyman, who wrote his *History of*

New Sweden in 1758. He listed articles, which were shipped to and from the port of Philadelphia mentioning that wheat, flour, bread and beef were all major exports to the West Indies in exchange for rum and sugar. Similar items were sent to Carolina, which in turn exported tar, pitch and turpentine. Philadelphia merchants sent rawhides, deerskins, and several items previously acquired from the West Indies to London, Bristol and Liverpool. In return, they "brought all kinds of English manufactures and even bottled liquors. But as this commerce is carried on with a very heavy balance against it, this must be made up by bills of exchange and by money..." (Brandt 1929:97). Acrelius went on to state that wheat, bread and wax were sent to Lisbon, whose merchants shipped wine, salt, olive oil, silk, satin, and tea back to the Delaware Valley (Brandt 1929). As a result, maritime commerce in the Delaware Valley increased throughout the eighteenth century. Port entrances and clearances in 1730 placed Philadelphia third in the colonies behind Boston and New York.

By 1772, Philadelphia's shipping activity had exceeded both of those ports, and in the immediate pre-Revolutionary War period, Philadelphia was indisputably the most active port in North America. The Revolutionary War completely disrupted commercial development in the Delaware River Valley, and the British Navy blockaded virtually all shipping that moved in and out of the Delaware Bay during most of the war. After the conflicts ended, Delaware Valley merchants sought to establish new trade routes to revitalize the local maritime economy, and a successful trade relationship was sponsored with the Far East (Cox 1988). Shortly thereafter, ships were also leaving Delaware Bay for Russian, Baltic and South American ports. Often the emergence of these new routes was necessitated by the tendency of each state to regulate its trade by levying stiff tariffs on shipped goods (Brewington 1939).

However, disruption, and therefore, further development of shipping in the early nineteenth century was curtailed by several events. The Napoleonic Wars tied up the majority of the European fleets in an embargo, greatly reducing the volume of trans-Atlantic traffic. In 1812, the British blockaded the Delaware once again as a result of Anglo-American hostilities. However, several developments stimulated the revival of shipping that followed these restrictive actions. The emergence of the anthracite coal trade, the growth of packet lines, and the slow but steady conversion to steam propulsion helped to keep the Delaware ports active (Cox 1988). The first regular steamboat service on the Delaware River was in operation from 1809 to 1813. The steamers, *Phoenix* and *Philadelphia* carried passengers on the middle section of the Delaware River between Philadelphia and Bordentown, New Jersey. The *Phoenix* was then replaced by the *Eagle*, which ran between Philadelphia, Pennsylvania and Burlington, New Jersey three times a week. Seven steamboats were reported to be operating on the Delaware River by 1813 and their number continued to increase through the second half of the nineteenth century. The *Vesta* was the first steamboat to venture down the Delaware Bay from Philadelphia to Cape May, New Jersey in 1819 and completed the trip twice a week (Baker 1976). Since it took some time before mariners gained sufficient confidence in the operation of steam-propelled vessels, most of the initial steam craft were outfitted with a sail rig and limited to operation in a relatively protected environment. Other early steamboat lines that operated within Delaware Bay ran to the cities of Philadelphia, Wilmington, Smyrna, and Salem.

Steam service in rivers and harbors tended to outperform coastal lines due to their design, which was unseaworthy for offshore use. However, while steamboats were initially designed only for operation in calm waters, they were eventually modified for open-water transit (Cox 1988). Most of the initial changes in hull design and steam technology, however, did not produce much improvement in the seaworthiness of steamboats. In 1836, the 596-ton steamboat *Charlestown*, built at Philadelphia, ran to South Carolina. This service experienced many difficulties and was discontinued in 1839. It was not until 1849 that the steamship *Philadelphia*, a vessel designed specifically for the rigors of the open sea, was built for coastal service (Cox 1988). She was equipped with side paddle wheels and driven by two side-lever engines. Other coastal steamers were rapidly built as the early steamship lines began to thrive. The 227-foot paddle-wheel steamer *Quaker City* ran between Philadelphia and Havana in 1854. The Clyde Line to New York and Boston was started in 1842 (Baker 1976).

Wholesale transportation of cargo overseas was still utilized primarily by large sailing vessels during the first half of the nineteenth century. Shipping companies used the large, ship-rigged sailing vessels on established routes that became known as packet lines. Regularly scheduled packet lines were sailing out of Philadelphia by the 1820s. Thomas Cope, in 1822, initiated Philadelphia's first trans-Atlantic packet line to Liverpool with two ships, the 290-ton *Lancaster* and the 278-ton *Tobacco Plant* (Cox, 1988). Packet lines continued to thrive in Philadelphia until after the Civil War. Other lines that operated out of Delaware River ports included: the Welsh Line (1823-24), the New Line of Liverpool and Philadelphia Packets (1824-37), the Black Diamond Line (1823-24), the New Line (1847-55), the Line of Liverpool Packets (1850-61), and the Philadelphia-Liverpool Line (1852-54) (Baker, 1976).

Throughout the historic period, there were several small, yet active ports along the larger tributaries flowing into Delaware Bay through the coastal counties of New Jersey and Delaware. A strong regional trade network developed between various ports in New Jersey and Delaware and the regional port hub of Philadelphia. New Jersey farmers and merchants used docks and landings on the Salem, Maurice, and Cohansey rivers to transport their products to Philadelphia. Indeed, the town of Salem, near the project area on the Salem River, became an official port of entry as early as 1682 and was one of only three official ports of entry for the entire colony of New Jersey. As a result, Salem enjoyed extended periods of prosperity during the early eighteenth century (Sebold and Leach, 1991). However, the vast majority of shipping activity along New Jersey's rivers draining into the Delaware River ultimately revolved around the port of Philadelphia. By the end of the nineteenth century, Salem had 13 wharves on the waterfront, 12 of which were associated with the Pennsylvania Railroad. Steamers, sailing vessels, barges and canal boats carried glass, canned goods, iron and brass castings, agricultural products and fertilizer from the Salem River to Philadelphia (Snyder and Guss 1974).

The rise of Cape May as a summer resort destination caused steamboat companies to develop direct steamer routes from Philadelphia to the southern tip of New Jersey at the mouth of the Delaware Bay. Several steamboat companies conducted successful passenger excursion trips to the resort community of Cape May. As early as 1816, the steamboat *Baltimore* traveled between Philadelphia and Salem twice a week. From Salem, passengers continued to Bridgeton and Cape May via stagecoach. In 1824, the *Delaware*, under the command of Captain Whilldin, began shuttling vacationers from Philadelphia and Wilmington and New Castle, Delaware, to the southern New Jersey shore. As demand for this service increased, established excursion operators and new lines competed for riders, and the ticket prices fell from $5.00 to $.50 a head (Sebold and Leach 1991). Passengers and much of the commerce from Cumberland County was carried down the Maurice River by steamboats into the Delaware Bay and up to Philadelphia. The Maurice River Steamboat Company operated the *Thomas Salmond*, which offered excursions from its homeport of Maurice River to Philadelphia (Sebold and Leach 1991). Sand, for the glass industry, was the principal item shipped along the Maurice River. During the first half of the nineteenth century, bog iron was smelted and shipped down the Maurice River for export. Gravel, oysters, fish, and lumber were also transported down the river and up to Philadelphia, and to a lesser degree, to New York.

A steamboat line was also established on the Cohansey River, which connected Bridgeton with Philadelphia and other Delaware Valley ports. In 1844, the *Cohansey* began making three excursions a week from Bridgeton to Philadelphia with stops at Greenwich, Port Penn, Delaware City, New Castle, Marcus Hook and Chester, as well as occasional trips to Cape May (Cox 1988). Three other steamboats operated on the Cohansey: the *Arwames*, the *Patuxent,* and the *Express* (Sebold and Leach 1991). Fishing, oystering, and in recent years, crabbing were all major industries in southern New Jersey as well as building ships for these fleets. Shallops and sloops were typical vessels used for trade on the Delaware Bay and River during the colonial period. The use of shallops and sloops for fishing, oystering and trading, declined after the introduction of the more versatile schooner (Sebold and Leach 1991). In Delaware, Sussex and Kent County merchants used landings along most of the major streams (Appoquinimink Creek and the Murderkill, Broadkill, St. Jones, Smyrna, Mispillion, and Leipsic rivers) to ship agricultural products to Philadelphia. They then returned home with manufactured items for the local population. Settlers engaged local shipwrights to build various types of vessels, primarily sloops and schooners, at strategic locations along the riverbanks. By 1860, three-masted schooners carrying 400 tons of cargo were entering and clearing many of the rivers in Delaware.

Lebanon, Forest Landing, Barkers Landing, and Dover all served as ports for the shipment of produce from Delaware farms to Philadelphia. Lebanon, originally called Lisbon, quickly became the most active port in Kent County (Valle 1984). Lewes was an important base for Delaware River pilots who guided ships through the shoals up the navigational channel to upriver ports in Delaware, Pennsylvania, and New Jersey. In addition Lewes Harbor became a harbor of refuge for ships traversing the Atlantic Ocean and Delaware Bay. Steamboats were introduced to Delaware's trade network during the second half of the nineteenth century. At the end of the nineteenth century, large steamboats were involved in the trade between Delaware merchants and the port of Philadelphia. The steamers *Diamond State*, *Maid of Kent, City of Milford* and *Lamokin* carried passengers and cargo from various Delaware ports. Arrivals and departures of steamers were planned around favorable high tides. After 1887, when a dredge cleared a 6-foot channel as far inland as Drapers Wharf, steamboats were able to penetrate the St. Jones River all the way to Dover (Valle 1984). The Dover and Philadelphia Navigation Company commenced a regular service from the St. Jones River with two large steamers, *John P. Wilson* and the *City of Dover*. In addition to the steamers, freight boats and two- and three-masted schooners were actively engaged in transporting farm produce from Delaware to Philadelphia. Railroads and all weather highways offered strong competition to the steamboat lines, so that by the Depression era most of the lines had ceased to operate (Valle 1984).

The Chesapeake and Delaware Canal, connecting the Delaware River just above Reedy Island to the Chesapeake Bay via the Elk River, was opened on October 14, 1829. Originally, the canal was 36 feet wide at the bottom, 66 feet wide at the top, and ten feet deep (Cox 1988). A series of locks were required to allow navigation between the two waterways. Although the canal had little impact on shipping in the lower Delaware Bay, it forged a water link between Philadelphia and Baltimore. The advent of railroads throughout the region limited the initial success of the canal. However, the Federal Government took over control of the canal in 1919, widened it, deepened it, and removed the locks, allowing sea level navigation by 1923 (Cox 1988). Several decades later the canal was again enlarged to the present depth of 35 ft. with a width of 450 ft. and is ranked by the U.S. Army Corps of Engineers as the busiest canal in the United States (Bryant and Pennock 1988). Use of the canal did not have a direct impact on shipping in the lower Delaware Bay until after the canal was reopened without locks. Northbound ships leaving and calling on Baltimore used the shorter canal route to reach the Atlantic Ocean via Delaware Bay, instead of traveling down the Chesapeake Bay and passing around Cape Charles (Cox 1988).

SHIPBUILDING ACTIVITIES IN THE DELAWARE RIVER AND BAY

Historically, the Delaware Valley has always had a strong and vibrant shipbuilding industry. From the early colonial period, even before William Penn founded Pennsylvania, up through World War II, Delaware Valley shipyards have been among the most productive in the country. With an advantageous combination of available resources, such as timber, iron, steel, and skilled labor, Delaware Valley shipyards rapidly established and maintained a strong shipbuilding tradition. The first documented shipbuilding activity by Europeans in the Delaware Valley region took place in the middle of the seventeenth century during the Dutch and Swedish occupation. Although references to shipbuilding during this period are sparse, records indicate that in 1644 the Swedes endeavored to build "two large, beautiful boats, one for use at Elfsborg, and the other at Fort Christina" (Brewington 1939:50). The Swedes remained active in shipbuilding for the next several years. Their carpenters finished a sloop, a barge, and a 200-ton ship by 1651. However, once the Dutch assumed control of the Lower Delaware Valley in 1655, Swedish shipbuilding activities ceased. There is no record of Dutch shipbuilding during this era, but it would not be unreasonable to assume that some boat construction took place in support of the several coastal forts and outposts that were built (Cox 1988).

Shipbuilding increased dramatically following the surge of English settlement in the Delaware Valley after 1664 (Cox 1988). One of the first vessels built by English settlers was the ship *Glob*, constructed in 1675. At least two other vessels were built that year along the Delaware River shoreline (Brewington 1939). In his designs for his colony, William Penn had intended to establish a strong tradition of shipbuilding. He recognized the potential of the hardwood forests that stretched along the upper sections of the Delaware River drainage. This vast source of timber suitable for shipbuilding was especially prized, since much of England's natural wood supply had been exhausted by the end of the seventeenth century. With these resources available, Penn advertised abroad for quality tradesman to come to Philadelphia. He wrote that shipwrights were among nine different types of craftsmen in Pennsylvania (Cox 1988). By 1685, there were shipwrights, boatwrights, ropemakers, sailmakers, and blockmakers all listed as residents of Philadelphia (Shipbuilding Research File, Philadelphia Maritime Museum n.d.).

With its ample supply of both raw materials and skilled labor, Delaware Valley shipyards rapidly became among the most active in all the colonies. In 1700, there were four commercial shipyards in operation along the Delaware River. Between 1682 and the beginning of maritime records in 1722 (ship registers started by the port authorities to collect customs), the average number of ships built is estimated to be slightly less than ten vessels per year, most of which were less than 50 tons in size (Crowther 1970). Several family shipyards were responsible for the majority of the early eighteenth century vessels built in the Delaware Valley. The West, Penrose, Humphries, Bowers, Eyre, Cramp, Lynn, and Vaughan facilities were some of the more prominent yards in the area (Cox 1988).

During the Colonial period, British Parliament enacted a ship register, whose purpose was to assist with enforcing certain provisions of the Navigation Acts of the late seventeenth century. In 1696, an Act required owners of vessels engaged in overseas plantation trade to swear an oath in writing that "no foreigner, directly or indirectly, hath any share, or part, or interest therein". Registration of the oath was made before local customs officers and a certificate was issued to the master of the vessel. The certificate allowed Englishmen or colonists owning vessels to engage in overseas trade within the British Empire. Vessels solely conducting Intra-colonial commerce and fishing operations were exempt from the Act and therefore not required to register. After 1722, an estimation of the output of the shipyards in the Delaware Valley can be determined from the *Ship Registers of Pennsylvania, 1722-1775* (McCuster 1970). Simeon John Crowther conducted a detailed examination of the registry records for the Port of Philadelphia, which date from 1726-1776. This research was performed in connection with his dissertation entitled, *The Shipbuilding Industry and the Economic Development of the Delaware Valley: 1681-1776.* A total of 3,241 vessels were registered in Philadelphia over this period. A large percentage of that number was undoubtedly built in local yards. Between 1722 and 1776, Delaware Valley yards produced approximately 95,000 tons of shipping if one estimates the output of missing years in the registers and adds that number to the total recorded output of 87,346 tons (Crowther 1970). The average tonnage of individual vessels increased steadily throughout the entire 54-year period (Cox 1988). Six types of vessels were listed in the registers: square-rigged ships, sloops, brigantines, snows, schooners, and shallops. These were the vessel types predominantly used in the Delaware Bay and the Delaware River during the colonial period. Their basic distinguishing characteristics were the type of sails and rigging used, but they also varied in size as well (Cox 2005).

A series of tables compiled by Crowther are very useful for this current study. Tables 1 and 2, presented below, were generated using Crowther's findings. Table 1 lists the number of vessels, by type, that were registered within the Port of Philadelphia from 1745 to 1761. Table 2 lists the annual mean tonnage of vessels from 1745 to 1761, by vessel type. Since the archaeological remains of the Roosevelt Inlet Shipwreck suggest the vessel was likely classified as a Ship, Snow, Brigantine, or Schooner, only these types of vessels were included within Tables 1 and 2 (Cox 2005). In addition, since the artifacts from the wreck appear to date within the time period of 1760-1775, the Tables 1 and 2 focus on this era. An expanded timeline was utilized in the event that the date range of the artifacts should change, based on future analysis and findings.

Since records do not exist from 1762 to 1765, those years could not be included. The registry data shows that from 1745 to 1761, a total of 524 vessels of the types listed above were registered for overseas trade. Of this total, 10 were classified as Ships, 89 as Snows, 164 as Brigantines, and 91 as Schooners (Cox 2005). During this period, the mean average tonnage for Ships was 106; Snows, 74; Brigantines, 54.5; and Schooners 16. By 1770, Pennsylvania, New Jersey, and Delaware shipyards were among the most active colonies, in terms of tonnage of vessels built.

Table 1. Annual Number of Vessels Registered in Philadelphia by Type of Vessel, 1745-1761.

Year	Ships	Snows	Brigantines	Schooners	Totals
1745	5	2	5	3	**15**
1746	6	5	12	4	**27**
1747	4	4	12	3	**23**
1748	18	10	15	11	**54**
1749	10	7	5	2	**24**
1750	14	15	10	6	**44**
1751	15	8	13	3	**39**
1752	13	6	11	6	**36**
1753	11	4	5	3	**23**
1754	8	4	9	2	**23**
1755	9	3	3	4	**19**
1756	5	4	9	8	**26**
1757	9	2	8	4	**23**
1758	10	4	10	5	**29**
1759	13	5	12	7	**37**
1760	20	6	8	12	**46**
1761	10	1	17	8	**36**
Totals:	***180***	***89***	***164***	***91***	***524***

Source: Crowther 1970:157, Table III-7.

Technological innovations ushered in with the Industrial Revolution helped change the nature of shipping and shipbuilding on the Delaware Bay and the Delaware River during the nineteenth century. Iron-hulled steam vessels rapidly became the standard type of vessel operating on the waterway (Cox, 2005). Shipbuilding yards along the banks of the Delaware soon were producing more iron-hulled vessels than any other region in the country and quickly earned the reputation as the "Clyde" of American shipbuilding. The Harlan and Hollingsworth shipyard in Wilmington became one of the nation's leaders of producing quality iron-hulled and wooden-hulled steam vessels (Cox, 2005). Other regional leaders in the production of iron-hulled ships include: John Roach and Sons; Thomas Reaney, Son & Archbold; N.F. Palmer; Chester

Shipbuilding (Chester); William Cramp & Sons; Neafie, Reaney & Company; John Birely & Son and John Vaughan & Son (Philadelphia); and John Dialogue & Sons and Wood & Dialogue (Camden) (Cox, 2005). This strong regional shipbuilding tradition continued through World War I, when the Hog Island Shipyard in Philadelphia and the New York Shipyard in Camden had been mass-producing vessels for the war effort. Wooden-hull shipbuilding in South Jersey, specifically on the Maurice River, was also important in the historic period. From the beginning of the nineteenth century, expert local shipwrights produced sloops, schooners, shallops, and a variety of small vessels for local trade and the thriving fish/shellfish industry.

Table 2. Annual Mean Tonnage of Vessels Registered in Philadelphia by Type of Vessel, 1745-1761.

Year	Ships	Snows	Brigantines	Schooners
1745	142	85	53	10
1746	97	75	52.5	22.5
1747	124	71	61	6.5
1748	122	80	52	15.5
1749	87.5	79.5	44	16.5
1750	95.5	70	54.5	17.5
1751	86.5	66	49.5	13.5
1752	94	70	48	24
1753	92	67.5	49	16.5
1754	124.5	87	52	14
1755	88	70	70	19
1756	88	71	56	10.5
1757	112	55	62	20
1758	120.5	67.5	57.5	9.5
1759	119.5	80	50	15
1760	100	61.5	47.5	23
1761	108.5	100	65	22
Mean Average:	***106***	***74***	***54.5***	***16***

Source: Crowther 1970:159, Table III-9.

Occasionally, much larger vessels were constructed for overseas trade. The schooner rig, adapted from early-eighteenth-century English and European vessel types, became popular throughout the lower Delaware Bay. A small crew could effectively operate a schooner-rigged vessel. Various types of schooners were developed in the eastern United States: "Virginia Schooner," "Baltimore Clipper," and "Bay Schooner" versions were all developed by American shipwrights in the nineteenth century. A version of the *Bay Schooner*, referring to the Chesapeake Bay, was modified by New Jersey boat builders to adapt to Delaware's strong tides and shallow waters (Cox 2005). In reference to the characteristics of schooners, Witty states, "By the 1920s, Delaware Bay schooners had taken on their own unique characteristics. Increased length of the hull lines, a freeboard with a long sweeping shoreline, and smaller heart-shaped sterns with elliptical tops characterized New Jersey schooners" (1986:96). As schooners became more popular among watermen, Delaware Bay sloops were dismantled and refitted as schooners with their characteristic fore and aft sail rig. During the first half of the twentieth century wind-powered oyster schooners were eventually outfitted with motors and pilothouses. Most of the existing schooners on the Maurice River pre-date 1930, the last year they were built in the area (Sebold and Leach 1991). Researcher Alonza Bacon compiled a list of 618 ships launched in Cumberland County, New Jersey between 1870 and 1935. The list documented 153 vessels built in Bridgeton, three in Fairton, 38 in Greenwich, 16 in Cedarville, 17 in Newport, 35 in Dividing Creek, 55 in Millville, two in Port Elizabeth, 61 in Mauricetown, 100 in Dorchester, 71 in Leesburg, and 32 in Port Norris (Cox 2005).

Regional shipyards were also active along many of Delaware's tidal rivers. In 1859, there were three yards in Milton on the Broadkill River, three in Milford on the Mispillion River, three at Lebanon on the St. Jones River, and two in Frederica on the Murderkill River (Cox 2005). The majority of the vessels were wooden-hull schooners, sloops, and fishing boats that utilized local wood products, particularly white oak and pine. Occasionally, much larger vessels were constructed at some of these regional shipyards. Nathaniel Link's shipyard in Frederica, Kent County employed approximately 35 people at the height of the industry in the mid-nineteenth century (Cox 2005). Link's yard produced three-masted schooners, one at a time, each ship needing nearly a year and a half for completion. Because the Murderkill River was so shallow, the ships were launched without their masts and towed to Philadelphia for final outfitting. Productivity of the yards began to decline in the 1880s, when wooden sailing ships were gradually phased out of coastal shipping (Hoffecker 1977).

NAVAL ACTIVITY

During the War of Independence, there were many significant naval engagements waged on the Delaware River, including a battle for access to Philadelphia. In September 1777, the city fell to British forces, but the colonials remained in control of the Delaware River. An attempt to gain control of the only supply route available to them was made by the British when they sent a massive naval fleet of warships to destroy the colonial forces that controlled the river. The Americans attempted to counter the strength of the English warships with a defense system, including three forts, two tiers of river obstructions (known as Chevaux de Frise), and numerous assorted small crafts (Cox 1988). These were composed of rowed galleys, floating batteries, guard boats, sloops and schooners, and fire rafts. The colonial forces assembled approximately 57 vessels on the Delaware River at the time (Jackson 1974).

The initial encounter between the two forces took place in the spring of 1776, near Wilmington, but the major engagement was fought in the upper reaches of the Delaware River in the fall of 1777. In May 1776, a fleet of three English vessels, under the command of Captain Hammond, was ordered up the Delaware River to perform a reconnaissance mission and ascertain the strength of the colonial forces (Cox 1988). The Americans sent a portion of the small boat fleet down below the lower tier of obstructions to meet the English forces. The two sides met on two separate occasions between May 8 and 12. The first encounter was adjacent to the mouth of the Christina River, and the second skirmish was slightly downriver from the Christina. Neither side suffered a loss in either engagement, as both conflicts were rendered inconclusive.

However, a fierce, six-week long struggle ensued beginning in October 1777, when the two the forces met again. The battle was contested until the vastly superior English force of nine warships loaded with 295 long guns was able to capture two forts (Mifflin and Mercer) on November 16 (Cox 1988). The British lost two of their warships near the mouth of Mantua Creek during the course of the battle, including the sixty-four-gun frigate, *Augusta* and the eighteen-gun sloop of war, *Merlin.* Losses to the colonial naval forces were heavy as all of their boats became trapped once the forts were captured with most becoming destroyed in the process. This particular engagement in the Delaware River during the War of Independence is the last significant battle that took place in the region (Cox 1988).

DELAWARE BAY AND RIVER NAVIGATION

Although Henry Hudson visited the Delaware Bay in 1609, which was explored by others within the next decade, the first comprehensive navigational chart of the Delaware Coast vicinity was not completed until 1756. In that year, Joshua Fisher charted the waters of the Delaware Bay and provided the first bottom contours, based on soundings. In the first half of the nineteenth century, several other maps and charts of the vicinity were privately published. The first standardized charting of the bay/river was not provided until the first United States Coast Survey was finished in 1848 (Cox 2005). In 1878, this agency was reconstituted as the United States Coast and Geodetic Survey, and from this time on, the agency has periodically updated the chart of the vicinity with increasingly detailed, more accurate hydrographic information.

As the Delaware Bay affords the only suitable deepwater inlet along the 295-mi. stretch of the Atlantic Coast between Chesapeake Bay and New York Bay, mariners frequently sought refuge in the mouth of the bay during periods of inclement weather. Lewes became a harbor of refuge for ships heading along the Atlantic Coast and up the Delaware Bay, alike (Cox, 2005). The earliest known aid to navigation in Delaware was the Cape Henlopen Light, which was erected in 1767. The light helped to guide vessels into the bay and also served as a warning that the cape was nearby. The lighthouse continued to aid vessels entering and exiting Delaware Bay until it was destroyed by erosion in 1926. A second lighthouse was constructed on Fenwick Island in 1858 to further aid mariners who traversed the Delaware coastal waters (Cox 2005).

A major aid to navigation in the area was the construction of a pair of breakwaters inside Cape Henlopen and the creation of a Harbor of Refuge, which provided protection to vessels from storms and ice at the mouth of the Delaware Bay (Cox 2005). Before the construction of these breakwaters, conditions at the mouth of the Delaware Bay were often more perilous than in the open ocean. Mariners, shipping companies, port officials, and insurers all raised the issue of the need for a protective breakwater near the mouth of the Delaware Bay to protect shipping (Cox 2005). In a plea made to Washington, D.C. in 1826, Alex Stewart encouraged officials to:

> ... place a shelter at the entrance of the bay [because] the commerce of the Delaware will not alone be protected and preserved by it, but that of the whole coast, daily passing and repassing its capes, together with foreign vessels who resort there when overtaken by accident at sea. All will find a haven where their crews can be recruited; damages repaired, and their wants fully supplied secure from mishap or danger; thereby the interests of merchants, and the lives of hundreds of individuals will be saved from jeopardy or untimely death [cited in Hazard 1828:70].

Delaware River Navigation

The first organized efforts to overcome the navigational hazards facing mariners who traversed up the Delaware River was established in 1766, when the port of Philadelphia was placed under control of the "Wardens of the Port of Philadelphia" (Snyder and Guss 1974). The office was created by, "An Act for Appointing Wardens for the Port of Philadelphia and for Regulating Pilots Plying the River and Bay to and from Said Port" (Slaski n.d.). The wardens were issued the responsibility of licensing pilots, placing buoys, alleviating the problem of winter icing, the erection of lighthouses, and the dredging of wharves and piers. However, in terms of physical improvements or installation of navigational aids, little was done until the nineteenth century. A set of 1796 sailing instructions for the bay mentions that buoys were located on Brown, Brandywine, and Cross Ledge Shoals. By 1827, additional buoys were placed on Joe Flogger, Fourteen Bank, and Upper Middle Shoals.

Ice was a serious threat to navigation on the Delaware River. Each winter, almost without exception until the middle of the nineteenth century, the Delaware River froze over. This phenomenon not only closed the port for a significant period of time each winter, sometimes lasting over a month, but it also posed a serious threat to any unfortunate vessel that became entrapped in its ice floes. The first attempt to manage this problem was in 1803 when the first of a series of ice piers was constructed off New Castle, Delaware (Cox 1988). A total of seven piers were built at New Castle and served to break up ice floes as they came down the river. The intention of these constructions was to provide a safe anchorage for ships behind the piers. Other piers were built later at Marcus Hook, Pennsylvania and Lewes, Delaware.

Another navigational hazard present in the Delaware River was the placement of the Chevaux de Frise during the Revolutionary War, mentioned earlier in the "Naval Activity" section. These frames, designed to defend the river, became serious threats to commercial shipping at the conclusion of the war. In 1783, the Port Wardens determined the location of buoys to mark the obstructions. Arthur Donaldson and Levi Hollingsworth were contracted by the Port Wardens in 1784 to remove the frames (Snyder and Guss 1974). After six months of work, they succeeded in removing 54 of the obstructions (Slaski n.d.). It is difficult to determine how thorough their effort was, because the number of frames the British had removed in 1777 cannot be determined. A report from the Port Wardens mentioned that during the year following the removal, only one incident concerning an obstruction was reported. Dredges working in the river during the 1930s and 1940s periodically struck a frame while dredging the main channel in the river (Cox 1988).

However, in the Delaware River, the most significant danger to mariners was, and still remains to this day, the hazard of running aground due to shoaling. Additionally, these shoals accumulate and shift unpredictably from sediment carried downstream, which further challenges the safety of navigating through the shoals. Today, there are eighteen major shoals or bars near the main shipping channel of the Delaware River and Bay (Cox 1988). Historically, mariners had to navigate through these shoals in a winding channel that was not improved until the last quarter of the nineteenth century. The average depth of the unimproved bay and river of the early nineteenth century was slightly more than 20 ft. in the main channel (Snyder and Guss 1974). This provided adequate draft for most vessels plying the river at that time. However, by the 1870s, a normal ocean-going vessel typically drew 20 to 24 ft. (Snyder and Guss 1974) and could easily run aground without the benefit of a full high tide. The major natural obstruction in the Delaware River was a rock shoal, located between Chester and Marcus Hook, Pennsylvania, known as Schooner Ledge (Snyder and Guss 1974).

Rock excavations at Schooner Ledge were started in 1879. The rock face was drilled with a rack and pinion device, and blasting charges were inserted into the rock. After exploding, the dispersed rock material was removed with a dipper dredge, and most of the material was placed behind Chester Island. Other major obstructions during this initial period were the shoals at Petty Island and near Fort Mifflin. Spoil from these two areas was deposited on government land at Fort Mifflin and League Island (Snyder and Guss 1974). Work at these locations was conducted between 1877 and 1882.

Finally, in 1885, legislation was approved, which authorized the permanent improvement of the Delaware River. The U.S. Army Corp of Engineers supervised all improvements on the waterway, including dredging and the construction and maintenance of anchorages, dikes, and harbors. A 30-foot channel from Bombay Hook Point to Philadelphia was authorized by the River and Harbor Act of 1896, which shortly thereafter, led to the creation of Artificial Island, just south of Salem, immediately adjacent to the survey area.

DREDGING IN THE DELAWARE RIVER

Up until the Industrial Revolution, the social and economic development of the Delaware River Valley could not advance appreciably without advancements in dredging technology. As noted earlier, the average natural depth of the Delaware River was only 20 ft. and did not allow for larger, more heavily laden, deeper drafted vessels to reach the major port of Philadelphia. Noteworthy activity in pursuit of channel dredging in the Delaware River coincided with the advent of steam-powered equipment (Snyder and Guss 1974). The establishment and maintenance of reliable Delaware River channels for navigation was first made possible in 1804 by Oliver Evans' "carriage," equipped with a steam engine and a stern paddle wheel (Figure 5).

The "*Orukter Amphibolos*" was probably the first mechanically functioning dredge to operate in the Delaware River. Evans described it as, "a large flat, or scow, with a steam engine of the power of five horses on board to work machinery to raise into flats" (Snyder and Guss 1974). With steam dredges such as the "Orukter," it became possible to retain and transport a higher percentage of the heavier material to create designated dredge spoil deposits. However, while this capability existed, without the use of a hydraulic pipeline dredge, deposition of this material was somewhat inefficient and prohibitively expensive. Attempts at avoiding this problem in the early nineteenth century involved inducing a measure of self-maintenance through harnessing the natural scouring force of the tide and current. However, a program for construction of channel training dikes was curtailed in 1885 after some effective diking had been done through the invention of another steam dredging machine, the *Ocracock Apparatus*. According to Snyder and Guss (1974), this apparatus was a form of a ladder dredge, which successfully provided a channel through a sand bar to a depth of approximately 10 feet. A hired machine worked the Delaware harbors and river in the summer of 1830. Operations continued through 1832, with Port Penn added to the harbor-dredging schedule.

In 1853, a system for improving navigation through dredging was recommended within the context of helping secure a greater national defense. Major Delafield, who was the superintendent of projects involving bolstering Atlantic Coast defenses, proposed a combination of dredging with ladders and diking the stream banks (Snyder and Guss 1974). The dredge spoil was to be dumped behind stone-filled timber dikes and represents a practice that continued long after ladder dredges disappeared from the Delaware River.

Dredging operations understandably came to a near standstill during the Civil War, but the post-war decade witnessed a phenomenal expansion of trade and industry, which accompanied a marked increase in maritime traffic for Philadelphia. Harbor planners ambitiously envisioned a ship channel in the Delaware River with fixed dimensions and permanent maintenance facilities. As mentioned previously, late 1800s commercial vessels had an average draft of 20 to 24 feet.

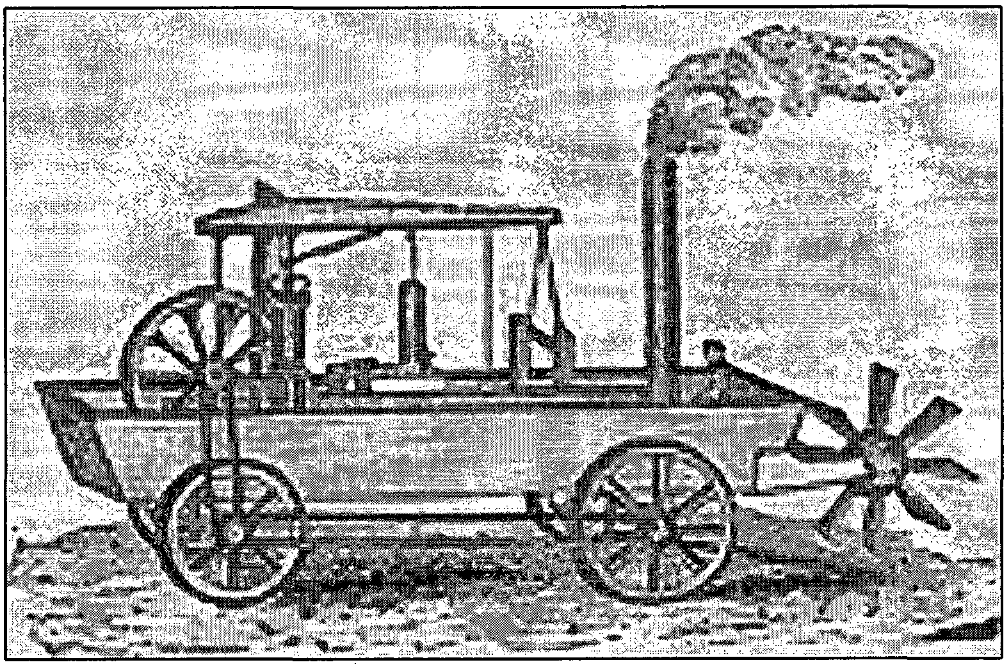

Figure 5. The Amphibious Digger, built by Oliver Evans for the Philadelphia Board of Health in 1804, was the first wheeled vehicle to move under its own power in the U.S. It was also the first mechanically powered dredge to operate in the Delaware River (courtesy of U.S. Army Corp of Engineers, Philadelphia District).

There were places in the Delaware River where ships could run aground easily, even at high tide, and the goal was to dredge the river to an average depth of 27 ft. (Snyder and Guss 1974). The most feared hazard and obstacle to this was at Schooner Ledge, 18 mi. below Philadelphia. It was a rock reef, in which according to Captain Ludlow of the U.S. Army Corp of Engineers, "could be regarded as the most serious obstruction in the river" (Snyder and Guss 1974). Rock excavation of Schooner Ledge took place in 1879, in the costliest single project undertaken yet for the improvement of the Delaware River for navigation.

DESIGNATED SPOIL SITES ON THE DELAWARE RIVER

When the challenge at Schooner Ledge was overcome, an experiment seeking an alternative to the overboard disposal of dredge material was proposed by Colonel Macomb at Fort Mifflin in 1879. Material was deposited in basins dug adjacent to a land-based dike enclosure, and then re-dredged into dump cars that moved on tracks along the top of the dikes, where they were then redeposited on land (Snyder and Guss 1974). This extensive effort was done, because it was observed that the "fluid and yielding material" tended to be redistributed and returned to the channel by natural forces (Snyder and Guss 1974). Seen as a success, dredge spoil sites were prospected for along the river, but by 1890, the scarcity of disposal areas was acute. Major Raymond, who started a 10-year tour of duty as the Philadelphia District Engineer, took charge of navigation improvement and the challenge of spoil disposal. A partial solution was achieved by making spoil disposal a responsibility of the dredging contractors. However, a tremendous volume of material had to be excavated from the Philadelphia harbor area. Government lands at Fort Mifflin and League Island were capable of receiving nearly half of the dredged material. However, in 1895, the Navy Department blocked a proposed extension of authority to continue the depositing of spoil at the League Island Navy Yard site (Synder and Guss 1974). In the six years following Major Raymond's appointment, approximately 10.7 million cubic yards of dredged materials were dumped on the river at nine different locations (Figure 6).

ARTIFICIAL ISLAND, SHIP BREAKWATER, AND HOPE CREEK

The River and Harbor Act of 1896 authorized a survey for the creation of a 30-foot channel from Philadelphia to the Delaware Bay. The survey covered 56 mi. of the proposed channel (Snyder and Guss 1974). The amount of material to be removed by dredging was estimated at 34,953,000 cubic yards plus the excavation of 24,000 cubic yards of rock. Six locations were earmarked as places of deposit with specific authority providing for the creation of one of the largest disposal areas below Reedy Island, on the eastern side of the river. At the site, Baker Shoal and Stony Point Shoal were to be enclosed by bulkheads to form the principal deposit basin in the Lower Delaware, known since as Artificial Island (see Figure 6). Initial appropriations for the 30-foot channel were designated for removal of the shoal below Reedy Island, deemed "now the most troublesome obstruction to the navigation of the river" (Snyder and Guss 1974) and for construction of bulk heading for the proposed artificial island disposal area. This work began with pile driving for the bulkhead on April 4, 1900 (Snyder and Guss 1974), but it was not until 1908 that the Artificial Island was finally completed. According to Josephine Jaquette, in a letter to the Salem Historical Society (see Appendix B), oral accounts from local fishermen, trappers, and people who helped construct Artificial Island, substantiated that the island was created on Stony Point and Baker Shoals as a means of keeping the channel open at the mouth of Alloway Creek. Furthermore, the intention was to create an island approximately 3 miles long and 1 mile wide for this to effectively occur.

After World War I, the government also had needed to dispose various wooden vessels (mostly freighters and oilers) particularly for World War I that had become obsolete. The World War I wooden vessels were sunken at the southern end of the Artificial Island (Figure 7). As this was all open water before the island was blown in (permitting the use of shad nets that would have caught on any obstruction below water), it is not believed that any ancient boats or wrecks are in this vicinity, according to the letter to the Salem Historical Society (see Appendix B).

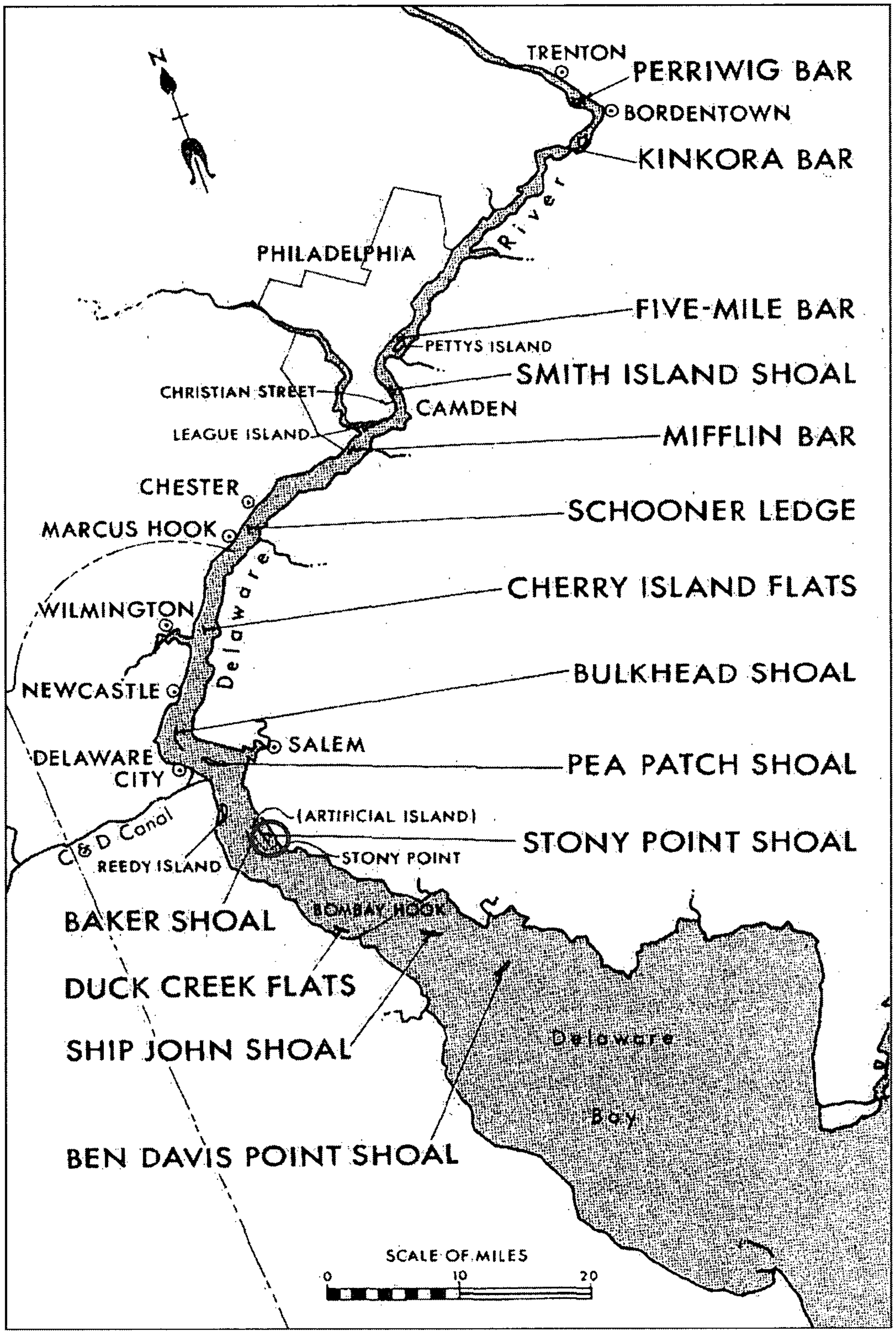

Figure 6. Showing the location of designated dredge spoil sites including Artificial Island and the approximate location of the survey area circled in red (courtesy of the U.S. Army Corp of Engineers, Philadelphia District).

Figure 7. Breakwater just south of Artificial Island composed of obsolete wooden World War I era vessels (courtesy of Google Earth™).

Referred to as "working on the Jetty" by locals employed during its construction in the early 1900s, the island was built in three sections on what was historically Stony Point Shoal, extending out to Baker Shoal (Figures 8a to 8c). The lower third of the island was built first, and then the upper third was built near the old cove of Alloway Creek. The east side connection was made next, leaving the west side of the middle section open so that tugboats could move the loaded scows inside for dumping mud. The gap was later filled in with clay from the nearby Hamburg Cove, and then topped with stone. There is also a stone bank that runs across the northern end of the lower third section and the southern end of the upper third section (*The Island Paper* 1991).

The U.S. Army Corp of Engineers owned Artificial Island until a 200 ac tract of land on the southern part of the island was exchanged with PSE&G for property the utility had owned in other locations along the Delaware River. Additional property was acquired from the State of New Jersey in 1974 to become what is now a 734 ac site for the Salem and Hope Creek Generating Stations. In 1968, a contractor for PSE&G built an access road to the Artificial Island across the marshland. Workmen in 1968 had to first cross Fishing Creek, and then bridge Hope Creek to make the island accessible to motor vehicle traffic (*The Island Paper* 1991).

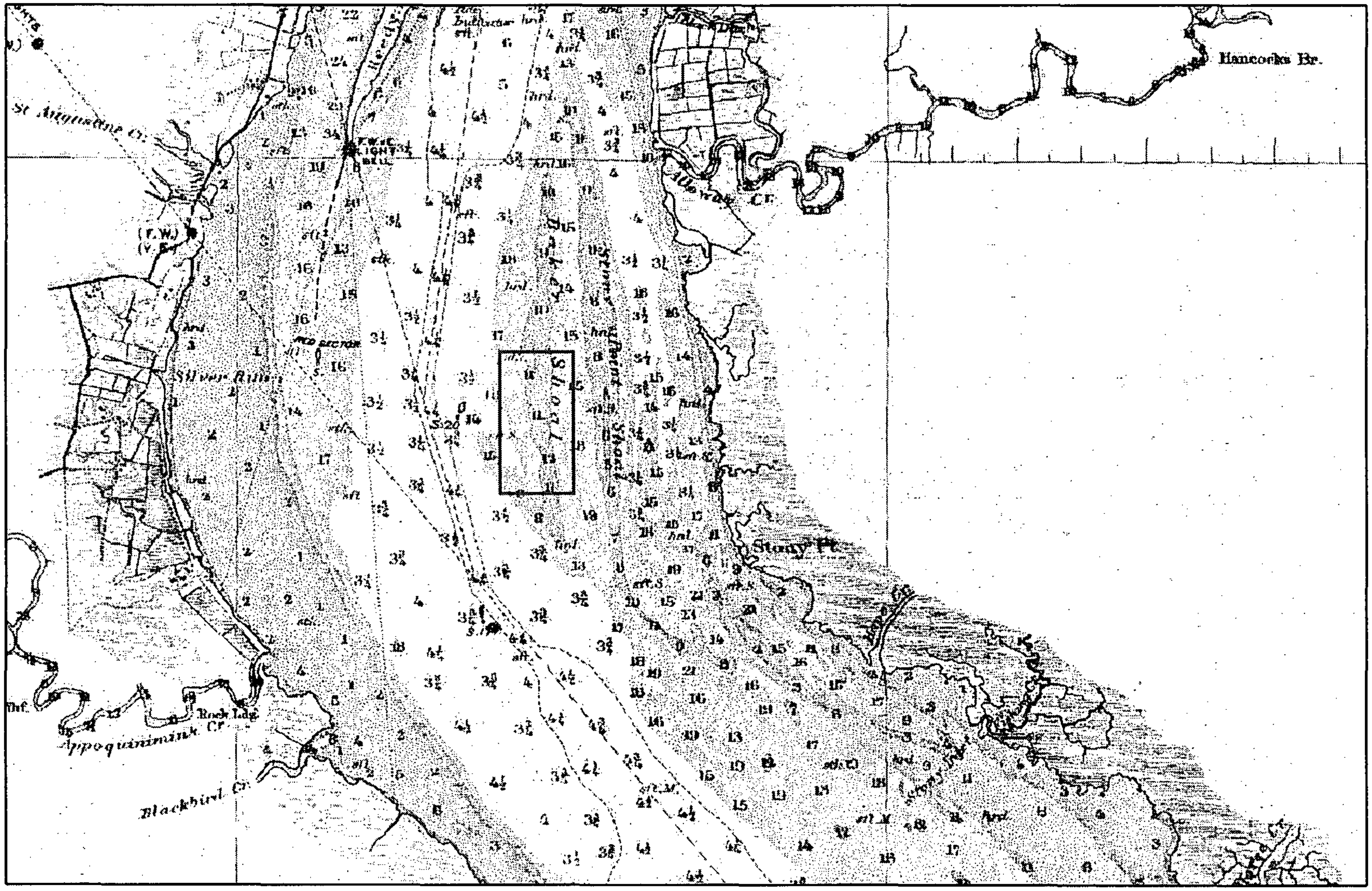

Figure 8a. 1896 chart, just prior to construction, shows Stony Point Shoal; project survey area outlined in red (courtesy of National Historic Chart Center).

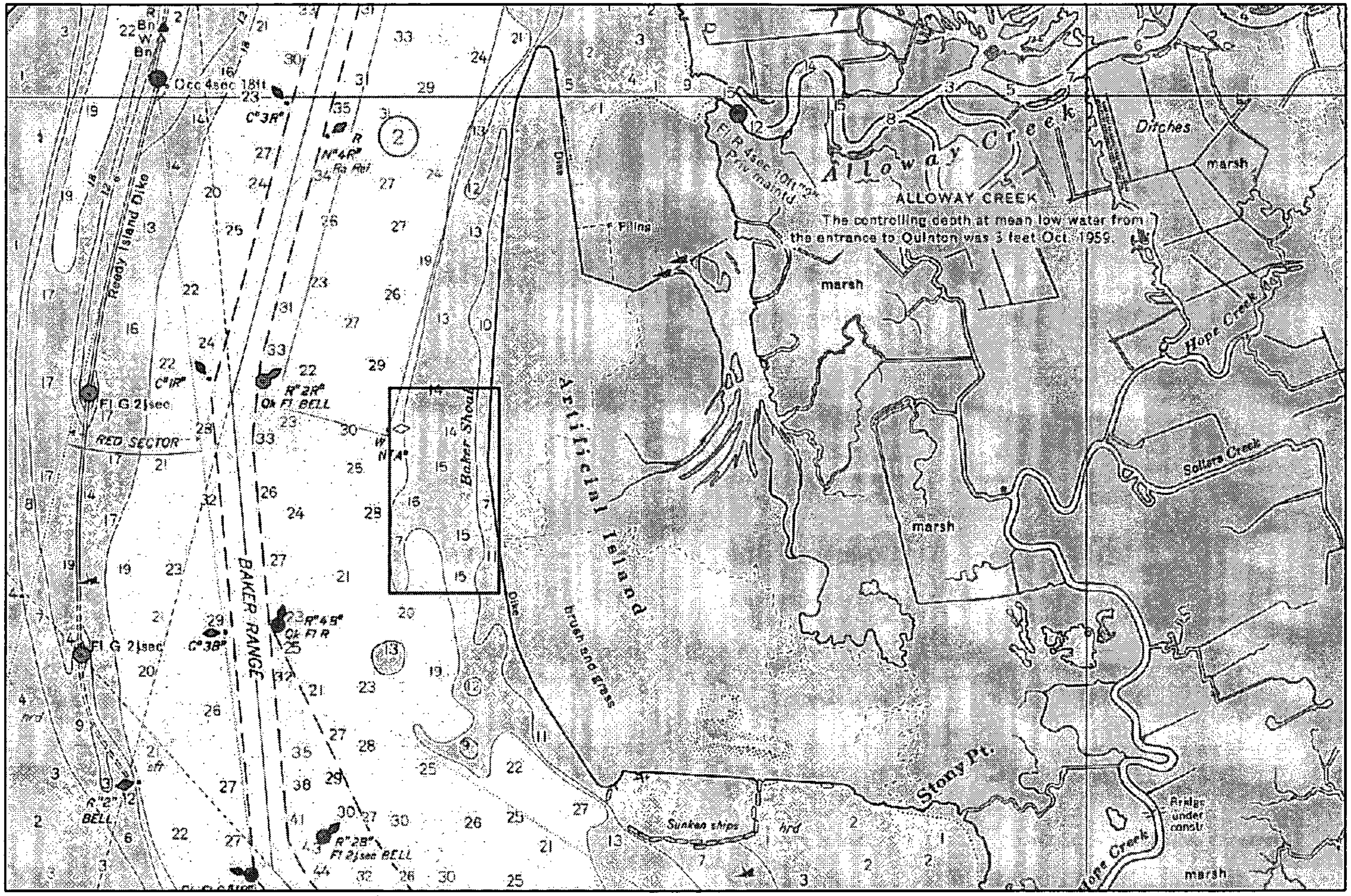

Figure 8b. 1968 chart just prior to the establishment of the nuclear plant; project survey area outlined in red (courtesy of National Historic Chart Center).

Hope Creek was the center of the fishing industry on the Delaware River, and for many years, fishermen made their headquarters along the creek due to its accessibility to the bay. The mouth of Hope Creek is still marked by a beacon and jetty. Also nearby, a tall granite obelisk marks the mouth of the Delaware River and the head of Delaware Bay (*The Island Paper* 1991). Today, three nuclear power plants constructed by PSE&G from 1968 to 1986 are on the southern portion of Artificial Island. The nuclear plant consists of three reactors, just southeast of the survey area. It is shown best in a nautical chart from 2000 (Figure 8c).

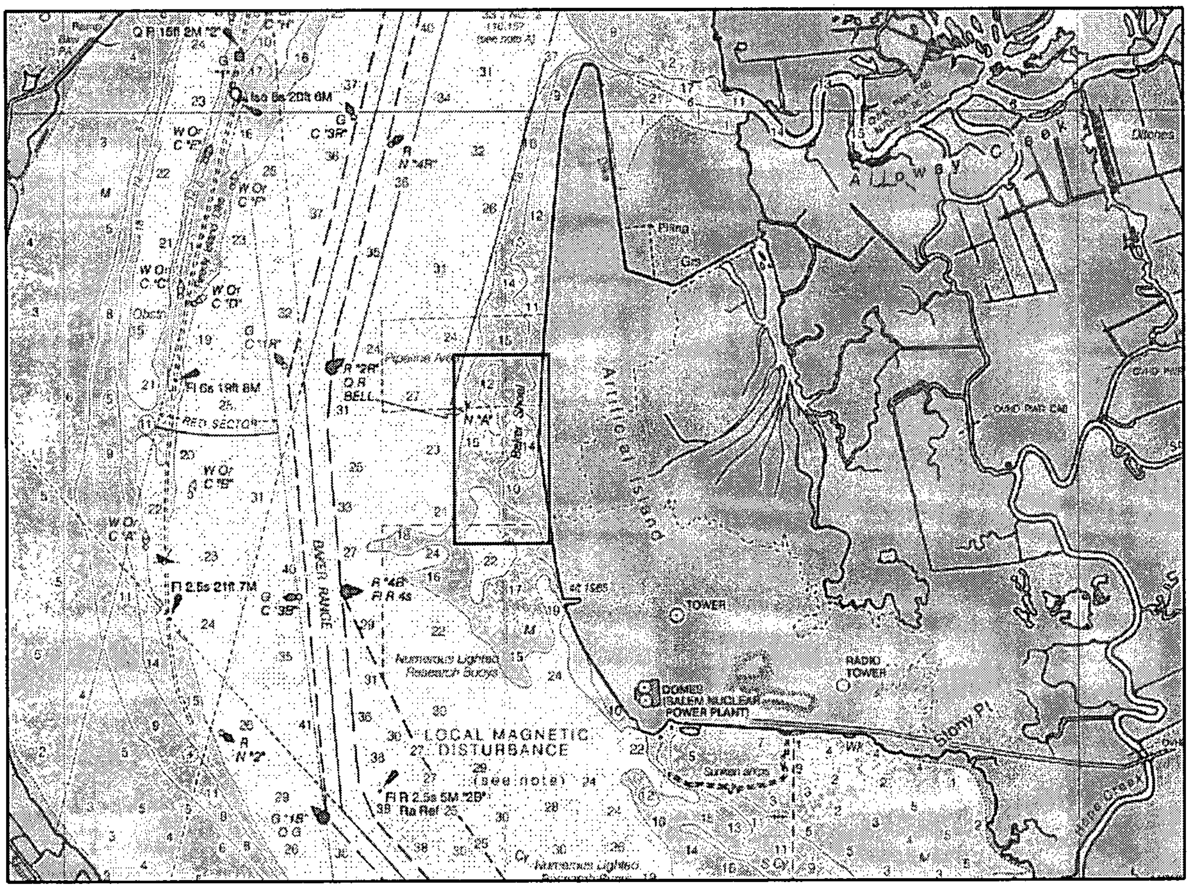

Figure 8c. 2000 chart showing nuclear plant facility; project survey area outlined in red (courtesy of National Historic Chart Center).

SHIPWRECKS IN THE DELAWARE RIVER

Two historic shipwreck sites were encountered during dredge operations on the Delaware River in the 1940s. The first site had been encountered while a new 34-foot channel off Hog Island, Philadelphia, was dug in January of 1941. The Atlantic Refining Company had been building a large wharf on the island and received permission to have the access channel cleared. The oil company built a dike on Hog Island that was eventually filled with more than 100,000 square yards of dirt and fill. Three suction dredges were then floated out over the spots where the channel was to be cleared. The bottom material was brought up through a cutterhead and was sent through a large pipeline to the shore disposal site (Cox 2005).

Among the items discovered in the disposal area, were various artifacts dating to different periods. An iron anchor, hand forged and weighing approximately 40 lbs., was found with one fluke missing. It was in a good state of preservation. Some 280 lbs. of copper sheathing, handmade nails, a hand forged brass spike, an iron cannon ball, a brass collar marked, "USNYN, 1871", and a copper spoon were among the recovered items (Cox 2005).

A second shipwreck site was discovered in 1948 on the New Jersey side of the river. In actuality, two separate sites were encountered by a dredge removing bottom sediment for the Mantua Creek Anchorage. The wrecks, one west of the mouth of Woodbury Creek and the other near the mouth of Mantua Creek, were reported to be imbedded in 6 ft. of mud under 36 ft. of water. Divers estimated the wreck near Woodbury Creek to be 200 ft. long and reported that the cutterhead had clipped off part of the deck, revealing a vast number of "kegs of nails". Among the items that were drawn up from the bottom and survived the mile and a half journey through a 27 in. dredge pipe to the disposal area on a farm near Thorofare, New Jersey, included: a harpoon, table knives, hand scythes, brass locks and keys, pewter plates, hoes, hinges, silver shoe buckles, copper tea kettles, and bottles (Cox 2005). Materials from the sites were dated as early as 1700, and debates ensued whether the vessels were English or Dutch.

Additionally, a *New York Times* article from June 29, 1902, entitled, *Treasure in River Shoals,* also states the local belief was that one of Captain Kidd's "treasure laden pirate ships" was wrecked on Dan Baker Shoals in the Delaware River, and the article also reveals that "dredgers at the mouth of the Schuylkill turned up a portion of the hull of a schooner, which no one knew anything about. The vessel's name could not be ascertained. In the part of the wreck brought to the surface were found a number of shovels and picks of antique pattern and several watches of unknown make and date" (see Appendix C).

PREVIOUS INVESTIGATIONS

Numerous underwater archaeological surveys have been conducted in Lower Delaware Bay over the last 25 years. In addition to the underwater archaeological investigations, one shipwreck, the *DeBraak*, has also been salvaged at the mouth of the Delaware Bay (Cox 2005). Most of these underwater projects included a cursory literature search. A few projects entailed more detailed archival study, while others involved a combination of historic research and remote sensing survey. A small number of these investigations included diving to examine targets established by remote sensing.

The Phase I and Phase II Lewes Beach and Roosevelt Inlet project area was originally surveyed during a 1995 investigation of two borrow areas (Area #1 and Borrow Area # 2 (where the 2004 dredging occurred) (Cox 2005). A submerged and shoreline cultural resources survey project was jointly undertaken by Hunter Research and Dolan Research at those two offshore borrow areas and a portion of the shoreline at Beach Plum Island (Cox 2005). Hunter Research conducted the shoreline survey and documented the remains of a derelict shipwreck site referred to as the Beach Plum Island wreck site. This wreck, a four-masted schooner converted to use later as a barge, was considered preliminarily eligible for inclusion in the National Register of Historic Places. A Phase II level study to confirm such a status was recommended, if avoidance was not feasible. Dolan Research was responsible for the submerged portion of the project and listed two targets in Borrow Area #1 and three targets in Borrow Area #2 (Cox 2005). However, no additional investigation was recommended at any of the five target locations.

Prior to the project described above and offshore of Lewes Beach and Broadkill Beach, numerous submerged cultural resources studies were conducted in the Delaware Bay, beginning in the early 1980s. In 1982, Historic Sites Research, under contract to the U.S. Corps of Engineers, conducted a Phase II level cultural resources survey for a proposed offshore borrow area off Cape May, New Jersey (Cox 2005). Nine magnetic anomalies were noted, three of which were deemed to be potentially significant enough to avoid in any future activities (Cox 2005). In 1985, Tidewater Atlantic Research performed an offshore cultural resources survey for the section of the Delaware Bay between Pickering Beach and Broadkill Beach, Delaware for the Delaware Department of Natural Resources and Environmental Control (DNREC). A magnetometer survey was conducted in four areas, all located west (i.e., on the Delaware side) of the main shipping channel—Pickering Beach, Bowers Beach, Broadkill Beach and Kitts Hummock resulted in the detection of 11 anomalies (four off Broadkill Beach, three off Pickering Beach, three off Kitts Hummock, and one off Bowers Beach). Seven of these anomalies were considered potentially significant, and avoidance was recommended (Cox, 2005).

Karell Archaeological Services performed two other offshore studies around the same time for DNREC. One of these studies was carried out in connection with the Slaughter Beach (South) Beach Nourishment Project, Sussex County Delaware. No anomalies were detected during the remote sensing component of this survey (Koski-Karell 1984a). The second investigation consisted of a background research study and field survey of the Delaware Inner Continental Shelf. This included remote sensing work at two offshore locations near Indian River Inlet, both offshore and south of the current study area (Koski-Karell 1984b).

In 1984, Dolan Research conducted a broad survey for the Pennsylvania Bureau for Historic Preservation, which was designed to assist the state in developing a strategy for managing submerged cultural resources in the Delaware and Susquehanna Rivers. The survey included magnetometer and diving work in selected portions of the Delaware River between Essington, Pennsylvania and Trenton, New Jersey. The remote sensing portion of the survey identified 39 targets in nine different work areas. In addition, 13 derelict vessels, one visible shipwreck and one submerged shipwreck were documented. The submerged wreck, discovered in a dredged portion of the Mantua Creek anchorage, lay in 40 ft. of water, and had been severely impacted by past dredging activities. Although highly disarticulated by dredging activity, it was still possible to date the remains on structural evidence to the early nineteenth century (Cox 1984).

In 1987, Dolan Research conducted a remote sensing survey of 14 locations in the Delaware River between Artificial Island, Salem County, New Jersey and League Island, Philadelphia in conjunction with the proposed modification of the federally-maintained and administered shipping channel. A total of 66 targets were identified, of which six were considered potentially significant and in need of additional archaeological investigation (Cox 1988). Two related studies were also conducted by Dolan Research, concurrently with the Delaware River main channel project: one at the mouth of the Maurice River, on the New Jersey side of the Delaware Bay (Cox 1988); and the other at the mouth of the Salem River, straddling both sides of the Delaware River (Cox 1988).

In the 1990s, Dolan Research conducted several additional magnetic and acoustic investigations in the Delaware Bay and Lower Delaware River, including: a remote sensing survey at the proposed site of a coal pier adjacent to the New Jersey shoreline, north of Oldman's Creek, where 11 targets, none of which were considered significant, were identified (Cox 1992); another remote sensing survey in conjunction with the planned improvement of the Salem River, where six targets were identified, one of which was considered potentially significant (Cox 1992); and a survey of a 200-foot wide proposed pipeline corridor across the Delaware River, just north of Tinicum Island, in which three remote sensing targets were identified, none of which was considered to be historically significant (Cox 1995).

In 1993, further underwater archaeological investigations were conducted by Dolan Research for the U.S. Corps of Engineers at various locations along the Delaware Bay and Delaware River, again in conjunction with the planned improvement of the main navigation channel. A total of 48 survey areas were examined as part of this project, comprising 12 locations where channel deepening was proposed, three locations where widening of bends in the channel was planned, and 33 locations where the side slope of the channel was to be altered. The survey included an intensive magnetic, acoustic, seismic, and bathymetric remote sensing investigation as well as target analysis to determine the presence or absence of submerged cultural resources, which might be affected by the proposed improvements. A total of 154 remote sensing targets were identified in the 48 different survey locations, 11 of which were designated as high probability targets, because they possessed signature characteristics suggestive of submerged cultural resources (Cox 2005). This program of underwater investigation also included ground-truthing of five other targets that had been identified during the earlier 1987 underwater survey carried out by Dolan Research. Two of these targets were considered eligible for listing in the NRHP—a late-nineteenth-century side paddlewheel steamboat and a mid-nineteenth century, intact sectional canal boat (Cox 2005). The extensive amount of underwater survey work performed to date in the Delaware Bay and Lower Delaware River has focused on the identification and evaluation of submerged cultural resources that might be affected by various project actions, such as dredging work, navigation improvements, and shoreline erosion control. Only one known historic resource has actually been physically removed from the floor of the Delaware Bay during the period that professional surveys have been undertaken. The specific project that was not designed or executed by professional underwater archaeologists, involved the salvage in 1986 of *DeBraak*, a late-eighteenth-century British naval vessel, which sank off Cape Henlopen, Delaware in 1798, approximately 50 mi. from the current study area. The salvage work entailed raising the wrecked vessel from a depth of 70 ft. in an area of strong currents. The entire operation produced a rich collection of late-eighteenth-century artifacts, consisting of well over 20,000 items, and it is important in demonstrating that historically significant material may still survive intact in a dynamic, high-energy environment, such as that encountered around the mouth of the bay (Cox 2005).

SUBMERGED CULTURAL RESOURCES POTENTIAL

CRITERIA OF EVALUATION

The information generated by these investigations was considered in terms of the criteria for evaluation outlined by the U.S. Department of the Interior, National Register Program. Nautical vessels and shipwreck sites, with the exception of reconstructions and reproductions, are considered historic if they are eligible for listing in the NRHP at a local, regional, national, or international level of significance (Cox 2005). To be eligible for the NRHP, a vessel or site "must be significant in American history, architecture, archaeology, engineering, or culture, and possess integrity of location, design, setting, materials, workmanship, feeling, and association". The vessel or site must meet one or more of the following four National Register criteria to be considered significant:

- **A.** Association with events that have made a significant contribution to the broad patterns of our history; or
- **B.** Association with the lives of persons significant in our past; or
- **C.** Embodiment of the distinctive 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; or
- **D.** Sites that have yielded, or may be likely to yield, information important in prehistory or history.

National Register of Historic Places Bulletin 20 clarifies the National Register review process with regard to shipwrecks and other submerged cultural resources. Shipwrecks must meet at least one of the above criteria and retain integrity of location, design, settings, materials, workmanship, feelings, and association. Determining the significance of a historic vessel depends on establishing whether the vessel is:

1. the sole, best, or a good representative of a specific vessel type; or
2. is associated with a significant designer or builder; or
3. was involved in important maritime trade, naval, recreational, government, or commercial activities.

Properties which qualify for the National Register, must have significance in one or more "Areas of Significance" that are listed in *National Register Bulletin 16A*. Although 29 specific categories are listed, only some are relevant to the submerged cultural resources in the Lower Delaware Bay. Architecture, commerce, engineering, industry, invention, maritime history, and transportation are potentially applicable data categories for the type of submerged cultural resources, which may be expected in the Lower Delaware Bay study area.

POTENTIAL UNDERWATER RESOURCE TYPES

The effect of coastal geomorphic processes may either erode or bury underwater resources, and the processes may occur rapidly or slowly over time. In many cases, the remains of shipwrecks may be submerged but not buried beneath sediment. Shipwreck material deposited in even the shallowest environment can settle rapidly into the bottom with its associated archaeological record intact. The wreck of the *DeBraak* (1798), discovered near the Delaware Breakwater 50 miles from the study area, provides a classic example. A good portion of the lower hull survived intact, along with an extensive associated artifact assemblage (Cox 2005). Even in extremely high-energy environments, evidence of the ship structure frequently survives. Numerous other underwater archaeological investigations along the eastern seaboard of the United States—off Massachusetts, North Carolina, South Carolina, Florida, and Texas—and in the waters off other countries around the world (such as England, Israel, and Turkey) offer examples where ship remains have survived largely intact with valuable archaeological data.

At many shipwreck sites sand and light mud similar to the bottom sediments found in the study area provide an excellent environment for preservation. Given the level of maritime activity throughout Delaware Bay, the extent of vessel losses in the vicinity of the study area, and the level of preservation at shipwreck sites in other similar environments, it is highly possible that well-preserved shipwreck sites could exist in the project vicinity.

As a major conduit for exploration, colonization, and expanding coastal commerce, Delaware Bay is an obvious and natural repository for underwater resources. Strong coastal storms, often with a lethal combination of treacherous northeast winds and swift tidal currents, coupled with the presence of shallow water and historically heavy bay and coastal traffic, have conspired to make the Delaware Bay the final resting place for dozens of documented sailing vessels, steamships, barges, tugs, and large modern ships over the last three centuries. A wide variety of ship types have wrecked while passing up or down the Delaware Bay. Many vessels attempting to reach the Harbor of Refuge at Lewes in the lee of Cape Henlopen have instead been wrecked in the mouth of the bay. A Bureau of Land Management study of the Continental Shelf from the Bay of Fundy to Cape Hatteras has characterized the Delaware Coastal Zone as an area of "moderately heavy" predicted shipwreck density (Bourque et al. 1979). An inventory of eighteenth-century shipwrecks and all types of ship losses near the mouth of the Delaware Bay was compiled during the background research phase of this study and confirms this predicted density (see Appendix A). Numerous shipwrecks and ship losses can be documented in the Lower Delaware Bay and near the mouth of the bay since the first reported loss in 1741. Drawn from a range of available primary and secondary sources, this extensive shipwreck list, while far from comprehensive, nonetheless gives an indication of the variety of shipwrecks that have occurred in the project vicinity during the eighteenth century. Furthermore, secondary and primary historical sources show that vessels have wrecked in the general vicinity of the project area throughout the eighteenth, nineteenth, and twentieth centuries (Cox 2005). The study area is therefore considered, based on background research, to hold a high potential for yielding underwater resources of a caliber suitable for inclusion in the National Register of Historic Places. Based on the information in Appendix A, numerous shipwreck episodes occurred at the mouth of Delaware Bay during the eighteenth century. These documented ship losses involved most of the common eighteenth-century ship types, including: ships, brigantines, snows, and schooners (see Appendix A). Other undocumented shipwreck sites involving smaller ships and boats must be considered likely in the Lewes offshore vicinity. These would include small fishing sloops and shallops. Any of the above mentioned vessel types would potentially lend historic insights into a wide range of maritime topics, including the contexts of international trading patterns, shipbuilding and regional shipping, and general patterns of local trade and industry.

3. METHODS

PROJECT PERSONNEL

The personnel assigned to this project met training and qualification requirements outlined in the U.S. Army Corps of Engineers Safety and Health Requirements Manual (EM 385-1-1). All team members are current in their Red Cross training certifications for first aid and Cardio-Pulmonary Resuscitation (CPR). Dr. Gordon P. Watts of Tidewater Atlantic Research directed and conducted the remote sensing survey. With extensive experience in remote sensing surveys, Dr. Watts was assisted by remote sensing technician, Joshua Daniel.

Safety and security was of paramount concern during the remote sensing phase of this project. Survey personnel registered with the PSEG security forces and remained in direct contact prior to and during the survey.

REMOTE SENSING SURVEY EQUIPMENT

The remote sensing survey was conducted with equipment and procedures intended to facilitate the effective and efficient search for magnetic and/or sidescan sonar anomalies and to determine their exact location. The positioning system used was a Trimble DSM12/212, Integrated 12-channel Global Positioning System (DGPS). Remote sensing instruments included an EG&G Geometrics cesium vapor magnetometer, a Klein System 3900 digital sidescan sonar, and an EdgeTech 3100P subbottom profiler with an SB-216S tow vehicle.

DIFFERENTIAL GLOBAL POSITIONING SYSTEM

A primary consideration in the search for magnetic anomalies is positioning. Accurate positioning is essential during the running of survey tracklines and for returning to recorded locations for supplemental remote sensing operations or ground-truthing activities. These positioning functions were accomplished on this project through the use of a Trimble Navigation DSM12/212 global-based positioning system (Figure 9).

Figure 9. Trimble Navigation DSM 12/212 global-based positioning system used during the investigation.

The DSM12/212 is a global positioning system that attains differential capabilities by internal integration with a Dual-channel MSK Beacon receiver. This electronic device interprets transmissions both from satellites in Earth's orbit and from a shore-based station, to provide accurate coordinate positioning data for offshore surveys. This Trimble system has been specifically designed for survey positioning. The differential system corrects for the difference between received and known positions. The DGPS aboard the survey vessel constantly monitored navigation beacon radio transmissions in order to provide a real-time correction to any variation between the satellite-derived and actual positions of the survey vessel.

For this project, the magnetometer and DGPS data were integrated with a Sony VAIO® laptop computer via NMEA protocols, utilizing Hypack Max® software applications for survey control, data storage, and data analysis. Hypack Max® was developed specifically for marine survey applications by Coastal Oceanographics, Inc.

The computer and associated hardware and software calculated and displayed the corrected positioning coordinates every second, and stored the data along with magnetic readings at that location. The level of precision for the system is considered by the manufacturer to achieve sub-meter accuracy (Trimble Navigation Limited 1998:1-2).

Each of the remote sensing devices was measured for "layback," which is their orientation relative to the antenna (Figure 10). This information is critical in the accurate positioning of targets during the data analysis phase of the project and in repositioning for any subsequent archaeological activities. The magnetometer was run 50 ft. off the stern, the sidescan amidships the port side, and the subbottom amidships the starboard side.

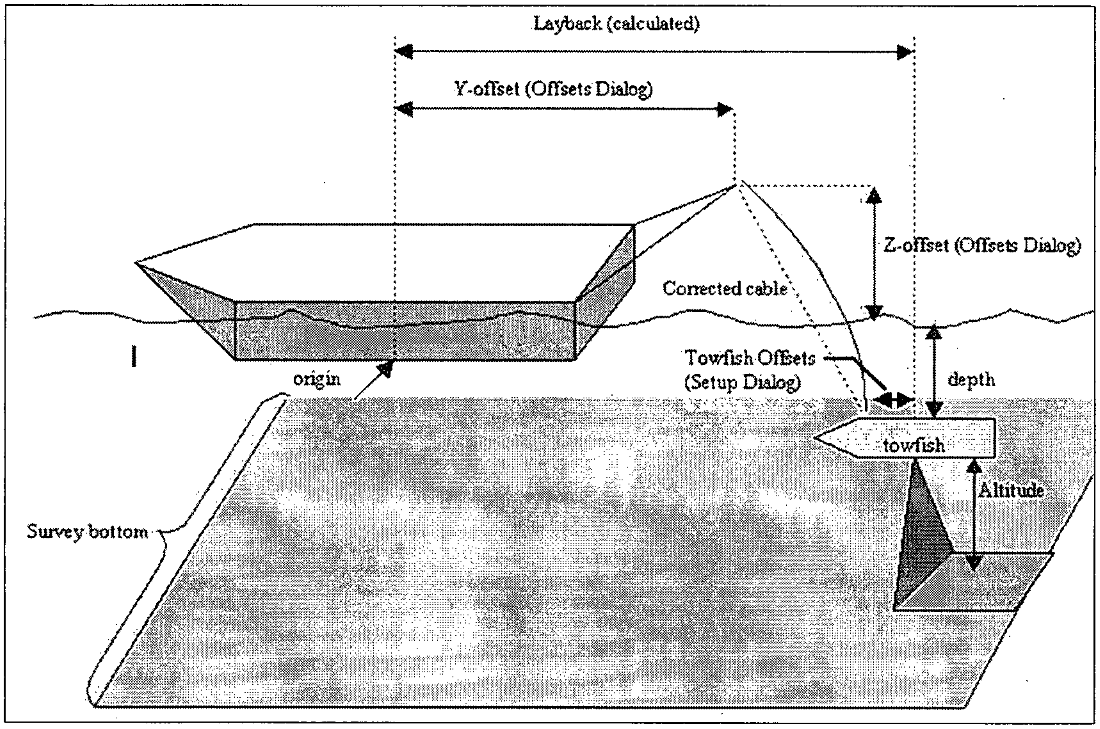

Figure 10. Equipment schematic illustrating layback (courtesy of Coastal Oceanographics, Inc.).

MAGNETOMETER

The remote sensing instrument used to search for ferrous objects on or below the river floor of the survey area was an EG&G Geometrics cesium vapor magnetometer (Figure 11). The magnetometer is an instrument that measures the intensity of magnetic forces. The sensor measures and records both the Earth's ambient magnetic field and the presence of magnetic anomalies (deviations from the ambient background) generated by ferrous masses and various other sources. These measurements are recorded in gammas, the standard unit of magnetic intensity (equal to 0.00001 gauss). To produce the most comprehensive magnetic record, data was collected at 5 samples per second. The magnetometer sensor was towed at a speed of approximately 3 to 6 knots. Magnetic data were recorded as a data file associated with the computer navigation system. Data from the survey were contour plotted using QuickSurf software to facilitate anomaly location and definition of target signature characteristics. All magnetic data were correlated with the acoustic remote sensing records. This data was stored electronically in the navigation computer and backed up to CD-R.

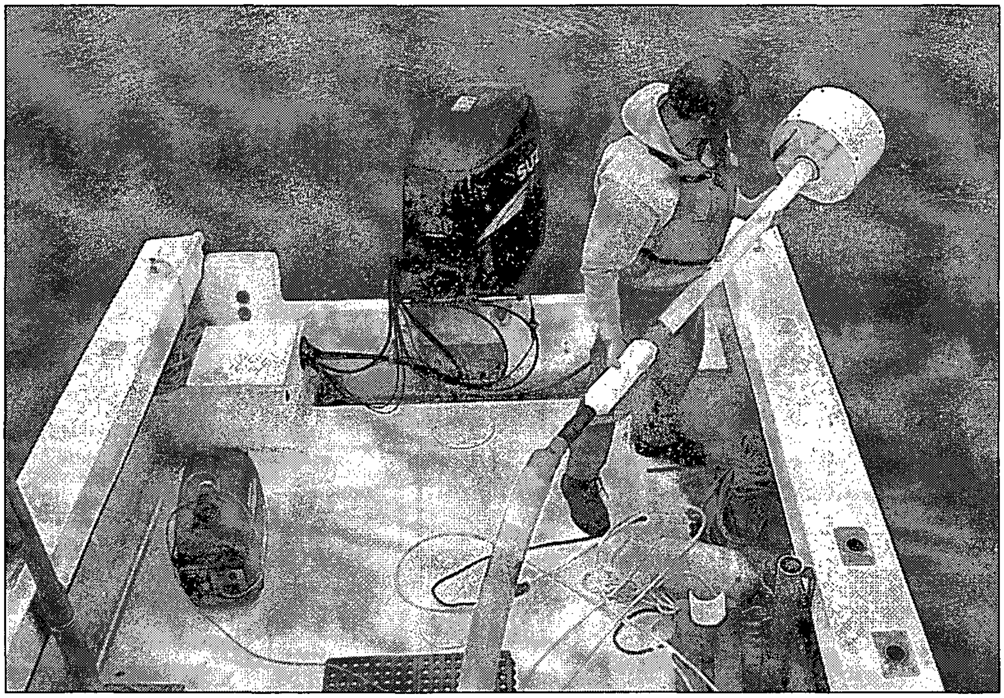

Figure 11. Launching the EG&G Geometrics G-881 cesium vapor magnetometer.

The ability of the magnetometer to detect magnetic anomalies, the sources of which may be related to submerged cultural resources such as shipwrecks, has caused the instrument to become a principal remote sensing tool of marine archaeologists. While it is not possible to identify a specific ferrous source by its magnetic field, it is possible to predict shape, mass, and alignment characteristics of anomaly sources based on the magnetic field recorded. It should be noted that there are other sources, such as electrical magnetic fields surrounding power transmission lines, underground pipelines, navigation buoys, or metal bridges and structures, that may significantly affect magnetometer readings. Interpretation of magnetic data can provide an indication of the likelihood of the presence or absence of submerged cultural resources. Specifically, the ferrous components of submerged historic vessels tend to produce magnetic signatures that differ from those characteristic of isolated pieces of debris.

While it is impossible to specifically identify the source of any anomaly solely from the characteristics of its magnetic signature, this information in conjunction with other data (historic accounts, use patterns of the area, diver inspection), other remote sensing technologies, and prior knowledge of similar targets, can lead to an accurate estimation.

SIDESCAN SONAR

The remote sensing instrument used to search for physical features on or above the ocean floor was a Klein 3900 digital sidescan sonar system (Figure 12). The sidescan sonar is an instrument that, through the transmission of dual fan-shaped pulses of sound and reception of reflected sound pulses, produces an acoustic image of the bottom. Under ideal circumstances, the sidescan sonar is capable of providing a near-photographic representation of the bottom on either side of the trackline of a survey vessel. This range was set at 20 m during the Survey.

The Klein 3900 digital sidescan sonar unit utilized on this project was operated with an integrated single frequency 445/900 kHz towfish. The sidescan has internal capability for removal of the water column from the instrument's video printout, as well as correction for slant range distortion. This sidescan sonar was utilized with the navigation system to provide manual marking of positioning fix points on the digital printout. Sidescan sonar data are useful in searching for the physical features indicative of submerged cultural resources. Specifically, the record is examined for features showing characteristics such as height above bottom, linearity, and structural form. Additionally, potential acoustic targets are checked for any locational match with the data derived from the magnetometer and the subbottom profiler.

A 445/900 kHz Klein 3900 digital sidescan sonar was interfaced with SonarPro data acquisition software to collect acoustic data in the survey area. The sidescan sonar transducer was deployed and maintained 10 ft. below the water surface. Acoustic data was collected using a range scale of 50 m to provide a combination of 300 percent coverage and high target signature definition. Acoustic data was recorded as a digital file with SonarPro and tied to the magnetic and positioning data by the computer navigation system. This data was then imported into the Chesapeake Technology SonarWiz.MAP for additional review and to create a mosaic.

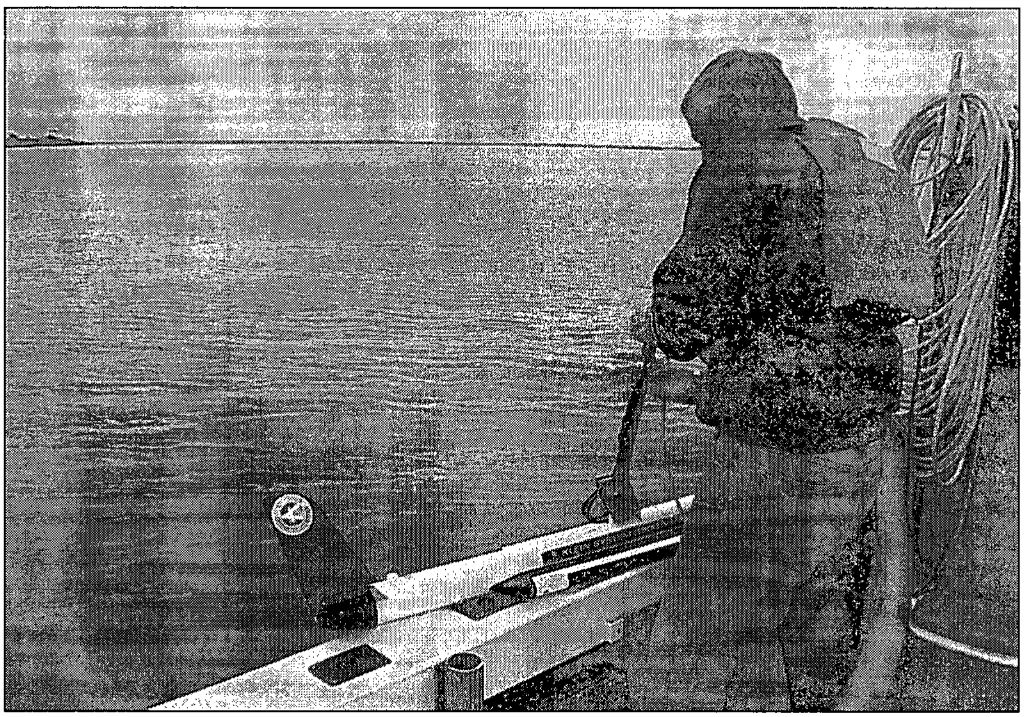

Figure 12. Launching the Klein System 3900 digital sidescan sonar.

SUBBOTTOM PROFILER

Acoustic subbottom data was collected using an EdgeTech 3100P Portable subbottom profiler with an SB-216S tow vehicle (Figure 13). The SB-216S provides three frequency spectrums between 2 and 15 kHz with a pulse length of 20 m/s. Penetration in coarse and calcareous sand is factory rated at 6 m with between 2 and 10 cm of vertical resolution. During the survey, the subbottom transducer was deployed and maintained between 4 to 5 ft. below the water surface. To facilitate target identification, subbottom sonar records were electronically tied to DGPS coordinates and recorded as a digital file using EdgeTech's Discover® software.

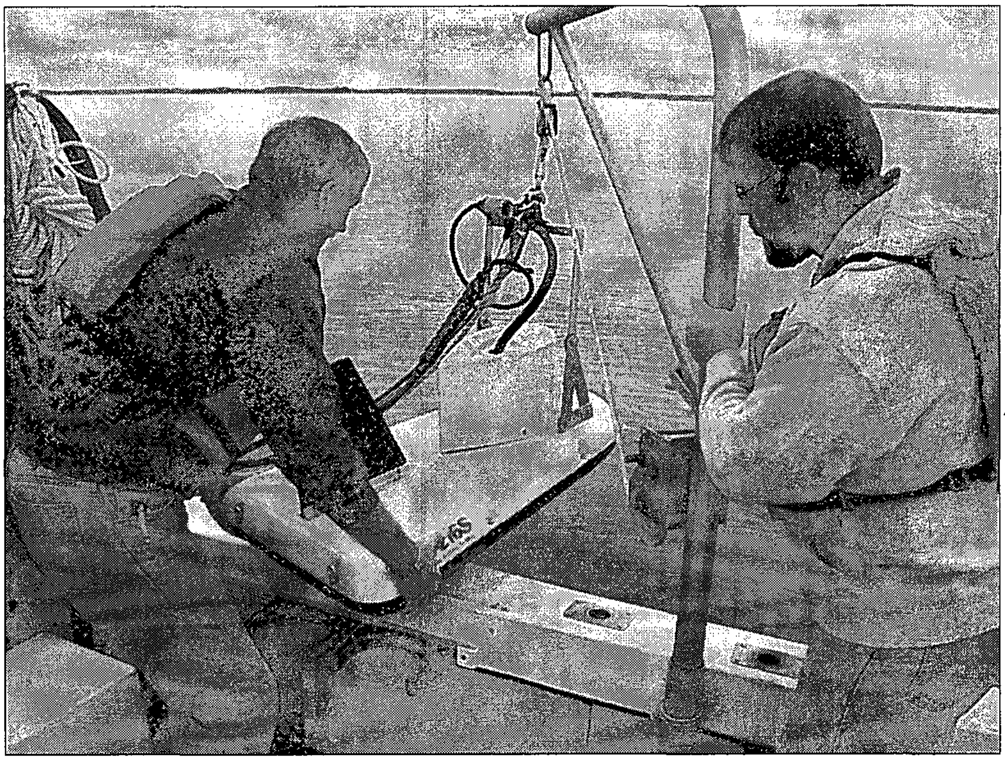

Figure 13. Launching the EdgeTech SB-216S tow vehicle.

Subbottom profilers generate low frequency acoustic waves that are capable of penetrating the seabed, and then reflect off boundaries or objects within the subsurface. These returns are received by hydrophone or hydrophone array operated in close proximity to the source. The data is then processed and reproduced as a cross section scaled in two-way travel time (the time taken for the pulse to travel from the source to the reflector and back to the receiver). This travel time can then be interpolated to depth in the sediment column by reference to the travel time of the sound (averaging 1,500 m/s).

These seismic cross sections can be studied visually as well as the shapes and extent of reflectors used to identify bottom and subbottom profile characteristics.

There are several types of subbottom profilers: sparkers, pingers, boomers, and CHIRP systems. Sparkers operate at the lowest frequencies and afford deep penetration but low resolution. Boomers operate from 0.5 to 5 kHz and can penetrate to between 30 and 100 m with resolution of 0.3 to 1.0 meter. Pingers operate from 3.5 and 7 kHz and penetrate seabeds from a few meters to more than 50 m depending on sediment consolidation, with resolution to about 0.3 m. CHIRP systems operate around a central frequency that is swept electronically across a range of frequencies between 3 to 40 kHz, and resolution can be on the order of 0.1 m in suitable near-seabed sediments.

Unconformities and other stratal contacts can be determined by seismic remote sensing, because these surfaces make acoustic impedance contrasts when printed (or projected). In general, high and low amplitude reflectors (light and dark returns) distinguish between stratigraphic beds; parabolic returns indicate point source objects of sufficient size to be sensed by the wavelength and frequency of the power source. Erosional or non-depositional contacts can be identified by discontinuities in extent, slope angle, and shape of the reflector returns. This latter fact is important when identifying drowned channel systems and other relict and buried fluvial system features (e.g., estuarine, tidal, lowland, upland areas around drainage features).

There are five types of spurious signals that may cause confusion in the two dimensional records: direct arrivals from the sound source, water surface reflection, side echoes, reflection multiples, and point source reflections. Judicious analysis is required to inspect them.

SURVEY VESSEL

The survey vessel, the *Tidewater Surveyor,* a 25-foot Parker, was used for the survey (Figure 14). There was abundant covered deck space for the electronic gear, generator, and towfish.

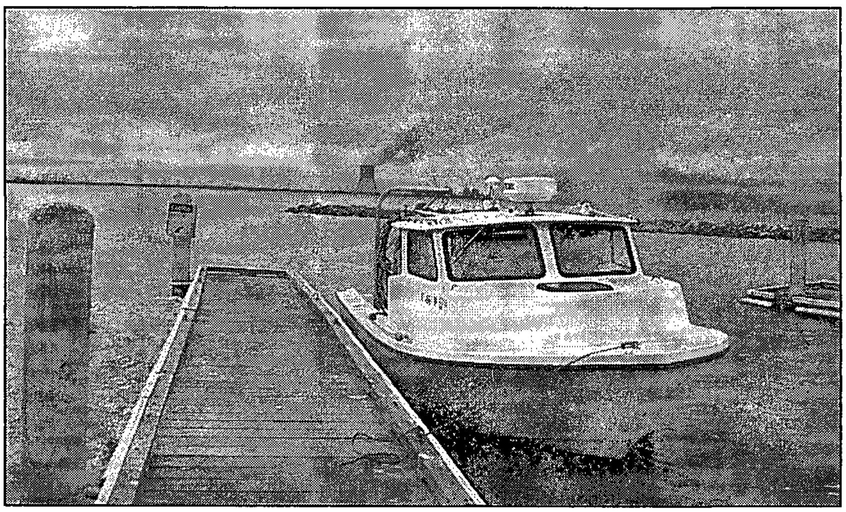

Figure 14. Project support vessel *Tidewater Surveyor*. Project area is the opposite shoreline in line with the pier and to the left of the nuclear plant's cooling tower.

SURVEY PROCEDURES

Provided by MACTEC, Inc., coordinates for the proposed survey area were entered into the navigation program Hypack®, and pre-plotted tracklines were produced using the New Jersey State Plane, NAD 83, U.S. Survey Foot coordinate system (see Appendix D). The border of the survey area was an irregular polygon approximately 3,758 ft. in length (along the shoreline), 1,593 ft. in width (from shore out), covering an area of 90.38 acres. Thirty-five pre-plotted tracklines with 50-foot offsets were programmed for full survey coverage and ran parallel to the shoreline (Figure 15). As indicated in Figure 15A, the sidescan mosaic of the project area, over 100 acres were surveyed and full coverage of the area was obtained.

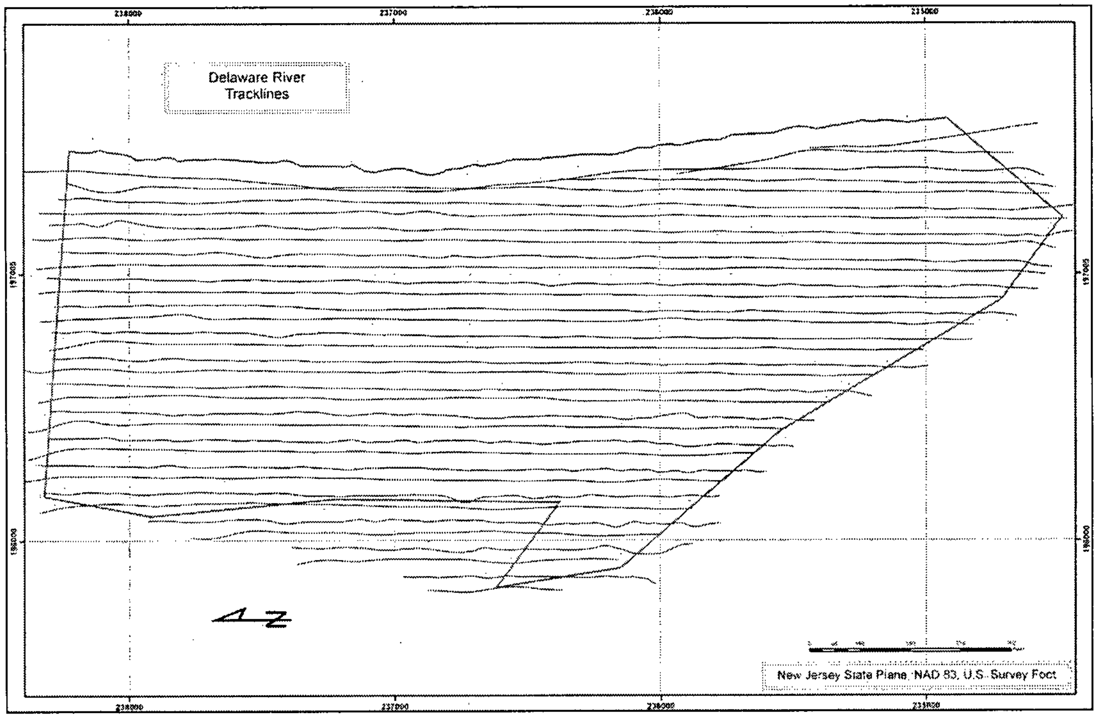

Figure 15. Survey transect lines relative to the survey area.

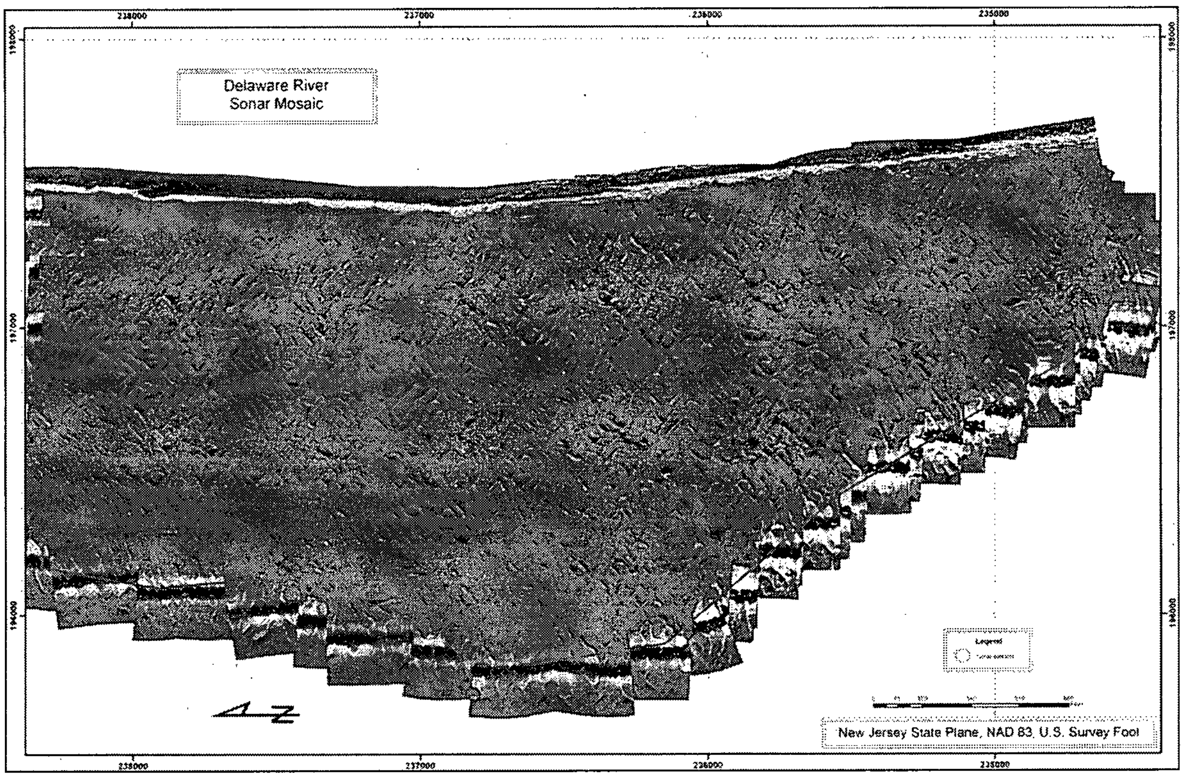

Figure 15A. Sidescan mosaic shows complete coverage of the survey area.

The magnetometer, sidescan sonar, and DGPS were mobilized and tested, and the running of pre-plotted tracklines began. The helmsman viewed a video monitor, linked to the DGPS and navigational computer, to aid in directing the course of the vessel relative to the individual survey tracklines. The monitor displayed the real-time position of the path of the survey vessel along the trackline (Figure 16).

As the survey vessel maneuvered down each trackline, the navigation system determined vessel position along the actual line of travel every second. One computer recorded positioning and magnetometer data every second, while a separate computer recorded all sidescan sonar returns during the survey. Vessel speed was between 3 to 4 ft. per second, acquiring magnetic readings every second. The positioning points along the line traveled were recorded on the computer hard drive, and the magnetic data were also stored digitally.

Each trackline was run until completed. Any navigation errors, problems with the remote sensing instruments, or with the positioning system during the running of a line resulted in the termination of that run. Significant off-line errors in navigation resulted in the immediate repetition of that line. Problems with remote sensing instruments were resolved before repeating the run of an aborted line.

Figure 16. Dr. Watts at the helm viewing the survey computer directing the course of the vessel along a transect line.

Upon completion of the magnetometer survey, the raw positioning and magnetometer data were edited within the Hypack® computer program. The edited file was inputted into the system's contouring program to produce magnetic contour maps. The maps, field notes, and magnetometer digital strip charts were then analyzed to create a list of magnetic anomalies that were indicative of potentially significant cultural resources. Afterwards, the sidescan sonar data was reviewed for any evidence of submerged cultural resources.

Prior to contour map production, a review of each survey tract line is conducted in Hypack®. Magnetic anomalies present on each survey trackline are labeled at this time, and locational information (Easting, Northing), as well as gamma deviations, are taken from the electronic strip-chart data and tabulated, the data table that appears in the report. Once all survey tracklines have been analyzed and all anomalies along each line have been labeled and tabulated, the contour map is then produced.

DATA ANALYSIS PROCEDURES

Upon completion of the remote sensing survey, the data was reviewed. This task essentially required the archaeologist and remote sensing specialist to analyze the previously acquired and processed data. Sidescan and subbottom features and magnetic anomalies were tabulated and prioritized for possible significance by employing signal characteristics (e.g., spatial extent, structural features, etc.). Magnetic data was presented in a magnetic contour map(s) with trackline format. Specific sidescan targets are also located on the map and are illustrated and discussed individually. The magnetic anomalies and/or sidescan targets shown on the map(s) are sequentially numbered and tabulated by location (Northing and Easting), as well as magnetic deviation. The contoured/labeled targets are then compared with strip chart records and attendant sidescan data. Each magnetic anomaly or sidescan target, described with the proper terminology and locational and positional information, is included. If any of the remote sensing targets correlated with any documentary evidence, it was noted.

The evaluation of the potential cultural significance of targets was then conducted, which was dependent on a variety of factors. These include: the detected characteristics of the individual targets (e.g., magnetic anomaly strength and duration and sidescan image configuration); association with other sidescan or magnetic targets on the same or adjacent lines; relationships to observable target sources, such as channel buoys or pipeline crossings; as well as correlation to the historic record. Magnetic anomalies were evaluated and prioritized based on amplitude or deflection intensity in concert with duration or spatial extent. Targets such as isolated sections of pipe can normally be immediately discarded as non-significant. Targets that were likely to represent potential historical shipwrecks or other potentially historic submerged resources were identified, and recommendations for subsequent avoidance or assessment were made.

MAGNETOMETER ANALYSIS

Data collected by the magnetometer is perhaps the most problematic to analyze. Magnetic anomalies are evaluated and prioritized based on magnetic amplitude or deflection of gamma intensity in concert with duration or spatial extent; they are also correlated with sidescan targets. The problems of differentiating between modern debris and shipwrecks, based on remote sensing data, have been discussed by a number of authors. This difficulty is particularly true in the case of magnetic data, and therefore, it has received the most attention in the current body of literature dealing with the subject. Pearson and Saltus state, "even though a considerable body of magnetic signature data for shipwrecks is now available, it is impossible to positively associate any specific signature with a shipwreck or any other feature" (1990:32). There is no doubt that the only positive way to verify a magnetic source object is through physical examination. With that said, however, the size and complexity of a magnetic signature does provide a usable key for distinguishing between modern debris and shipwreck remains (see Garrison et al. 1989; Irion et al. 1995; Pearson et al. 1993). Specifically, the magnetic signatures of most shipwrecks tend to be large in area and tend to display multiple magnetic peaks of differing amplitude.

The state of technology of iron-hulled or steam vessels may also be considered a factor in their potential for being detected by modern remote sensing techniques. The magnetometer detects ferrous objects that create deviations in the Earth's natural magnetic field. The greater the weight of iron in the remains of a shipwreck, the greater the likelihood the remains will be observed, at least theoretically. The mass of metal on iron-hulled or steam vessels is made up of the hull and/or boilers, pipes, valves, steam engines, hogging trusses and straps, deck gear, auxiliary engines, pumps, hoists, winches, and other pieces of equipment. As the state of steam technology advanced, boilers and engines became larger and/or more were used for larger vessels. Larger locomotion systems contained more iron, and therefore, are more likely to have a detectable magnetic signature.

In a study of magnetic anomalies in the northern Gulf of Mexico, Garrison et al. (1989) indicate that a shipwreck signature will cover an area between 10,000 and 50,000 square meters. Applicable to the Gulf Coast and based on large vessel types, the study's findings are not entirely relevant to wooden sailing vessels in the pre-steam era. However, criteria from the Garrison et al. (1989) study and others, developed to identify that the signatures of larger vessel types are applicable. Using the Garrison et al. (1989) study as well as years of "practical experience," in an effort to assess potential significance of remote sensing targets, Pearson et al. (1991) developed general characteristics of magnetometer signatures that most likely represent shipwrecks. The report states, "the amplitude of magnetic anomalies associated with shipwrecks vary [*sic*] considerably, but, in general, the signature of large watercraft, or portions of watercraft, range from moderate to high intensity (> 50 gamma) when the sensor is at distances of 20 feet or so" (1991:70). Using a table of magnetic data from various sources as a base, the report goes on to state, "data suggests that at a distance of 20 ft. or less, watercraft of moderate size are likely to produce a magnetic anomaly (this would be a complex signature, i.e., a cluster of dipoles and/or monopoles) greater than 80 or 90 ft. across the smallest dimension…" (Pearson et al. 1991:70).

While establishing baseline amounts of amplitude and duration reflective of the magnetic characteristics for a shipwreck site, the authors recognize, "that a considerable amount of variability does occur" (Pearson et al. 1991:70). Generated in an effort to test the 50-gamma/80-foot criteria and to determine amount of variability, Table 3 lists numerous shipwrecks as well as single- and multiple-source objects located by magnetic survey and verified by divers. All shipwrecks meet and surpass the 50-gamma/80-foot criteria, while all single-source object readings, with the exception of the pipeline, fall below the criteria. However, the signature of the pipeline should be portrayed as a linear feature on a magnetic contour map, and it should not be confused with a single-source object. While the shipwrecks and single-source objects adhere to the 50-gamma/80-foot criteria, the multiple-source objects do not. If all targets listed on the table had to be prioritized as to potentially significant, based on the 50-gamma/80-foot criteria, then the two multiple-source object targets would be classified as potentially significant.

Although data indicates the validity of employing the 50-gamma/80-foot criteria, when assessing magnetic anomalies other factors must be taken into account. Pearson and Hudson (1990) have argued that the past and recent use of a water body must be an important consideration in the interpretation of remote sensing data; in many cases, it is the most important criterion. Unless the remote sensing data, historical record, or specific environment (e.g., harbor entrance channel) provide compelling and overriding evidence to the contrary, it is believed that the history of use should be a primary consideration in interpretation. What constitutes "compelling evidence" is to some extent left to the discretion of the researcher; however, in settings where modern commercial traffic and historic use are intensive, the presence of a large quantity of modern debris must be anticipated. In harbor, bay, or riverine situations with heavy traffic, this debris will be scattered along the channel right-of-way (ROW), although it may be concentrated at areas where traffic would slow or halt; it will appear on remote sensing surveys as small, discrete objects.

Table 3. Magnetic Data from Shipwrecks and Non-Significant Sources.

Vessel (object)	Type & Size	Magnetic deviation	Duration (ft.)	Reference
Shipwrecks				
Tug	wooden tug with machinery	-30257	176	Tuttle and Mitchell 1998
Mexico	288 ton wooden bark	1260	454	Tuttle and Mitchell 1998
J.D. Hinde	129-ft. wooden sternwheeler	573	110	Gearhart and Hoyt 1990
Utina	267-ft., 238-ton wooden freighter	690	150	James and Pearson 1991; Pearson and Simmons 1995
King Phillip	182-ft., 1,194-ton clipper	300	200	Gearhart 1991
Reporter	141-ft., 350-ton schooner	165	160	Gearhart 1991
Mary Somers	967-ton iron-hulled sidewheeler	5000	400	Pearson et al. 1993
Gen. C.B. Comstock	177-ft. wooden hopper dredge	200	200	James et al. 1991
Mary	234-ft. iron sidewheeler	1180	200	Hoyt 1990
Columbus	138-ft., 416-ton wooden-hulled Chesapeake sidewheeler	366	300+	Morrison et al. 1992
El Nuevo Constante	126-ft. wooden collier	65	250	Pearson et al. 1991
James Stockton	55-ft. wooden schooner	80	130	Pearson et al. 1991
Homer	148-ft. wooden sidewheeler	810	200	Pearson and Saltus 1993
Modern shrimp boat	27 × 5 ft. segment	350	90	Pearson et al. 1991
Confederate obstructions	various wooden vessels w/ machinery removed, filled w/ construction rubble	110	long duration	Irion and Bond 1984
Single-source Objects				
pipeline	18-in. diameter	1570	200	Duff 1996
anchor	6-ft. shaft	30	270	Pearson et al. 1991
iron anvil	150 lbs.	598	26	Pearson et al. 1991
engine block	modern gasoline	357	60	Rogers et al. 1990
steel drum	55 gallon	191	35	Rogers et al. 1990
pipe	8 ft. long × 3 in. diameter	121	40	Rogers et al. 1990
railroad rail segment	4-ft. section	216	40	Rogers et al. 1990
Vessel (object)	**Type & Size**	**Magnetic deviation**	**Duration (ft.)**	**Reference**
Multiple-source Objects				
anchor/wire rope	8-ft. modern stockless/large coil	910	140	Rogers et al. 1990
cable and chain	5 ft.	30	50	Pearson et al. 1991
scattered ferrous metal	14 × ft.	100	110	Pearson et al. 1991

After Pearson et al. 1991.

SIDESCAN ANALYSIS

By contrast, sidescan analysis is less problematic. The chief factors considered in analyzing sidescan data include: linearity, height off bottom, size, associated magnetics, and environmental context. Since historic resources in the form of shipwrecks usually contain large amounts of ferrous compounds, sidescan targets with associated magnetic anomalies are of top importance. The results of targets with no associated magnetics are usually items such as rocks, trees, and other non-historic debris that are of no interest to the archaeologist. In addition, since historic shipwrecks tend to be larger in size, smaller targets tend to be less important during data evaluation. In addition, the area in which the target is located can have a strong bearing on whether or not the target is selected for further work. If a target is found in an area with other known wreck sites or an area determined to be high probability for the location of historic resources, it may be given more consideration than it would be given otherwise. However, every situation and every target located is different, and all sidescan targets are evaluated on a case-by-case basis.

SUBBOTTOM PROFILER ANALYSIS

Subbottom profilers generate low frequency acoustic waves capable of penetrating the seabed and then reflect off boundaries or objects within the subsurface. These returns are received by hydrophone or hydrophone array operated in close proximity to the source. The data are then processed and reproduced as a cross section scaled in two-way travel time (the time taken for the pulse to travel from the source to the reflector and back to the receiver). This travel time can then be interpolated to depth in the sediment column by reference to the travel time of the sound down (averaging 1,500 m/s) and forward (speed of the vessel).

These seismic cross sections can be studied visually and the shapes and extent of reflectors used to identify bottom and subbottom profile characteristics. In general, high and low amplitude reflectors (light and dark returns) distinguish between stratigraphic beds; parabolic returns indicate point source objects of sufficient size to be sensed by the wavelength and frequency of the power source. Erosional or non-depositional contacts can be identified by discontinuities in extent, slope angle, and shape of the reflector returns. This latter fact is important when identifying drowned channel systems and other relict and buried fluvial system features (e.g., estuarine, tidal, lowland, upland areas around drainage features).

Seismic stratigraphy is a form of stratigraphic correlation. The reflection characteristics (e.g., as amplitude, continuity, wipeout [erosion] and bedform geometry) of regional unconformities and strata surfaces are used to estimate rock or sediment properties, facie relationships, and some stratigraphic details to infer structural evolution and paleo-environmental histories (Mitchum et al. 1977, Vail et al. 1977).

There are five types of spurious signals that may cause confusion in the two dimensional records: direct arrivals from the sound source, water surface reflection, side echoes, reflection multiples, and point source reflections. Judicious analysis is required to suspect them. This is particularly true when the bottom or subbottom being traversed has considerable deformation or point source anomalies.

Subbottom in the Identification of Shipwreck Sites

Previous research (Quinn et al. 1997, 1998) has shown that wooden wreckage can be recognized, depending on the type of wood (hard woods are better), size of the remains, and the context (sand or silt, etc.). The strategy for identifying historic wrecks was to identify seismic features in the strata that might be coincident with magnetometer fluctuations, and thus indicate buried wreckage. In addition, the subbottom profiler record includes data on precise depth to bottom, and so can be used to reconstruct bathymetry.

This output record is a visual representation of density differences in the geologic bed and sound wave velocity of the device. In general, high and low amplitude reflectors (light and dark returns) distinguish between stratigraphic beds; parabolic and "spot" returns indicate point source objects of sufficient size to be sensed by the wavelength and frequency of the power source. Erosional or non-depositional contacts can be identified by discontinuities in extent, slope angle, and shape of the reflector returns. This latter fact is important when identifying drowned channels systems and other relict and buried fluvial system features (e.g., estuarine, tidal, lowland, upland areas around drainage features) but not necessarily of value with respect to shipwreck remains.

Wood objects of sufficient density and size can be sensed with CHIRP systems, but the image is dependent on "the orientation of the incident compression wave relative to the axis of the woods elastic symmetry cellular structure" (Quinn et al. 1997:27). In other words, the ability of the sensor to detect buried shipwreck remains is dependent on which angle the wood is approached with the sound waves, the character of the burial sediment, and the size of the remains (Quinn et al. 1997:33).

GIS MAPPING LOCATIONAL CONTROL AND ANALYSES

To ensure reliable target identification and assessment, analysis of the magnetic and acoustic data was carried out as it was generated. Using QuickSurf contouring software, magnetic data generated during the survey were contour plotted at 5-gamma intervals for analysis and accurate location of magnetic anomalies. The magnetic data was examined for anomalies that were isolated and analyzed in accordance with intensity, duration, areal extent, and signature characteristics. Sonar records were mosaiced in EdgeTech's Discover® software and analyzed to identify targets based on configuration, areal extent, target intensity and contrast with background, and elevation and shadow image. The records were also reviewed for possible association with identified magnetic anomalies. The subbottom profiler data was mined for bathymetric data, and a bathymetric map was produced for inclusion in the results section of this report. All data was translated from decimal minutes latitude longitude (from the subbottom profile software from Edgetech) to New Jersey State Plane Coordinates in feet, by the U.S. Army Corps of Engineers. These conversions allowed all locational data from the magnetometer, sidescan sonar, and subbottom profiler to be compared in GIS format.

Data generated by the remote sensing equipment was developed to support an assessment of each magnetic and acoustic signature. Analysis of each target signature included consideration of magnetic and sonar signature characteristics previously demonstrated to be reliable indicators of historically significant submerged cultural resources. Assessment of each target includes avoidance options and possible adjustments to avoid potential cultural resources. Where avoidance is not possible, the assessment will include recommendations for additional investigation to determine the exact nature of the cultural material generating the signature and its potential NRHP significance. Historical evidence was developed into a background context and an inventory of shipwreck sites that identified possible correlations with magnetic signatures. A magnetic contour map of the survey area was produced to aid in the analysis of each target.

4. RESULTS

Conducted the last week of October, survey conditions were excellent. No wind or waves were present which allowed the collection of excellent sidescan sonar and magnetometer data. Figure 17 illustrates the conditions at the time of the survey as well as the environment.

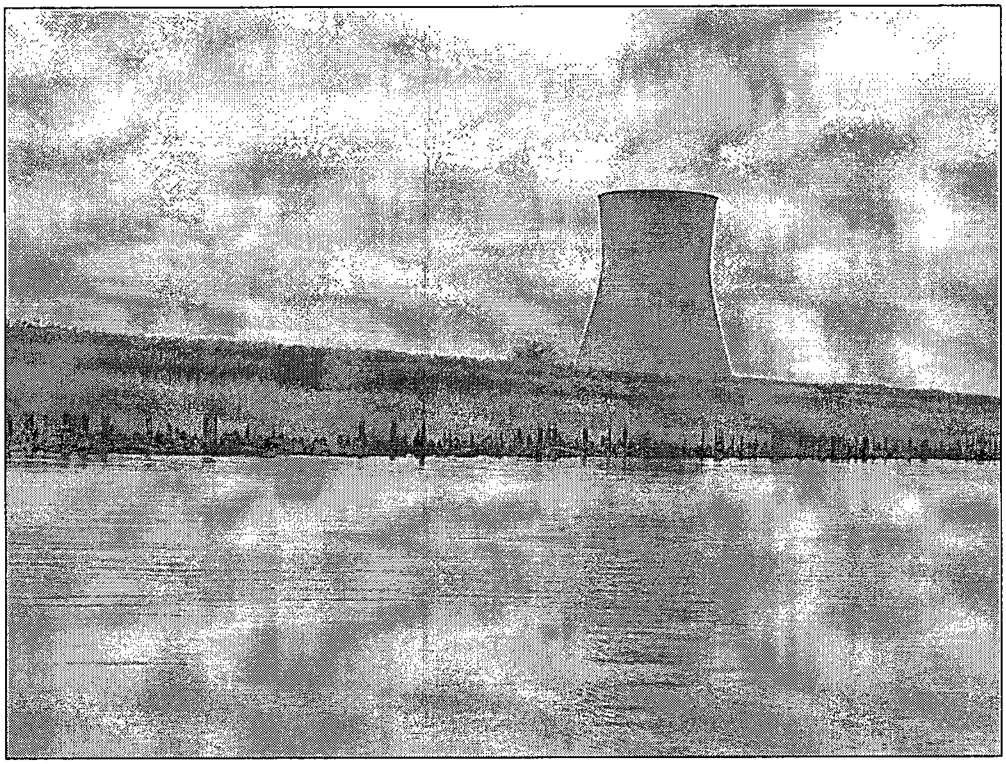

Figure 17. Looking eastward toward the Artificial Island shoreline. Note wooden bulkhead wall and the excellent working conditions at time of survey (i.e., no wind or waves).

MAGNETOMETER RESULTS

Examination of the sonar record revealed that 16 anomalies have an associated acoustic image (Figure 18, see Appendix E). Sonar images confirm that at least 14 anomalies are associated with small single objects or modern debris exposed on the bottom surface possibly associated with the deteriorating bulkhead that defines the eastern perimeter of the survey area. Analysis of the remote sensing data revealed 84 magnetic targets within the area surveyed (Table 4, Figure 19). Relative to the analysis section above, the vast majority of the magnetic anomalies do not have signature characteristics that are considered suggestive of historic vessel remains.

Three clusters of magnetic anomalies and two associated acoustic images exhibit characteristics indicative of vessel remains (Table 5, Figure 18). Target Cluster 1 is comprised of two magnetic anomalies that are associated with sonar image DR-14. That sonar image has characteristics suggestive of shipwreck remains (Figure 20). While it is possible that the image is associated with bulkhead material, the image suggests the partially exposed remains of the lower hull of a vessel. That site should be avoided. If avoidance is not possible, additional investigations should be carried out to identify material generating the signatures and to assess its NRHP significance. Cluster 2 is comprised of five magnetic anomalies that are associated with sonar image DR-10, which is an area of small debris (Figure 21). The complex nature of the anomalies and debris on the bottom surface should also be considered to have a potential association with vessel remains. Cluster 3 is composed of four magnetic anomalies. Although the anomalies have no corresponding sonar image, the complex nature of the magnetic signature should be considered as suggestive of an association with shipwreck remains. Like Cluster 1, both Cluster 2 and 3 should also be avoided, and if avoidance is not possible, additional investigations should conducted to identify material generating the signatures and to assess its NRHP significance.

Table 4. Magnetic Anomalies from the Delaware Artificial Island Remote Sensing Survey.

Anomaly	Northing	Easting	Type* and Deviation	Duration (ft.)	Sonar Association
3-1	197483.0	235317.6	Nm 40g	180	No
3-2	197502.3	235012.4	Mc 30g	390	DR-1 and DR-2
4-1	197463.6	235057.7	Mc 29g	700	DR-1 and DR-2
5-1	197402.7	238513.2	Pm 1486g	250	No
5-2	197394.7	238159.4	Mc 4g	170	DR-4
5-3	197392.2	234891.3	Pm 72g	180	No
6-1	197345.0	234892.2	Dp 5g	100	No
6-2	197345.0	234892.2	Pm 9g	310	DR-5
7-1	197328.2	237421.0	Mc 10g	1400	DR-12
7-2	197321.0	236295.0	Pm 5g	50	No
7-3	197308.8	235107.3	Mc 13g	275	No
8-3	197264.0	236033.3	Mc 12g	420	No
8-4	197248.0	235103.1	Mc 5g	190	No
8-5	197240.2	234680.0	Pm 213g	90	No
9-2	197210.7	235186.0	Mc 16g	350	DR-17
9-4	197210.7	235186.0	Dp 5g	300	No
9-5	197206.4	234685.6	Nm 80g	110	No
10-1	197176.4	237786.6	Dp 12g	90	DR-11
10-3	197164.5	236387.4	Dp 6g	100	DR-13
10-4	197147.8	235056.9	Mc 6g	900	No
11-2	197135.7	238014.1	Dp 5g	80	No
11-3	197133.3	237595.9	Dp 4g	100	No
11-5	197121.0	236400.8	Pm 4g	70	No
11-7	197113.4	235098.8	Mc 6g	470	No
12-1	197081.1	238021.5	Dp 5g	120	No
12-3	197073.2	237036.2	Dp 16g	100	No
12-4	197069.1	236778.8	Dp 3g	100	No
12-5	197051.1	235091.8	Mc 7g	250	No
13-1	197036.9	238083.5	Pm 5g	110	No
13-2	197037.0	237784.7	Pm 3g	40	No
13-3	197028.0	237180.8	Mc 10g	520	No
13-4	197021.2	235551.4	Mc 7g	175	No
14-1	196977.1	237650.9	Pm 5g	90	No
14-2	196958.3	235754.4	Dp 47g	140	No
14-3	196951.7	235078.6	Mc 6g	850	No
15-1	196937.3	238249.5	Pm 8g	100	No
15-2	196911.6	235702.9	Mc 6g	240	No
15-3	196911.7	235142.2	Mc 16g	350	No
16-1	196867.4	237008.9	Dp 9g	90	No

Anomaly	Northing	Easting	Type* and Deviation	Duration (ft.)	Sonar Association
16-2	196860.7	235676.0	Pm 6g	90	No
16-3	196858.3	235566.3	Nm 5g	100	No
17-1	196824.1	235579.8	Mc 13g	160	No
17-2	196815.1	235257.3	Mc 6g	475	No
18-1	196758.9	235712.3	Dp 15g	110	No
19-1	196731.0	236878.0	Dp 7g	180	DR-9
19-2	196719.8	235712.4	Dp 26g	120	DR-15
20-1	196680.7	237771.3	Mc 12g	160	No
21-1	196635.0	237975.1	Dp 6g	70	DR-8
21-2	196637.3	237783.1	Nm 6g	100	No
21-3	196627.5	236382.6	Dp 4g	60	No
21-5	196615.5	235320.5	Dp 10g	190	No
22-1	196570.9	237155.3	Dp 3g	180	No
22-2	196557.8	235325.2	Dp 104g	170	No
23-1	196543.9	237930.8	Dp 4g	80	No
23-2	196537.6	237642.5	Dp 8g	160	DR-7
24-2	196461.0	235810.7	Dp 4g	100	No
25-1	196437.1	237602.1	Pm 5g	50	No
25-3	196417.2	235890.0	Dp 4g	80	No
26-2	196371.4	236069.6	Pm 5g	100	No
26-3	196361.3	235964.3	Dp 7g	80	No
27-2	196325.4	236097.2	Nm 5g	110	No
27-3	196317.5	235893.7	Dp 3g	65	No
28-1	196269.3	237204.4	Nm 5g	130	No
28-2	196270.4	236866.4	Mc 9g	440	DR-6
28-3	196265.0	236528.3	Nm 4g	110	No
28-4	196260.2	235950.3	Pm 3g	40	No
29-1	196236.4	237205.1	Nm 7g	200	No
29-2	196223.2	236535.2	Nm 4g	150	No
30-1	196169.0	236570.0	Nm 3g	120	No
31-2	196138.0	237772.3	Dp 5g	200	No
31-3	196124.9	236247.3	Dp 6g	75	No
31-4	196118.1	236006.9	Mc 4g	100	No
32-1	196051.1	236165.4	Nm 4g	60	No
35-3	195930.3	236345.4	Pm 3g	75	No

*D = dipole, M = monopole, C = complex, N = negative, P = positive

SUBBOTTOM PROFILE RECORD

Employed to penetrate sediment beds with the possibility that buried hazards or paleochannels, paleo-landscape settings, or mounded midden features might be sensed, review of the seismic data suggests that the bottom consists of winnowed sand deposits over a uniform clay substrate. No evidence of tidal estuaries, alluvial terraces, stream channels, shell middens, or other relic landforms considered to be associated with prehistoric habitation was recorded in the survey area (Figure 22).

Table 5. Potentially Significant Clusters.

Cluster	Anomaly	Northing	Easting	Sonar
Cluster 1	8-1	197279.7	238055.8	DR-14
Cluster 1	9-1	197234.4	238044.2	DR-14
Cluster 2	8-2	197279.3	237196.8	DR-10
Cluster 2	9-2	197235.7	237208.1	DR-10
Cluster 2	10-2	197172.2	237307.2	No
Cluster 2	11-4	197133.6	237361.0	No
Cluster 2	12-2	197076.3	237390.7	No
Cluster 3	24-1	196472.5	237113.0	No
Cluster 3	25-2	196430.2	237010.0	No
Cluster 3	26-1	196372.1	237027.0	No
Cluster 3	27-1	196331.6	237013.8	No

POTENTIAL HAZARDS

All of the located targets may be construed as potential hazards; that is, magnetic targets are composed of metal, and sidescan targets can also be composed of metal and/or wood. These materials may be hazardous to the proposed construction activities, depending on the type of activity that is conducted (i.e., pile driving, etc.).

11X17 Z Fold FRONT

Figure 18. Sonar mosaic with acoustic target locations.

Z-Fold BACK
Figure 18

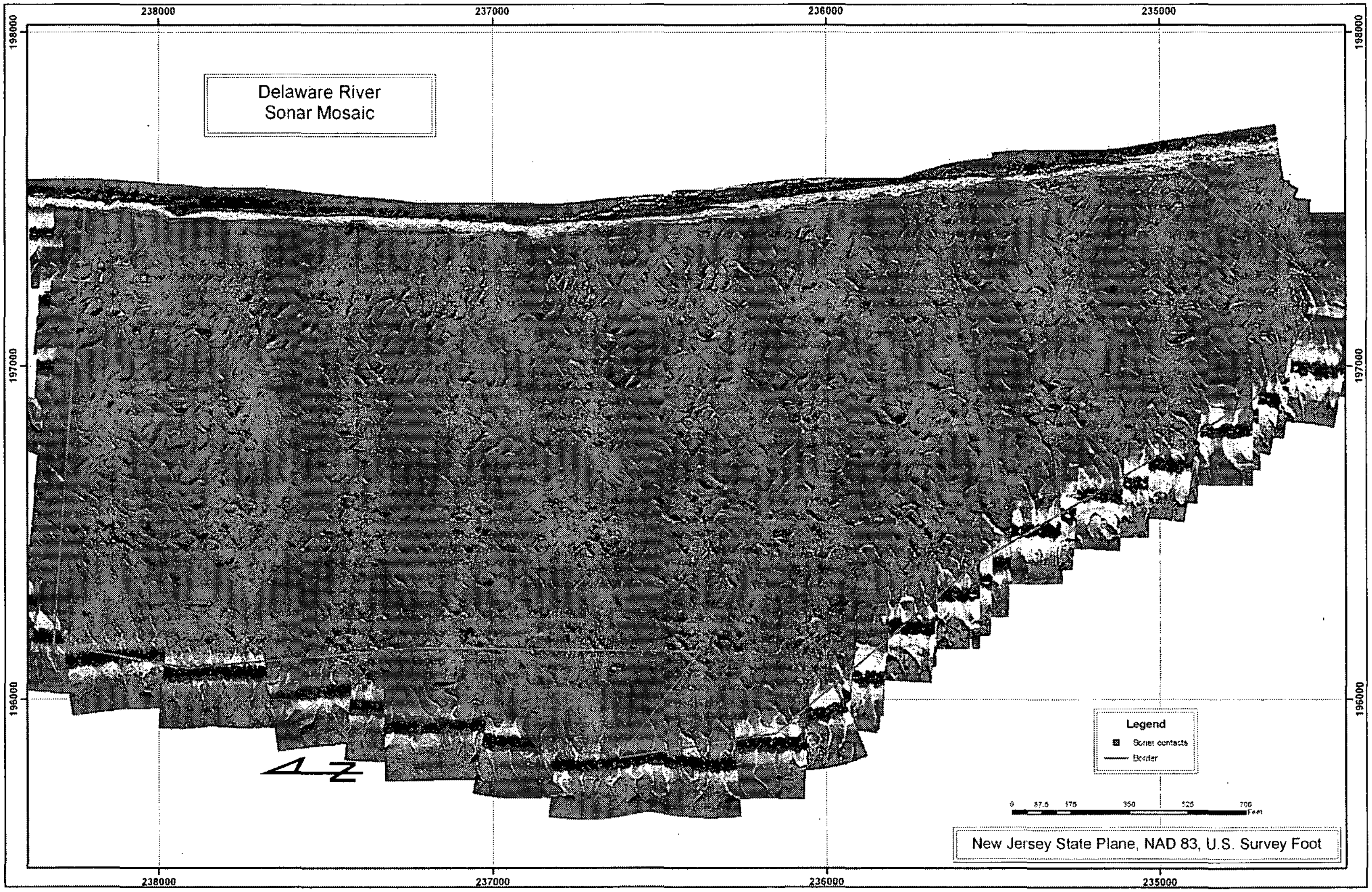

Figure 18. Sonar mosaic with acoustic target locations.

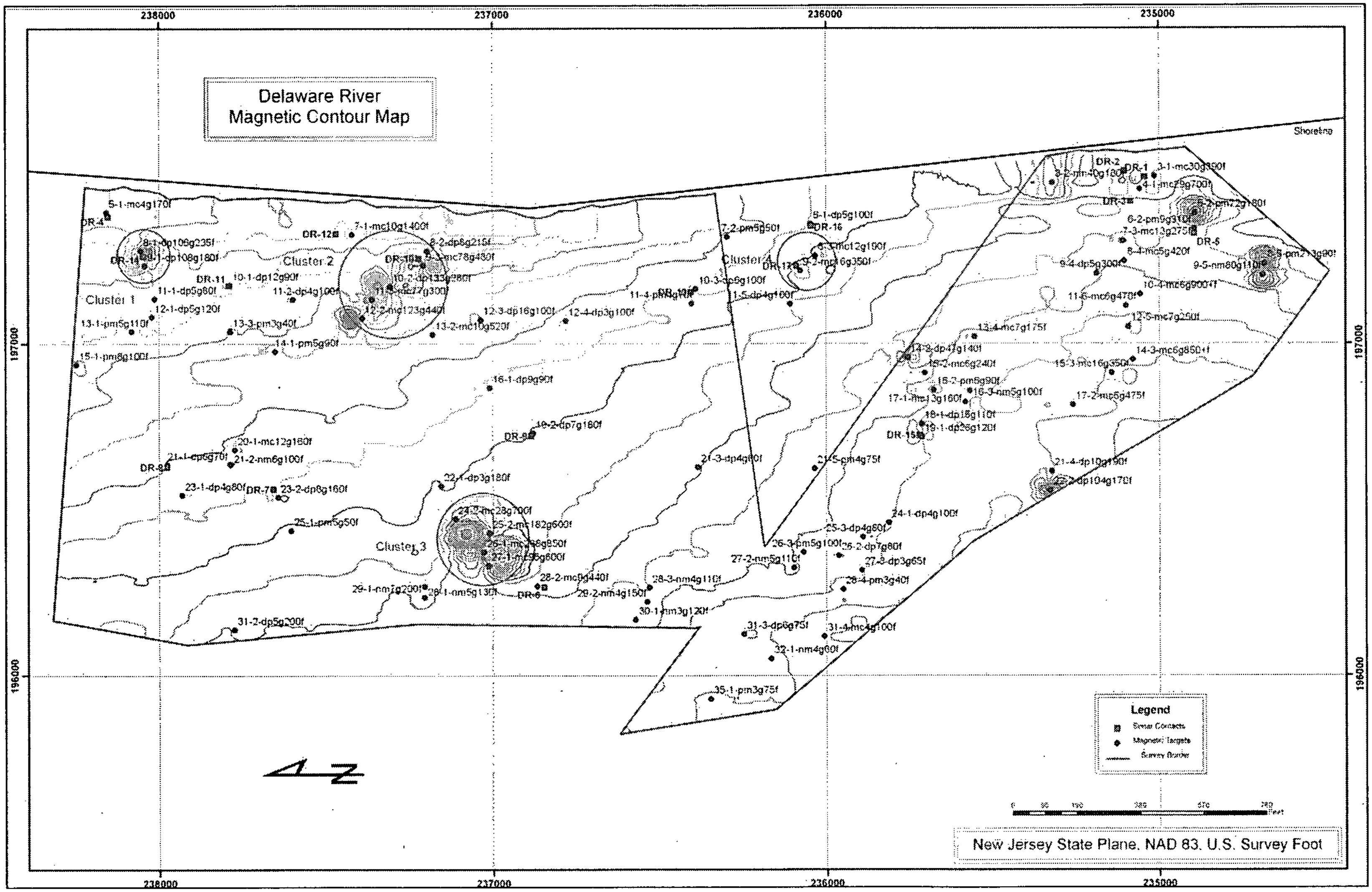

Figure 19. Magnetic contour map with anomaly, anomaly cluster and sonar target locations.

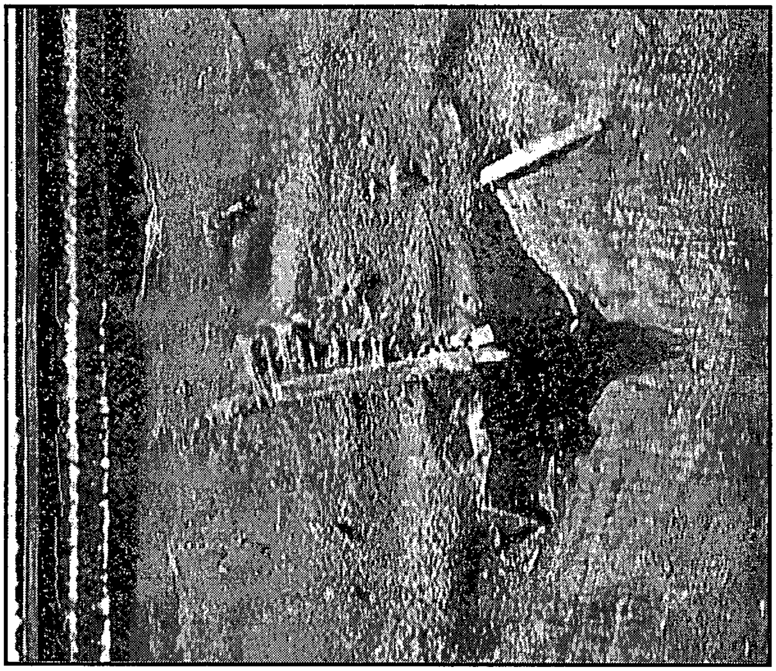

Figure 20. Acoustic image of DR-14 associated with Target Cluster 1. Approximately 40 ft. long and 50 ft. wide, this target has the characteristics of the remains of a wooden hull.

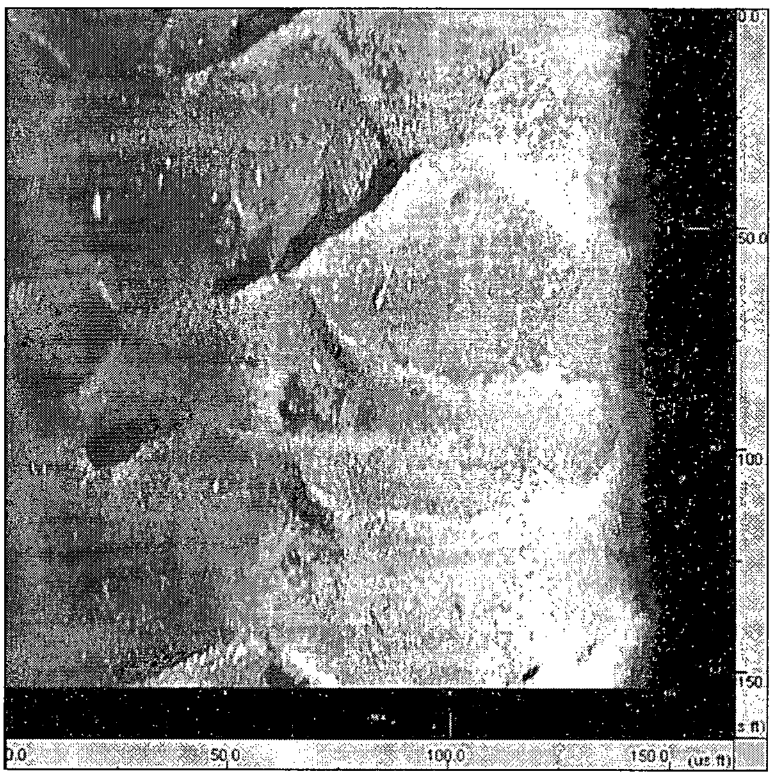

Figure 21. Acoustic image of DR-10 associated with Target Cluster 2. It is a 50 foot-wide area of small debris. Note the winnowed sand bottom.

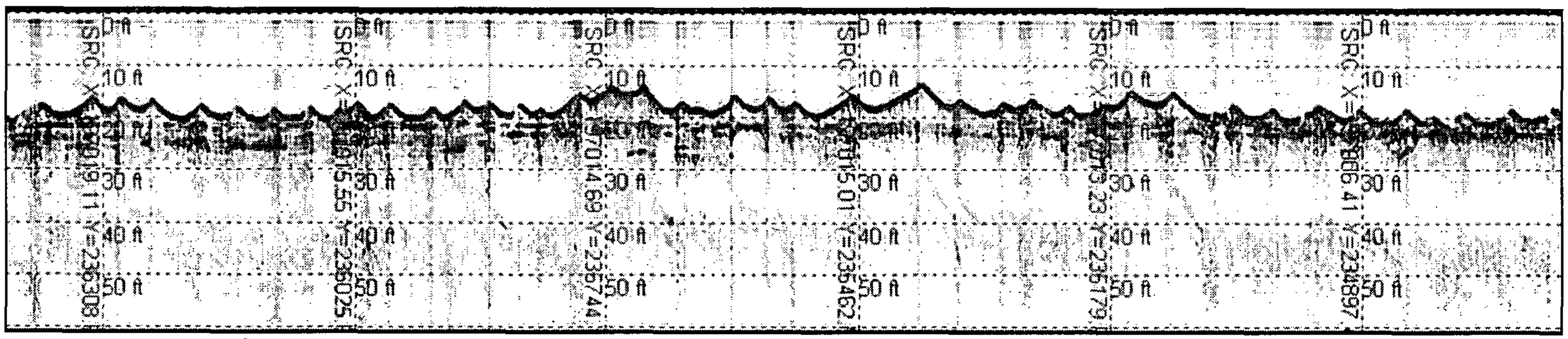

Figure 22. A sample of the subbottom data showing a featureless landscape. The upper surface reflects the winnowed sand waves seen in the sidescan mosaic. Note this image is a center line segment that runs parallel to the shore.

5. CONCLUSIONS AND RECOMMENDATIONS

Panamerican Consultants, Inc. of Memphis, Tennessee conducted an intensive submerged cultural resources remote sensing survey of a proposed dredging area, as part of work to support the PSEG Early Site Permit Application (ESPA), immediately adjacent to the western shore of Artificial Island on the Delaware River in Salem County, New Jersey. Comprised of a magnetometer, sidescan sonar, and a subbottom profiler survey, the primary focus of the investigation was to determine the presence or absence of anomalies representative of potentially significant submerged cultural resources that are eligible for listing on the NRHP, and if present, which resources subsequently, might require additional investigations. A secondary aspect of the project was to identify hazards to the proposed construction.

Results of the survey identified a total of 84 magnetic anomalies, 17 sidescan sonar targets, and no subbottom profiler impedance contrasts within the project area. Three clusters of magnetic anomalies and two associated acoustic images exhibit characteristics indicative of vessel remains. Target Cluster 1 is comprised of two magnetic anomalies that are associated with sonar image DR-14. That sonar image has characteristics suggestive of shipwreck remains. While it is possible that the image is associated with bulkhead material, the image suggests the partially exposed remains of the lower hull of a vessel. It is recommended that the site be avoided. If avoidance is not possible, additional investigations should be conducted to identify material generating the signatures and to assess its NRHP significance. Cluster 2 is comprised of five magnetic anomalies that are associated with sonar image DR-10, which is an area of small debris. The complex nature of the anomalies and debris on the bottom surface should also be considered to have a potential association with vessel remains. Cluster 3 is composed of four magnetic anomalies. Although the anomalies have no corresponding sonar image, the complex nature of the magnetic signature should be considered as suggestive of an association with shipwreck remains. Like Cluster 1, it is recommended that both Cluster 2 and 3 also be avoided. If avoidance is not possible, additional investigations are recommended to be conducted to identify material generating the signatures and to assess its NRHP significance.

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APPENDIX A: EIGHTEENTH CENTURY DELAWARE BAY SHIPWRECK LIST

A list of shipwrecks and marine accidents in Delaware Bay/River was compiled from numerous primary and secondary sources. Among the sources used during the compilation of this list include: *Pennsylvania Gazette*, Philadelphia Chamber of Commerce Study, 1826; *Encyclopedia of American Shipwrecks* (Berman 1972); *Shipwrecks off the New Jersey Coast* (Krotee and Krotee 1965); "A Preliminary Survey to Analyze The Potential Presence of Submerged Cultural Resources In the Delaware and Susquehanna Rivers" (Cox, 1984); *Shipwrecks in the Americas* (Marx, 1971); *Shipwrecks of Delaware and Maryland* (Gentile 1990); *Shipwrecks of New Jersey* (Gentile 1988); *The Pennsylvania Navy, 1775-1781: The Defense of the Delaware* (Jackson, 1974); *Automated Wreck and Obstruction Information System - AWOIS*, (National Oceanographic and Atmospheric Administration); *Wreck Chart of the North American Coast of America*, General Records of the Hydrographic Office, National Archives; *Philadelphia, Port of History*, 1609 -1837 (Chandler, et. al. 1976); *Hazard Annuals of Pennsylvania 1609 -1682* (Hazard 1850); and *The Majestic Delaware* (Brandt 1929).

Name	Year Lost	Comments
Mercury	1741	English merchantman, Captain Hogg, sailing from Philadelphia to Lisbon, lost near the Delaware River.
Molly	1754	Captain Francis Blair, bound to Jamaica, struck on the Brandywine and sprung leak. Got off and was intentionally run ashore about the mouth of Lewes-Town Creek, where she was entirely lost. Little of the cargo saved.
Beaufort	1754	Captain Ferguson, bound to St. Christophers from Philadelphia, was drove ashore at Cape Henlopen in a violent gale of wind.
Sally	1757	Captain Saze, sailing from Philadelphia to Antigua, lost at Brandy Wine on the Delaware.
Pusey	1757	Captain Good, arriving from Jamaica wrecked on Reedy Island in the Delaware River.
Cornelia	1757	Captain Smith, sailing from Philadelphia to Gibraltar, lost her rudder and received other damage on Reedy Island. Came ashore on the Cross Ledge full of water. Eventually sank in the Delaware Bay somewhere between Cape Henlopen and Cape May.

Molly	1760	Captain Stewart, overset off of Cape Henlopen, in a violent gale of wind.
Vaughan (Vaughn)	1763	English merchantman, under Captain Foster, sailing from Bristol to Philadelphia, ran ashore on the Shears in Delaware Bay.
Pitt Packet	1763	English merchantman, under Captain Montgomery sailing from Belfast to Philadelphia with a large number of passengers, foundered in the Delaware Bay with a total loss of life.
Charlestown	1766	American merchantman, under Captain Simpson, sailing from Hamburg to Philadelphia wrecked on January 25 on Brandywine Bank in the Delaware Bay.
Kildare	1768	Captain Nicholson, sailing from Barbados to Philadelphia, lost at the mouth of the Delaware River.
Commerce	1771	English merchantman, under Captain Addis, sailing from England to New York, wrecked at Cape Henlopen.
Severn	1774	English merchantman, under Captain Hathorn sailing from Bristol to Philadelphia, wrecked in the Delaware Bay, but all of her crew was saved.
Endeavor	1775	English merchantman, under Captain Caldwell, sailing from Philadelphia to Londonderry, caught fire and sank off Reedy Island in the Delaware River but most of her cargo was saved.
Washington	1777	Continental frigate, 32 guns, was scuttled along with <u>Effingham</u> near Bordentown to prevent capture by British.
Effingham	1777	Continental frigate, 28 guns, was scuttled along with <u>Washington</u> near Bordentown to prevent capture by British.
Andrea Doria	1777	Warship, 14 guns, was scuttled near Philadelphia to prevent capture by British.
Sachem	1777	Warship, ten guns, lost in the Delaware River during naval battle with British.
Independence	1777	Warship, ten guns, lost in the Delaware River during naval battle with British.

Wasp	1777	Warship, eight guns, lost in the Delaware River during naval battle with British.
Mosquito	1777	Warship, four guns, lost in the Delaware River during naval battle with British.
Xebecks	1777	Brig, lost in the Delaware River during naval engagement with British warships.
Repulse	1777	Brig, lost in the Delaware River during naval engagement with British warships.
Champion	1777	Brig, lost in the Delaware River during naval engagement with British warships.
Augusta	1777	British Frigate, 64 guns, grounded and exploded off mouth of Mantua Creek.
Merlin	1777	British Sloop of War, 18 guns, grounded and later scuttled by British off of Mantua Creek, south of Augusta.
20 unidentified	1777	Small sloops and other vessels of the Pennsylvania Navy were burned after attempting to pass above Philadelphia after the surrender of Forts Mifflin and Mercer.
Montgomery	1777	Pennsylvania Navy brig, 20 guns, was scuttled after attempting to pass above Philadelphia after the surrender of Forts Mifflin and Mercer.
2 unidentified	1777	Two floating batteries were burned after attempting to pass above Philadelphia after the surrender of Forts Mifflin and Mercer.
2 unidentified	1778	Two ships were part of a 44-vessel fleet destroyed by British in and around Crosswicks Creek during a two day raid to destroy colonial vessels that hid upriver after the surrender of Forts Mifflin and Mercer.
Unidentified	1778	Privateer sloop, part of the colonial fleet destroyed by the British near Bordentown.
18 unidentified	1778	Brigs, schooners and sloops, part of the colonial fleet destroyed by the British near Bordentown.
Sturdy Beggar	1778	Privateer, 18 guns, part of the colonial fleet destroyed by the British near Bordentown.
2 unidentified	1778	Schooners, 14 and 10 guns each, part of the colonial fleet destroyed by the British near Biles Island Creek.

4 unidentified	1778	Sloops, 16 guns each, part of the colonial fleet destroyed by the British near Biles Island Creek.
6 unidentified	1778	Brigs and Schooners, part of the colonial fleet destroyed by the British near Bristol.
2 unidentified	1778	Sloops, part of the colonial fleet destroyed by the British at ferry above Bristol.
9 unidentified ships	1783	Wrecked at Cape Henlopen during a severe gale in the fall.
Peace	1784	Captain Star, sailing vessel from London to Virginia wrecked on Hog Island in the Delaware Bay.
Faithful Steward	1785	Scottish immigrant ship, under Captain McCausland, sailing from Londonderry to Philadelphia sank near Cape Henlopen, over 200 persons perished.
Santa Rosalea	1788	Spanish merchantman, under Captain Pardenus sailing from Baltimore to Havana, wrecked near Cape Henlopen.
Pomona	1789	English ship, under Captain Hopkins arriving from Quebec, sank in the Delaware Bay in October.
John	1790	English merchantman, under Captain Staples, arriving from England, wrecked on December 5, in the Delaware Bay.
Alliance	1790	Continental Navy frigate was abandoned and broken up behind Pettys Island.
Perseverance	1790	John Fitch's experimental steamboat abandoned behind Pettys Island.
Industry	1793	American merchantman, under Captain Carson, sailing from France to Philadelphia sank in the Delaware Bay, near Cape May.
San Joseph	1794	Spanish merchantman, sailing from Philadelphia to Cuba, was lost in the Delaware Bay when ice crushed her hull.
Peggy	1794	American merchantman, sailing from Philadelphia for Savannah, was lost in the Delaware Bay.
Lively	1795	Sailing from Amsterdam to New York, under Captain Lawrence, ship sank near Lewes.

Henry & Charles	1796	American merchantman, sailing from Hamburg to Philadelphia, wrecked near Cape Henlopen.
Favorite	1796	American merchantman, sailing from Cadiz to Philadelphia sank in the Delaware Bay.
Minerva	1796	American merchantman, sailing from Lisbon to Philadelphia wrecked near the mouth of the Delaware River.
John	1797	American ship sailing from Hamburg to Philadelphia with 300 immigrants under Captain Folger wrecked at what is now know at Ship John Shoal in the Delaware Bay.
DeBraak	1798	A British Sloop of War, capsized approximately one mile off Cape Henlopen.
New Jersey	1799	American merchantman, under Captain Clay sailing from Puerto Rico to Philadelphia, wrecked on the west side of the Delaware Bay.
George	1800	English merchantman preparing to sail for England, sank at Philadelphia.
Susannah	1800	Merchantman, sailing from Hamburg to Philadelphia under Captain Medlin wrecked in the Delaware Bay.

APPENDIX B: SALEM HISTORICAL SOCIETY LETTER

Artificial Island

450 East Broadway,
Salem, N. J.,
May 20, 1961.

Mr. H. B. Marshall,
309 Nichols Ave.,
Wilmington 3, Del.

Dear Sir:

Replying to your letter of May 6th, I have made a search thru our records and our many scrap-books regarding Artificial Island and the ships sunk there, but could find no printed matter regarding same. However, I have been in touch with several of our local elder men who have fished and trapped in that vicinity for years - one of them, in fact, since 1888. They all tell me the same thing, so I feel sure it is correct.

Mr. Billy Baker father of Mrs. Ray Parkell Born 1874 trapped his first muskrat at 14.

Artificial Island was blown in on the Dan Baker Shoals (local name) by the Government in the decade 1895 to 1905, as a means of keeping the channel open at the mouth of Alloway Creek. The Island is approximately three miles long and maybe one mile wide, and runs from one-half mile below the mouth of Alloway Creek to Hope Creek.

After World War I, the Government had need to dispose of various wooden vessels, mostly freighters and oilers which had been built particularly for that war period and were obsolete. They were sunk at the southern end of the Island.

As this was all open water before the Island was blown in, an d thus permitted the use of shad nets, which would have caught on any obstruction below water, it is not believed any ancient boats or wrecks are in this vicinity.

I trust this will be of some help to you.

Yours very truly,

SALEM COUNTY HISTORICAL SOCIETY

Josephine Jaquett, Historian

Figure B-1. Letter sent from Historian of Salem Historical Society discussing creation of Artificial Island, according to local oral historical accounts.

APPENDIX C: *NEW YORK TIMES* ARTICLE

TREASURE IN RIVER SHOALS.

Uncle Sam Wants It If Picked Up by Dredgers in the Delaware.

Special to The New York Times.

PHILADELPHIA, June 28.—At last some one has been found who thinks there "might be something in" the old sailors' yarns to the effect that wealth beyond the dreams of avarice lie buried in the treacherous sands of Dan Baker Shoals, in the Delaware River, and that some one is no less a personage than credulous old Uncle Sam.

Veteran seadogs believe in the old story that one of Capt. Kidd's treasure-laden pirate ships was wrecked on the shoals, and to bear out their stories, they point triumphantly to the fact that a few years ago dredgers at work at the mouth of the Schuylkill turned up a portion of the hull of a schooner which no one knew anything about. The vessel's name could not be ascertained. In the part of the wreck brought to the surface were found a number of shovels and picks of antique pattern, and several watches of unknown make and date.

Dan Baker Shoals are several miles from the mouth of the Schuylkill. Uncle Sam may have had these discoveries in mind when he inserted a clause in the contract for dredging these shoals, and for which bids have been opened, to the effect that any coin or valuables discovered in the work of dredging must revert to the National Government.

The New York Times

Published: June 29, 1902

Figure C-1. Article in *New York Times* stating local belief that a schooner found in Baker Shoal near the project area was sailed by the pirate, Captain Kidd.

APPENDIX D: SURVEY AREA COORDINATES

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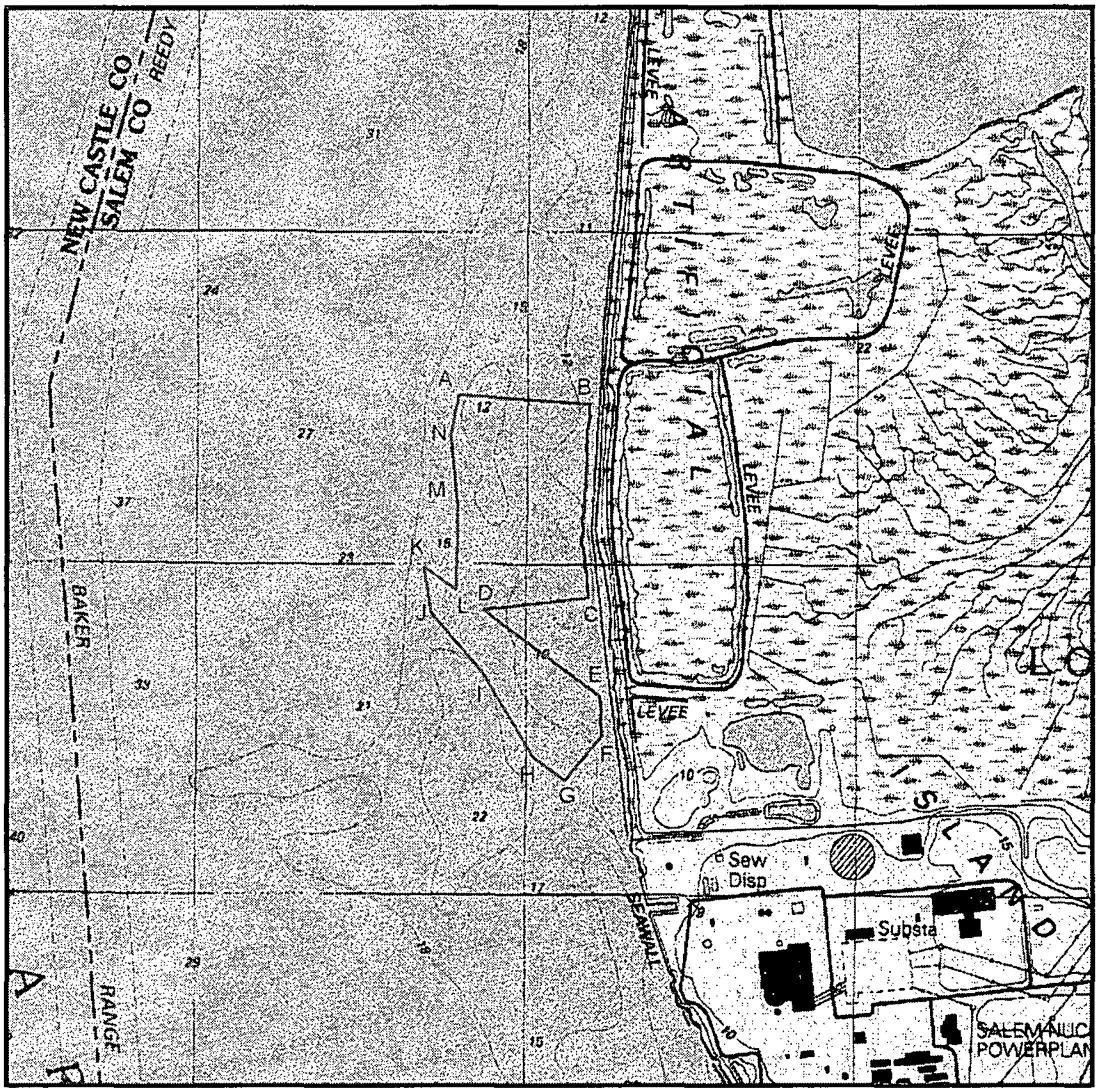
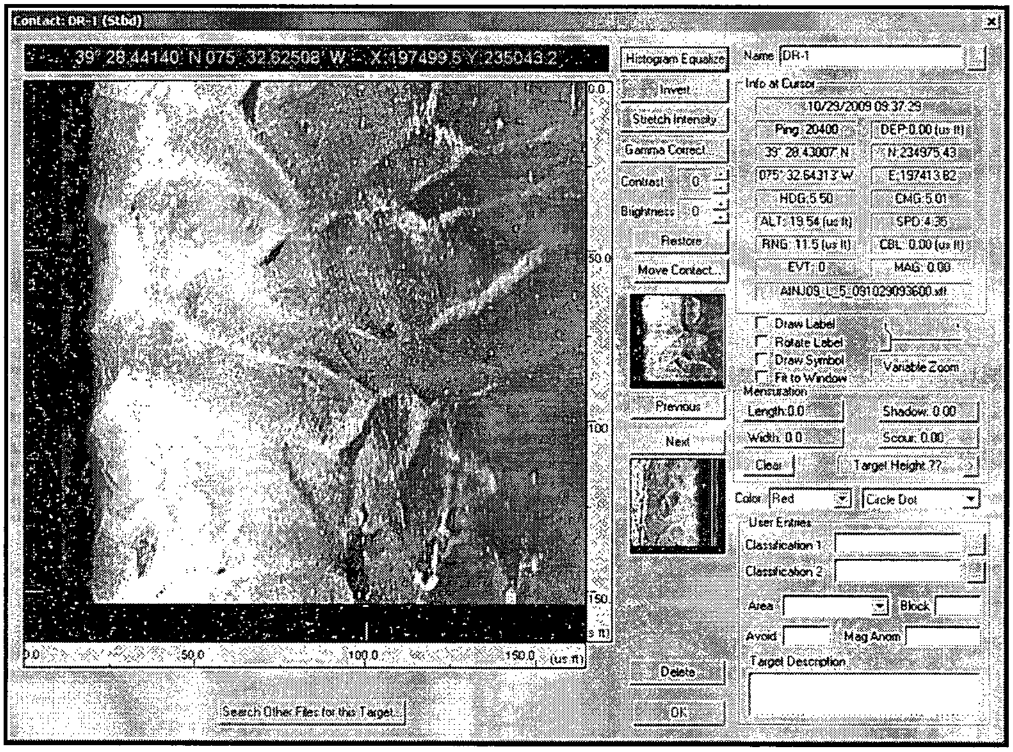


Figure D-1. Coordinate location map (USGS 7.5' Quadrangle: Taylors Bridge (DE), 1981).

APPENDIX E: SIDESCAN SONAR TARGET IMAGES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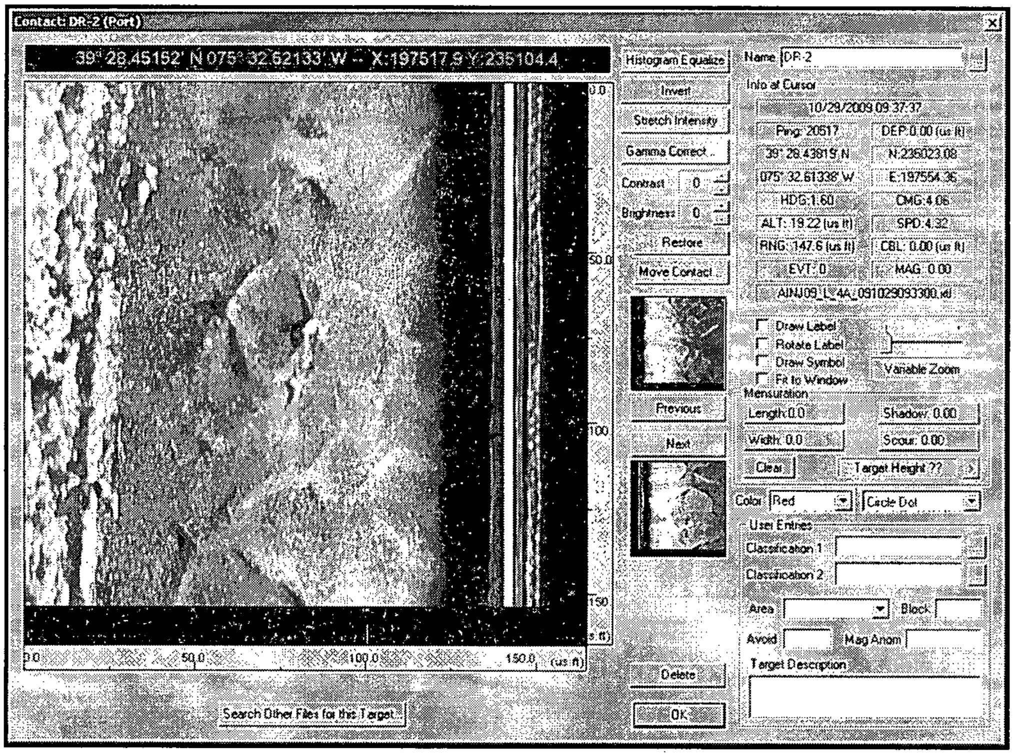
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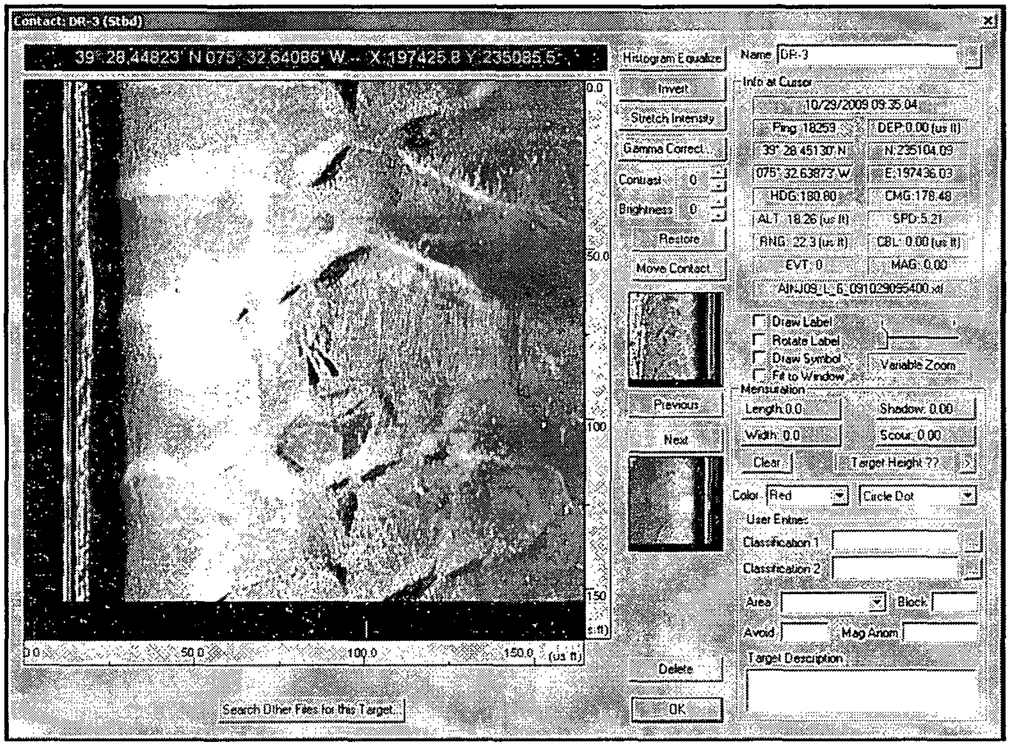
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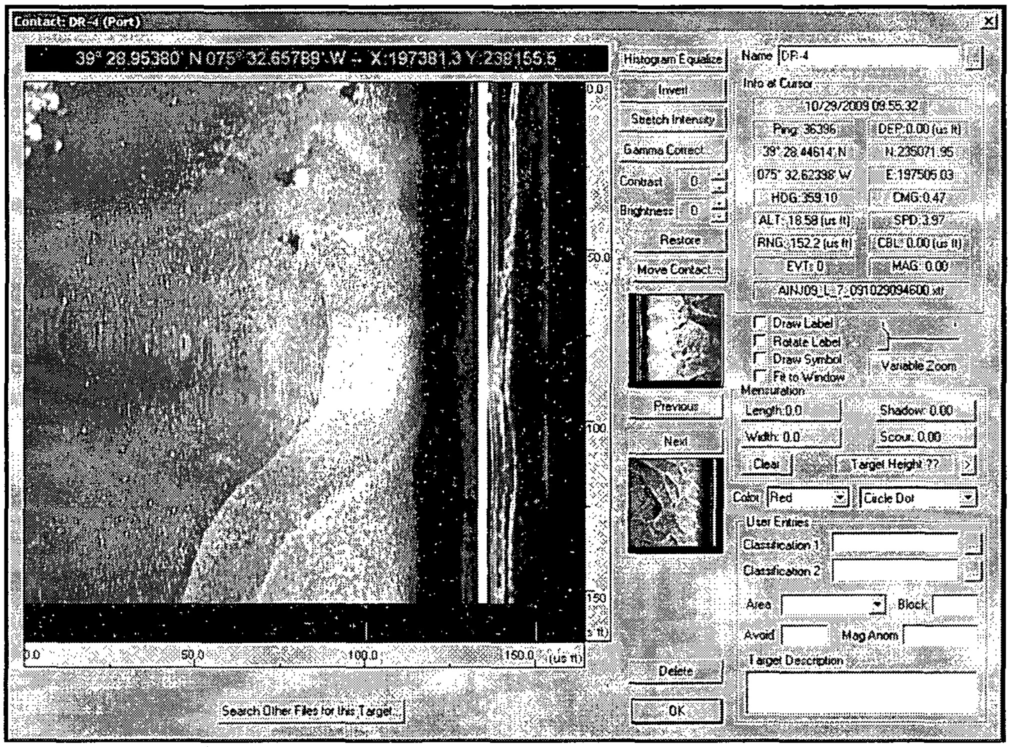
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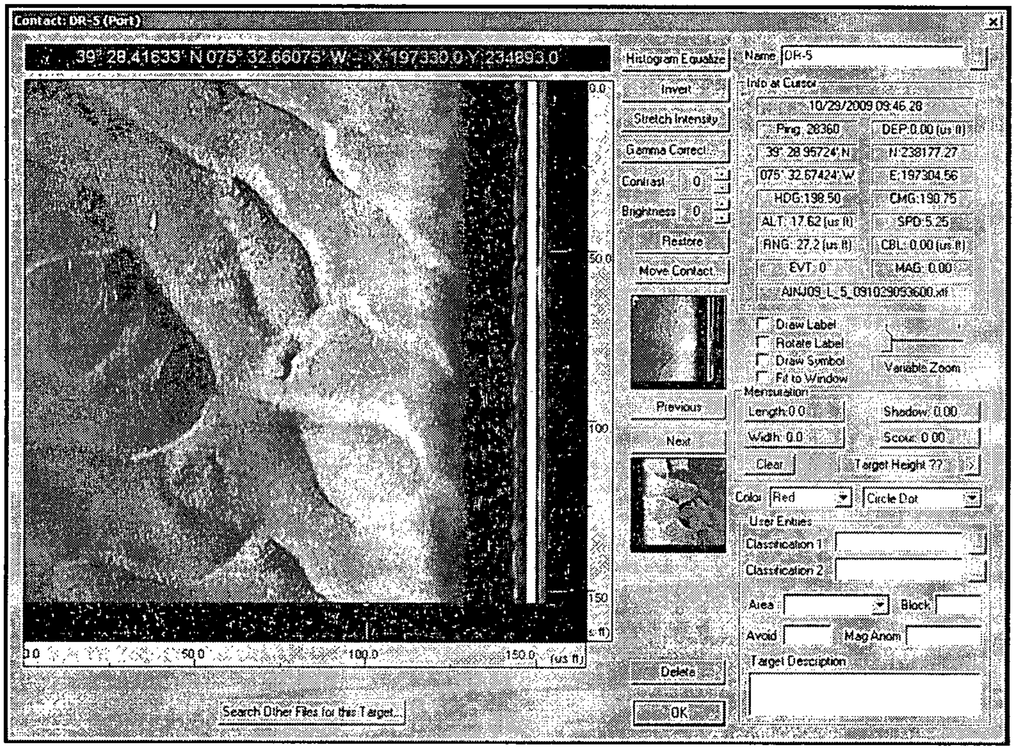
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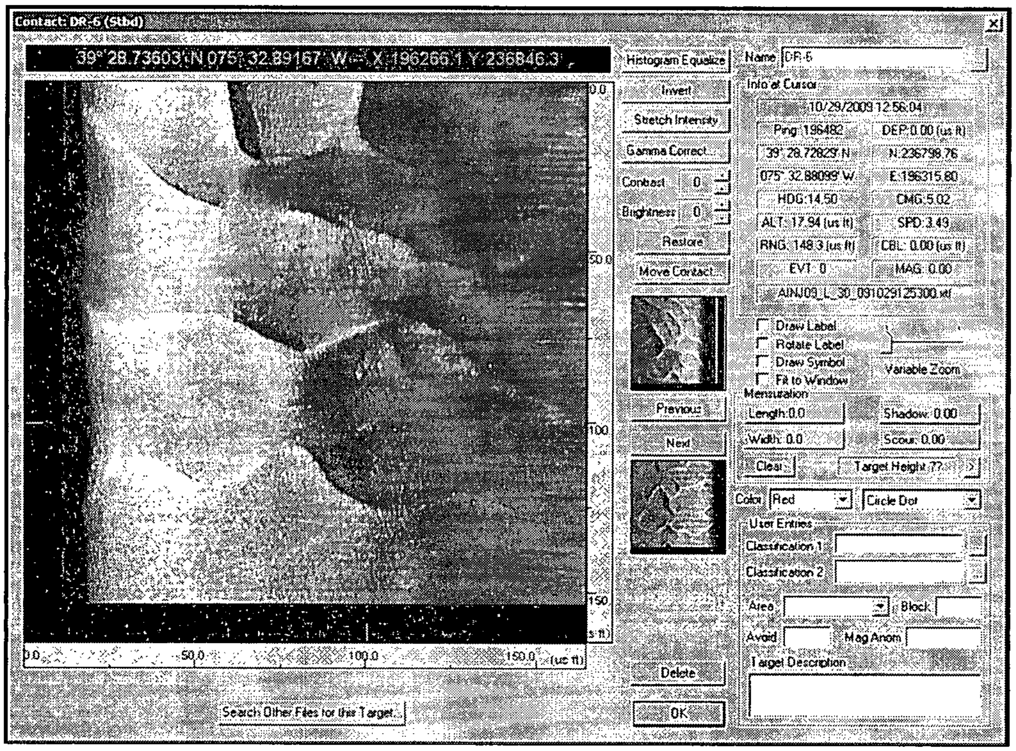
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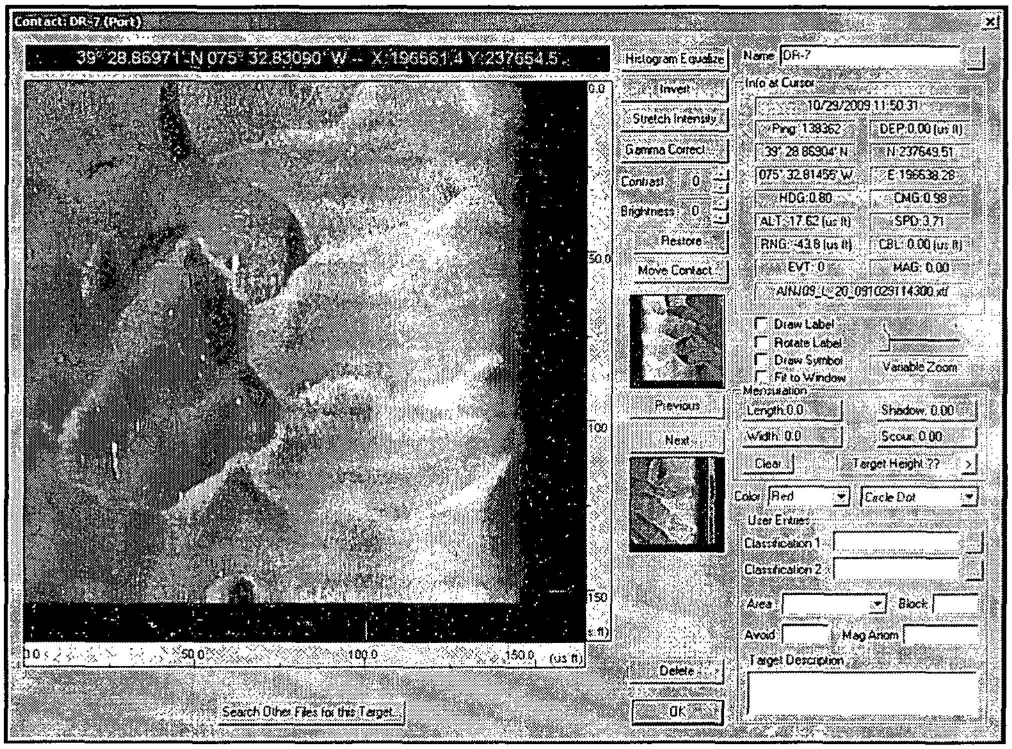
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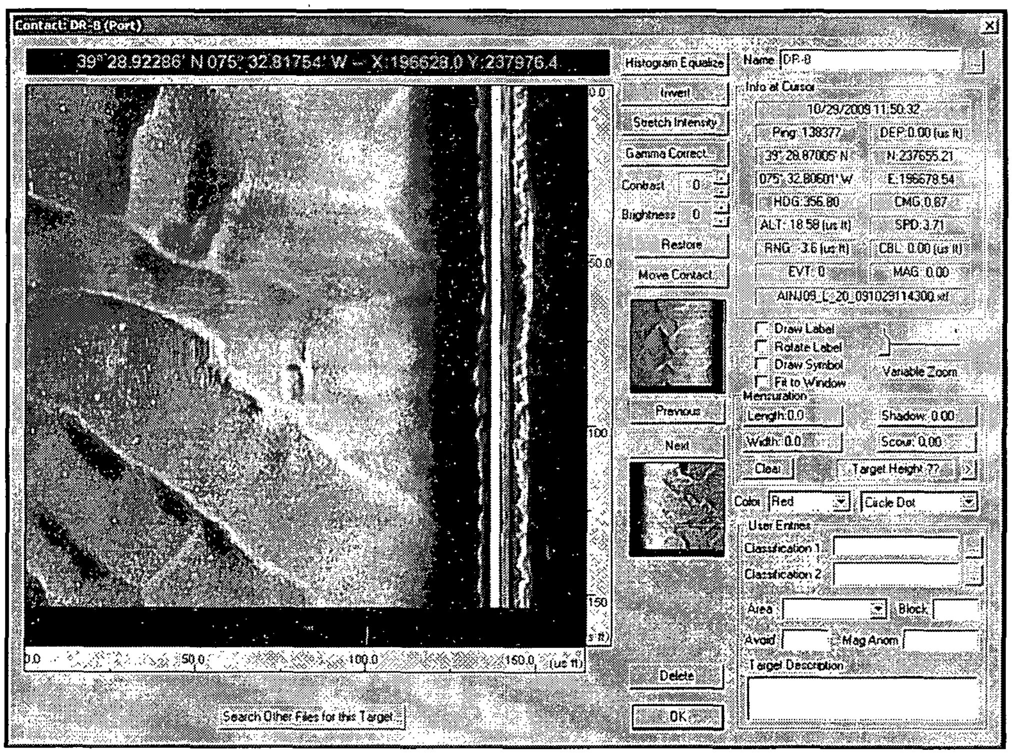
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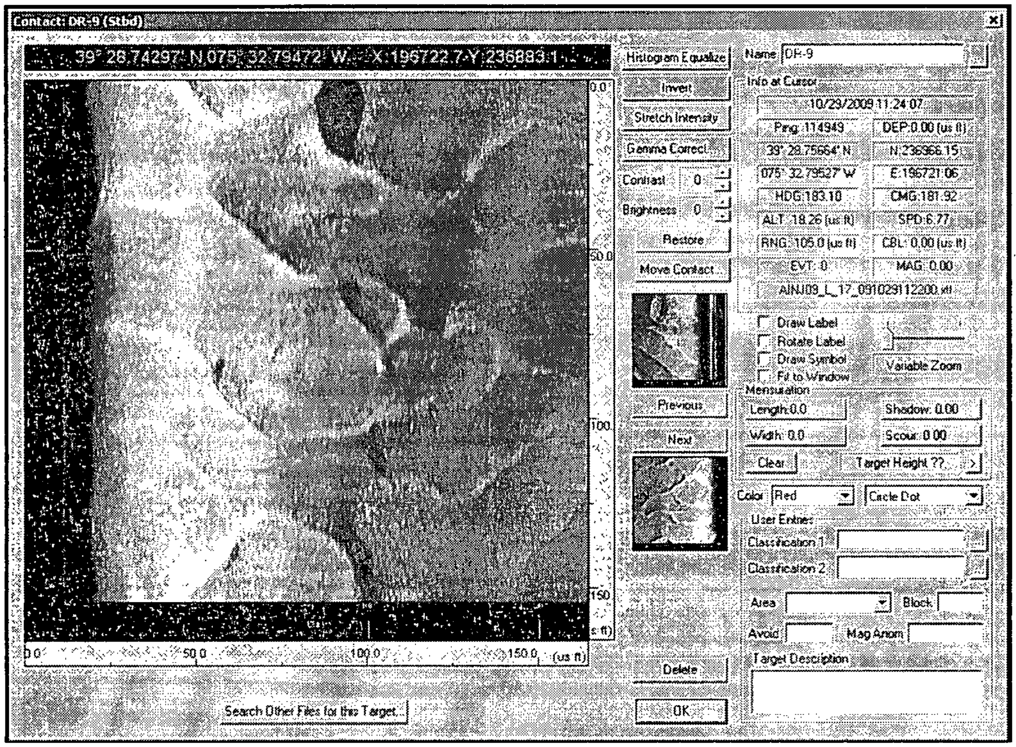
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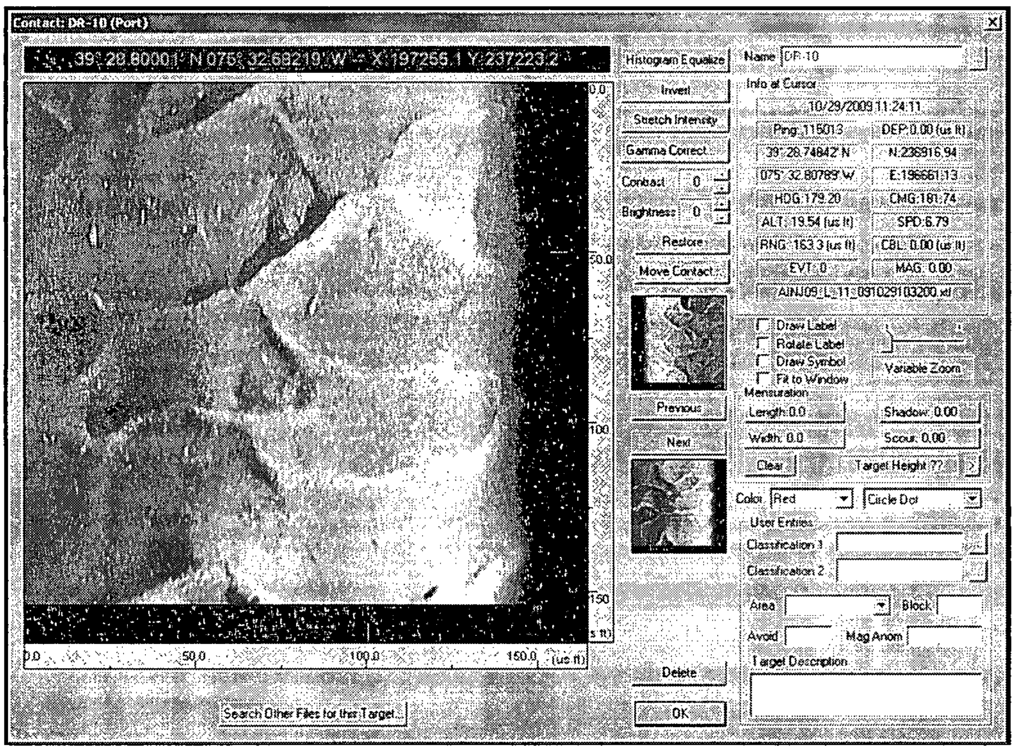
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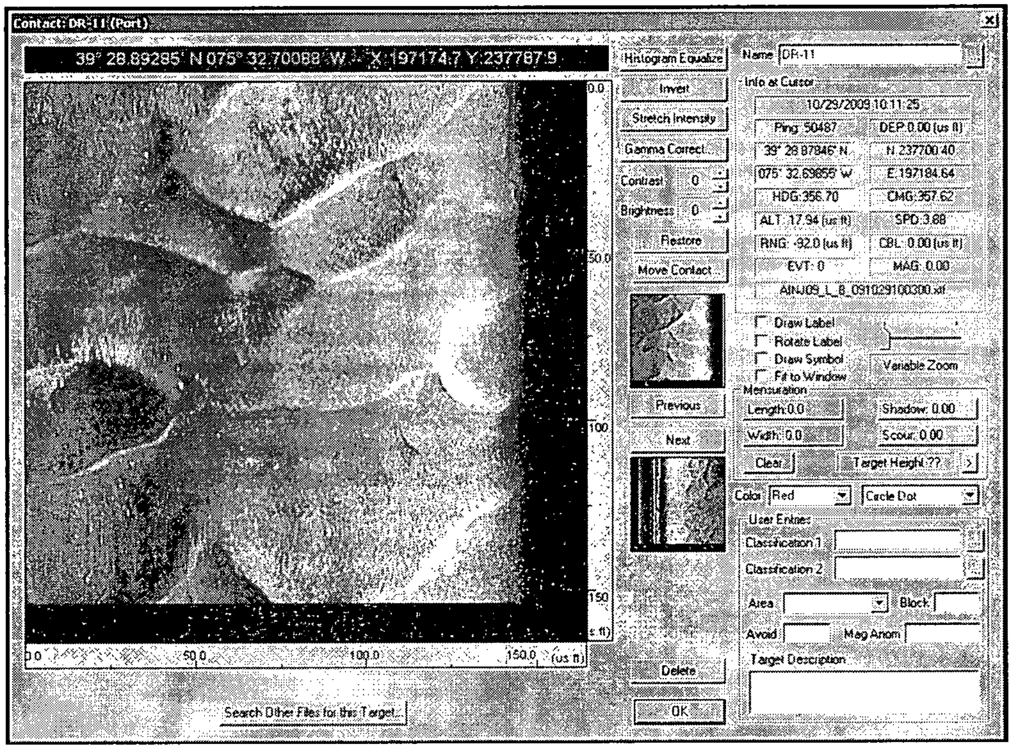
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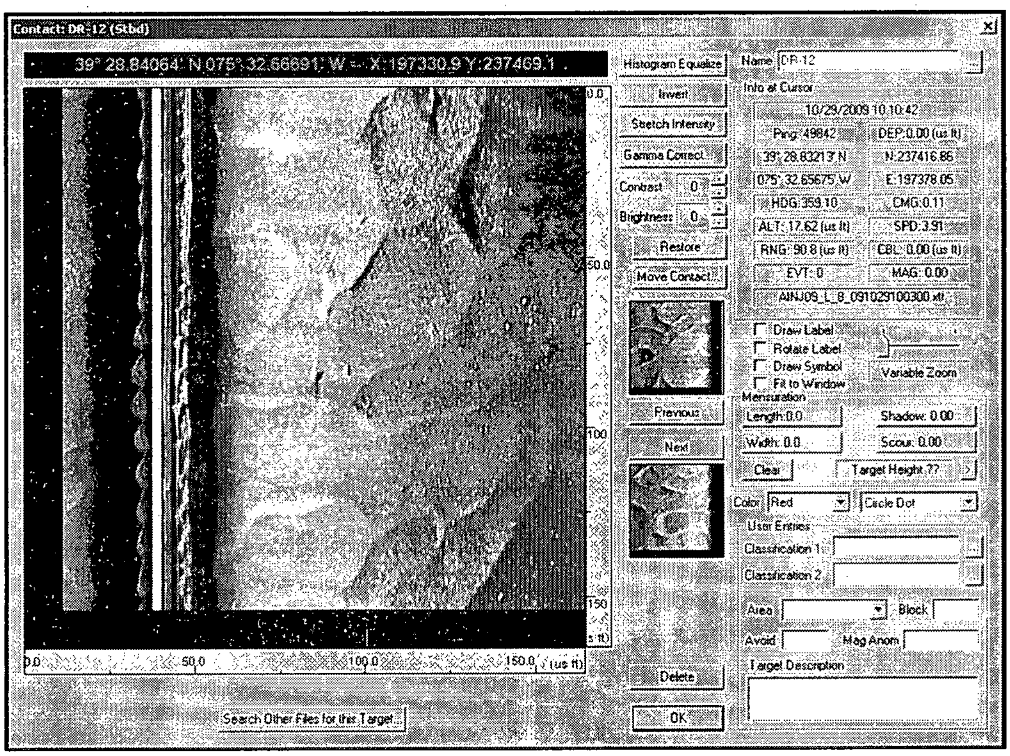
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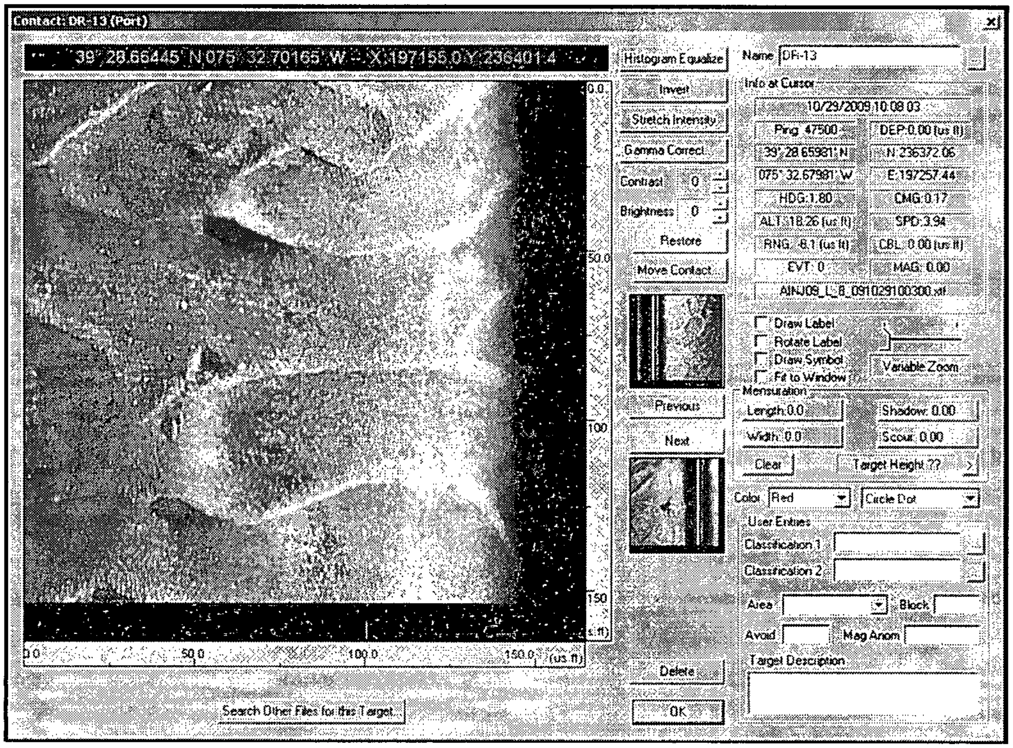
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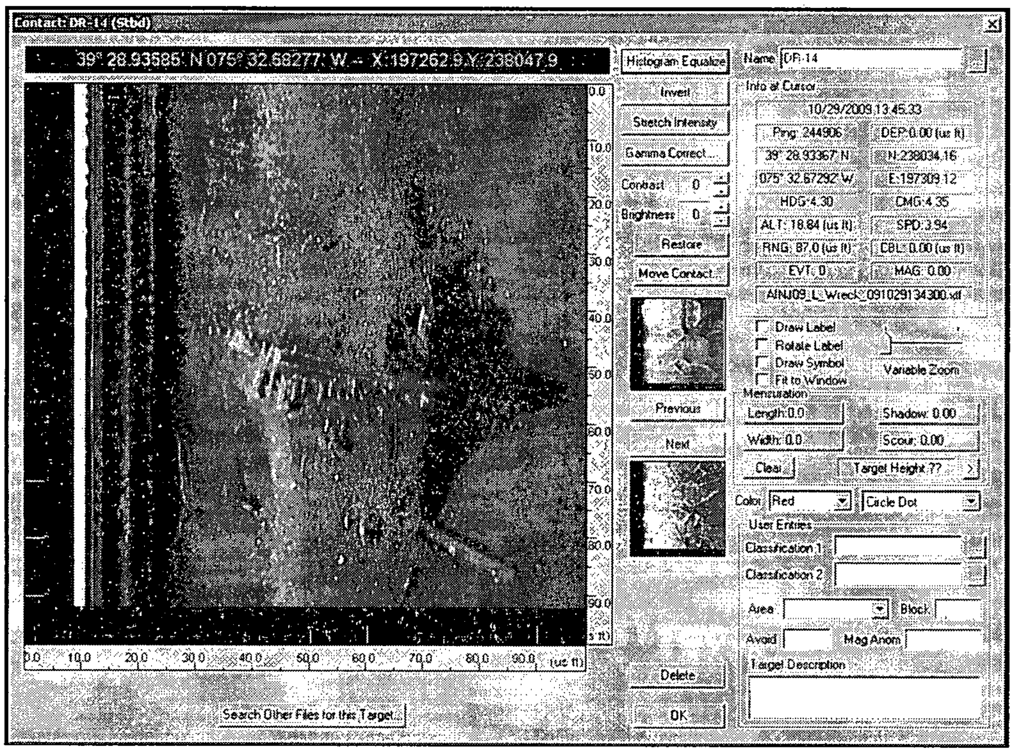
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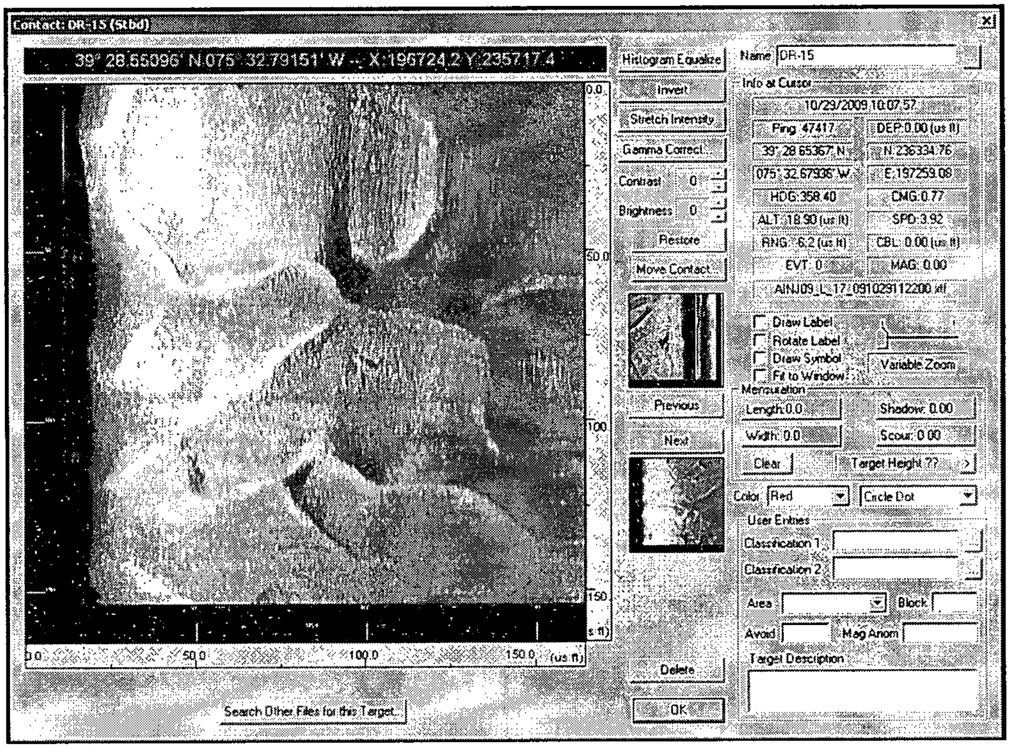
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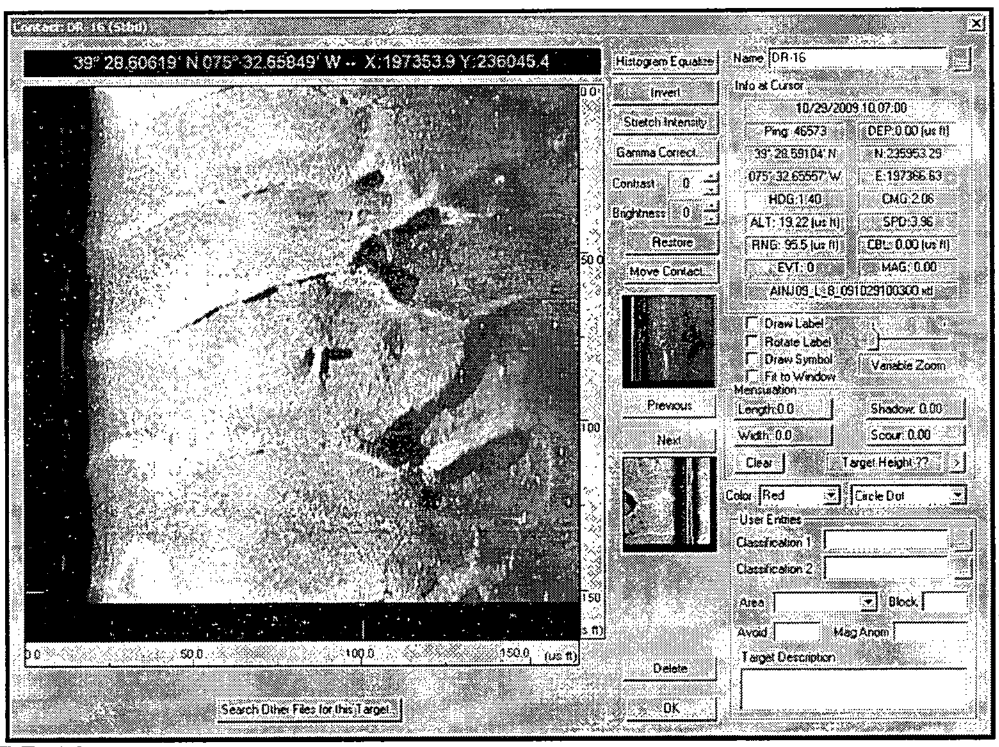
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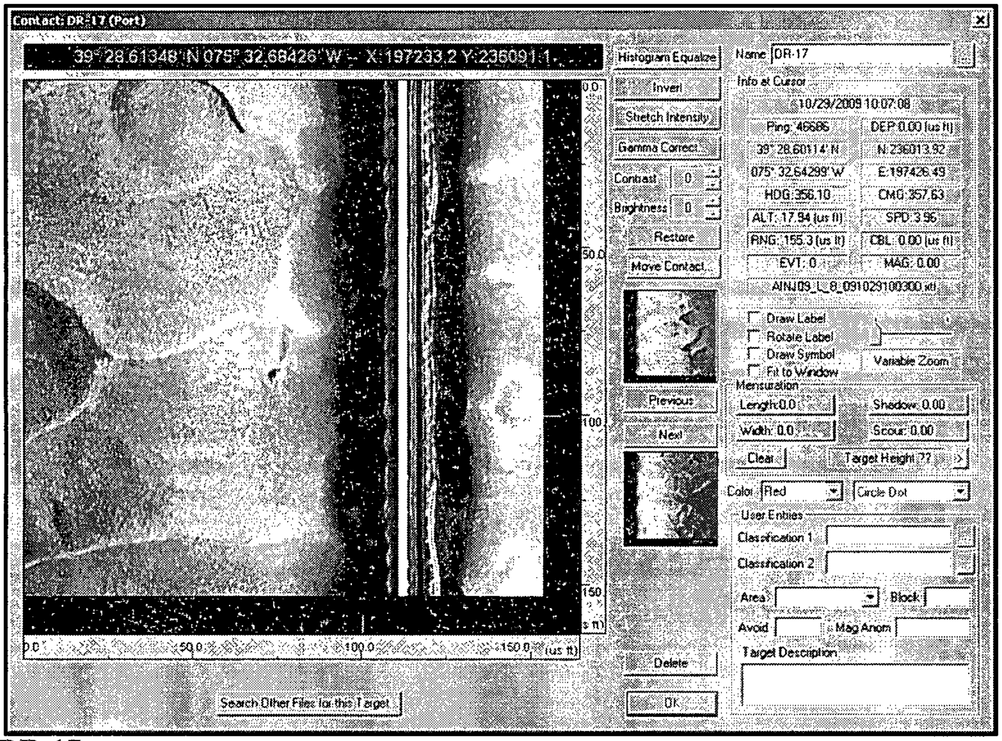
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DR-17

REPORT OF
PHASE I ARCHAEOLOGICAL SURVEY
FOR SELECTED PORTIONS OF TWO
ACCESS ROAD ALTERNATIVES
PSEG EARLY SITE PERMIT APPLICATION
SALEM COUNTY, NEW JERSEY

Prepared For:
PSEG Power, LLC

Submitted to:
Sargent & Lundy, LLC

Prepared By:

MACTEC

MACTEC Engineering and Consulting, Inc.
9725 Cogdill Road
Knoxville, TN 37932

Principal Investigator: J. Emmett Brown, RPA

MACTEC Project 3250-08-5280

December 24, 2009

REPORT OF
PHASE I ARCHAEOLOGICAL SURVEY
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MACTEC Engineering and Consulting, Inc.
9725 Cogdill Road
Knoxville, TN 37932

J. Emmett Brown, RPA
Senior Archaeologist
Cultural Resource Manager

Patrick H. Garrow, RPA
Senior Principal Archaeologist

MACTEC Project 3250-08-5280

December 24, 2009

EXECUTIVE SUMMARY

MACTEC Engineering and Consulting, Inc., (MACTEC) conducted a Phase I archaeological survey on sections of the two proposed access road alternatives in Salem County, New Jersey. The survey was conducted for PSEG Power, LLC (PSEG) for the development of the Early Site Permit (ESP) application for the construction of a new nuclear plant at the PSEG Site location. The archaeological survey was conducted on uplands within PSEG-owned lands and public lands along each of two possible access alternatives: the Alloway Creek Neck Road Access Alternative (ACNRAA) and the Money Island Road Access Alternative (MIRAA).

The Phase I survey was limited to shovel testing and pedestrian survey of upland parcels of publicly owned lands. A field survey was not conducted on Artificial Island. Artificial Island was created from dredged material and has a low potential for archaeological sites. In order to assess the potential for buried paleosols underneath Artificial Island, the soil stratigraphy from geotechnical borings was reviewed. Based on the review of the soil borings, it is the recommendation of MACTEC that no archaeological resources will be impacted during construction activities on Artificial Island. This review is presented in Appendix D.

The Property access was not obtained for privately owned parcels and no investigation was conducted within these areas. Those portions of the ACNRAA and MIRAA that are located within marsh or estuary environments were not surveyed. Once an access alternative is selected, a geoarchaeological study may be needed to identify if deeply buried paleosols exist in these areas. This report describes only the results of the archaeological Phase I survey and a summary and description of the soil stratigraphy on Artificial Island. Although historic structures were identified during the background research, an assessment of historic structures was not part of the current investigation.

The MIRAA is a proposed 4.8-mile (7.7-km) access road that begins at the intersection of Money Island Road and Mason Point Road and runs to the PSEG Site. A 0.9-mile (1.4-km) stretch of the MIRAA (including possible parking lot areas) was surveyed. Six archaeological sites were identified and included sites 28SA179, 28SA180, 28SA181, 28SA182, 28SA183, and 28SA186. These sites are potentially eligible for listing on the National Register of Historic Places.

Site 28SA179 is a multicomponent site located within the proposed MIRAA right of way and in a proposed parking lot area on the east side of Money Island Road. The site measures 492 feet (150 meters) east/west by 328 feet (100 meters) north/south and was identified during a pedestrian survey of a plowed agricultural field. The historic component dates circa (ca.) the mid-eighteenth to nineteenth century and may represent a domestic occupation. The prehistoric component may represent a Kipp Island or Webb Phase campsite in the Middle to Late Woodland period (3,250-400 BP).

Site 28SA180 is a multicomponent site located within the proposed MIRAA right of way and in a proposed parking lot area on the east side of Money Island Road. The site measures 328 feet (100 meters) east/west by 656 feet (200 meters) north/south and was identified during a pedestrian survey of a plowed agricultural field. The historic component dates ca. the eighteenth to nineteenth century and may represent a domestic occupation. The prehistoric component consists of undecorated ceramics and can only be assigned to the Middle to Late Woodland period.

Site 28SA181 is a multicomponent site located in a proposed parking lot area located on the east side of Money Island Road. The site measures 229 feet (70 meters) east/west by 574 feet (175 meters) north/south and was identified during a pedestrian survey of a plowed agricultural field. The historic component dates ca. the eighteenth to the nineteenth century and may represent a domestic occupation. The prehistoric component consists of undecorated ceramics and can only be assigned to the Middle to Late Woodland period.

Site 28SA182 is a multicomponent site located in a proposed parking lot area on the west side of Money Island Road. The site measures 410 feet (125 meters) east/west by 360 feet (110 meters) north/south and was identified during a pedestrian survey of a plowed field. The historic component dates ca. the eighteenth to nineteenth century and may represent a domestic occupation. The prehistoric component consists of undecorated ceramics and can only be assigned to the Middle to Late Woodland period.

Site 28SA183 is a multicomponent site located in a proposed parking lot area located on the west side of Money Island Road. The site measures 246 feet (75 meters) east/west by 902 feet (275 meters) north/south and was identified during shovel testing of an agricultural field. The historic component dates ca. the eighteenth to nineteenth century and may represent a domestic occupation. The prehistoric component consists of undecorated ceramics and can only be assigned to the Middle to Late Woodland period.

Site 28SA186 is a historic site identified during a pedestrian survey of the area designated as Field C. The field was plowed agricultural field at the time of the survey with surface visibility at 75 to 100%. The site measures approximately feet (90 meters) east/west by feet (60 meters) north/south and encompasses 1.4 acres (ha) The site was identified on a small rise that contained a surface scatter of historic artifacts. The site boundaries were determined by the distribution of artifacts that were contained to the small rise. The 1842 coastal map depicts a structure located in the approximate area of the artifact concentration. The historic component consisted of ceramics, glass, and metal artifacts that date the site to the mid-eighteenth century to the nineteenth century. Additionally, Site 28SA186 is located in close proximity to the previously identified Elsinboro/Lower Alloway Creek District, which is potentially eligible to the NRHP for the historic salt hay farming that occurred in the area. MACTEC recommends that Site 28SA186 is potentially eligible for inclusion on the NRHP.

The ACNRAA entails the widening of the existing road from Hancocks Bridge Road to the PSEG Site for a distance of 6.2 miles (10 kilometers [km]). A 1-mile (1.6-km) section was surveyed, and no archaeological sites were identified. However, the ACNRAA passes through the Chambless House property which is listed on the New Jersey State Register of Historic Places. If the ACNRAA is selected as the access alternative, a reevaluation of the Chambless property and consultation with the New Jersey Historic Preservation Office is needed. No archaeological sites were identified in the 1-mile (1.6-km) section of the ACNRAA.

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LIST OF ABBREVIATIONS AND ACRONYMS

ACNRAA	Alloway Creek Neck Road Access Alternative
amsl	above mean sea level
BP	before present
ca.	circa
CC	cream-colored
CDF	Confined Disposal Facility
CFR	Code of Federal Regulations
cm	centimeters
cmbs	centimeters below surface
CRCG	Cultural Resource Consulting Group
DEIS	Draft Environmental Impact Statement
DEP	Department of Environmental Protection
ESP	Early Site Permit
GPS	global positioning system
ha	hectares
HPO	Historic Preservation Office
km	kilometer
LGM	Last Glacial Maximum
MIRAA	Money Island Road Access Alternative
NEPA	National Environmental Protection Act of 1966
NHPA	National Historic Preservation Act
NJDEP	New Jersey Department of Environmental Protection
NRC	U.S. Nuclear Regulatory Commission
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
OTMA	Othello, Fallsington, and Trussum
PPK	Projectile Point Knife
PSEG	PSEG Power, LLC
RCYBP	radiocarbon years before present
STP	shovel test pit
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
WMA	Wildlife Management Area

1. INTRODUCTION

PSEG Power, LLC (PSEG) is in the process of developing an Early Site Permit (ESP) Application for the construction of a new nuclear plant at the PSEG site location in Salem County, New Jersey. PSEG plans to submit the ESP application to the U.S. Nuclear Regulatory Commission (NRC) in 2010. Conceptual designs are for a new generating plant and administration building, switchyard, laydown areas, a cooling system (including cooling tower), an access road, and a barge docking facility. However, the reactor technology has not been determined, and PSEG has not made a decision to build.

The current document describes a Phase I archaeological survey of areas being considered as alternatives for access road development. Throughout the remainder of this document, "project area" refers to these proposed road construction and modification projects.

A number of project alternatives are being considered by PSEG to address the current and future transportation needs for the PSEG Site. Roadway alternatives considered include:

- Alternative 1 – Construction of a new, three-lane roadway on fill material extending from the power plant northward to Money Island Road.
- Alternative 2 – Construction of a new, three-lane, elevated causeway extending from the power plant northward to Money Island Road.
- Alternative 3 – Widening the existing Alloway Creek Neck Road by constructing two parallel lanes for inbound traffic on fill material. The existing three-lane section would be converted to outbound traffic only.

Alternatives 1 and 2 occupy the same proposed footprint and extend from the PSEG Site north to Money Island Road. However, Alternative 1 would be constructed on fill while Alternative 2 would be constructed on structure that traverses coastal wetlands areas. Alternatives 1 and 2 are identical in their location and area of ground disturbance within the uplands along Money Island Road and are collectively referred to in this report as the Money Island Road Access Alternative (MIRAA). Alternative 3 would consist of an upgrade to the existing Alloway Creek Neck Road by constructing additional lanes along the same alignment from the power plant to Hancocks Bridge. In the context of this report, this alternative is referred to as the Alloway Creek Neck Road Access Alternative (ACNRAA).

This Phase I archaeological survey was carried out to identify archaeological sites that may be located within the project area. The study included background research, fieldwork, and analysis that follows the guidelines for Phase I archaeological survey and reporting as outlined by the New Jersey Historic Preservation Office (HPO). A description of the environmental resources, cultural background, previously identified cultural resources within a 1.2-mile (2-kilometer [km]) radius of the project area, methodology, results, and recommendations are included in this report.

MACTEC Engineering & Consulting, Inc. (MACTEC) performed this Phase I archaeological survey under contract with Sargent & Lundy, LLC. Sargent & Lundy has been retained by PSEG, which owns and operates the existing Salem and Hope Creek generating stations, to perform engineering and environmental studies related to the ESP application. Artifacts collected and records generated during this study remain the property of PSEG, and will be curated at the New Jersey State Museum upon the termination of this cultural resources project.

THE PSEG SITE

The location for the construction and operation of the new plant is north of the Hope Creek Generating Station on the northwestern portion of PSEG's property. Location of the centerpoint of the new plant in

New Jersey State Plane Feet has been calculated as follows based upon a composite drawing of the four reactor technologies considered in this ESP:

234753.989 N
198529.294 W

The PSEG Site is located on the east bank of the Delaware River in the southwest portion of Salem County, in southern New Jersey. The site is 15 miles (24.1 km) south of the Delaware Memorial Bridge, 18 miles (29 km) south of Wilmington, Delaware, 30 miles (48.3 km) southwest of Philadelphia, Pennsylvania, and 7.5 miles (12.1 km) southwest of Salem, New Jersey. The municipalities of Salem and Pennsville (about 12 miles [19.3 km] north of the site) are the nearest sizable municipalities in New Jersey. Middletown (about 10 miles [16.1 km] due west of the site) and New Castle (about 13 miles [20.9 km] north of the site) are the nearest sizable municipalities in Delaware. The river area adjacent to the site is a transition zone between the Delaware Bay (to the south of the site) and the Delaware River (to the north of the site). This transition zone extends from Marcus Hook, Pennsylvania, downriver to Artificial Island.

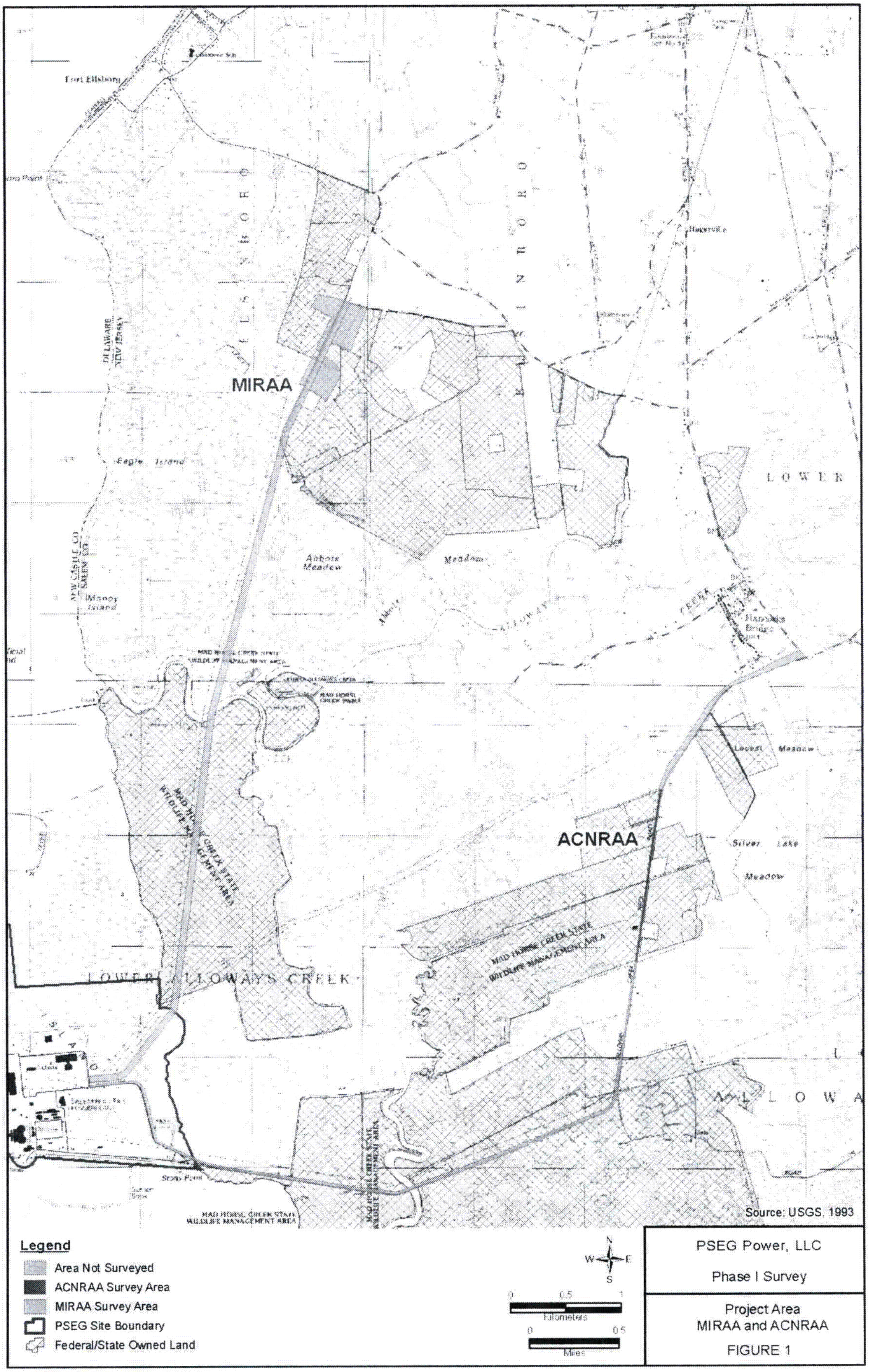
AREA OF POTENTIAL EFFECT FOR THE CURRENT ARCHAEOLOGICAL SURVEY

The project area for this project consists of two non-contiguous areas that are being evaluated as alternatives for access road development (Figure 1). One alternative (MIRAA) consists of a new 200 feet (61 meters) wide access road right of way that extends from the eastern edge of Artificial Island to the intersection of Mason Point Road and Money Island Road. This alternative also conceptually has included parking areas (Figure 2). The total length of the MIRAA would be approximately 4.8 miles (7.7 km).

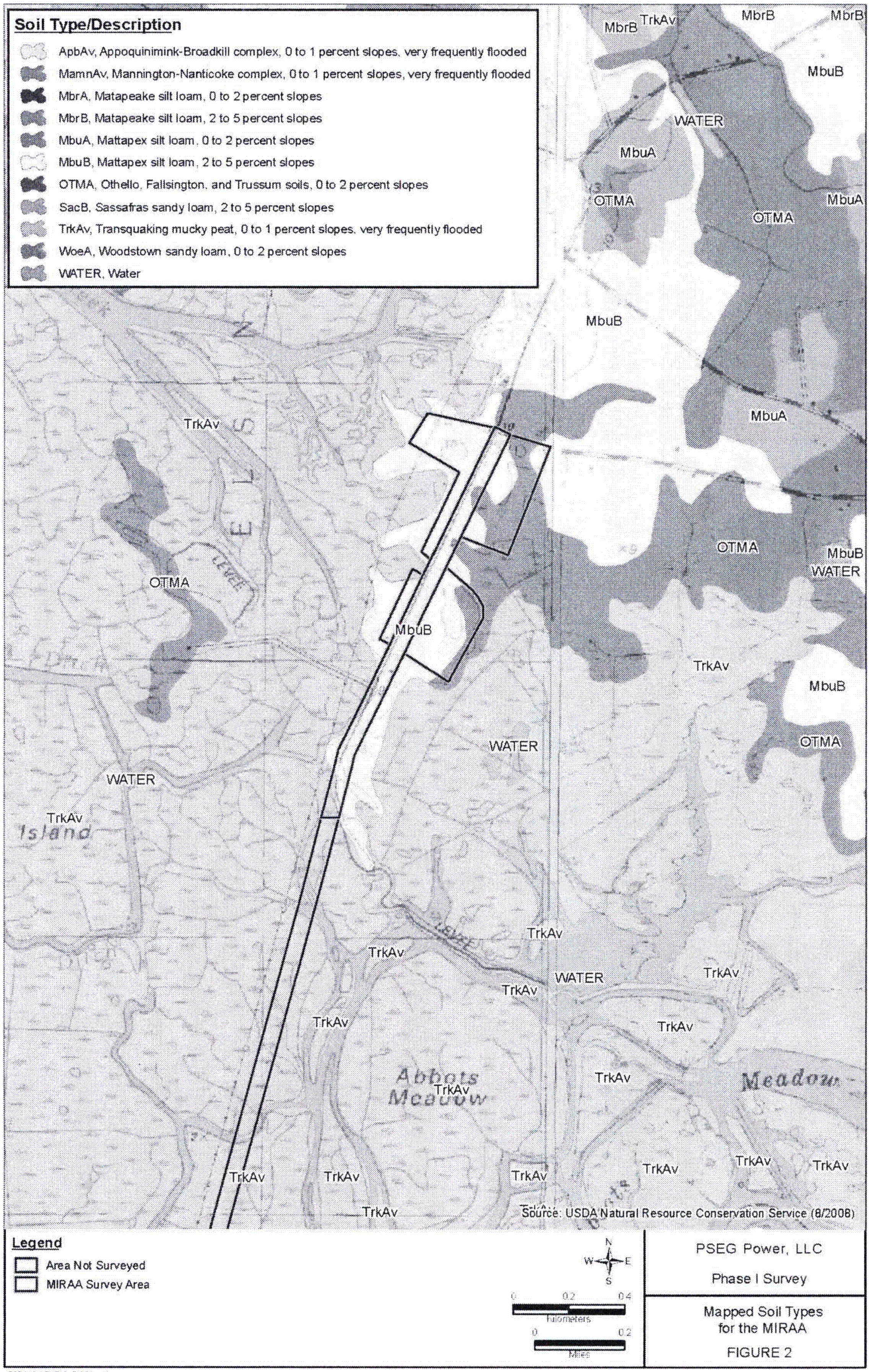
A second alternative being considered entails the widening of the existing access road from Hancocks Bridge to the PSEG Site (ACNRAA). The right of way for this alternative (Figure 3) extends from the west or north edge of pavement for 75 feet (23 meters), and is 6.2 miles (10 km) in length. One section of the road includes realignment, along a curve in the northern part of the project area.

The project area of both access alternatives can be divided into subsections based on their potential for intact subsurface cultural resources: Artificial Island, saltwater marsh, and uplands. Areas of the project area within Artificial Island consist of hydraulic fill (see below) with no potential for intact cultural resources, and are excluded from the survey. Similarly, areas of the project area that lie within tidal marsh or freshwater wetlands lack potential for cultural deposits because wetland soils generally do not contain intact cultural deposits. However, these areas have an unknown potential for deeply buried (>19 inches [50 centimeters (cm)]) Holocene upland soils, which could contain cultural resources. These saltwater marsh areas are excluded from the current Phase I survey but may require further analysis. Further consultation regarding these saltwater marsh areas should be conducted with the New Jersey Department of Environmental Protection (NJDEP) Historic Preservation Office (HPO) to determine the need for additional study of these areas. The upland portions of the project area (those within areas mapped as having upland soils, which are higher than the elevation of the maximum high tide) have potential for intact buried cultural resources that could be identified using pedestrian survey and/or shovel tests.

During the current study, only those areas owned by PSEG or by the State of New Jersey are examined. Privately owned land within the two project area sections may be examined in the future as dictated by project needs and consultation with NJDEP.. These areas are located primarily on the ACRNAA and consist of farmland and residential tracts. In sum, the area examined here consists of that part of the project area of both access alternatives that have upland soils and are within lands owned by PSEG or that are state owned (see Figure 1).

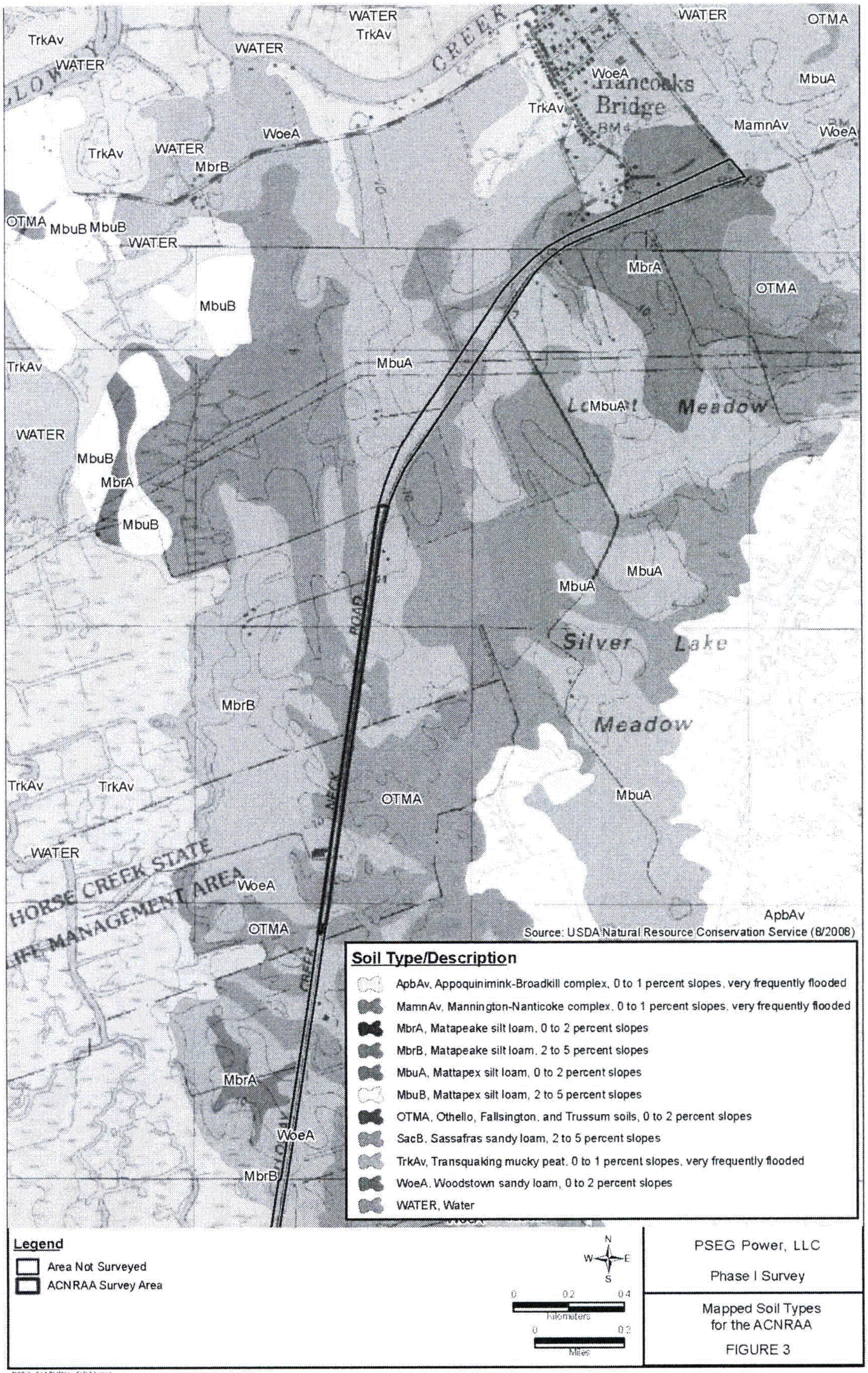


PSEG_CULTURAL_FIG01.mxd



Mapped Soil Types
for the MIRAA
FIGURE 2

PSEG_CULTURAL_FIG02.mxd


Source: USDA Natural Resource Conservation Service (8/2008)
Soil Type/Description
ApbAv, Appoquinimink-Broadkill complex, 0 to 1 percent slopes, very frequently flooded
MamnAv, Mannington-Nanticoke complex, 0 to 1 percent slopes, very frequently flooded
MbrA, Matapeake silt loam, 0 to 2 percent slopes
MbrB, Matapeake silt loam, 2 to 5 percent slopes
MbuA, Mattapex silt loam, 0 to 2 percent slopes
MbuB, Mattapex silt loam, 2 to 5 percent slopes
OTMA, Othello, Fallsington, and Trussum soils, 0 to 2 percent slopes
SacB, Sassafras sandy loam, 2 to 5 percent slopes
TrkAv, Transquaking mucky peat, 0 to 1 percent slopes, very frequently flooded
WoeA, Woodstown sandy loam, 0 to 2 percent slopes
WATER, Water
Legend
Area Not Surveyed
ACNRAA Survey Area
Kilometers
Miles
PSEG Power, LLC
Phase I Survey
Mapped Soil Types for the ACNRAA
FIGURE 3
Hancocks Bridge
Silver Lake Meadow
HORSE CREEK STATE WILDLIFE MANAGEMENT AREA
PSEG_CULTURAL_FIG03.mxd

LEGAL BASIS OF STUDY

The NRC is the lead federal agency for the project. The Code of Federal Regulations (CFR) Part 10, Chapter 51, *Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions*, requires NRC compliance with the National Environmental Protection Act of 1966 (NEPA) in licensing and operating nuclear facilities. The NRC has determined that an Environmental Impact Statement (EIS) is required for the new plant ESP, in accordance with the NEPA. The EIS will include consideration of the likely effects of the project construction and operation on historic properties.

Because the project constitutes a federal undertaking with potential for effects to historic properties, it is also subject to Section 106 of the National Historic Preservation Act (NHPA), as amended, and its implementing regulations at 36 CFR Part 800, Section 106, which require that historic properties within the project area be identified. It is also required that the eligibility of each identified cultural resource be evaluated for the National Register of Historic Places (NRHP), and that potential effects to eligible cultural resources be evaluated. Further, if it is found that the project would cause adverse effects to historic properties, then measures to avoid, minimize, or mitigate the effects must be considered. The Section 106 review process satisfies the NEPA requirement that the agency consider the project's likely effects on historic properties.

The purpose of the current Phase I archaeological survey is to identify historic properties within the project area. Historic properties are defined by Section 106 (36 CFR Part 800.16) as "any prehistoric or historic district, site, building, structure or object included in, or eligible for inclusion in, the NRHP maintained by the Secretary of the Interior." As further specified by this part of Section 106, the term "eligible for inclusion in the NRHP" includes properties that have been formally determined to be eligible as well as all other properties that meet eligibility criteria.

Eligibility for the NRHP is based on the concept of significance. This concept is defined, and the eligibility criteria are explained, in 36 CFR 60.4 as follows:

> "The quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and
>
> (a) that are associated with events that have made a significant contribution to the broad patterns of our history; or
>
> (b) that are associated with the lives of persons significant in our past; or
>
> (c) that embody the distinctive 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; or
>
> (d) that have yielded, or may be likely to yield, information important in prehistory or history. "

Colloquially, the more inclusive term "cultural resources" denotes prehistoric and historic sites, buildings, structures, and objects, regardless of whether they are eligible for inclusion in the NRHP.

2. BACKGROUND

ENVIRONMENTAL SETTING

Physiography, Geomorphology, Hydrology

Four physiographic provinces are recognized within New Jersey, and these are arrayed in wide corridors aligned on a southwest-northeast axis. From northwest to southeast, these are: Valley and Ridge, Highlands, Piedmont, and Coastal Plain (Dalton, 2003). The first three are grouped as part of a higher order physiographic unit, the Appalachian Plateau. They are underlain by thick bedrock units that were formed during major tectonic events from the Precambrian to the Triassic periods. The rocks in these provinces are volcanic and metamorphic in origin.

The project area lies within the fourth of New Jersey's provinces, the Coastal Plain Province. The Coastal Plain extends 2200 miles (3541 km) along the Atlantic coast of North America from Cape Cod to the Mexican border, and continues another 1000 miles (1600 km) in Mexico (Dalton, 2003). The section of the Coastal Plain within the United States is termed the Atlantic Coastal Plain Province, and it is subdivided into several smaller geomorphic units called sections. Southern New Jersey (totaling 4667 square miles [12,087 square km]) lies within the Embayed Section of the Coastal Plain province, which includes drowned river mouths and a series of coastal terraces paralleling the shoreline (Dalton, 2003). The Coastal Plain is underlain by sediments deposited in coastal, alluvial, glacial, and periglacial contexts during the Upper and Lower Cretaceous, Miocene, Pliocene, Pleistocene, and Holocene. The study corridor lies within the New Jersey Coastal Plain.

The surficial geology in southern New Jersey consists of alternating series of unconsolidated sand, gravel, clay, and glauconite clay formations dating to the Cretaceous, Tertiary, and Quaternary. Recent surface deposits have accumulated over these formations in some areas, in thickness on the order of 10 – 100 feet (3 – 30 meters) (Stanford and Sugarman, 2006). These unconsolidated sands, gravels, clays, and recent surface deposits overlie Late Proterozoic and Early Paleozoic schist, gneiss, pegmatites, diorite, and amphibolite (Stanford and Sugarman, 2006; U.S. Fish and Wildlife Service [USFWS], 1997). These deposits tilt downward toward the southeast, and the exposed surficial deposits increase in age toward the southeast.

No cherts or other cryptocrystalline siliceous rocks that could have been used by prehistoric stone workers occur within the Coastal Plain sediments. Chert is found in northern New Jersey (Kraft, 1972), along with coarse-grained siliceous rocks such as basalt and diabase. Because northern New Jersey (defined as that part of the state north of a line connecting Trenton to Raritan Bay; Kraft and Mounier, 1982:56) was glaciated during the Wisconsin glaciation, glacial till deposits containing siliceous cryptocrystalline rocks can be found in the central and northern parts of the state. However, the Coastal Plain is a source of several resources that have been mined historically: glass sand, bog iron, foundry sand, ceramic and brick clay, glauconite (for use in fertilizer), and titanium from the mineral limonite (NJDEP, 1997).

The Coastal Plain is subdivided into two subregions, the Inner Coastal Plain and the Outer Coastal Plain, which are separated by a series of low hills capped by erosion-resistant sandstones and gravels, called cuestas. The Inner Coastal Plain runs from west to east through the northern parts of Salem, Gloucester, Camden, Burlington, and Monmouth counties; and the southern parts of Mercer and Middlesex counties. The Outer Coastal Plain, which covers a much larger area, extends from the Inner/Outer Coastal Plain boundary to the Atlantic Ocean and includes parts of Salem, Gloucester, Camden, Burlington, and Monmouth counties, and all of Cumberland, Cape May, Atlantic, and Ocean counties. The project is on the western edge of the Outer Coastal Plain.

The two subregions have similar lithology, but differ in topography, hydrology, soils, and vegetation. Unlike the Inner Coastal, the Outer Coastal Plain has sandy, excessively drained soils that do not support agricultural crops (USFWS, 1997). Most of the Outer Coastal Plain consists of the Pine Barrens, a dry, heavily forested area with many fragile wetland ecosystems. Soils in the Pine Barrens are sandy or gravelly and acidic, making them poorly suited to agriculture. Although it is diverse biologically, the Outer Coastal Plain historically has not supported a large human population and has remained relatively undeveloped. The cuestas form a drainage divide, and rivers in the Inner Coastal Plain drain to the north and east, while those in the Outer Coastal Plain drain south into the Atlantic Ocean and west into the Delaware Bay.

A commission was selected in 1905 by the legislatures of Delaware and New Jersey to define a line separating Delaware Bay from the Delaware River. The following year, a stone monument was placed on each side of the river at the selected locations. An imaginary straight line connecting the two monuments defines the mouth of the Delaware River and the beginning of Delaware Bay. The Delaware monument was placed northwest of Liston Point, and the New Jersey monument was placed at the mouth of Hope Creek (http://www.lighthousefriends.com/light.asp?ID=464). Thus, the project area lies in the vicinity of the River-Bay junction, at least as it was artificially defined in 1906. In reality, the zone of tidal influence extends several miles further north.

Low lying areas along the shores of Delaware Bay (and the Atlantic Ocean) have developed extensive areas of salt marsh and tidal mudflats. Salt marsh occupies a roughly 4 miles (6.4 km) wide strip of land County paralleling the shore of Delaware Bay (NRCS, 2004), extending from the vicinity of Fort Mott (11 miles [18 km]) north of the Salem nuclear plant), south along the Delaware Bay shore through the Cape May and along the Atlantic coast.

The salt marshes of Delaware Bay, and the bay itself, developed as a result of gradual sea level rise beginning in the early Holocene (ca. 12,000 years before present [BP]). In the Pleistocene, areas now underwater in Delaware Bay were dry land. This land was drained by the ancestral Delaware River, which originated from glacial meltwater emanating from the edge of the Laurentide Ice Sheet. During the Holocene (ca. 11,500 BP to present), global ice sheets melted and the sea level rose. This relatively flat, level land was gradually inundated, transforming dry land into freshwater marsh, then saltwater marsh and, in some areas, drowning the land within the bay. Areas near the river mouth underwent these changes first, with the inundated area (and tidal marshes) migrating northward over a period of 7,000 years or more (Fletcher et al. 1990). It is estimated that salt marsh first developed in the project area vicinity between ca. 1,000 and 3,000 years BP, based on a model of Delaware Bay evolution (Fletcher et al., 1990).

This process would have resulted in the continuous deposition of freshwater wetland soils, salt marsh soils, and (in cases) estuarine sediments on top of upland soils. Hence, it is expected that intact upland soils lie buried at depth below marsh soils. Although this process was initially thought to be continuous (Kraft, 1974), recent research has established that the past 12,000 years of Delaware Bay history was marked by a series of minor marine transgressions and regressions, caused by interactions between sedimentation, geomorphology, isostatic rebound, and the rate of freshwater discharge (Leori et al., 2006). An 820 foot (249.9 meter) deep corehole drilled at Fort Mott in 2001 consisted primarily of unconsolidated Cretaceous sediments, which were capped uncomformably by the late Pleistocene/Holocene Cape May Formation. The Cape May Formation consists of a complex series of channel gravels, cross-bedded to laminated sands, sandy silts, and burrowed clays, which are characteristic of estuarine deposits. These deposits were found at depths ranging from 1.5 feet (0.46 meters) to 27.7 feet (8.44 meters) and probably date to the Middle to Late Pleistocene and the Holocene. The possibility of buried paleosols within the Cape May Formation was not addressed in the study.

Given the proximity of the project area to Fort Mott, and the similarity in environmental context, it is possible that upland soils developed during the Holocene in areas now covered by salt marsh within the project area. As no detailed geomorphological study has been carried out in the project area, the existence of such soils has not been demonstrated and their depth, if they exist, is unknown. If such soils do exist within the project area vicinity, then they have the potential to contain preserved cultural resources 1000 years old or older.

During a geotechnical study to support the construction of the existing access road (Thor Engineers, 1982), 35 soil borings were taken along Alloway Creek Neck Road. Most of the borings were taken to depths of 22 – 37 feet (6.7 – 11.3 meters) below ground surface. The sediments consisted mainly of 7.5 – 21 feet (2.3 – 6.4 meters) of very soft black and brown well-rotted peat and grey organic silt, with an average thickness of 15 feet (4.6 meters), over loose to very dense interbedded sands, silts, and sandy clays. Interpretation was limited to the engineering properties of the sediments, but the description suggests that deposits at these depths are dominated by buried wetlands soils. These may overlie or be interbedded with estuarine channel deposits. In the area of Artificial Island, these deposits were capped by interbedded mixtures of sand, silt, clay and organic soils, representing the hydraulic fill that was emplaced in the early twentieth century.

Artificial Island was constructed between 1907 and 1956 of hydraulic fill (dredge spoils). The original construction used an artificial reef constructed of fill and resulted in an elongated island parallel to the shoreline. Later, additional hydraulic fill was placed in the shallow water between the island and shore, connecting the island to the mainland. Most of this artificial landform is within New Jersey, but its northern tip falls within Delaware because the Delaware/New Jersey state boundary crosses the river channel at that latitude. The Salem and Hope Creek generating stations and the proposed access road alternatives are entirely within New Jersey.

The Delaware River is the longest undammed river east of the Mississippi. It begins at the confluence of the East Branch Delaware River and West Branch Delaware River in the northern end of the Appalachian Highlands near Hancock, New York and flows 330 miles (531 km) to the mouth of Delaware Bay. New Jersey's southern counties bordering Delaware Bay are drained by several small tributary streams, all less than 15 miles (24 km) in length. These include Alloway Creek, which would be crossed by the MIRAA, and the Salem River, which flows through Salem, New Jersey. These tributaries are slow moving and are tidally influenced. The salt marsh is also drained by a complex network of smaller streams of varying widths, with "sharply defined banks" (Sebold, 1992:15). These allow daily tidal flooding and draining.

Scattered reclamation efforts were begun in the salt marsh in this region by Dutch and English settlers in the late seventeenth century. By 1789, the value of reclaimed marsh was recognized by Jedidiah Morse in his *American Universal Geography* (Sebold, 1992), and the number of reclamation projects in the area was increasing. Prior to 1900, reclaimed land was mainly used for raising grain, but in the twentieth century, truck farming grew and replaced grain as the most economically important land use. Reclamation consisted of the construction of berms or dikes to keep out the tide with sluices to allow flooding, and ditches to drain the marsh. Once this work was completed, the land was allowed to "mellow" for a number of years before it was suitable for growing crops. Much reclaimed land was allowed to return to its natural state during the depression of the late nineteenth century and the Great Depression of the 1930s, during which time farmers could no longer afford the expense of maintaining the berms, ditches, and sluices. More information on this practice is provided below in the Cultural Background section.

Soils Mapped for the MIRAA

The project area crosses four classified soil types (http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx). Soil within the plant boundary is classified as Urban Land, which is described as "Surface covered by pavement, concrete, buildings, and other structures underlain by disturbed and natural soil material." Because the soil map shows this soil within Artificial Island, it can be inferred that the underlying material consists of hydraulic fill.

Outside the PSEG Site boundary but within Artificial Island, the proposed MIRAA crosses a soil classified as Udorthents, dredged fine material (see Figure 2). This soil type is described as "fine-loamy dredge spoils" and "loamy material transported by human activity." It occurs on slopes ranging from 0 to 8 percent, has a depth to water table of more than 80 inches (203 cm), and has a high available water capacity. The typical soil profile consists of 0 – 12 inches (0 – 30.5 cm) of loam underlain by clay at 12 to 72 inches (30.5 to 182.9 cm) below surface. Because it is artificially deposited material (hydraulic fill), this soil has no potential to contain intact subsurface archaeological resources.

An area containing Udorthents extends north from the plant boundary to Alloway Creek, for a total distance of approximately 11,023 feet (3,360 meters). However, it is clear from the map of soil types that Udorthents cover some of the areas that were natural land (salt marsh) prior to the construction of Artificial Island. The estimated former shoreline closely parallels the eastern bank of the north-flowing drainage dividing Artificial Island from the mainland. When superimposed on the map of soil types, the estimated pre-1907 shoreline intersects the area mapped as Udorthents. It seems likely that, in this area, a bed or lense of hydraulic fill is superimposed on natural soils, but we have no information about the thickness of the fill. The MIRAA corridor crosses this estimated boundary at a point south of the southern terminus of the drainage on Artificial Island. Thus it appears that approximately 8956 feet (2730 meters) of the length of the project corridor crosses an area where hydraulic fill has capped salt marsh soils.

North of Alloway Creek, a natural soil, Transquaking mucky peat (0 – 1 percent slopes, frequently flooded) is found at the surface. This poorly drained soil occurs within tidal marshes and develops on herbaceous organic material over loamy substrate. The distance to groundwater is typically 0 inches. Flooding is very frequent, ponding is frequent, and it is slightly to strongly saline. It is anticipated that this soil has a very low probability for historic or prehistoric cultural resources because areas with such soil are not inhabitable. It is also possible that upland soils that developed 3000 years ago or earlier lie buried beneath the Transquaking mucky peat. Approximately 7874 feet (2400 meters) of the MIRAA corridor lies in this area.

The northern end of the MIRAA corridor crosses an area with Mattapex silt loam, 2 – 5 percent slopes. This is a moderately well-drained upland soil free of flooding and ponding, in which the depth to water table is from 18 – 42 inches (45 to 107 cm). It develops within a substrate of "silty eolian deposits over coarser fluviomarine deposits" (http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx). The typical soil profile contains three horizons of silt loam from 0 to 52 inches (0 – 132 cm), overlying a stratified loamy sand to fine loamy sand at 52 – 56 inches (132 – 142 cm) below surface. This lies over a stratified sand to loamy sand at 56 – 72 inches (142 – 183 cm). We anticipate moderate to high probability for intact buried cultural resources within the upper horizon of this soil type. Approximately 4822 feet (1470 meters) of the MIRAA corridor (19.3 percent) is within this area.

On a plan map of the MIRAA area, Mattapex silt loam is shaped as a thin finger of soil extending southward toward the edges of the MIRAA corridor. This finger of soil extends into areas on either side of the MIRAA corridor which are mapped as Transquaking mucky peat (0 – 1 percent slopes, frequently flooded). Thus, the outer parts of the MIRAA right of way in this northern end of study corridor may extend into areas with wetland soils, and may not be amenable to shovel testing.

Soils Mapped For The ACNRAA

The area containing Matapeake component is located approximately 1,640 feet (500 meters) southwest of Hancocks Bridge (see Figure 3). Slopes are 0 – 2 percent. This component is a well-drained soil found on ridges, flats, and terraces on coastal plains. The parent material consists of silty eolian deposits over marine deposits and/or coarse fluviomarine deposits. There is no zone of water saturation within a depth of 72 inches (182.8 cm). Organic matter content in the surface horizon is about 2 percent. This soil does not meet hydric criteria.

The Mattax component is located in multiple areas of the project area southwest of Hancocks Bridge. Slopes are 0 – 2 percent. This component is moderately well-drained and located on flats, terraces on coastal plains, and ridges. The parent material consists of silty eolian deposits over coarser fluviomarine deposits. Seasonal organic matter content in the surface horizon is about 2 percent. This soil does not meet hydric criteria.

The area containing the Woodstown component is located approximately 1.6-mile (2.6-km) southwest of Hancocks Bridge. Slopes are 0 – 2 percent. This component is moderately well-drained and located on drainageways and flats on coastal plains. The parent material consists of old alluvium and/or sandy marine deposits. Organic matter content in the surface horizon is about 2 percent. This soil does not meet hydric criteria.

There are multiple areas containing Othello, Fallsington, and Trussum (OTMA) soils within the project area. These soils are made up of three distinct soil components, as described below. This soil is poorly drained and inundated for a substantial portion of the year.

The Othello component makes up 45 percent of the map unit. Slopes are 0 – 2 percent. This component is poorly drained and found on depressions on coastal plains. The parent material consists of silty eolian deposits over fluviomarine deposits. A seasonal zone of water saturation is at 6 inches (15.2 cm) during January, February, March, and April. Organic matter content in the surface horizon is about 85 percent. This soil meets hydric criteria.

The Fallsington component makes up 35 percent of the map unit. Slopes are 0 – 2 percent. This component is poorly drained and found on depressions on coastal plains. The parent material consists of loamy fluviomarine deposits. Seasonal zone of water saturation is at 6 inches (15.2 cm) during January, February, March, and April. Organic matter content in the surface horizon is about 85 percent. This soil meets hydric criteria.

The Trussum component makes up 20 percent of the map unit. Slopes are 0 – 1 percent. This component is poorly drained and found on depressions on coastal plains. The parent material consists of clayey marine deposits. A seasonal zone of water saturation is at 6 inches (15.2 cm). during January, February, March, and April. Organic matter content in the surface horizon is about 2 percent. This soil meets hydric criteria.

Elevations in Salem County's salt marshes do not exceed 10 feet (3 meters) above mean sea level (amsl). East of the 4-mile (6.4-km) wide strip of land containing salt marsh, the land gradually rises with maximum elevations in the county of 160 feet (48.8) (NRCS, 2004). On Artificial Island, the elevations of the project area are approximately 14 – 15 feet (4.3-4.6 meters) amsl. Elevations in the salt marsh area do not exceed 10 feet (3 meters) amsl. In the upland regions of the project area for each corridor, there is a slight rise, with elevations slightly higher than 10 feet (3 meters) amsl. Overall, the land is very flat with very little relief. The study area topography is characteristic of the New Jersey part of the Delaware Bay area.

Modern Climate

Climate data were obtained from the *Soil Survey of Salem County, New Jersey* (NRCS, 2004), and were collected between 1961 and 1990 at Woodstown. The area's climate is strongly influenced by ocean air and water currents. As a result, summers are cooler and winters warmer than more inland areas of the mid-Atlantic region. The average annual temperature for that period is 54.4 degrees Fahrenheit (°F). Average daily temperatures by month range from 31.2°F in January to 76.2°F in July. In half the years, the last freezing temperature in spring occurred after April 20, and in half the years, the first freezing temperature in fall occurred before October 20. An average year has a growing season (days with temperatures above the freezing point) lasting 183 days. The average annual precipitation is 44 inches

(111.8 cm). This is distributed fairly evenly throughout the year, although it is slightly heavier in July/August and lighter in February than in other months. This includes an average annual snowfall of 19.2 inches (48.8 cm). The heaviest single-day snowfall during the period was 17 inches (43.2 cm) on February 19, 1979. Prevailing winds from October – April are from the northwest and from the south for the period of May through September.

Modern Flora and Fauna. Salt marsh environments have high biodiversity and high biomass, which is undoubtedly one reason why the New Jersey shore of the Delaware Bay has a relatively high density of prehistoric archaeological sites.

The salt marshes in New Jersey are renowned as one of the most important stopping points for large flocks of migratory waterfowl, with an estimated total bird population of 800,000 – 1.5 million annually, including up to 200,000 snow Geese (http://www.manomet.org/WHSRN/viewsite-new.php?id=6). The largest spawning of horseshoe crabs in North America occurs in Delaware Bay, and horseshoe crab eggs provide a major food source for shorebirds such as the redknot. In 1986, the Delaware Bay became the first named Site of Hemispheric Importance listed by the Western Hemisphere Shorebird Reserve Network, an international conservation organization dedicated to preserving shorebird habitat (http://www.whsrn.org/network/site-list.html). To be listed as a Site of Hemispheric Importance, a wetland must host at least 500,000 shorebirds annually and constitute at least 30 percent of the biogeographic population for a species. The listed Delaware Bay wetlands occupy 129 miles (80 km) of shoreline, from the Cohansey River to Cape May Point, New Jersey, and from Woodland Beach to Cape Henlopen, Delaware (*Ibid*). The open bay supports a large number of fish. Mammals inhabiting the salt marshes include raccoon, muskrat, squirrels, coyote, and deer.

Topography

The topography of the area is primarily marsh. Salt marsh is a wetland environment that develops on very low-lying, frequently flooded land along estuaries, where salt tolerant reeds and grasses thrive. Salt marshes are home to many species of fish, reptiles, amphibians, crustaceans, gastropods, mollusks, birds, and some mammals. Part of the study corridor is within an isolated section of Mad Horse Creek State Wildlife Management Area (WMA). The WMA is, in turn, part of the Delaware Bay wetlands, which are listed on the List of Wetlands of International Importance maintained by the Ramsar Convention (known as the "Ramsar List").

Vegetation in the salt marshes of New Jersey has been dominated, historically, by salt hay grass (*Spartina patens*). This grass was an important historic resource in colonial times, and was harvested for use as mulch, animal fodder and bedding, packing material for the glass industry, and as cover for hay stacks in fields (Sebold, 1992, www.edc.uri.edu/restoration/html/gallery/planst/salt.htm). In recent years, salt hay grass range has shrunk, and salt hay grass has been replaced by *Phragmites australis*, the common reed, which has no economic importance. Uplands support oaks, sweet gum, and sassafras.

Paleoenvironment. The arrival of humans in North America co-occurred with a series of dramatic global climatic changes. These heralded the end of a long glacial stage, referred to in North America as the Wisconsin (110,000 – 15,000 BP). This stage was marked by lower global temperatures, longer and harsher winters, and shorter summers than today. The coolest global temperatures and most southward ice advances occurred during the Last Glacial Maximum (LGM) at approximately 20,000 – 18,000 BP. During the end of the Wisconsin, a series of global warming and cooling episodes occurred, referred to as the Late Glacial (15,000 – 10,000 BP). The Late Glacial began with a brief warming episode, followed by an abrupt, severe cold episode referred to as the Younger Dryas (12,800 – 11,500 BP). This was followed by a second warming episode that signaled the onset of a sustained warm period — the Holocene (11,500 BP – present). It is not known exactly when people arrived in the Americas, but mounting evidence suggests it preceded the Younger Dryas by at least 1000 years.

During the LGM, when global ice attained its greatest volume and sea levels their lowest elevation of the past 120,000 years, the Laurentide ice sheet covered all of present-day Canada. At its maximum extent, this ice sheet penetrated into northern New Jersey and along Long Island. Periglacial conditions, with permafrost and little vegetation, would have prevailed along the south edge of the ice (Heusser et al., 2002). Further south was tundra and taiga. What is now the Delaware Bay would have been, at that time, a low-lying area drained by a river that was most likely a braided stream fed primarily by glacial meltwater and surrounded by sparse vegetation. Where there is now salt marsh there may have been tundra, taiga, or grassland.

The LGM sea levels in this region were approximately 351 – 400 feet (107 – 122 meters) lower than today (USFWS, 1997) and coastlines were close to the continental shelf break. New Jersey's continental shelf break lies approximately 96 miles (154 km) offshore. After the LGM, the melting of global ice due to global warming raised sea levels, which attained their modern levels by approximately 5000 BP in many areas of the world. Hence, large areas that were formerly dry land, and probably inhabited by prehistoric humans, are now underwater off the coast of the Atlantic states, and at the bottom of the Delaware Bay.

As the earth warmed, the glaciers retreated. Vegetation took over on the recently uncovered terrain, and vegetation zones migrated northward. By the beginning of the Holocene, the study corridor would most likely have supported a mixed meophytic forest with conifers and deciduous trees and a diverse understory.

The early Holocene (approximately 11,500 – 8,000 BP), while warmer than the preceding glacial period, remained relatively cool when compared to modern conditions (Delcourt and Delcourt, 1981). Although deciduous tree species had begun the transition to more northward latitudes, they remained primarily at lower elevations. In regions of higher altitudes on the Allegheny Plateau, conditions more closely reflected those of the current Canadian boreal forests, and similar varieties of species dominated (Maxwell and Davis, 1972), such as spruce, fir, and alder. At Gallipolis Lock and Dam, approximately 6.2 miles (10 km) downstream of the mound of the Kanawha River on the Ohio River, a pollen zone was identified that was characterized by high percentages of ash (*Fraxinus* undiff.) and smaller percentages of elm (*Ulmus*), oak (*Quercus*), hickory (*Carya*), sycamore (*Platanus occidentalis*), and poplar or cottonwood (*Populus*). This pollen zone was dated by radiocarbon to between 8800 and 10,000 BP (Fredlund, 1987).

Climatic warming and drying during the middle Holocene (8000 to 4000 BP) appear to have contributed to an advance of prairie vegetation eastward in the Interior Low Plateaus (Wright, 1968). The maximum of these conditions occurred at approximately 7000 BP (Wright, 1968; Maxwell and Davis, 1972:108), and was followed by a slight, gradual cooling and increase in precipitation.

Moderate fluctuations in local climate and precipitation levels characterized most of the Late Holocene. From 4000 BP through approximately 2800 BP, warming trends and increases in precipitation continued (Delcourt, 1979; Maxwell and Davis, 1972; Baerreis et al., 1976). Evidence from Chesapeake Bay sediments indicates a pattern of climatic variation in the past 600 years that shows decade- and century-scale variations in rainfall (Cronin et al., 2000). During that period, 14 major wet periods and 14 "megadroughts" (severe sustained dry periods) occurred. Megadroughts during the middle to late sixteenth century and early seventeenth century were more severe than those in the twentieth century, and may have adversely affected early European colonization efforts along the Atlantic seaboard.

Cultural Background of the Study Corridor Vicinity

The background study included sources for information about, and summaries of, the prehistoric and historic periods in southern New Jersey. However, because there is little large-scale development in this part of the state, apart from the Atlantic City Expressway, the New Jersey Turnpike, the Salem and Hope

Creek generating stations, and several transmission lines, relatively few cultural resource studies have been carried out. A larger body of literature exists for the surrounding region, including the Delaware Bay and the Delmarva Peninsula (the peninsula shared by Delaware, Maryland, and Virginia). The results of the background study presented here draws on this larger body of literature while attempting to relate the information to the study area. In addition, the prehistory of Salem County, New Jersey is part of the prehistory of this larger area.

Current Land Use. The *Soil Survey of Salem County, New Jersey* (NRCS, 2004:1-2) provides the data on land use in the county (Table 1):

Table 1 Land Use Types in Salem County

Land Use Type	Percent of area
Agriculture	42
Wetland	25
Forested	17
Urbanized	9
Barren Land	7
	Prepared By/Date: JEB/6-19-09 *Checked By/Date: PHG/6-19-09*

Modern land use along both access road corridors falls into three categories, which correspond to major soil associations. The end of the MIRAA corridor is urbanized, being within the area of the PSEG Site. The middle section of that corridor is wetland. About half of this is part of the Mad Horse Creek State WMA, and about half is privately owned, some of which is bordered by the Abbotts Meadow State WMA. The wetland section has no development. The upland portion of the project area traverses agricultural land.

Prehistoric Background (13,500 – 500 BP). North America was first populated by humans at least 13,500 years ago, and perhaps several thousand years earlier. No stratified archaeological sites dating to that earliest period have been found in southern New Jersey. Although rare in general, these sites may exist in this area. The period of time before history (when a written record begins) in eastern North America is divided, at the most general level, into three main periods: Paleoindian, Archaic, and Woodland. The Archaic and Woodland periods are, in turn, divided into early, middle, and late sub-periods. The chronology of the Archaeological Society of New Jersey is presented in Table 2.

Table 2. General Cultural Chronology of New Jersey Prehistory

Period	BP Age (Calendar Years)	Dates – BC/AD (Calendar Years)
Paleoindian	14,800 – 10,000	12,800 – 8000 BC
Archaic		
Early	10,000 – 8500	8000 – 6500 BC
Middle	8500 – 6000	6500 – 4000 BC
Late	6000 – 3000	4000 – 1000 BC
Woodland		
Early	3250 – 2500	1250 – 500 BC
Middle	2000 – 1100	AD 1 – AD 900
Late	1000 – 400	AD 1000 – 1600
		Prepared By/Date: JEB/6-19-09 *Checked By/Date: PHG/6-19-09*

Paleoindian Period (14,800 – 10,000 BP). The earliest recognized Paleoindian diagnostic tool is the Clovis fluted point. The Clovis fluted point is a thin lanceolate hafted biface or knife with nearly parallel sides, usually made on a large blade which has been thinned by skilled flaking. This includes removal of one or more long, thin "channel flakes" from the base, forming the characteristic "flute." These artifacts have margins that expand gently from the base, and are widest within the proximal third of the piece.

Bases are smoothed by grinding, presumably to facilitate hafting. Clovis points are associated with a direct percussion blade-making technology that is similar to that of the Upper Paleolithic in Asia and Europe. However, no direct cultural connection between Clovis and the Upper Paleolithic has been demonstrated. Several other kinds of tools are commonly associated with Clovis sites including gravers, scrapers, and perforators. Unfortunately, most Clovis finds in the Northeast are isolated points found on the ground's surface rather than in buried, stratified sites.

There is remarkable uniformity in the morphology of Clovis points throughout North America, and all are thought to date to the same relatively brief period. Anderson (1995) assigns the eastern Clovis to the range 11,500 – 10,900 radiocarbon years ago (equivalent to 13,500 – 13,000 calendar years BP). One of the most striking aspects of the Clovis period, the earliest Paleoindian complex, is its sudden appearance. The 40-odd reliable radiocarbon dates associated with Paleoindian sites in North America cluster at around 13,500 – 13,000 BP (11,500 – 11,000 radiocarbon years before present [rcybp]), coinciding with the early Late Glacial Period. This fact, and the dearth of sites reliably dated to early periods, has lent support to the idea that Clovis represents the initial peopling of North America.

However, the timing of the initial peopling of the New World is controversial. Until recent years, most archaeologists have supported the Clovis First model, in which Clovis people arrived in Alaska via the Bering Strait. The Clovis people populated previously uninhabited North and South America relatively quickly. They adapted to new biomes and increased in population before evolving into more regionally-adapted Archaic cultures. That view has been increasingly challenged by the Pre-Clovis view, which asserts that North America was inhabited prior to Clovis. There are no archaeological sites in New Jersey that offer support for this view, but Meadowcroft Rockshelter in southwestern Pennsylvania has provided widely-accepted evidence of a Pre-Clovis occupation dating as early as 16,000 years ago (McConaughy, 2004). Within New Jersey, however (as in most of the east), Clovis remains the earliest well-established human presence.

Clovis lasted for approximately 600 years, after which the Clovis point was replaced by other forms of fluted projectiles, such as Folsom in the western United States and Cumberland in the eastern United States, and unfluted forms such as Plano (west) and Quad (east). The end date for the Paleoindian period is generally regarded to be ca. 11,000 BP (9800 rcybp), just after the end of the Younger Dryas.

A small number of Paleoindian sites have been documented in northern New Jersey. Most Paleoindian finds are isolated artifacts found on the ground surface. By the late 1980s, over 300 fluted point find sites, including three stratified sites (Plenge, Zierdt, and Turkey Swamp), had been documented in New Jersey (Grumet, 1990). Over 100 fluted points and over 1000 pieces of lithic debris were collected from the Plenge site (Kraft, 1972), but they were mixed with younger Archaic-age artifacts in a plowed soil. Small fluted points and triangular points were found within a single soil horizon at Turkey Swamp, dated by radiocarbon to 7300 – 8900 BP (Grumet, 1990:19). The Zierdt site is a small open-air site which yielded 1 fluted point, 17 other Paleoindian tools, over 100 flakes, and 3 features (Grumet, 1990:239). All three stratified sites are in northern New Jersey, but the southern part of the state has yielded many surface finds of Paleoindian artifacts.

Stratified sites in New York, Pennsylvania, Virginia, Tennessee, Alabama, and other eastern states have given a basic picture of Paleoindian way of life. The Paleoindian adaptation is often viewed as a continental adaptation that was uniform across vast expanses of land. In New Jersey, Paleoindians inhabited boreal forest and tundra. In the northeastern United States and eastern Canada, there are clear associations of Paleoindian artifacts with caribou and other large mammals. For example, at the Dutchess Quarry Cave in southern New York, near the New Jersey border, fluted points were found in association with the bones of caribou, evidence that early Paleoindians hunted those animals. However, no clear evidence of the hunting of large extinct megafauna have been found there (Mounier, 2003). It appears that the Paleoindian habitation of this region may post-date the retreat of glacial ice and the extinction of Pleistocene megafauna. Recent evidence from sites like Dust Cave in northern Alabama (Walker, 1997) indicates that at least some Paleoindian peoples pursued small game, birds, and amphibians. Paleoindian finds in the region tend to be found on terraces along the major drainages (Delaware, Susquehanna, and Hudson). Gardener's (1977, 1987) premise that Paleoindian site locations are tied to outcrops of high quality siliceous stone seems to have gained wide acceptance. A pattern of transporting tools made of high quality stone over long distances implies high residential mobility. Funk (1976) argued that Paleoindians camped at central habitation sites, located near caribou migration routes and other resources, and dispersed into smaller habitation sites and small hunting/fishing camps during fall and winter.

No Clovis points or other Paleoindian artifacts were identified in this study.

Archaic Period (10,000 – 8,500 BP). The Archaic period immediately follows the Paleoindian, and is divided into three sub-periods: Early Archaic, Middle Archaic, and Late Archaic. Late Glacial climatic changes immensely altered the floral and faunal composition of the landscape. The warmer climate allowed for the northerly spread of deciduous forests, and likely contributed to the extinction of the megafauna. These environmental changes were accompanied by changes in social organization and material culture.

Early Archaic (10,000 – 8,500 BP). The Early Archaic period is marked by the appearance of smaller projectile point forms with side and corner notches for hafting. These changes coincided with the disappearance of fluted Paleoindian points. Different hafted biface types became more abundant as well. New technologies such as the chipped stone axe and twist drill appeared (Gardner, 1987). Diagnostic hafted biface types include side-notched forms such as Big Sandy, Thebes, Hardaway, Greenbrier, Kessell, and St. Albans; corner-notched types such as Lost Lake, Kirk Corner-Notched, Decatur, Pine Tree, and Charleston; and bifurcate stemmed types such as MacCorkle, LeCroy, and Kanawha Stemmed. The Early Archaic has the earliest evidence for seasonally based foraging and the exploitation of a broad range of habitats. Based on an increase in the number of sites, the population increased steadily during this time. Groups became more sedentary, setting up residential base camps in river valleys and smaller, specialized camps in the surrounding area (Chapman, 1975 and 1985).

Much of our current understanding of the Early Archaic period is based on stratified sites at three locations in the southeastern United States: the St. Albans site in West Virginia, (Broyles, 1966 and 1971), the Doershuk and Hardaway sites in North Carolina (Coe, 1964), and the Rose Island and Icehouse Bottom sites in east Tennessee.

The St. Albans site provided an 18.0 foot (5.5 meters) thick stratigraphic sequence containing 41 zones, of which 18 contained cultural material, each sandwiched between sterile zones of flood borne material. From bottom to top, these zones showed a sequence of changes in the dominant projectile point type: Charleston Corner-Notched, Kirk Corner-Notched, MacCorkle Stemmed, St. Albans Side-Notched, Le Croy Bifurcate Stem, and Kanawha Stemmed. These were bracketed by a series of radiocarbon dates between 7900 ± 500 BC and 6210 ± 100 BC (Broyles, 1971).

At the Hardaway site in north-central North Carolina, Coe (1964) documented a sequence beginning with Hardaway Side-Notched points, which he implied were Late Paleoindian, followed by the small, basally ground Palmer, then the larger Kirk (without basal grinding), and then a mixed layer with Stanly and later types. At the nearby Doershuk site, the sequence began with the broad-bladed, small-stemmed Stanly and progressed through contracting stem Morrow Mountain, lanceolate Guilford, and broad-bladed Savannah River points. At the top of the sequence were Badin, Yadkin, Pee Dee, and Caraway (all triangular Woodland forms). The upper part of this sequence was correlated with the sequences at Lowder's Ferry and the Gaston site. However, a much later re-analysis of records made during the Lowder's Ferry excavation indicated that each stratigraphic layer contained a mixture of points that Coe had placed in separate horizons.

While well stratified sites such as St. Albans have facilitated the development of a chronology for the Archaic period, the economic and social dimensions of Early Archaic populations are less well understood. The data available from excavations and surface collections in the greater Ohio Valley indicate that Early Archaic populations were small, highly mobile bands. Sites were likely occupied on a short-term basis, as indicated by the general absence of midden deposits, burials, and pit features. An analysis of Upper Kirk site distributions along parts of the Tellico River and the Great Smoky Mountains indicated a pattern in Early Archaic site type distributions (Kimball, 1996). In Kimball's study, the base camps, called "residences" tended to be along major river drainages, while field camps (camps occupied briefly during foraging or collecting trips) tended to be located along smaller streams. Hunting camps, kill sites, and butchering sites are often located in the uplands or along tributaries but rarely on the valley floor (e.g., Wilkins, 1978).

Middle Archaic (8,500 – 6,000 BP). The beginning of the Middle Archaic coincides with the onset of the Hypsithermal, a warmer, dryer period. This period is generally distinguished by a decrease in lithic tool kit diversity, an increase in regionalization, and the development of new tool classes including atlatl weights, netsinkers, and chipped stone axes (Chapman, 1985), which signal technological changes such as the invention of the atlatl.

The most widely recognized Middle Archaic hafted biface types in the eastern United States are Stanly, Morrow Mountain, and Guilford stemmed types, and Big Sandy II and Raddatz side-notched types. Stanly Stemmed hafted bifaces are generally recognized as diagnostic of the early Middle Archaic period, though radiocarbon dates for these occupations place it a little earlier, in an Early/Middle Archaic transitional period. Stanly and Morrow Mountain hafted bifaces have a wide distribution throughout the southeast. Guilford is restricted to the Appalachians and is particularly concentrated in the piedmont of North Carolina (Coe, 1964). Raddatz is more commonly found in the Midwest; it is a morphologic cognate of Big Sandy II (Gardner, 1987; Justice, 1987). At the Hansford Ballfield Site in Kanawha County, West Virginia, a hearth containing Stanly hafted bifaces was dated to 7,695 ± 155 rcybp /8,415 BP (Wilkins, 1985). This date would make it nearly contemporaneous with the Kanawha Stemmed horizon at St. Albans.

Late Archaic (6,000 – 3,000 BP). The Late Archaic period is marked by increasingly complex subsistence strategies, social organization, and expanded trade networks (e.g. Chapman, 1985; Custer, 1986). There is limited but convincing evidence for plant domestication during this period. Sunflower seeds exhibiting traits of domestication were found at the Hayes site (40Ml139) in Tennessee (Crites, 1993), and domesticated cucurbit (squash/gourd) have been found in mid-Holocene contexts in Pennsylvania and Maine (Hart and Sidell, 1997). At some sites, more substantial structures were built, possibly indicating an increased degree of permanence (e.g. Bentz, 1986). There was also a general increase in the size of habitation areas during the Late Archaic period.

Hafted biface types associated with the Late Archaic include a large number of stemmed and side-notched forms. The beginning of the Late Archaic in the Middle Atlantic is marked by the appearance of Savannah River stemmed hafted bifaces. The Ledbetter stemmed point, defined in west Tennessee and found throughout the Tennessee River watershed (e.g., Thorne et al., 1981). Wilkins (1978) identified a number of hafted biface types in Boone County, West Virginia as dating to the Late Archaic, including Big Sandy II, Brewerton Side-Notched, Brewerton Eared Triangular, Hansford Corner-Notched and Concave Based. Elsewhere, however, Big Sandy II is considered a Middle Archaic hafted biface type (Cambron and Hulse, 1965). In addition to these types, others are common in the Middle Atlantic region including Brewerton series, Lamoka, Orient Fishtail, Vosburg Corner-Notched, Genessee, Snook Kill, Saratoga, Susquehannah Broad, and Gary Contracting Stem.

Bowls made of steatite (soapstone) appeared during the Late Archaic nearly simultaneously throughout the Eastern Woodlands, from Florida to Maine. Steatite is a rock made up primarily of talc, which is soft enough to be easily worked. Steatite outcrops and quarries are scattered along a narrow band within the Piedmont from central Alabama to western Maine. One known source of sedimentary steatite occurs in northwest New Jersey, near another source in eastern Pennsylvania (Truncer, 2004a:489). The occurrence of steatite vessels and sherds, however, is not closely tied to this distribution of geologic occurrences. Steatite vessel sherds are well represented in sites throughout New Jersey and are concentrated in an area in Gloucester County, which borders Salem County to the north (Truncer, 2004a:491). A date of 1,220 B.C. was obtained on charcoal in stratigraphic association with steatite sherds at the Miller Field site (Truncer, 2004), which yielded an abundant assemblage of Terminal Archaic artifacts and a possible charnel house or mortuary structure (Mounier, 2003:205). Steatite sherds have also been found in dated contexts in New York, Pennsylvania, and throughout New England. Because steatite is resistant to thermal shock and easily shaped, it appears to have served much the same function, as ceramic vessels did later, after ceramic technology developed or spread to areas where stone vessels were in use (Truncer, 2004b).

Little information is available regarding the changes in lifeways during the Late Archaic period in the Middle Atlantic. There is clear evidence here of new technological developments. The Late Archaic is also characterized by the emergence of plant husbandry, population aggregation, and increased sedentariness. There is broad consensus that there was a shift toward less mobility, smaller territories, and adaptation to local areas during the Late Archaic. A shift toward horticulture has been dated in eastern Kentucky (Gremillon, 2004) and throughout the Eastern Woodlands to approximately 1,000 BC (Smith, 1994). By that time, people were cultivating native goosefoot (*Chenopodium* spp.), sumpweed (*Iva annua*), sunflower (*Helianthus annuus*), and gourd (*Cucurbita pepo*), as evidenced by physical changes in the plants, indicating domestication. People were also harvesting several weedy species such as maygrass (*Phalaris caroliniana*) and erect knotweed (*Polygonum erectum*), although those species lack firm evidence of domestication (Smith, 1994). Along the Tennessee, Cumberland, and Green rivers in Tennessee, Alabama, and Kentucky, and in the West Virginia panhandle, intensive harvesting of shellfish began during the Late Archaic. Thus, while the basic subsistence mode continued to be hunting, gathering, and fishing, new patterns were emerging by the Late Archaic, and these foreshadowed the increased sedentism and intensive horticulture of the Woodland period.

The divisions between Early, Middle, and Late Archaic are marked by changes in projectile point styles. Kirk Corner-Notched, Palmer, and bifurcate stem points are associated with the Early Archaic. Stanly and Morrow Mountain are associated with the Middle Archaic. Poplar Island and Rossville points, and very late broadspears, are diagnostic of the Late Archaic. Bannerstones (atlatl weights) appear during the Middle and Late Archaic, signaling the invention of the atlatl, or spearthrower, which is a technological innovation allowing projectiles to be launched with greater force and accuracy. Throughout the Archaic, there appears to be an increase in the size of the human population, an increase on the reliance on mast and shellfish, and possible settlement changes related to patterns of resource exploitation.

Early evidence of cultural complexity appears during the Late Archaic in New Jersey with the Koens-Crispin Complex, a mortuary complex in which the dead were cremated and the bones placed in pits with high-cost grave goods including bannerstones, celts, broad-bladed bifaces, fossils, and exotic materials (Mounier, 2003).

<u>Woodland Period (3,250 – 400 BP)</u>. The appearance of ceramics heralds the beginning of the Woodland period. In New Jersey, this appearance occurred ca. 3,250 BP. The Woodland period is generally characterized as a continuation and amplification of social and technological developments that had already begun during the Late Archaic, but which became more intense during the Woodland. Pottery rapidly became ubiquitous as cooking and storage utensils. The use of cucurbits, sunflower, maize, chenopods, goosefoot, and sumpweed intensified and progressed naturally to cultivation. In the Midwest and Southeast, major ceremonial centers develop and are associated with large interaction spheres (Adena, Hopewell) through which goods and ideas flowed over large areas including the Middle Atlantic. The appearance of small triangular projectile points signals the innovation of the bow and arrow.

The earliest ceramics in New Jersey are flat bottomed vessels tempered with soapstone (Mounier, 2003). These are associated with a variety of small stemmed and notched projectile points including Jack's Reef Corner-Notched, Fishtail, Hellgrammite, and Meadowood. The latter point type is characteristic of the Middlesex Complex, an Early Woodland (1,250 – 500 BC) mortuary complex similar, and probably related, to Adena. During the Middle Woodland (AD 1 – 500) pottery evolved into conoidal jars and pots with net impressions and cord marking. The broad-bladed Fox Creek point is characteristic of this period, which is referred to locally as Abbot Phase after the Abbot's Farm site. Fishing became an important part of the diet during this time. Also during the Middle Woodland, the Kipp Island or Webb Phase arose, characterized by ceramics with a corded or cross-corded surface treatment, graves with exotic artifacts, and Jack's Reef Corner-Notched projectile points. Middle Woodland settlements are found in abundance along the coast and in back bays in the Cape May area, and small camps are found in rockshelters.

During the Late Woodland (1,000 – 400 BP), ceramics in New Jersey became increasingly refined and were decorated with intricate designs. Characteristic wares include Riggins Fabric Impressed, Point Peninsula, and Owasco. Kraft divided the Late Woodland into two phases: Pahaquarra (AD 1,000 – 1,350) and Minisink (AD 1,350 – 1,600). Pahaquarra pottery is similar to Owasco, a pre-Iroquois tradition, and is characterized by collarless, conidial vessels with cord marking or fabric impressions. Minisink pottery has parallels with the Iroquois tradition in New York; it consists of globular vessels with decorated collars, decorated with incising rather than impressions. Minisink vessels often have castellations and elaborate designs such as human faces.

<u>Historical Period.</u> *Early Exploration.* The first documented European to discover the Delaware Bay was Henry Hudson, who had been commissioned by the Dutch West India Company to locate the then hypothetical northwest passage to the orient (Cox, 1988). After the initial discovery, Dutch explorers traveled up the Delaware Bay in order to establish outposts for trading furs with the Indians. The first trading outpost to be established in the area was Fort Nassau, which was constructed in 1626 near present-day Gloucester Point. In 1631, the Dutch also established a whaling station called Zwaanendael in present-day Lewes, Delaware. The colony was destroyed by Indians after a year (Cox, 1988).

Frontier. Prior to the construction of Fort Christina in 1638, the European presence in the Delaware Bay area was limited to exploratory forays. Fort Christina was built by the New Sweden Company with the help of the Swedish government in what is now Wilmington, Delaware. Fort Christina, the first permanent European settlement in Delaware, was the center of what came to be called New Sweden, and was mainly comprised of Swedish and Finnish farmers and traders (Weslager, 1987). At this time, Dutch influence in the area was in decline as Swedish and Finnish interest expanded.

In 1641, an attempt was made by settlers from New England to establish a presence on the New Jersey side of the Delaware Bay, near Salem. This attempt was quickly thwarted, as they were run out of the area by the Swedes after a very brief occupation (Wacker, 1995). The New Jersey side of the Delaware was not permanently occupied by Swedes until the 1660s; however, they constructed a fort, called Elfsborg, to the south of Salem in 1642. It has been suggested that the fort was abandoned after a very short occupation because of the severe mosquito infestation (Wacker, 1995). The location of this site has not been established.

In the early 1650s, the Dutch West India Company constructed Fort Casimir in an attempt to establish control over the Lower Delaware (Munroe, 2006). This resulted in a number of skirmishes and, in 1654, the Swedes captured the fort and renamed it Fort Trinity. In 1655, the Dutch recaptured Fort Trinity and also took Fort Christina, though the Swedish and Finnish families were allowed to remain and follow their own cultural practices (Kellogg, 1992).

In 1663, the English began a military campaign against the Dutch settlements in the New World and, in 1664, Sir Robert Carr had captured all the Dutch and Swedish settlement in the Delaware River area (Cox, 1988). A portion of the land that was acquired by the English became what is now New Jersey, which was given to Philip Carteret to govern. Two Quakers, Edward Byllynge and John Fenwick, had purchased a large portion of the land that comprised New Jersey, and hoped to establish a religious haven. Disagreements between the Quakers and Carteret led to New Jersey being divided into East Jersey and West Jersey in 1672, with Byllynge and Fenwick ruling the west side and Carteret ruling the east side. In 1675, Salem was established by a group of Quakers in West Jersey. During the division of East and West Jersey, Burlington and Salem counties were created, though they were much larger geographically than today. Salem County included what are now Gloucester, Salem, Cumberland, Cape May, and Atlantic counties, and came to have its current boundaries in 1748. Salem incorporated in 1695 and became an important town in the shipping industry. It also served as a legally recognized port of entry. The city of Burlington was also created shortly after the split between East and West Jersey. Burlington was settled in 1677 by a group of 230 Quakers and served as the center for Quaker life in the New World until it was superseded by Philadelphia (Veit, 2002).

Market Economy/Early Industry. Most of the early Swedish, Dutch, and English settlers were farmers growing crops such as tobacco, rye, barley, flax, hemp, cabbage, lettuce and root vegetables. Fruit tree orchards were abundant as well and included apple, pear, cherry, and peach. Salt hay farming became a very important aspect of the agricultural industry during the seventeenth and eighteenth centuries. Salt hay provided stable bedding, thatching, cattle feed, mulch, insulation, packing material, and a base layer for gravel roads. It was also used in the making of butcher paper.

Mills developed to support the agriculture and lumber industries. Timbering occurred in the west and central areas of Salem County (Logan, 1996). Lumber was shipped as building material and fuel to other states in addition to its domestic use. Glassware, iron, and transportation also comprised some of New Jersey's early industrial base (Lazzerini, 2006). Copper and iron mines began to open during this period as well. Transportation became an important industry in New Jersey because of its location between Philadelphia and New York City, a characteristic of the state that came to affect all aspects of its economic, social, and industrial development.

Numerous glassworks opened in the state and remained an important industry until well into the twentieth century. A prominent glassworks company, Wistarburg, was founded in Salem County in 1739, which was set up as a self-contained community. When it was put up for sale, the company had 1500 acres of land, two furnaces, a manufactory, storehouse, pot house, stamping mill, and rolling mill, as well as a mansion, a stable, a granary, and a wagon house (Wacker, n.d.). The glassworks was in production between the 1740s and the 1780s, and many of the glassmakers went on to open their own glassworks after Wistarburg closed.

New Jersey was the manufacturing center for many iron products as abundant sources of iron ore were found there: magnetite, hematite, and limonite (bog iron). The first two are found in northern New Jersey, and are extracted via underground mining. Bog iron, on the other hand, seeps out of the soil and deposits on vegetation which eventually forms ferrous beds that can be dug out of swamp land (Veit, 2002). New Jersey also had abundant forests for creating the charcoal necessary to keep the furnaces blasting. This need for large amounts of charcoal, in turn, helped to create a large and important timber industry in New Jersey as well. A third necessary ingredient for iron manufacture is flux, which is used in blast furnaces to remove impurities from charcoal. In New Jersey, flux is created from the readily available calcined lime, as well as oyster shell. The iron industry began in New Jersey as early as the end of the seventeenth century (Veit, 2002).

New Jersey played an active role in the American Revolution, providing troops, ammunition, and supplies, though the citizens were heavily divided in their loyalties. Presbyterian ministers from Essex and Morris counties preached for revolution while Loyalists remained a strong presence in Monmouth County (Veit, 2002). Forts were built along the Delaware River to protect the passage to Philadelphia. The forts were taken by the British after they took Philadelphia. The City of Salem was taken by the British in March of 1778, in what was the last major battle in New Jersey during the Revolutionary War. The war left much of New Jersey in ruins caused by looting by supporters of each side.

After the war, New York City and Philadelphia came to dominate the New Jersey economy, and it became clear that the development of improved transportation systems could be a solution to changing the state's economic posture. The struggle for power came to focus on steamboat routes, bridges, toll roads, and canals (Fleming, 1977). Controversy between New York and New Jersey regarding steamboats crossing borders leads to a historic Supreme Court decision that the federal government would regulate interstate commerce. This removed a large barrier to interstate commerce. Numerous toll roads were commissioned and built during the early part of the nineteenth century. The proliferation of toll roads meant that not many of them were particularly profitable until the War of 1812 when Washington D.C. began shipping supplies northward and the British set up a blockade making shipment via water impossible (Fleming, 1977).

Mature Industry. In 1832, Col. John Stevens constructed the first railroad in New Jersey, the Camden and Amboy. This ran from a point near Philadelphia to Raritan Bay. Although the Camden and Amboy was extremely profitable, it was a monopoly and charged inflated fares, had a deplorable safety record, and provided poor service. Camden and Amboy acquired steamboats in the Delaware Bay as well, and used politics and violence to keep independent steamboats from operating (Fleming, 1977). In 1856, plans were made to construct a railroad from Salem to Elmer, called the Salem Railroad. The railroad facilitated the transportation of manufactured goods and crops to be distributed along the eastern seaboard. The Salem Railroad provided an economic boost to the area and also jump-started the industrial revolution, which included both the expansion of old industries and the introduction of new ones. Several new glassworks opened, including the Salem Glassworks, which became one of the largest producers of hollowware in the world (Logan, 1996).

Until the 1830s, New Jersey remained largely a rural agricultural state. Manufacturing was not a large industry. At that time, Newark, New Jersey's largest city, had a population of only 10,953 (Fleming, 1977). As a result, the New Jersey government adopted very business-friendly policies to encourage economic growth. While population grew as a result, and manufacturing plants increased in number, the policies resulted in an industrial aristocracy that exploited workers and corrupted the government and media. New Jersey also lacked an insane asylum. Most of the mentally ill were kept in prisons or poorhouses. Dorothea Dix campaigned and lobbied relentlessly for months until the legislature would give the money needed for a mental hospital. This was constructed in 1848 (Fleming, 1977).

In spite of the large Quaker population in New Jersey, the state as a whole was not very enthusiastic about the anti-slavery movement. At the end of the Revolutionary War, New Jersey had more slaves than any other northern state, except New York. In addition, many of New Jersey's markets were in the South. However, the state remained in the Union during the Civil War, though sentiment for the war was lukewarm at best, and became volatile when Lincoln instituted the draft (Fleming, 1977).

Agriculture remained an important aspect of the New Jersey economy, though farmers experienced a number of obstacles, most importantly soil depletion and drought. The problem of soil depletion was remedied in the early 1820s with the discovery that greensand marl, which underlays much of the Inner Coastal Plain, would both provide nutrients and deal with acidity problems. The use of marl as a fertilizer became widespread by the 1840s. The problem of droughts was not tackled until the beginning of the twentieth century when, in 1911, Charles Seabrook and C.W. Skinner began to experiment with sprinkler irrigation. By 1933, Seabrook was packing frozen vegetables for market (Wacker, n.d.).

By the end of the nineteenth century, 13 wharves were located along the Salem River, all but one of which was associated with the Pennsylvania Railroad. The major items being traded from the Salem River were canned goods, glass, iron and brass casting, cinder, gasoline and oils, fertilizer, and tomatoes (Cox, 1988).

Salem County finally saw a true population boom during the early part of the twentieth century, though it had experienced steady increase since the end of the nineteenth century. The population boom, which coincides with WWI, is likely due to the labor demands of the DuPont Company's smokeless gunpowder plant. Salt hay farming declined after WWI, as industrialism continued to expand.

PREVIOUSLY RECORDED CULTURAL RESOURCES

Based on the New Jersey HPO guidelines for Phase I archaeological surveys, a review of previously identified archaeological sites and historic structures was undertaken prior to the fieldwork. This background research is used to better understand the prehistory and history of the area to formulate expectations, and identify any known sites or NRHP properties that may already exist in the project area. Although known archaeological sites outside of the project area will not be directly impacted, knowledge of these sites can aid in project design. Although a formal evaluation of historic structures was not part of the current investigation, knowledge of potentially eligible, NRHP eligible structures, or districts can also aid in project design. A review was undertaken of the surveys conducted in or adjacent to the project areas , and a number of historic and archaeological properties were identified (Figure 4). The following is a brief description of the surveys conducted and the sites identified. The site information is on file at the New Jersey Historic Preservation Office.

Archaeological Sites

28SA63. The Money Island West Site (28SA63) is a multicomponent site located west of Money Island Road in a wooded area surrounded by brackish marsh. The prehistoric component shows an Archaic and Woodland occupation indicated by the recovery of artifacts that include lithic debitage, chipped stone tools, and a groundstone celt. The State Site Form indicates that historic artifacts were also present, but fails to provide a description of them.

28SA72. The Dickson Site (28SA72) is an indeterminate prehistoric site adjacent to the western bank of Alloway Creek. The approximately 99,030 square feet (9,200 square meters) site is situated in an agricultural field that slopes from a ridge on the north to a marsh in the south. Artifacts noted include lithic debitage, chipped stone tools, and prehistoric ceramics. According to the State Site Form, local collectors stated they recovered 13 arrowheads from the area during a search of the field.

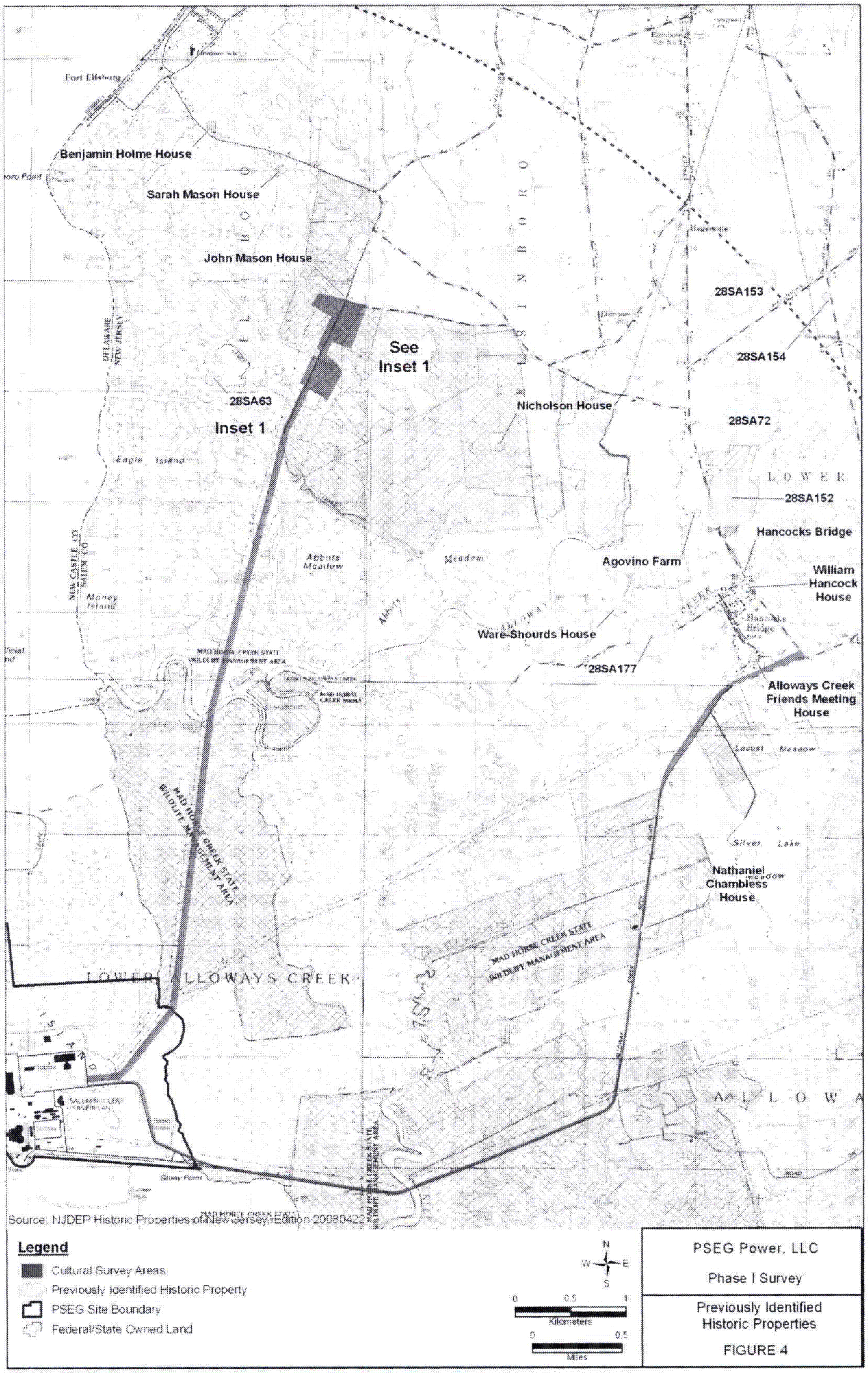
28SA152. The Carr (Finlan) Site (26SA152) is an indeterminate prehistoric site located approximately 395 feet (120 meters) northwest of Alloway Creek. The site is situated atop a knoll surrounded by marsh. Artifacts recovered include lithic debitage and prehistoric ceramics.

28SA154. The J. Ridgeway Site (28SA154) is an indeterminate prehistoric site located approximately 330 feet (100 meters) north of Alloway Creek. The approximately 121,630 square feet (11,300 square meters) site is situated between a cultivated field to the north, a marsh to the south, a wooded area to the west, and a road to the east. There is a knoll on the northwest quadrant of the site that is approximately 20 feet (6 meters) above creek level. Artifacts recovered are described in the New Jersey State Site Form as simply "chips of common material."

28SA177. The Hancocks Bridge Levee Site (28SA177) is a multicomponent site located on the south bank of Alloway Creek. The site was investigated in 2008 by Alan Monier and yielded lithic debitage, thermally altered rock, brick fragments, and coal. The site is located nearby previously documented sites.

Historic Buildings

In 1996, Cultural Resource Consulting Group (CRCG) conducted a historic structure survey in support of the Estuary Enhancement Program directed by PSEG (Table 3). The study included an area within a 1.2-mile (2-km) radius of the project area and identified several historic farmsteads that were grouped together to form the Elsinboro/Lower Alloways Creek District. The district is a collection of seventeenth through nineteenth century farmsteads associated with the salt hay farming industry (Veit and Cielo 1996). This district includes the Abel Nicolson House, the George Abbott House, John Mason House, Sarah Mason House and Agovino Farm. This district, along with the individual structures, was nominated to the NRHP under criteria (a) and (d) (36 CFR 60.4).



Fort Elfsborg
Benjamin Holme House
Sarah Mason House
John Mason House
See Inset 1
28SA63
Inset 1
Nicholson House
28SA153
28SA154
28SA72
LOWER
28SA152
Hancocks Bridge
Agovino Farm
William Hancock House
Ware-Shourds House
28SA177
Alloways Creek Friends Meeting House
Nathaniel Chambless House
LOWER ALLOWAYS CREEK
MAD HORSE CREEK STATE WILDLIFE MANAGEMENT AREA
Source: NJDEP Historic Properties of New Jersey, Edition 20080422
Legend
Cultural Survey Areas
Previously Identified Historic Property
PSEG Site Boundary
Federal/State Owned Land
Kilometers
Miles
PSEG Power, LLC
Phase I Survey
Previously Identified Historic Properties
FIGURE 4

Table 3. Historic Buildings near the MIRAA and ACNRAA

Site[1]	Name	Location	Date Built
1703-19/Possible District	Abel Nicholson House	Fort Elfsborg-Hancocks Bridge Road, Salem County	1722
1703-24, 24A/Possible District	John Mason House	Money Island and Mason Point Road, Salem County	1695
1703-36/Possible District	Holmeland	Fort Elfsborg-Hancocks Bridge Road, Salem County	1729
1703-38D, 38F/Possible District	Sarah Mason House	Fort Elfsborg -Hancocks Bridge Road, Salem County	1721
1704-14, 14A, 14B /Possible District	Agovino Farm	Salem Hancocks Bridge Road, Salem County	1790
1704-23BB/Possible District	William Hancock House	Front Street, Locust Island Road, and 2nd Street	1734
1704-25	Ware Shourds House	134 Poplar Street	1730
1704-23	Hancocks Bridge District	The Village of Hancocks Bridge	18th-19th century
____	Alloways Friends Meeting House	The Village of Hancocks Bridge	1730
	Chambless House	Alloway Creek Neck Road (no formal address given)	

[1] CCRG, 1996.

Prepared By/Date: JEB/6-19-09
Checked By/Date: PHG/6-19-09

The Abel Nicholson House was constructed by Abel Nicholson in 1722 with additions in 1850. The Nicholson family was one of the original families to settle Fenwick's Colony of Salem. The house contains the Delaware brick patterning and consists of two stories and is three bays in width. The house is listed on the NRHP.

The John Mason House was purportedly built by John Mason in 1695 (based on a wall plaque), and is one of the oldest standing farmhouses in Elinsboro Township. The house has three stories and three bays with a stucco exterior. The house has several associated structures, including a Dutch barn. John Mason was a member of the Colonial Assembly, and some of his descendents became influential state politicians. The house was acquired by the Acton family in 1839, and remained in their ownership until 1934 (Veit and Cielo, 1996). The John Mason House is adjacent to the MIRAA, but is located outside the project area.

The Holmeland House was constructed ca. 1729. Benjamin Holme bought the house and adjacent property in 1762. Holme was a supporter of the American Revolution and the house was burned by British troops in 1778. Holmes rebuilt the house in 1784.

The Sarah Mason House was most likely constructed in 1721. The farmstead includes an English barn, corncrib, utility shed, and heifer barn. The house is Italianate in style with a stucco exterior.

The Agovino Farm was constructed ca. the late eighteenth century (most likely 1790) with additions during the nineteenth century. The original farmstead included a barn, corncrib, and at least two sheds.

The William Hancock House is one contributing element to the Hancock Bridge district. The house is an excellent example of the Delaware Valley patterned brick style. The house is two stories and has three bays with centered front and rear entrances. Other details include gable-end chimneys and a wood shingle roof. During the Revolutionary War, a contingent of soldiers quartered at the house were massacred by a group of British and Tory soldiers (Veit and Cielo, 1996).

The Chambless House and associated property is situated along a 1.5-mile (2.4-km) stretch of the MIRAA. The house and associated property was listed on the New Jersey State Register in the mid-1980s. The original segment of the Nathaniel Chambless House (HABS-NJ-1202) was constructed in

1730, with additions at unknown later dates. The two-story original structure is historically significant due to its patterned Flemish Bond brick construction by Quaker settlers and its exclusivity to Salem County and western Cumberland County, New Jersey.

The Ware/Shourds House was constructed ca. 1730 by Joseph Ware Jr. The house is a three bay main section with a pent roof. Thomas Shourds, the historian for Salem County, lived in the house during the nineteenth century.

Hancocks Bridge District consists of a possible district for the eighteenth to nineteenth century and includes the William Hancock House and a cluster of nineteenth century buildings associated with the nineteenth century canning industry. A total of 75 buildings is located in the district.

Alloways Creek Friends Meeting House consists of a religious meeting house used by the residents of Hancock Bridge. The meeting house was constructed ca. the eighteenth century.

3. RESEARCH DESIGN

The research design for this project was formulated to identify archaeological sites within the project area. The main objectives of the Phase I survey were to: (1) identify archaeological sites, (2) collect sufficient data to determine preliminary NRHP eligibility for each site, and (3) construct a settlement and utilization history of the project area. Based on the background research, it was expected that both prehistoric and historic archaeological sites would exist in the project area. Prior to the field survey, a probability model was developed to guide the field methodology. The predictive model was based on several key attributes and assigned areas as high, moderate, or low probability to contain archaeological resources (Table 4). These designations dictated the intensity of shovel testing with high probability at 25 ft (7.6 m) intervals, high/medium probability at 25 feet (7.6 meters) intervals, and low probability at 75 feet (22 meters) intervals. Attributes used to construct the predictive model included the following:

- distance from a reliable water source (within approximately 330 ft [100m]),
- presence and density of well-drained soils,
- proximity to resource rich areas (surface water/marshes that represent a reliable food supply),
- proximity to a standing historic structure,
- proximity to a previously recorded standing historic structure, and
- degree of subsurface disturbance.

Consultation with New Jersey HPO was conducted on February 26, 2009 to introduce HPO staff to the project and to describe field study methodology. HPO staff concurred that the field methodology proposed for this project was appropriate.

Based upon the application of the attributes above, the MIRAA within uplands consisted primarily of high probability areas. Factors that contributed to this determination included the presence of a historic structure (the John Mason House), proximity to a resource rich environment, and a generally low degree of disturbance. However some exceptions were noted. Several areas were designated as medium/high probability due to intermixed patches of low, wet areas. A total of five archaeological sites were identified within the surveyed portion of the MIRAA.

In contrast, the area evaluated along the ACNRAA was designated as a low probability area due to the distance from a reliable water source and the previous disturbance from the construction and maintenance of Alloway Creek Neck Road. The majority of the ACNRAA was in plowed fields and a pedestrian survey was sufficient to identify archaeological sites. If artifacts were found on the surface, radial shovel tests were excavated at 49 feet (15 meters) intervals to determine if the artifacts constituted an archaeological site. Although artifacts were found on the surface, these artifacts represent field scatter and not intact archaeological sites. A historic house, the Chambless house, is located along the east side of the existing Alloway Creek Neck Road, but the proposed impacts are located on the west side of Alloway Creek Neck Road. The survey through this portion of the ACNRAA resulted in scattered surface finds but no intact sites or deposits that could be associated with the Chambless house.

The fieldwork supported the expectations as outlined in the predictive model. The location of the MIRAA adjacent to a resource rich environment, water source, proximity to a historic house, and an area of lower disturbance, resulted in the identification of five multi component archaeological sites. The location of the ACNRAA in a previously disturbed area, distance greater than approximately 330 feet (100 meters) from water/resource rich areas, and location west of Alloway Creek Neck Road, resulted in the identification of isolated finds and field scatter, but no archaeological sites.

Table 4. Project Areas Probability, Visibility, and Methods Used in the MIRAA and ACNRAA

Area	Probability	Visibility (%)	Method
Money Island Access Alternative			
Area 1	High	0	Shovel tests
Area 2	High	0	Shovel tests
Area 3	High	0	Shovel tests
Small field	High	0	Shovel tests
Large field	High, medium	0	Shovel tests
Field A	High	75 – 100	Pedestrian survey
Field B	High	75 – 100	Pedestrian survey
Field C	High	75 – 100	Pedestrian survey
Field D	High, medium	75 – 100	Pedestrian survey
Field E	High, medium	75 – 100	Pedestrian survey
Field F	High, medium	75 – 100	Pedestrian survey
Field I	Low		Shovel tests
Alloway Creek Neck Road Alternative			
Field II	Low	75 – 100	Pedestrian survey
Field III	Low	50 – 75	Pedestrian survey
Field IV	Low	75 – 100	Pedestrian survey
Field V	Low	5 – 50	Shovel tests
			Prepared By/Date: JEB 6-19-09 *Checked By/Date: PHG 6-19-09*

HIGH PROBABILITY

Areas designated as high probability were found on well-drained soils, within 328 feet (100 meters) of a water source, adjacent to a resource rich environment, and proximity to standing historic houses or in locations of previously known historic houses. In areas of high probability, STPs were excavated at 25-foot (7.6-meter) intervals (http://www.state.nj.us/dep/hpo/1identify/arkeoguide1.htm) (New Jersey HPO, n.d.). All of the high probability areas identified for this study were found at the proposed new access road location (MIRAA) (Figure 5).

HIGH/MEDIUM PROBABILITY

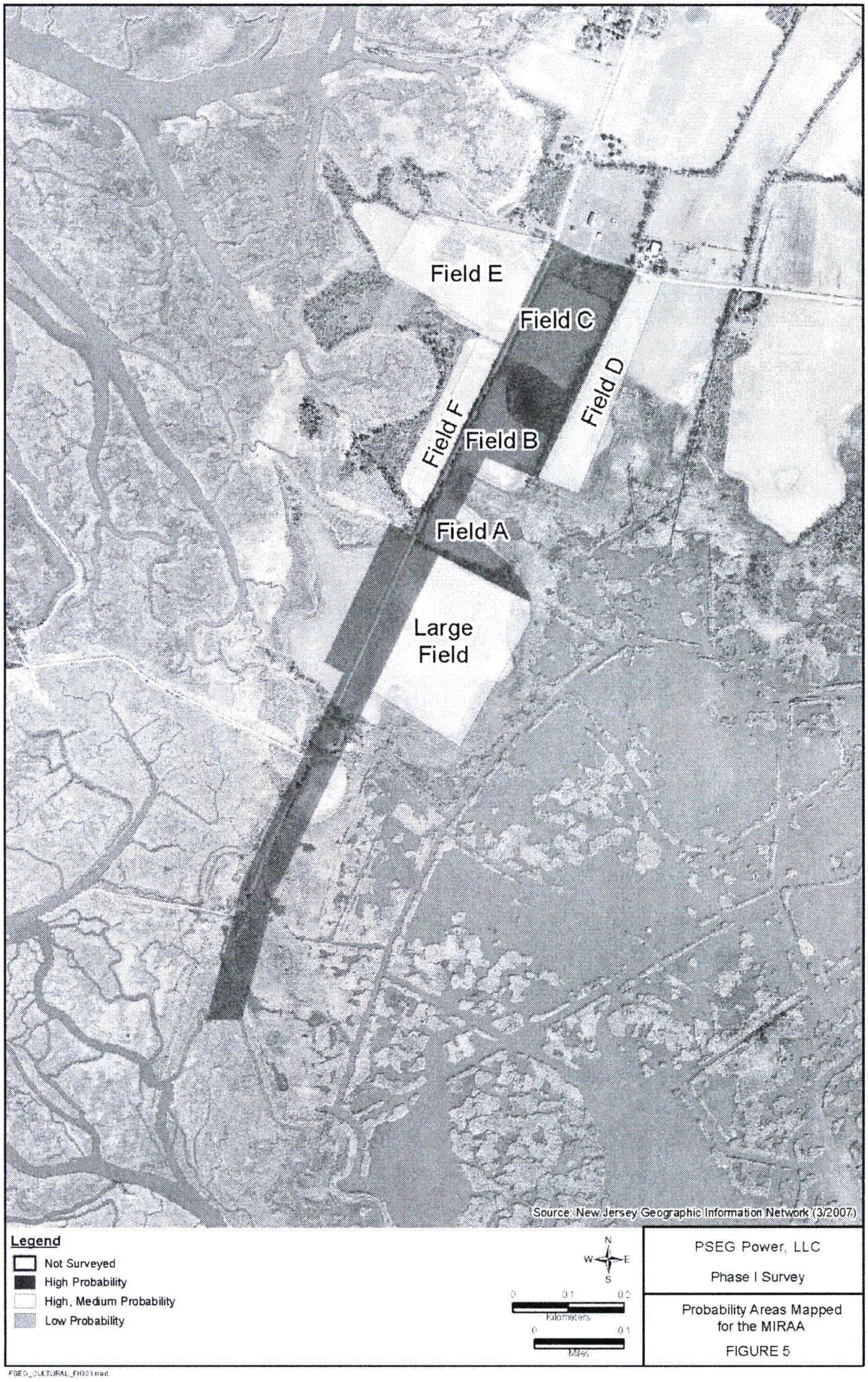
Areas designated as high/medium probability were found intermixed with areas of high probability on the MIRAA. In the high/medium probability areas, STPs were placed in a grid with an interval of 25 feet (7.6 meters) (http://www.state.nj.us/dep/hpo/1identify/arkeoguide1.htm). All of the high/medium probability areas identified for this study were found at the proposed new access road location (Figure 5).

LOW PROBABILITY

Low probability areas were more than approximately 330 – 490 feet (100 – 150 meters) from a water source, located in areas that did not contain or had a low density of well-drained soils, not located in close proximity to standing historic houses or in locations of previously known historic houses, and located in areas of previous disturbance. The only low probability area identified in the project area consisted of the 75 feet (23 meters) right of way for the ACNRAA (Figure 6). The STPs were placed in a single transect parallel to the roadway, approximately 35 feet (11 meters) away from the edge of pavement, and spaced 75 feet (23 meters) apart (http://www.state.nj.us/dep/hpo/1identify/arkeoguide1.htm) .

After the identification of sites in the project area, artifacts and artifact groups were analyzed to infer temporal, spatial, and functional attributes. Once these three attributes were determined, they formed the basis by which to make recommendations concerning potential eligibility to the NRHP.

After each site was assigned as potentially eligible or not eligible, it was then determined if project undertakings would have an adverse effect on the sites recommended as eligible.


Field E
Field C
Field D
Field F
Field B
Field A
Large Field
Source: New Jersey Geographic Information Network (3/2007)
Legend
Not Surveyed
High Probability
High, Medium Probability
Low Probability
N
W
E
S
Kilometers
Miles
PSEG Power, LLC
Phase I Survey
Probability Areas Mapped for the MIRAA
FIGURE 5

Field I
Field II
Field III
Field IV
Source: New Jersey Geographic Information Network (3/2007)
Legend
Not Surveyed
Low Probability
N
W
E
S
Kilometers
Miles
PSEG Power, LLC
Phase I Survey
Probability Areas Mapped for the ACNRAA
FIGURE 6

4. METHODS

FIELD METHODS

The fieldwork consisted of systematic pedestrian survey with collection, systematic shovel testing, and limited hand augering.

DEFINITIONS

In this report, "artifact" refers to any object manufactured or significantly modified by humans, and dating earlier than the mid-twentieth century. In the current context, prehistoric artifacts included pot sherds (fragments of ceramic vessels), and flakes and tools made of chipped stone. One possible fragment of fire-cracked rock (rock modified by heating in a fire) was also identified. Historic artifacts observed during the study included historic ceramics, glass fragments, nails and unidentified metal objects, brick fragments, and coal or cinders. Artifacts that were not recorded consisted of modern trash such as shards of glass from modern beer bottles and miscellaneous plastic items.

"Site" is defined according to the *Site Identification Criteria* of the New Jersey Archaeological Site Survey files at the New Jersey State Museum. These definitions provide practical criteria for distinguishing between sites and non-site artifact scatters in the field. A pre-contact period (prehistoric) site is defined as three or more culturally modified objects (artifacts), excluding fire-cracked rock, found on the surface within a 49 feet (15-meters) diameter area on the ground surface. When subsurface techniques are used, the minimum criteria are: two subsurface units containing artifacts (flakes or other culturally modified objects) within 1 acre (0.4 ha); five or more chipped or ground stone tools within an acre; or any aboveground or below ground cultural derived feature.

A historic site is defined as 25 – 50 artifacts per acre, or 10 per acre for very early (e.g., Colonial Period) artifacts. In addition, the site should either be associated with a listed or eligible historic property and have potential to contribute to that property's significance; be associated with an important or potentially important historic event; or have potential to yield information important in history (that is, should meet criterion *d* of 36 CFR Part 60.4). These artifacts may be collected from the surface or from subsurface units such as shovel tests.

In this study, sites were identified based on observations made in the field. However, the sites noted were reevaluated after artifacts had been washed and sorted in the laboratory, and after maps of artifact distributions were carefully studied, to make sure that the sites met the above criteria.

PEDESTRIAN SURVEY

Areas that had recently been disced or plowed, had a minimum of 50 percent ground surface visibility, and had recently been rained on, were examined using systematic pedestrian survey. This method, when applicable, affords the best chances of identifying cultural resources. In most areas within the project area that had these conditions, pedestrian survey was carried out with a crew of three to five archaeologists spaced 12 – 14 feet (3.7-4.3 meters) apart, walking parallel straight line transects at a slow pace. Each observed artifact was marked with a pin flag. The artifacts' provenience information was noted on the bag and recorded using a global positioning system (GPS) unit with submeter accuracy, and the artifacts were collected.

Surface scatters were collected using three field provenience designations: isolated find, cluster, and field letter or number. Field letters and numbers refer to individual plowed fields. In the new access road area, six fields were surveyed: Field A through Field F. In the existing access road area, surface collections were made in Fields II, III, IV, and VI. Within each field, isolated finds (one or two artifacts within a 25 foot [7.6 meter] radius) and clusters (more than two artifacts within a 25 foot [7.6 meter] radius) were collected separately. When brick fragments were encountered within a cluster, they were noted, but not collected, or representative specimens were collected.

Fields A through F in the proposed MIRAA (see Figure 5) and Fields II, IV, and VI in the ACNRAA had been disced very recently, and heavy rain had recently fallen prior to the field study, as well as during the study. Some low weeds had grown in places, but not sufficiently to reduce visibility below 75 percent. Field IV in the ACNRAA had been plowed or disced recently, and crop plants had grown to a height of 4 – 5 inches (10.2 – 12.7 cm) after discing/seeding. Ground visibility was between 50 and 75 percent in that field, and the recent rain had exposed objects on the surface. Therefore, pedestrian survey was employed in this field also, but with a crew spacing of 7 – 8 feet (2.1 – 2.4 meters) rather than 12 – 14 feet (3.7 – 4.3 meters).

SYSTEMATIC SHOVEL TESTING

Areas that did not meet conditions for a pedestrian survey were examined using systematic shovel testing. Shovel tests were excavated to a width of 12 – 15 inches (30.4 – 38.1 cm), and to the depths of inferred Holocene soil. The depth of Holocene soil was inferred from hand augers placed in selected shovel tests. The typical soil profile consisted of a brown (10YR 4/3), dark grayish brown (10YR 4/2), or very dark grayish brown (10YR 3/2) silt loam or sandy clay loam AB horizon, typically 20 – 30 inches (50.8 – 76.2 cm) in thickness, overlying a yellowish brown (10YR 5/6) to light yellowish brown (10YR 6/4) clay loam or sandy clay loam C horizon. This profile shows strong soil development, indicative of a mature soil. In hand auger tests, this C horizon was underlain by sandy sediments (sometimes with gravel), coarsening downward, indicative of fluviomarine deposition. Hence, shovel tests were excavated through the AB horizon at least 1.5 – 3.9 inches (3.8-9.9 cm) into the C horizon.

All excavated sediment was screened through quarter-inch hardware cloth and searched carefully for artifacts. Artifacts were collected and bagged by natural stratum and by shovel test number. A master bag list for the project was maintained by the Field Director. The precise location of each shovel test was recorded using a handheld GPS unit with submeter accuracy. Sketch maps showing shovel test locations were also made in the field. The texture and color of each soil in each shovel test were described using standardized soil texture terms and a Munsell soil color field book. This information was recorded on field forms by the excavators.

LABORATORY METHODS

Historic Analysis

Historic artifacts were classified based on material type. Categories included ceramics, container glass, flat glass, metal, nails, architectural materials, and other. Within each material class, each artifact was described based on method of manufacture, decorative technique (as appropriate), and function. This information was then used to determine an approximate *terminus post quem* (earliest possible manufacture date) and *terminus ante quem* (latest possible manufacture date) for each item. While this range does not always correspond to the actual period of use, it does allow for an estimate of when a particular site was occupied.

Ceramics were analyzed for ware and decoration following South (1977), Garrow (1982) and Miller (1980 and 1991). Container glass was described based on color and decoration or embossments. Date ranges for glass vessels were established using Jones and Sullivan (1989), Toulouse (1971) and the Historic Glass Bottle Identification & Information Website (Lindsey, 2007). Flat glass was described by color and manufacturing method and measured for thickness. All flat glass was assumed to be derived from windows unless obviously from a shelf or similar item. The date of manufacture for window glass fragments was determined by using Moir's (1987) method, which uses a statistical regression to derive a calendar date from the thickness. This method is only useful for glass made before the early twentieth century when the mass production of plate glass begins. Metal artifacts were described based on form and function where possible. Nails were analyzed for method of manufacture (wrought, cut or wire). Date ranges were derived from Young (1991).

In order to provide a frame of reference and facilitate discussion of the assemblages, the artifacts from each site were classified according to South's (1977) functional classification system, as modified by Garrow (1982).

Prehistoric Analysis

Prehistoric lithic material was analyzed on a piece-by-piece basis. All collected artifacts were analyzed and described. Initial descriptions included raw material type, stage of reduction or recognizable tool or projectile point types, count and weight. The data were recorded in a Microsoft Access™ database and exported to a spreadsheet, to facilitate data analysis and reporting.

Prehistoric ceramic analysis included recording the following attributes for each sherd: surface treatment, temper, count and weight, and any sherd-specific attributes such as the presence of soot, abrader marks or refits with other sherds. The data were recorded in a Microsoft Access™ database and exported to a spreadsheet, to facilitate data analysis and reporting.

5. FIELD RESULTS

THE MONEY ISLAND ROAD ACCESS ALTERNATIVE (MIRAA)

In the MIRAA right of way, six areas had less than 50 percent ground visibility and were shovel tested: two small areas adjacent to the south parking lot, a willow thicket within a small projection of upland just north of that location, a small field immediately south of PSEG's Estuary Enhancement Program field office, and the large field (13.2 acres) immediately north of the field office. Exceptions to the grid pattern were made in the two areas near the parking lot and the willow thicket. The small areas near the south parking lot are within the high probability zone, but due to their small size only a small number of shovel tests were able to be excavated in each (shovel tests M1 – M6). Two of these could not be completed due to standing water. Most of the willow thicket was inaccessible due to the thick vegetation (willow and brambles), and three shovel tests (M510 – M511) were excavated at that location. In the small field and large fields, the grid pattern was used, with the spacing dependent on the probability zone. The STP numbers M7 – M60 were excavated in the small field, and numbers M6 – M505 in the large field. The large field fell within both the high and medium probability zones. The east edge of the field is marked by an abrupt boundary with saltwater marsh, which was indicated by muddy soil, abundant crab burrows, and a tall stand of *Phragmites*. The wetland area was 1 – 2 feet (0.3 – 0.6 meter) lower in elevation than the rest of the field, in which alfalfa and other low plants (less than 1 foot high) were growing. The high probability zone consisted of a 100-foot (30.5 meter) wide buffer from the edge of the wetland. The medium probability zone stretched from that 100-foot (30.5 meter) buffer through the remainder of the field. A small depression with several inches of standing water surrounded by wet soil and distinct vegetation was noted within the large field. There was no indication that this is an artificial pond; rather, it appears to be a natural depression. This depression was excluded from shovel testing, but STPs in the grid were placed around it. A total of six five archaeological sites were identified during the survey and recommended as potentially eligible for inclusion to the NRHP under criteria (d) (36 CFR 60.4) (Figure 7).

The John Mason House is situated at the intersection of Money Island Road and Mason Point Road. The house is situated on the western side of Money Island Road just outside of the project area. The house was recommended as potentially eligible as a contributing element part of the Elsinboro/Lower Alloways Creek District. The widening of the MIRAA will not impact the John Mason House. However, indirect impacts such as noise and vibration waves may need to be assessed, if this access alternative is selected as part of the proposed off-site project features of the new plant.

Coastal survey maps from 1842 (Figure 7) and the Wilmington topographic quadrangle from 1906 (Figure 8) were utilized to determine the presence or absence of historic structures along Money Island Road. Five structures are depicted on the 1842 map on the east side of Money Island Road. Two of the structures are located opposite the John Mason House. The survey revealed that the area nearest the intersection of Money Island Road and Mason Point Road was heavily disturbed and no evidence was found that would indicate that any intact archaeological remains were present. However, the area to the south produce a scatter of historic artifacts located within the approximate area of the second structure. This artifact scatter was designated as Site 28SA186 (Figure 7). Two structures and an orchard are depicted just west of Site 28SA183 (Figure 7) and may represent a house and associated barn. The house is still standing and was recorded during an architectural survey of the area in 1996 (CCRG 1996). The house is known as the Waddington House and was constructed circa the late eighteenth century to the early nineteenth century but has underwent exterior and internal renovations. The house and yard is easily demarcated by low, wet areas to the north, west, and east. Shovel test were placed to the south of the existing barn on the Waddington House property in an attempt to identify the additional structure just south of the house. No evidence was found that would indicate a structure was located at this location (Figure 9). The Waddington House is the former Estuary Enhancement Program field house. The Waddington House will not be impacted by the proposed MIRAA expansion.

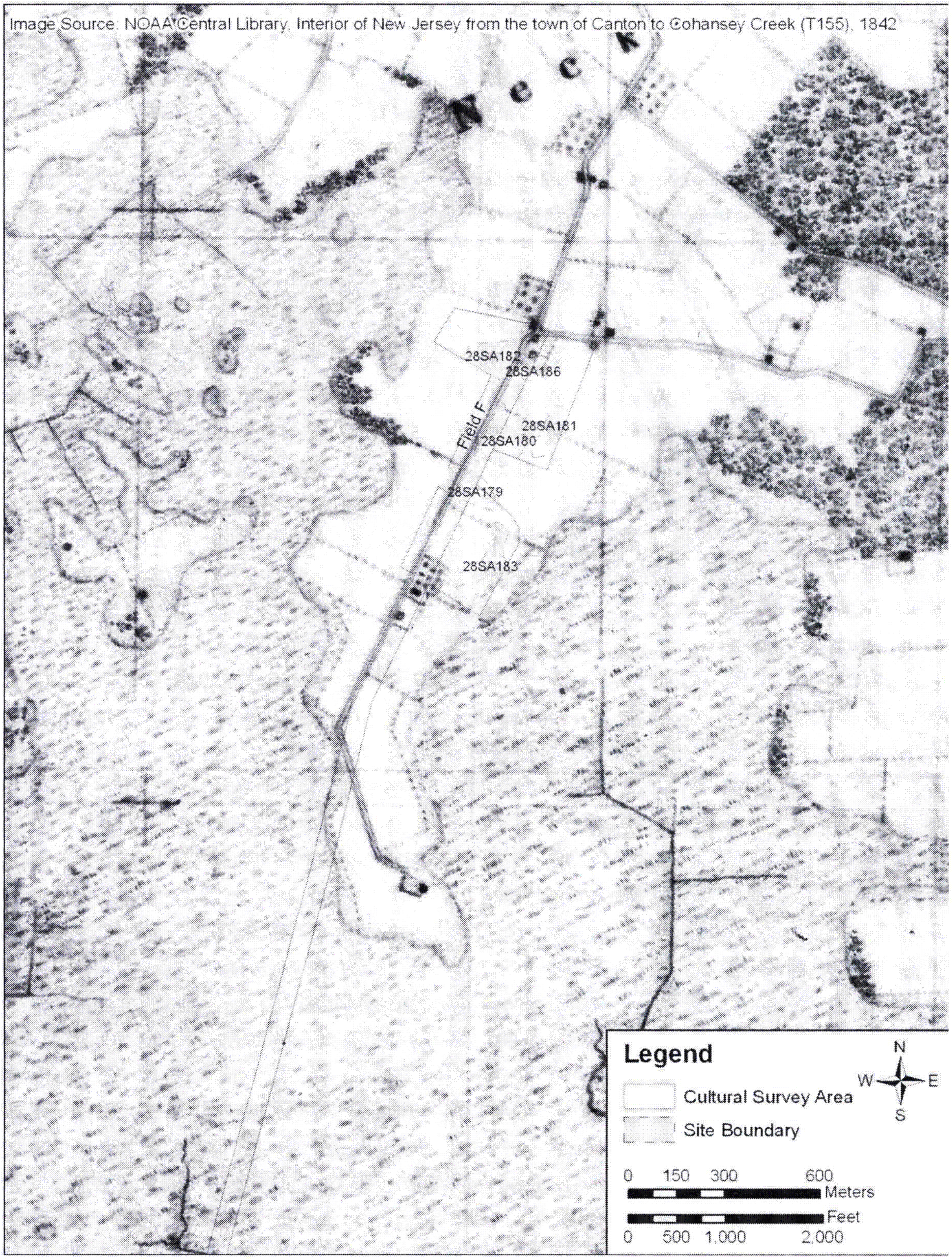


Figure 7. Coastal survey map of 1842 showing historic structures in relation to identified archaeological sites along the MIRAA.

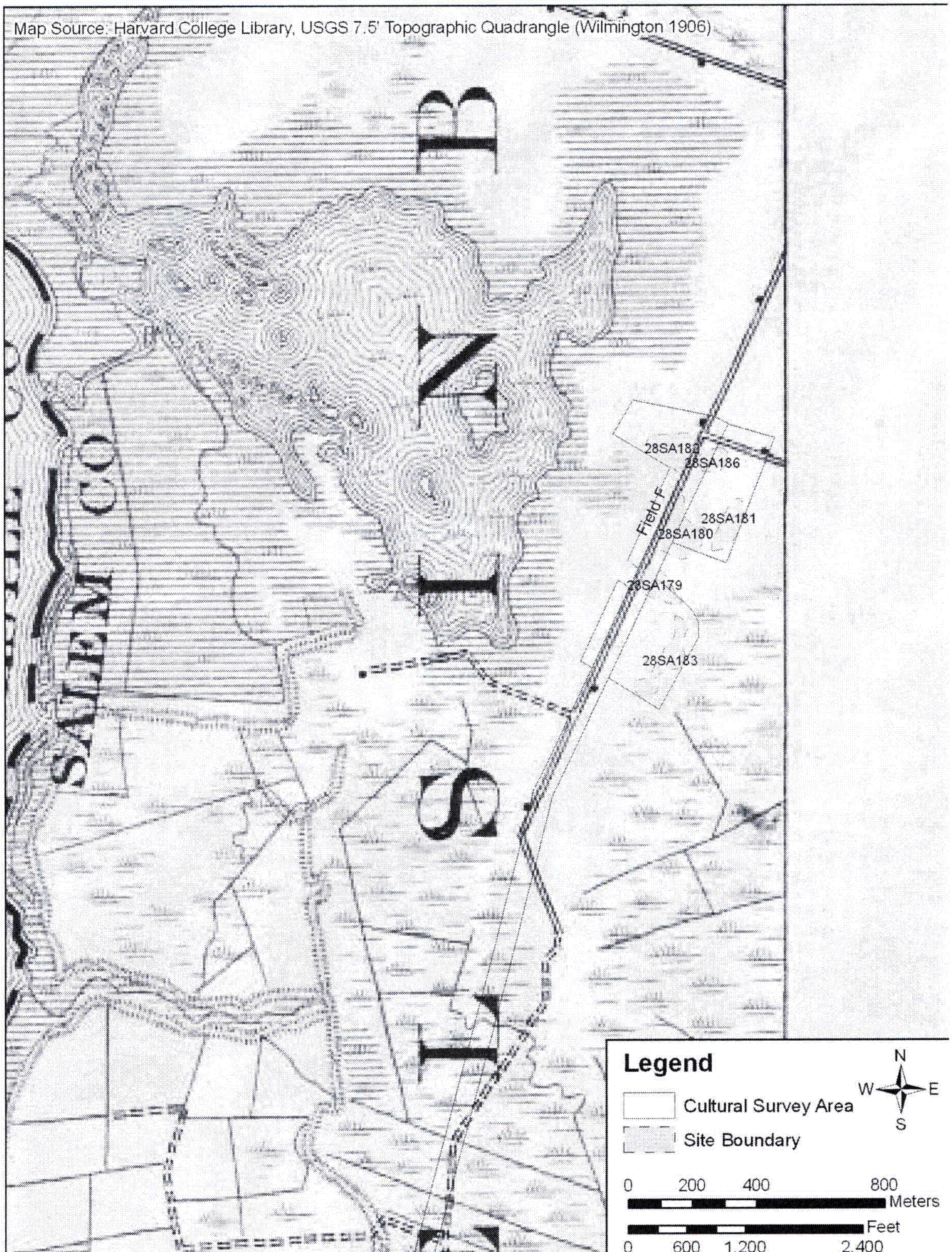


Figure 8. 1906 Wilmington, NJ topographic quadrangle showing historic structures in relation to identified archaeological sites along the MIRAA.

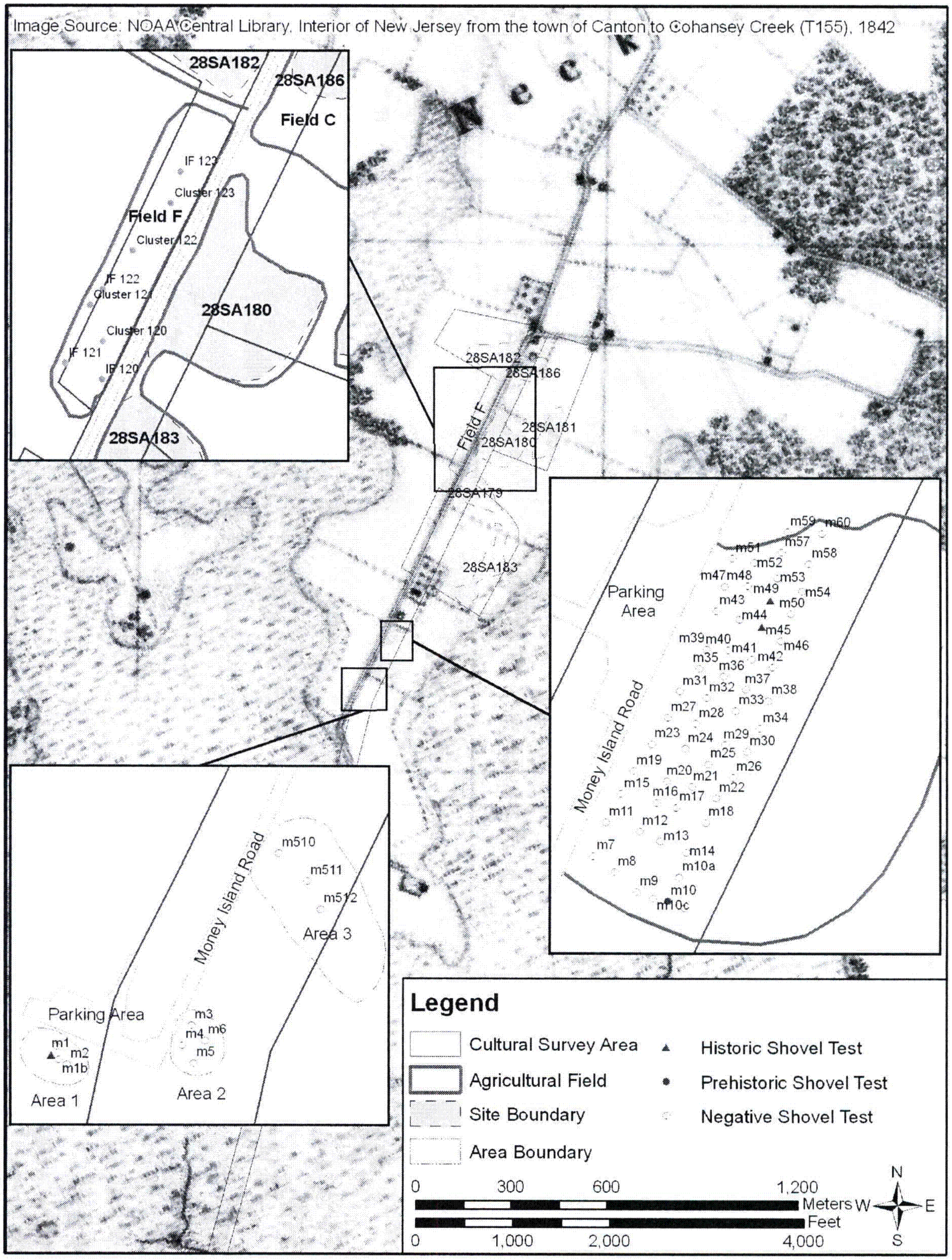


Figure 9. **Coastal survey map of 1842 showing shovel test locations in the southern portion of the MIRAA.**

ARTIFACT CLUSTERS AND ISOLATED FINDS

The pedestrian survey in the MIRAA right of way identified isolated artifacts within the area designated as Field C (see Figure 10, area denoted by red hatching). Field C measures approximately 5.52 acres (2.23 ha) and includes Site 28SA186. While the majority of artifacts were identified at Site 28SA186, isolated historic and prehistoric artifacts were collected in the part of the field outside the boundaries of Site 28SA186. The density and type of artifacts represented by these isolated finds and field scatters do not meet the criteria for classification as archaeological sites in New Jersey. Historic and prehistoric isolated finds are presented in Table 5 and Table 6. Due to the low density of artifacts, these artifacts recovered from clusters and isolated finds in Field C were determined to be re-deposited field scatter. Field C was revisited in November 2009 and the field was walked to gather additional information to better delineate the boundaries of Site 28SA186. No additional artifacts were identified outside of Site 28SA186.

Table 5. Historic Artifacts Recovered from Isolated Finds in Field C of the MIRAA.

Context	Artifact	Type	Count	Inception	Terminal
IF 19	Ceramic	Utilitarian redware; unglazed	1	late 18th c	19th c
IF 20	Tobacco Pipe	Stem; kaolin	1		
IF 21	Ceramic	Ironstone; plain	1	1844	present
IF 23	Ferrous metal	Chisel	1		
	Curved glass	Colorless	1		
IF 25	Ceramic	Ironstone; plain	1	1844	present
IF 26	Ceramic	Ironstone; plain	1	1844	present
IF 27	Ceramic	Stoneware; blue banded w/Bristol glazed interior	1	early 20th c	
IF 28	Ceramic	Utilitarian redware; brown glazed	1	late 18th c	19th c
IF 29	Ceramic	Ironstone; plain	1	1844	present
IF 30	Ceramic	Ironstone; plain	1	1844	present
IF 31	Ceramic	Refined stoneware; black glazed interior and exterior	1		
Total			12		
Prepared By/Date: ______ *Checked By/Date:* ______					

Table 6. Prehistoric Artifacts Recovered from Clusters and Isolated Finds in Field C of the MIRAA.

Context	Artifact	Material	Count	Period
Cluster 29	Prehistoric ceramic	Plain; indeterminate temper	1	
Cluster 37	Prehistoric ceramic	Plain; indeterminate temper	1	
IF 18	Prehistoric ceramic	Cord marked; sand tempered	1	Woodland
IF 36	Prehistoric ceramic	Cord marked; indeterminate temper	1	Woodland
IF 37	Prehistoric ceramic	Plain; sand and grit tempered	1	
	Prehistoric ceramic	Plain; indeterminate temper	1	
IF 22	Lithic	Shatter; light gray chert	1	
IF 24	Lithic	Shatter; quartz	1	
Total			**8**	
	Prepared By/Date: ______ *Checked By/Date:* ______			

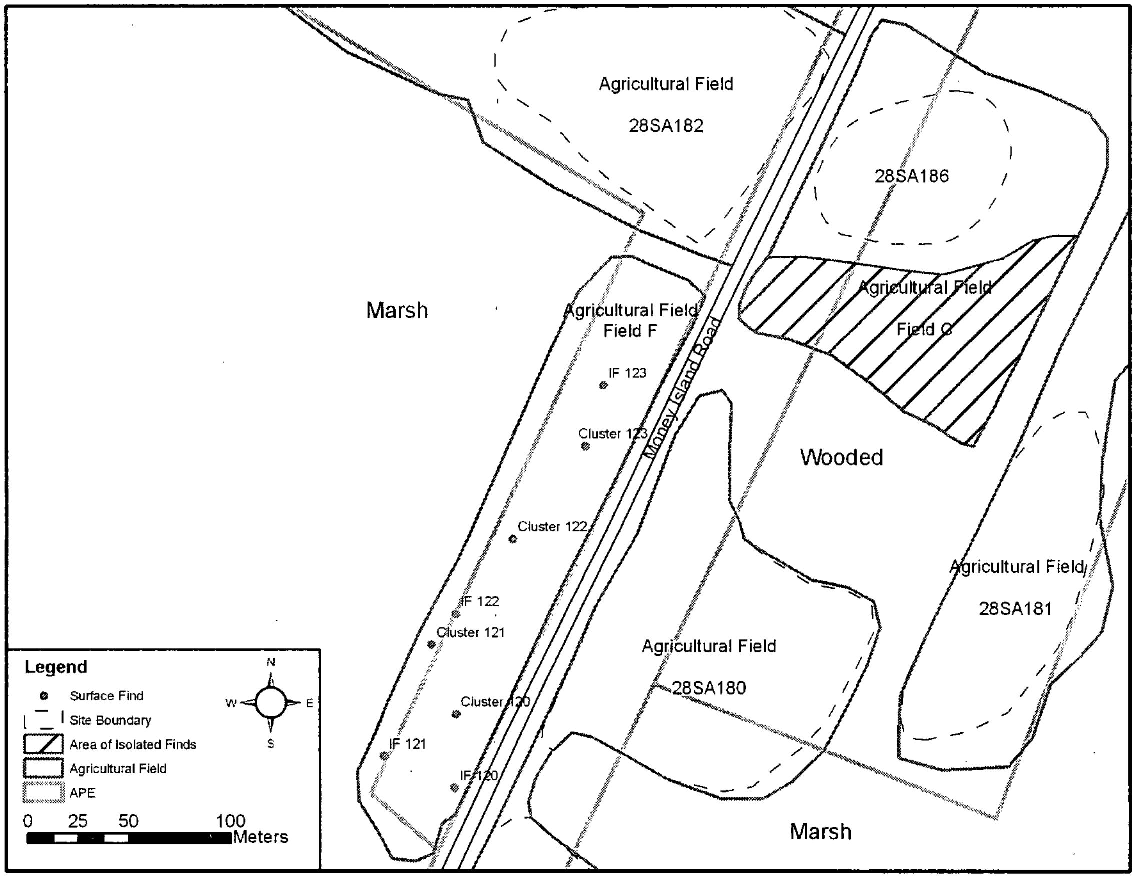


Figure 10. Fields C and F showing locations of Isolated Finds and Field Scatters

A pedestrian survey was conducted in the area designated as Field F (see Figure 10). Field F had been recently disced at the time of the survey and surface visibility ranged from 75 to 100 percent. A total of 11 historic and three prehistoric artifacts were recovered throughout the field with no discernible concentrations. Historic artifacts recovered from Field F included a British Brown stoneware sherd, redware sherds, a piece of olive bottle glass, and a piece of nondiagnostic metal. Prehistoric ceramics included one grit tempered ceramic sherd, one plain ceramic sherd, and one possible fire cracked rock. Due to the low density of artifacts and the absence of known structures or houses in Field F, the recovered artifacts represent re-deposited field scatter. Artifacts types are presented in Table 7 and 8.

Table 7. Historic Artifacts Recovered from Clusters and Isolated Finds in Field F of the MIRAA.

Context	Artifact	Type	Count	Inception	Terminal
Cluster 121	Ceramic	Utilitarian redware; black glazed	1	late 18th c	19th c
	Ceramic	Utilitarian redware; unglazed	1	late 18th c	19th c
Cluster 122	Ceramic	Utilitarian redware; black glazed	1	late 18th c	19th c
	Ceramic	Utilitarian redware; unglazed	1	late 18th c	19th c
	Ceramic	British brown stoneware	1	1690	1775
Cluster 123	Ceramic	Utilitarian redware; black glazed	3	late 18th c	19th c
IF 120	Metal	Spring	1		
IF 121	Curved glass	Olive	1		
IF 123	Ceramic	Utilitarian redware; dark brown glazed	1	late 18th c	19th c
Total			**11**		

*Prepared By/Date:*__________
*Checked By/Date:*__________

Table 8. Prehistoric Artifacts Recovered from Clusters and Isolated Finds in Field F of the MIRAA.

Context	Artifact	Material	Count	Period
Cluster 122	Prehistoric ceramic	Plain; grit tempered	1	
IF 120	Prehistoric ceramic	Plain; indeterminate tempered	1	
IF 121	Lithic	Poss. FCR; quartzite	1	
Total			**3**	
	Prepared By/Date:_______ Checked By/Date:_______			

A pedestrian survey and shovel testing was conducted in the area designated as Large Field (Figure 11). Site 28SA183 is located on the western edge of the Large Field while the remainder of the field contained field scatter and isolated prehistoric artifacts. The density and type of artifacts represented by these isolated finds and field scatters do not meet the criteria for classification as archaeological sites in New Jersey (Table 9 and Table 10). Prehistoric sherds were found in isolated finds 18, 36, and 37). Due to the low density of artifacts, these artifacts recovered from clusters and isolated finds in Field C were determined to be re-deposited field scatter.

Table 9. Historic Isolated Finds Recovered from the Large Field

Artifact	Type	Count	Incept	Terminal
Ferrous metal	Square stock fragment	1		
Brick	Handmade; ash glazed	1		1900
Brick	Handmade	4		1900
Flat glass	Blue-green	2		
Flat glass	Light aqua	1		
Nail	Indeterminate	1		
Plaster		2		
Cuprous metal	Shotgun shell base	1		
Ceramic	Creamware; plain	1	1762	1830
Ceramic	pearlware; plain	3	1780	1830
Ceramic	Utilitarian redware; brown glazed	2	late 8th c	19th c
Ceramic	Utilitarian redware; dark brown glazed	1	late 8th c	19th c
Curved glass	Blue-green	2		
Curved glass	Cobalt blue	1		
Curved glass	Colorless; embossed	1		
Curved glass	Colorless; machine made	1	1900	
Curved glass	Colorless	3		
Curved glass	Light aqua	3		
Curved glass	Opaque olive	1		
Ferrous metal	Indeterminate	3		
Total		**35**		
Prepared By/Date: JEB 12-4-09 Checked By/Date: PHG 12-4-09				

Table 10. Prehistoric Isolated Finds and Scatters Recovered from the Large Field

Artifact	Material	Count
Prehistoric ceramic	Cordmarked; quartz tempered	3
Prehistoric ceramic	Cordmarked; sand to grit tempered	1
Prehistoric ceramic	Plain; sand tempered	3
Prehistoric ceramic	Plain; sand and mica tempered	1
Prehistoric ceramic	Indeterminate; quartz tempered	1
Prehistoric ceramic	Indeterminate; residual	16
Lithic	Shatter; brown chert w/cortex	1
Lithic	Shatter; chalky dark gray-black chert; cortex	1
Lithic	Flake; tan chert	1
Lithic	FCR; quartzite; fine grained	1
Lithic	FCR	1
Total		**30**
		Prepared By/Date: JEB 12-4-09 *Checked By/Date: PHG 12-4-09*

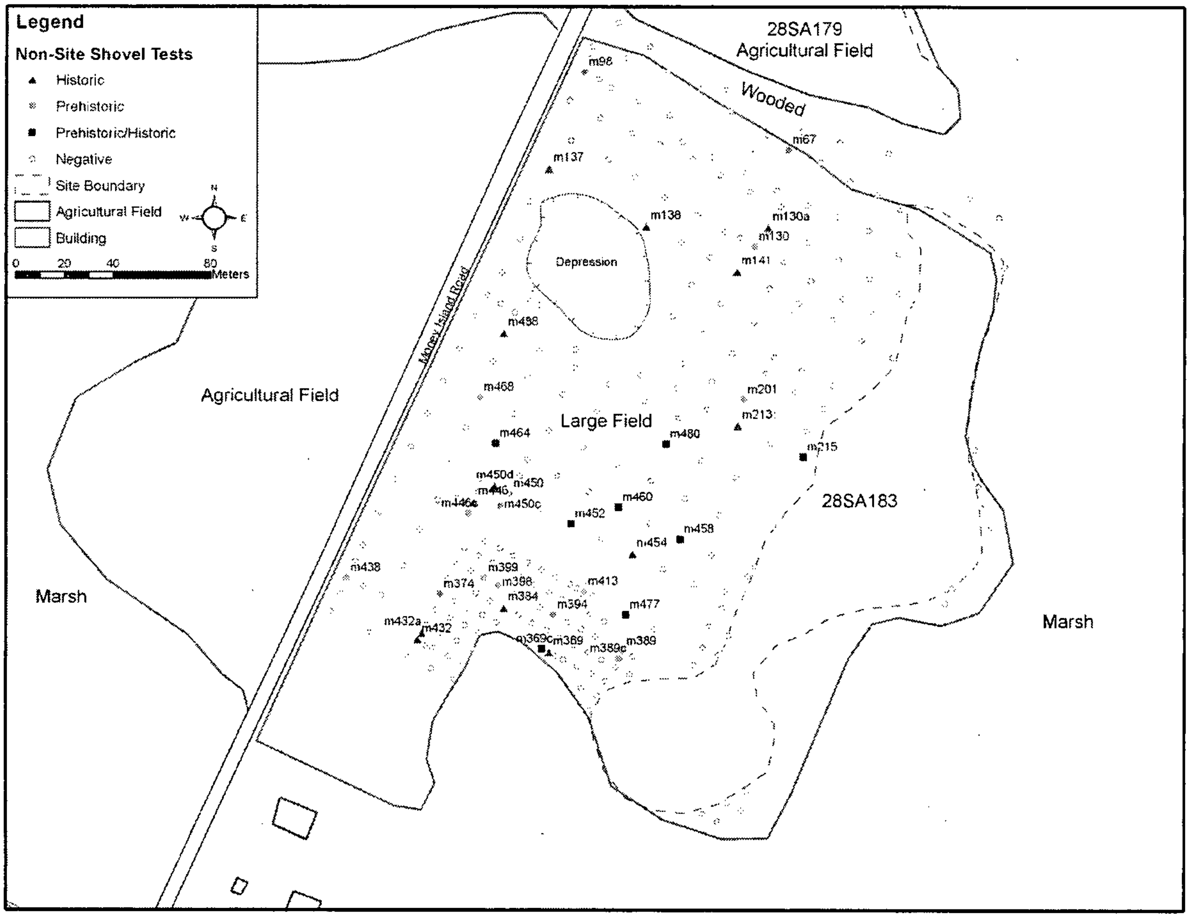


Figure 11. Large Field showing locations of Isolated Finds and Field Scatter

Site 28SA179

Site 28SA179 is a multicomponent site identified in an area that measures approximately 490 feet (150 meters) east/west by 330 feet (100 meters) north/south (Figure 12). The site encompasses 2.46 acres [1 ha] and is located on the east side of Money Island Road approximately 1640 feet (500 meters) south of the intersection of Mason Point Road and Money Island Road. The site boundaries were determined by the distribution of artifacts on the surface. Site 28SA183 is located to the south and separated from Site 28SA179 by a stand of trees, while Site 28SA180 is located approximately 165 feet (50 meters) to the north. Wetlands are located to the east and west of the site. The field had recently been disced and visibility was greater than 75 percent. The site was surveyed by a pedestrian survey. A grid was established with transects running east to west across the field spaced at 13 foot (4 meter) intervals. A total of 91 artifacts were recovered during the pedestrian survey (Tables 11 and 12).

Table 11. Historic Artifacts Recovered from Site 28SA179

Artifact	Type	Count	Inception	Terminal
Ferrous metal	Hatchet	1		
Ferrous metal	Washer	1		
Brick	Unidentified	7		
Flat glass		1		
Ceramic	Creamware; plain; lighter yellow color	7	1775	1820
Ceramic	Pearlware; banded	1	1780	1830
	Pearlware; blue painted w/banded rim	1	1780	1830
	Pearlware; blue transfer print	1	1780	1830
	Pearlware; plain	2	1780	1830
Ceramic	Utilitarian redware; black glazed	17	late 18th c	19th c
	Utilitarian redware; brown glazed	1	late 18th c	19th c
	Utilitarian redware; light brown glazed	1	late 18th c	19th c
	Utilitarian redware; dark brown glazed	1	late 18th c	19th c
	Utilitarian redware; reddish-brown glazed	1	late 18th c	19th c
	Utilitarian redware; green glazed	1	late 18th c	19th c
	Utilitarian redware; yellow slip	1	late 18th c	19th c
	Utilitarian redware; multicolor slip w/banding	1	late 18th c	19th c
	Utilitarian redware; unglazed	19	late 18th c	19th c
Ceramic	Refined earthenware; poss. Jackfield; black glazed	1	1740	1780
Ceramic	White salt glazed stoneware; hand painted overglaze red floral	1	1740	1775
Ceramic	CC ware; plain	3	1830	1860
	CC ware; polychrome	1	1830	1875
	CC ware; spongeware	1	1830	1860
Ceramic	Late blue transfer print	1	1830	1860
Ceramic	Late mulberry transfer print	1	1830	1840
Curved glass	Colorless	1		
Indeterminate	Ceramic; possible gastrolith	1		
Total		**76**		

Prepared By/Date: JEB/6-19-09
Checked By/Date: PHG/6-19-09

Table 12. Prehistoric Artifacts Recovered from Site 28SA179

Artifact	Material	Count	Period
Prehistoric ceramic	Cord marked, fabric impressed; indeterminate temper	1	Woodland
Prehistoric ceramic	Indeterminate; sand tempered	1	
Prehistoric ceramic	Plain; indeterminate temper	2	
Prehistoric ceramic	Plain; sand tempered	3	
Prehistoric ceramic	Plain; sand and grit tempered	2	
Lithic	Flake; black chert	1	
Lithic	Flake; light gray chert	1	
Lithic	Flake; dark brownish green chert	1	
Lithic	Low grade chert nodule	1	
Lithic	Core; nodular chert	1	
Lithic	Groundstone	1	
Total		**15**	

Prepared By/Date: JEB/6-19-09
Checked By/Date: PHG/6-19-09

The historic component consists of ceramics, glass, and metal artifacts. The most frequently recovered artifacts were from the Kitchen Group, accounting for 95.6 percent (n=65) of the historic assemblage. The Kitchen Group artifacts include domestic artifacts such as plates, cups, bowls, etc. manufactured from an array of ceramics, glass, and metal. Kitchen Group artifacts recovered from Site 28SA179 include ceramics (n=64) and container glass (n=1). Utilitarian redwares comprise the majority of recovered historic ceramics. A variety of glaze colors as well as two slip colors were identified on the redware sherds. Black glazing was identified on 17 redware sherds, with one sherd containing an incised line. Other glaze colors include brown, dark and light brown, a reddish-brown, and green. A multicolor slip sherd with brown and black banding was identified on one sherd, while a yellow slip was identified on another sherd. Nineteen redware sherds were unglazed, of which one had an incised line. Refined stoneware included one rim sherd of white salt glazed decorated with a handpainted red floral pattern, ca. 1740 – 1775. Refined earthenwares recovered include creamware (n=7), pearlware (n=5), and cream-colored (CC) ware (n=5). Additional refined earthenware sherds included one sherd decorated with a late blue transfer print, one sherd decorated with a mulberry transfer print, and one refined redware sherd identified as a possible Jackfield. This sherd represents an early refined ware type that was commonly found in teaware sets (Hume, 1969).

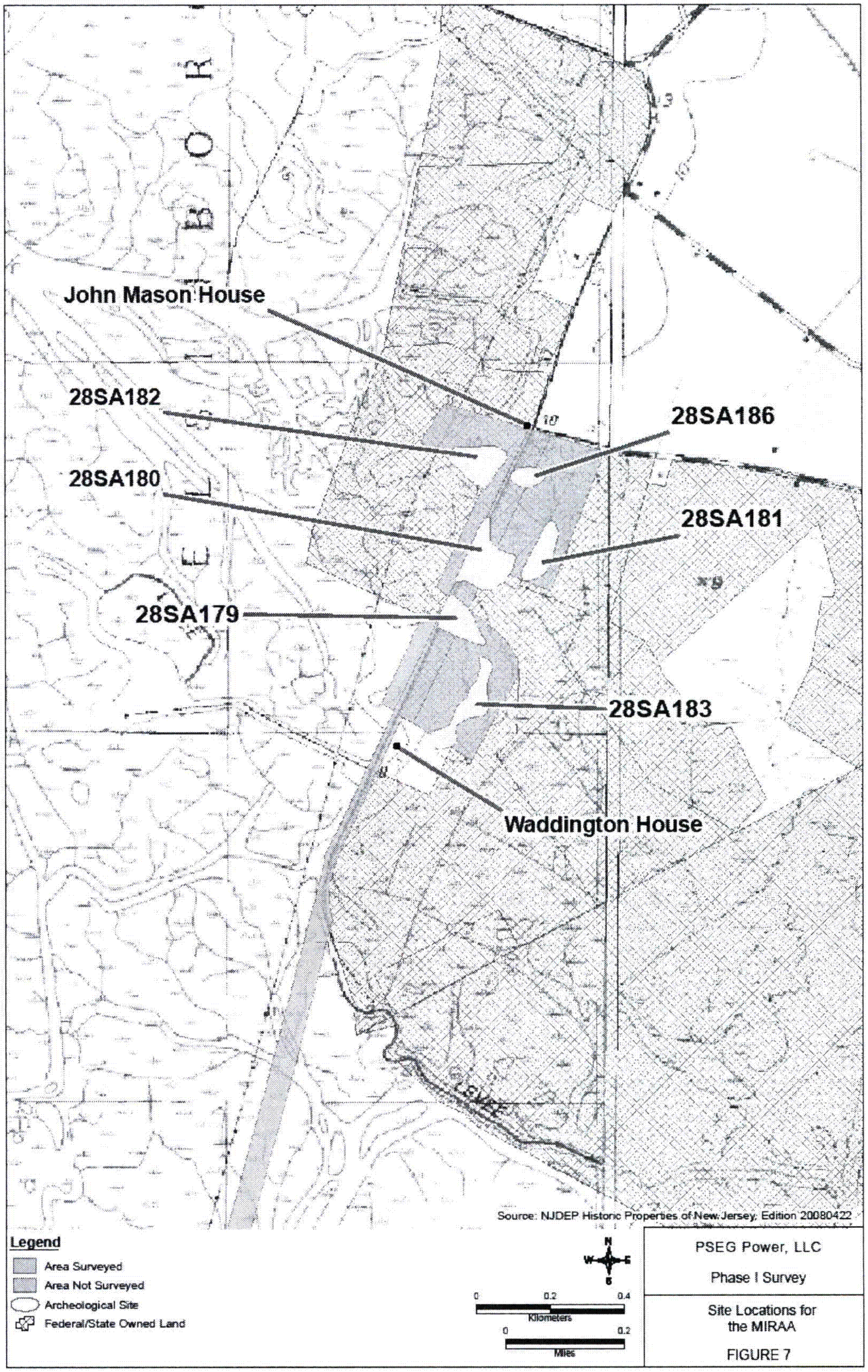
The creamware sherds exhibit a plain and lighter yellow color ca. the late eighteenth century to the early nineteenth century. Decorated pearlware sherds (n=3) include blue transfer print, banded, and blue-painted with a blue-banded rim, which indicate a date ca. 1780 – 1830. The remaining three sherds were undecorated. Decorated CC ware sherds include polychrome (n=1) and spongeware (n=1), with the remaining sherds undecorated (n=3). Between 1830 and 1860, CC ware was a popular ceramic type, however, the polychrome decoration continued in popularity to ca. 1875. The one colorless container glass fragment was from a panel bottle.

One piece of flat glass comprised the Architecture Group (1.47 percent). Two artifacts, a metal hatchet fragment and a large metal washer, comprise the Activities Group (2.94 percent). Eight artifacts were recovered that were not assigned to a functional group. These include seven brick fragments and one indeterminate ceramic fragment.

The prehistoric component most likely dates ca. the Middle or Late Woodland period, although an Archaic component may also exist at the site. Prehistoric artifacts include ceramic sherds (n=9), lithic debris (n=3), one possible core of nodular chert, a piece of groundstone, and two low-grade chert nodules. The ceramic sherds exhibit sand tempering (n=4), and sand tempering intermixed with grit (n=2). The temper on three sherds could not be determined. Surface decoration was identified on one sherd but decoration type could not be determined based on the small sherd size. The lithic artifacts consist of black-colored, very light gray-colored, and dark brownish-green chert debitage. The groundstone exhibited possible honing.

<u>Recommendation</u>. Site 28SA179 is a multicomponent site identified during a pedestrian survey of 2.46 acres (1 ha) of plowed agricultural field. Prior to the survey, the site area was identified as having a high potential to contain archaeological resources. This site is recommended as potentially eligible for inclusion to the NRHP under criteria (d) (36 CFR 60.4). The historic component was distributed throughout the site and most likely represents the remains of a historic occupation ca. the mid-eighteenth century to the nineteenth century. Although the majority of historic artifacts are redwares, the recovery of colonial and eighteenth century ceramics indicate that an early historic domestic occupation is possible at Site 28SA179. While the architectural history of the region is well documented, very little supporting archaeological data is available for the early historic period of the area. Additionally, the historic component may contribute to the potential salt hay farming district that was previously nominated for inclusion to the NRHP. The prehistoric component may represent a Kipp Island or Webb Phase camp during the Middle to Late Woodland period.

As a result, MACTEC recommends that Site 28SA179 is potentially eligible for inclusion on the NRHP.


John Mason House
28SA182
28SA186
28SA180
28SA181
28SA179
28SA183
Waddington House
Source: NJDEP Historic Properties of New Jersey, Edition 20080422
Legend
Area Surveyed
Area Not Surveyed
Archeological Site
Federal/State Owned Land
N
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E
S
0
0.2
0.4
Kilometers
0
0.2
Miles
PSEG Power, LLC
Phase I Survey
Site Locations for
the MIRAA

FIGURE 7

Site 28SA180

Site 28SA180 is a multicomponent site identified in an area that measures approximately 328 feet (100 meters) east/west by 656 feet (200 meters) north/south in a plowed agricultural field (see Figure 12). The site encompasses 4.05 ac.(1.6 ha) and is located on the east side of Money Island Road, approximately 984 feet (300 meters) south of the intersection of Mason Point Road and Money Island Road. The site boundaries were determined by the distribution of artifacts on the surface. Site 28SA179 is located 164 feet (50 meters) to the south while Site 28SA181 is located 82 feet (25 meters) to the east. The area to the west contains a linear agricultural field bounded by a wetland. The field had recently been disced, and visibility was greater than 75 percent. The site was surveyed by a pedestrian survey. A grid was established with transects running east to west across the field spaced at 13 feet (4 meters) intervals. A total of 119 artifacts were recovered during the pedestrian survey (Tables 13 and 14).

The historic component consists of ceramics, glass, and metal artifacts. The most frequent artifacts recovered were from the Kitchen Group (n=94) representing 93.1 percent of the historic assemblage. The Kitchen Group included ceramics (n=82) and curved glass (n=12). Forty-five sherds of utilitarian redware were recovered from the site. Black glazing was the most frequent identified glaze and was found on a base, a rim, and 17 body sherds. Nine sherds had a brown glaze and one of the brown-glazed rim sherds had an incised decoration present. A light brown glaze was present on two sherds and one sherd had a darker brown glaze. The remaining redware sherds were unglazed (n= 14). One British brown stoneware body sherd was recovered from the site and dates ca. late seventeenth to late eighteenth century.

Two sherds of undecorated creamware were recovered that exhibited a light yellow color, ca. 1775 – 1820. Twelve sherds of pearlware, ca. 1780s to the 1830s, were recovered and include plain sherds (n=6), a sherd decorated with a blue transfer print (n=1), a sherd with a polychrome decoration (n=2), blue hand painted sherds (n=2), and blue banding (Exhibit 2). The CC ware sherds, ca. mid to late nineteenth century, included plain sherds (n=10), a mocha decorated sherd, and a sponged decorated sherd (Exhibit 1). Two plain ironstone body sherds, ca. post-1844, were recovered. One sherd of hard paste porcelain that was popular during the nineteenth century was identified. Seven refined ceramic sherds were classified as indeterminate either because they were small or burned, or did not contain enough characteristics to determine the ware type. Curved glass colors identified included aqua (n=3), amber (n=1), bright green (n=1), green-blue (n=1), olive (n=3), and colorless (n=3). The majority of the glass fragments were from the body of containers, either bottles or jars. Two rims and one base were also identified.

Activities (n=3) and Architectural Group (n=3) artifacts each represent approximately 3 percent of the historic artifact assemblage. The Activities Group artifacts include two fragments of blue-green insulator glass. One fragment of insulator glass is attributed to the Hemingray Glass Company based on the letters "HEM …A." The presence of "drip points" on the bottom of one of the fragments places the insulator as likely manufactured in the twentieth century, as this feature was patented by Hemingray on May 2, 1893 (Willis, 2002 http://www.hemingray.info/database/faq.html). Additionally, one metal fragment from a stock was identified. Three flat glass fragments were identified as Architectural Group artifacts. The single Clothing Group artifact is a 2-hole, white ceramic, Prosser button with a 0.46 inch (1.2 cm) diameter. This button was manufactured post 1840 (Sprague, 2002). Six artifacts were recovered that were not assigned to a functional group. These include five brick fragments, three of which were handmade with an ash glazing, and one indeterminate metal fragment.

Table 13. Historic Artifacts Recovered from Site 28SA180

Artifact	Type	Count	Inception	Terminal
Curved glass	Blue green insulator fragments	2	20th c	
Ferrous metal	Stock	1		
Brick	Handmade; ash glazed	3		
Brick	Indeterminate	2		
Flat glass	Light green	3		
Ceramic	White; 2 hole Prosser button	1	After 1840	
Ceramic	Creamware; plain; lighter yellow color	2	1775	1820
Ceramic	Pearlware; blue-banded rim	1	1780	1830
Ceramic	Pearlware; blue painted	2	1780	1830
Ceramic	Pearlware; blue transfer print	1	1780	1830
Ceramic	Pearlware; polychrome	2	1780	1830
Ceramic	Pearlware; plain	6	1780	1830
Ceramic	Utilitarian redware; black glazed	19	Late 18th c	19th c
Ceramic	Utilitarian redware; light brown glazed	2	Late 18th c	19th c
Ceramic	Utilitarian redware; brown glazed	9	Late 18th c	19th c
Ceramic	Utilitarian redware; dark brown glazed	1	Late 18th c	19th c
Ceramic	Utilitarian redware; unglazed	14	Late 18th c	19th c
Ceramic	British brown stoneware	1	1690	1775
Ceramic	CC ware; mocha	1	1830	1860
Ceramic	CC ware; spongeware	1	1830	1860
Ceramic	CC ware; plain	10	1830	1860
Ceramic	Ironstone; plain	2	1844	Present
Ceramic	Hard paste porcelain	1	19th c	
Ceramic	Indeterminate refined	7		
Curved glass	Amber	1		
Curved glass	Aqua	3		
Curved glass	Bright green	1		
Curved glass	Green-blue	1		
Curved glass	Olive	3		
Curved glass	Colorless	3		
Indeterminate	Metal	1		
Total		**107**		

Prepared By/Date: JEB/6-19-09
Checked By/Date: PHG/6-19-09

Table 14. Prehistoric Artifacts Recovered from Site 28SA180

Artifact	Material	Count	Period
Prehistoric ceramic	Cord marked; grit tempered	1	Woodland
Prehistoric ceramic	Cord marked; sand tempered	2	Woodland
Prehistoric ceramic	Plain; grit tempered	1	
Prehistoric ceramic	Plain; sand and grit tempered	1	
Prehistoric ceramic	Plain; indeterminate temper	2	
Lithic	Flake; poss. Bifacial thinning flake; brown chert	1	
Lithic	Shatter; tan chert	3	
Lithic	Shatter; jasper	1	
Total		**12**	

Prepared By/Date: JEB/6-19-09
Checked By/Date: PHG/6-19-09

The prehistoric component most likely dates ca. the Middle or Late Woodland period, although an Archaic component may also exist at the site. Prehistoric artifacts include ceramic sherds (n=7), shatter fragments (n=4), and one flake. The ceramic temper types included sand (n=2), sand and grit (n=1), and indeterminate (n=2). No decoration was identified on the sherds. The lithic shatter was manufactured from a tan-colored chert (n=3) and jasper (n=1). A possible bifacial thinning flake, manufactured from a brown chert, was also recovered from the site.

Recommendation. Site 28SA180 is a multicomponent site identified during a pedestrian survey of 4.05 acres (1.64 ha) of plowed agricultural field. Prior to the survey, the site area was identified as having a high potential to contain archaeological resources. This site is recommended as potentially eligible for inclusion to the NRHP under criteria (d) (36 CFR 60.4). The historic component was distributed throughout the site and most likely represents the remains of a historic occupation ca. the eighteenth to nineteenth century. Although the majority of historic artifacts are redwares, the recovery of colonial and eighteenth century ceramics indicates that an early historic occupation is possible at Site 28SA180. While the architectural history of the region is well documented, very little supporting archaeological data is available for the early historic period of the area. Additionally, the historic component may contribute to the potential salt hay farming district that was previously nominated for inclusion to the NRHP. The prehistoric component most likely represents a Middle to Late Woodland occupation.

MACTEC recommends that Site 28SA180 is potentially eligible for inclusion on the NRHP.

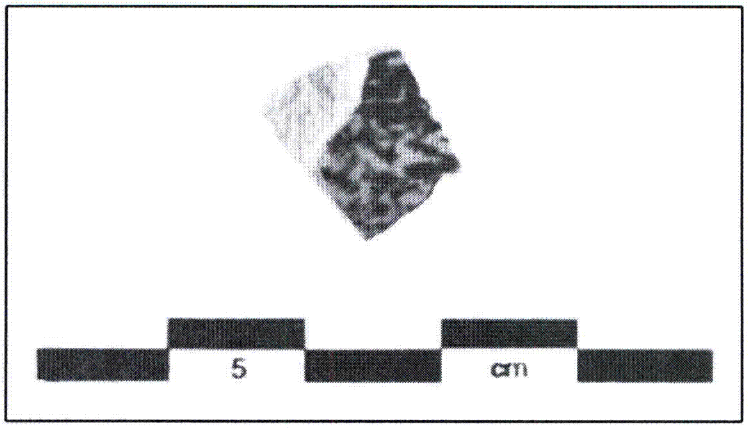

Exhibit 1.
Sherd of CC Spongeware Recovered from Site 28SA180

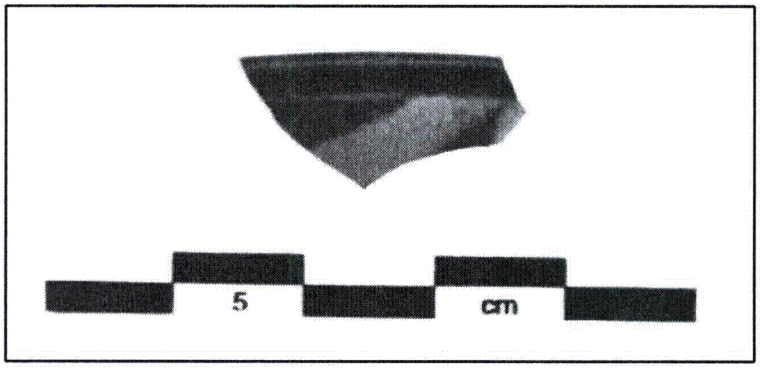

Exhibit 2.
A Blue-Painted Pearlware Rim Sherd Recovered from Site 28SA180

Site 28SA181

Site 28SA181 is a multicomponent site identified in an area that measures approximately 229 feet (70 meters) east/west by 574 feet (175 meters) north/south. The site encompasses 2.17 acres (0.88 ha). It is located on the east side of Money Island Road, approximately 656 feet (200 meters) south from Mason Point Road (see Figure 12). The field had recently been disced, and visibility was greater than 75 percent. A grid was established with transects running east to west across the field spaced at 13 foot (4 meter) intervals. A total of 54 artifacts were recovered from the surface (Tables 15 and 16).

The most frequently recovered artifacts were from the Kitchen Group (n=47) accounting for 95.9 percent of the historic assemblage. The Kitchen Group included ceramics (n= 42) and container glass (n= 5). The ceramics were dominated by utilitarian redwares in black and brown glazes. Black was the most frequent glaze color with 11 sherds, while brown glazing was identified on three of the sherds. Refined stoneware was also recovered from the site and included a rim and a body sherd. The body sherd exhibited a molded white salt glaze ca. the mid to late eighteenth century. One body sherd exhibited a Bristol exterior; Albany slipped interior stoneware was also identified. This combination of glaze and slip was popular from the 1880s to the 1920s. Refined earthenwares include creamware (n=4), pearlware (n=6), CC ware (n=3), and hard paste porcelain (n=2). The plain creamware sherds had a lighter yellow color and date ca. the late eighteenth to early nineteenth century. The pearlware sherds included four undecorated, one decorated with a blue and black transfer print, ca. 1780s – 1830s, and one decorated with a blue-banded rim, ca. 1780s – 1830s. The CC ware sherds included two undecorated sherds and one sherd decorated with blue-edged and polychrome, ca. the mid to late nineteenth century. The hard paste porcelain sherds were undecorated.

Three fragments of aqua container glass, one each from the base, body, and lip, were identified. One body fragment of colorless glass and a fragment of a milk glass canning lid were the remaining container glass artifacts. Two pieces of flat glass comprised the Architecture Group (4.0 percent). One indeterminate brick fragment was also identified but was not included in a functional group.

The prehistoric component most likely dates ca. the Middle or Late Woodland period, although an Archaic component may also exist at the site. The prehistoric assemblage consisted on one sand tempered ceramic, two shatter fragments, and one biface fragment. The ceramic sherd had an indistinguishable decoration. It was too small to accurately identify the method of decoration and can generally be attributed to the Woodland Period. The two shatter fragments were manufactured from brown chert and quartz, while the biface fragment was manufactured from a gray chert.

Recommendation. Site 28SA181 is a multicomponent site identified during a pedestrian survey of 2.17 acres (0.88 ha) of plowed agricultural field. Prior to the survey, the site area was identified as having a high potential to contain archaeological resources. This site is recommended as potentially eligible for inclusion to the NRHP under criteria (d) (36 CFR 60.4). The historic component was distributed throughout the site, and most likely represents the remains of a historic occupation ca. the eighteenth to nineteenth century. Although the majority of historic artifacts are redwares, the recovery of eighteenth century ceramics indicates that an early historic occupation is possible at Site 28SA181. While the architectural history of the area is well documented, very little supporting archaeological data is available for the early historic period of the area. Additionally, the historic component may contribute to the potential salt hay farming district that was previously nominated for inclusion to the NRHP. The prehistoric component most likely represents a small campsite occupied during the Middle to Late Woodland period.

MACTEC recommends that Site 28SA181 is potentially eligible for inclusion on the NRHP.

Table 15. Historic Artifacts Recovered from Site 28SA181

Artifact	Type	Count	Incept	Terminal
Brick	Indeterminate	1		
Flat glass	Light green	2		
Ceramic	Creamware; plain; lighter yellow color	3	1775	1820
Ceramic	Creamware; plain; darker yellow color	1	1762	1780
Ceramic	Pearlware; banded	1	1780	1830
Ceramic	Pearlware; black transfer print	1	1780	1830
Ceramic	Pearlware; blue transfer print	1	1780	1830
Ceramic	Pearlware; plain	3	1780	1830
Ceramic	Utilitarian redware; black glazed	11	late 18th c	19th c
Ceramic	Utilitarian redware; brown glazed	3	late 18th c	19th c
Ceramic	Utilitarian redware; unglazed	9	late 18th c	19th c
Ceramic	White salt glazed stoneware; molded	2	1740	1775
Ceramic	CC; blue-edged	1	1830	1860
Ceramic	CC; polychrome	1	1830	1875
Ceramic	CC; plain	1	1830	1860
Ceramic	Hard paste porcelain	2	19th c	
Ceramic	Bristol glazed interior; Albany slip interior stoneware	1	1880s	1920s
Ceramic	Indeterminate refined	1		
Curved glass	Aqua	3		
Curved glass	Milk glass	1		
Curved glass	Colorless	1		
Total		**50**		
Prepared By/Date: JEB 6-19-09 *Checked By/Date: PHG 6-19-09*				

Table 16. Prehistoric Artifacts Recovered from Site 28SA181

Artifact	Material	Count	Period
Prehistoric ceramic	Indeterminate; sand tempered	1	
Lithic	Shatter; brown chert	1	
Lithic	Shatter; quartz	1	
Lithic	Biface; gray chert	1	
Total		**4**	
Prepared By/Date: JEB 6-19-09 *Checked By/Date: PHG 6-19-09*			

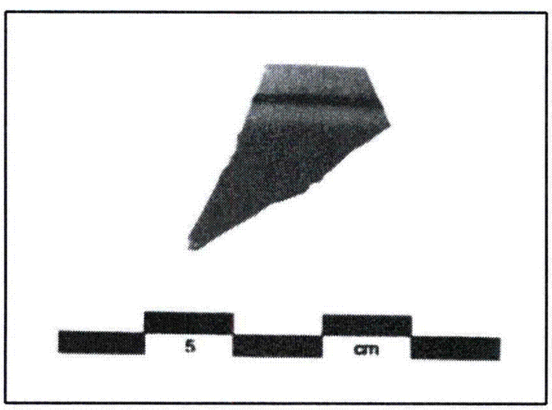

Exhibit 3.
A Banded Pearlware Rim Recovered from Site 28SA181

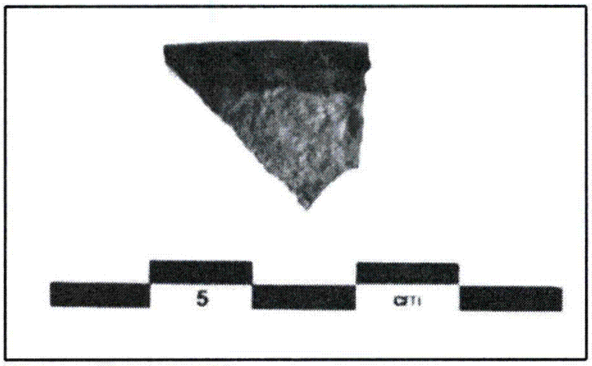

Exhibit 4.
A Blue-Edged CC Ware Sherd Recovered from Site 28SA181

Site 28SA182

Site 28SA182 is a multicomponent site identified in an area that measures approximately 410 feet (125 meters) east/west by 360 feet (110 meters) north/south in a plowed agricultural field. The site is located in a plowed agricultural field that is 6.56 acres (2.65 ha). However, artifacts were only recovered from the eastern end of the field in an area approximately 3 acres (1.2 ha) in size. The site is located on the western side of Money Island Road, approximately 229 feet (70 meters) south of the intersection of Mason Point Road and Money Island Road (see Figure 12). The site boundaries were determined by the distribution of artifacts on the surface. A linear agricultural field (Field F) is located to the south along Money Island Road, while a large agricultural field (Field C) is located to the east across Money Island Road. The field had recently been disced and visibility was greater than 75 percent. The site was surveyed by a pedestrian survey. A grid was established with transects running east to west across the field spaced at 13 foot (4-meter) intervals. A total of 70 artifacts were recovered during the pedestrian survey (Tables 17 and 18).

Table 17. Historic Artifacts Recovered from Site 28SA182

Artifact	Type	Count	Inception	Terminal
Ferrous metal	Spring	1		
Brick	Handmade; ash glazed	1		
Flat glass	Light green	1		
Ceramic	Chinese export porcelain	1	1660	1800
Ceramic	Utilitarian redware; black glazed	13	late 18th c	19th c
Ceramic	Utilitarian redware; brown glazed	5	late 18th c	19th c
Ceramic	Utilitarian redware; light brown to yellow glazed	1	late 18th c	19th c
Ceramic	Utilitarian redware; unglazed	3	late 18th c	19th c
Ceramic	White salt glazed stoneware; plain	1	1740	1775
Ceramic	Refined stoneware; brown glazed interior/exterior	1		
Ceramic	Slipware; dark yellow glazed	1	1670	1795
Ceramic	British brown stoneware	1	1690	1775
Ceramic	North American stoneware; gray w/cobalt decoration	2	19th c	
Ceramic	CC ware; plain	2	1830	1860
Ceramic	Flow blue	1	1844	1860
Ceramic	Ironstone; plain	2	1844	present
Curved glass	Aqua	2		
Curved glass	Blue-green	1		
Curved glass	Bright green	1		
Curved glass	Light green	1		
Curved glass	Milk glass	2		
Total		**44**		
Prepared By/Date: JEB 6-19-09 *Checked By/Date: PHG 6-19-09*				

Table 18. Prehistoric Artifacts Recovered from Site 28SA182

Artifact	Material	Count	Period
Prehistoric ceramic	Plain; grit tempered	3	Indet.
Prehistoric ceramic	Plain; sand tempered	5	
Prehistoric ceramic	Plain; sand to grit tempered	2	
Prehistoric ceramic	Plain; indeterminate temper	5	
Prehistoric ceramic	Indeterminate; sand tempered	3	
Lithic	Biface; black chert	1	
Lithic	Flake; black-pale red chert	1	
Lithic	Flake; quartz	2	
Lithic	PPK fragment; brown chert	1	
Lithic	PPK fragment; quartz	1	
Lithic	Shatter; quartz	1	
Lithic	Groundstone	1	
Total		**26**	
Prepared By/Date: JEB 6-19-09 Checked By/Date: PHG 6-19-09			

The historic component consists of ceramics, glass, and metal artifacts. The most frequently recovered artifacts were from the Kitchen Group (n=41), accounting for 95.3 percent of the historic assemblage. The Kitchen Group included ceramics (n=34) and container glass (n=7). Recovered ceramics were predominately utilitarian redwares (n=22). Glaze colors identified on redware sherds included black (n=13), brown (n=4), brown with some slip decoration (n=1), and light brown to yellow (n=1). Three sherds were unglazed. The recovered refined stoneware sherds included a body sherd of white salt glazed stoneware and one body sherd glazed on the interior and exterior with a brown glaze. These refined stonewares were popular from the mid to late eighteenth century. British brown stoneware was represented by one body sherd and dates from the late seventeenth to late eighteenth century. Two sherds of North American made stoneware were also identified and were common in the nineteenth century.

Refined earthenwares include slip ware (n=1), CC ware (n=2), flow blue (n=1), ironstone (n=2), and Chinese export porcelain (n=1) (Exhibit 5). The slip ware sherd had a dark yellow glaze. The CC ware sherds were undecorated and date ca. 1830 – 1860. Flow blue decorated wares became popular ca. post-1844 to the 1860s (Exhibit 6). The two ironstone sherds consisted of one undecorated sherd and one sherd decorated with a ghost of a slip decoration. Both date ca. post-1844. The Chinese export porcelain was a plain base fragment and was imported to the United States between 1660 and 1800.

One piece of flat glass comprised the Architecture Group (2.32 percent) and a ferrous metal spring comprised the Activities Group (2.32 percent). One handmade, ash-glazed brick fragment was also identified but was not included in the Architectural functional group. Container glass colors included aqua (n=2), blue-green (n=1), bright green (n=1), very light green (n=2), and milk glass (n=1). One portion of finish was identified in the aqua glass and a portion of an embossed base with a "2" on it was in very light green glass. The milk glass was a portion of a canning lid liner.

The prehistoric component most likely dates ca. the Middle or Late Woodland period, although an Archaic component may also exist at the site. Prehistoric artifacts include 18 ceramic sherds, lithic debris (n=3), shatter (n=1), one biface, two projectile point fragments, and one piece of groundstone. The flake debris was manufactured from quartz and black/pale red chert while the shatter was manufactured from quartz. The corner notched PPK fragment was manufactured from a brown chert and the distal portion of the other PPK was manufactured from quartz. The groundstone identified was a possible mano. The ceramic temper types included sand (n=8), grit (n=3), sand to grit (n=2), and indeterminate (n=5) (Exhibit 7). Three of the indeterminate sherds did exhibit some type surface decoration, however the decoration was too small to identify. The corner-notched PPK fragment could not be identified to type; however corner-notched types were prevalent during the Archaic period.

Recommendation. Site 28SA182 is a multicomponent site identified during a pedestrian survey of 3 ac. of plowed agricultural field. Prior to the survey, the site area was identified as having a high potential to contain archaeological resources. This site is recommended as potentially eligible for inclusion to the NRHP under criteria (d) (36 CFR 60.4). The historic component was distributed throughout the site and most likely represents the remains of a historic occupation ca. the eighteenth to nineteenth century. Although the majority of historic artifacts are redwares, the recovery eighteenth century ceramics indicate that an early historic occupation is possible at Site 28SA182. While the architectural history of the region is well documented, very little supporting archaeological data is available for the early historic period of the area. Additionally, the historic component may contribute to the potential salt hay farming district that was previously nominated for inclusion to the NRHP. The prehistoric component most likely represents an Archaic and Middle to Late Woodland occupation. MACTEC recommends that Site 28SA182 is potentially eligible for inclusion on the NRHP.

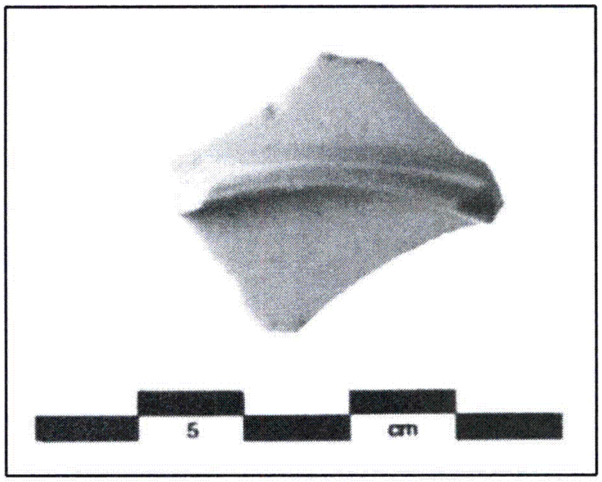

Exhibit 5.
A Possible Chinese Export Porcelain Recovered from Site 28SA182

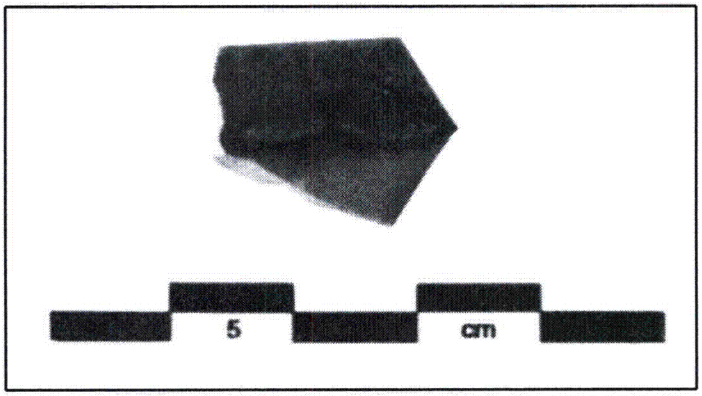

Exhibit 6.
A Flow Blue Rim Recovered from Site 28SA182

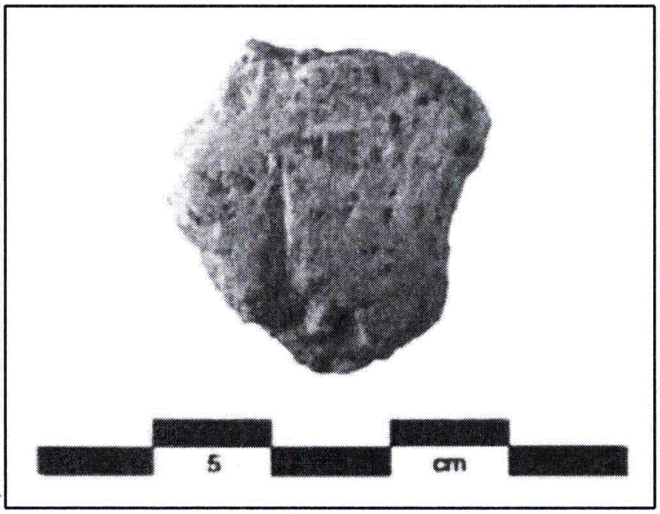

Exhibit 7.
Sand/Grit Tempered Sherd Recovered from Site 28SA182

Site 28SA183

Site 28SA183 is a multicomponent site identified in an agricultural field along the interface of the field and marsh. The site measures approximately 245 feet (75 meters) east/west by 900 feet (275 meters) north/south and encompasses 2.46 acres (1.0 ha) The site boundaries were determined by the distribution of artifacts on the surface and from the high density of artifacts recovered from the western portion of the field adjacent to the wetland. The site is located on the east side of Money Island Road, approximately 1970 feet (600 meters) south of the intersection of Mason Point Road and Money Island Road (see Figure 12). The site area was planted in ankle high grass that resulted in less than 50 percent surface visibility. The site was surveyed by excavating shovel test pits across the field. A grid was established with transects running east to west across the field spaced at 25 foot (7.6 meter) intervals. A total of 50 artifacts were recovered from the shovel test pits.

The historic component consisted of ceramics, glass, and metal artifacts. Historic artifacts were classified in the Activities and Kitchen functional groups (Table 19). The Kitchen Group included ceramics (n=6) and container glass (n=4). Ceramics from Site 28SA183 were redware (n=4) and cc ware (n=2). Glaze colors on the utilitarian redwares were black (n=2), brown (n=1), and one sherd where the glaze was eroded away or unglazed. The CC ware rim and body fragment were plain and date from the mid to late nineteenth century. Container glass colors included aqua (n=1), colorless (n=2), and solarized (n=1). The aqua glass was from a tumbler rim and the remaining sherds were body fragments. The solarized glass dates from 1880 to 1915. One indeterminate metal fragment was not placed in a functional group. One fragment of a ferrous metal horseshoe comprised the Activities Group (9.1 percent).

The prehistoric assemblage consisted of 32 ceramic sherds and lithic debris (n=7) (Table 20). The flake debris was quartz (n=2), black chert (n=2), brown chert (n=2), and red chalcedony (n=1). The ceramic temper types included sand (n=4), grit (n=4), and quartz (n=2). Two of the sand tempered sherds were cordmarked. The remaining sherds were plain (n=7), except for one quartz tempered sherd that had and eroded surface. The remaining 22 ceramic sherds were indeterminate as to temper and surface treatment. The ceramics indicate a Middle Woodland occupation of this area.

Table 19. Historic Artifacts Recovered from Site 28SA183

Artifact	Type	Count	Inception	Terminal
Ferrous metal	Horseshoe fragment	1		
Ferrous metal	Indeterminate	1		
Ceramic	Utilitarian redware; black glazed	2	late 18th c	19th c
Ceramic	Utilitarian redware; brown glazed	1	late 18th c	19th c
Ceramic	Utilitarian redware; eroded	1	late 18th c	19th c
Ceramic	CC ware; plain	2	1830	1860
Curved glass	Aqua	1		
Curved glass	Solarized	1	1880	1915
Curved glass	Colorless	1		
Total		**11**		
			Prepared By/Date: JEB 6-19-09 Checked By/Date: PHG 6-19-09	

Table 20. Prehistoric Artifacts Recovered from Site 28SA183

Artifact	Material	Count	Period
Prehistoric ceramic	Cordmarked; sand tempered	2	Indet.
Prehistoric ceramic	Plain; sand tempered	2	
Prehistoric ceramic	Plain; quartz tempered	1	
Prehistoric ceramic	Eroded; quartz tempered	1	
Prehistoric ceramic	Plain; grit tempered	4	
Prehistoric ceramic	Indeterminate decoration/temper	22	
Lithic	Flake; quartz	2	
Lithic	Flake; black chert	2	
Lithic	Flake; brown chert	2	
Lithic	Flake; chalcedony	1	
Total		**39**	
		Prepared By/Date: JEB 6-19-09 *Checked By/Date: PHG 6-19-09*	

A total of 228 shovel test pits were excavated to determine the boundaries of Site 28SA18 (Figure 13). Of these, 42 tested positive for cultural materials. Historic artifacts were recovered from a total of 13 shovel tests, four of which also contained prehistoric artifacts. Prehistoric artifacts were recovered from a total of 31 shovel tests, four of which also contained historic artifacts. Two shovel tests contained faunal remains.

The historic component is distributed throughout the entire site, with the heaviest concentration in the southernmost segment. The prehistoric component is distributed throughout the entire site. Shovel tests proving positive for prehistoric materials appear mainly as clusters spread relatively evenly throughout the site.

A typical soil profile consists of 0 – 12 inches (0 – 30 cm) below surface of 10YR5/4 yellowish brown silty loam over 12 – 18 inches (30 – 46 cm) below surface brownish-yellow clayey loam (see Exhibits 8 and 9).

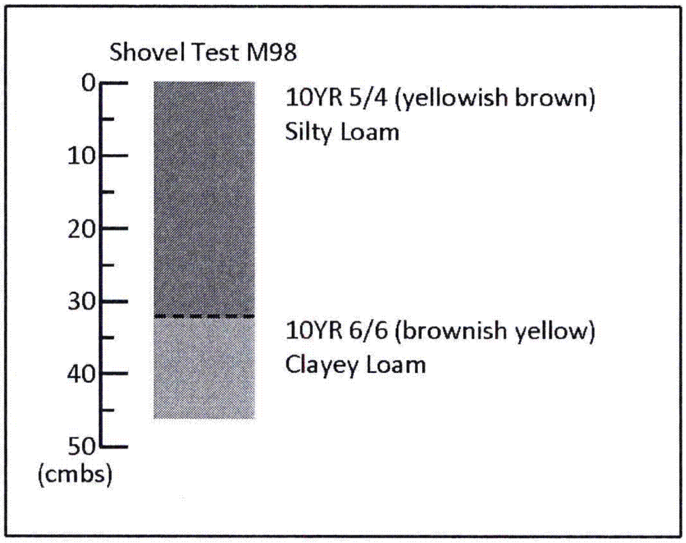

Exhibit 8.
A Typical Soil Profile from Site 28SA183

Exhibit 9.
Photograph of a Typical Soil Profile from Site 28SA183

Recommendation. Site 28SA183 is a multicomponent site identified during shovel testing of an agricultural field. Prior to the survey, the site area was identified as having a high potential to contain archaeological resources. This site is recommended as potentially eligible for inclusion to the NRHP under criteria (d) (36 CFR 60.4). The historic component was distributed throughout the site and most likely represents the remains of a historic occupation ca. the eighteenth to nineteenth century. Although the majority of historic artifacts are redwares, the recovery eighteenth century ceramics indicate that an early historic occupation is possible at Site 28SA183. While the architectural history of the region is well documented, very little supporting archaeological data is available for the early historic period of the area. Additionally, the historic component may contribute to the potential salt hay farming district that was previously nominated for inclusion to the NRHP. The prehistoric component most likely represents an Archaic and Middle to Late Woodland occupation. MACTEC recommends that Site 28SA183 is potentially eligible for inclusion on the NRHP.

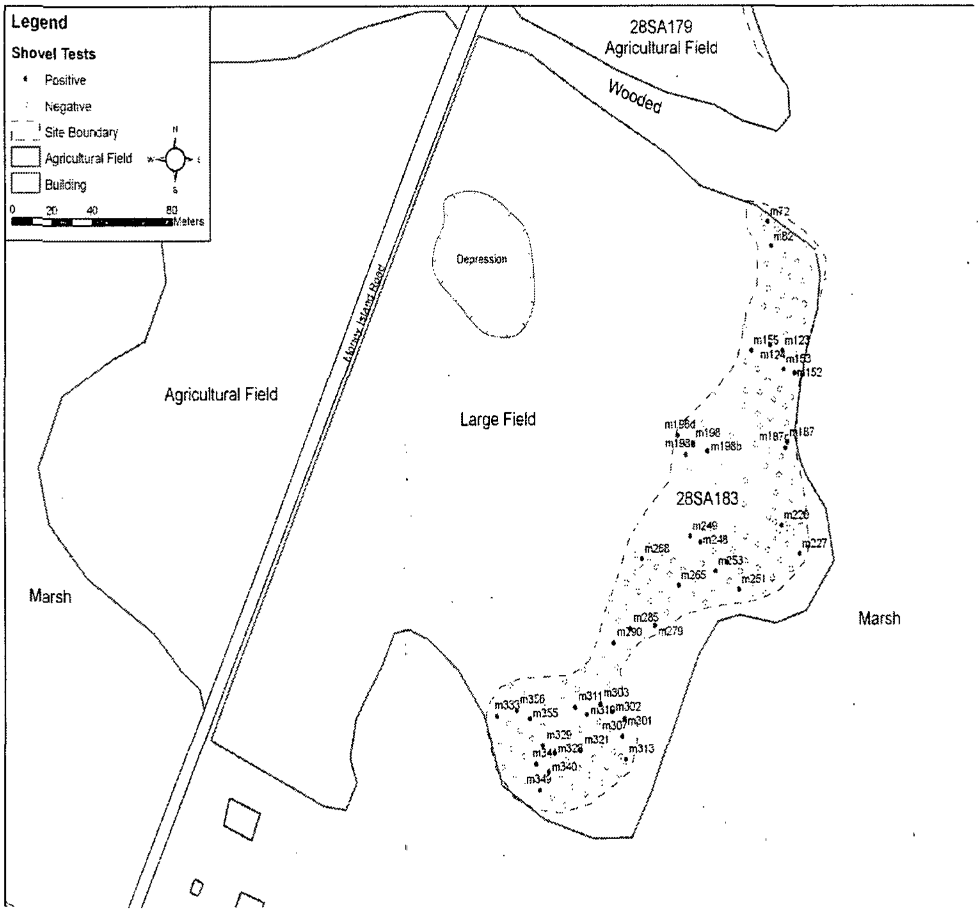

Figure 13. Plan Map of Site 28SA183 showing Shovel Test Locations

Site 28SA186

Site 28SA186 is a historic site identified during a pedestrian survey of the area designated as Field C. The field was plowed agricultural field at the time of the survey with surface visibility at 75 to 100%. The site measures approximately 295 feet (90 meters) east/west by 196 feet (60 meters) north/south and encompasses 1.4 acres (ha) (see Figure 12). The site was identified on a small rise that contained a surface scatter of historic artifacts. The site boundaries were determined by the distribution of artifacts that were contained to the small rise. The 1842 coastal map depicts a structure located in the approximate area of the artifact concentration.

The historic component consisted of ceramics, glass, and metal artifacts. Historic artifacts were classified in the Activities and Kitchen functional groups (Table 21). The Kitchen Group included ceramics (n=35) and container glass (n=5). Ceramics included redware (n=20), stoneware (n=2), ironstone (n=3), CC ware (n=2), pearlware (n=1), late transfer print (n=1), and (porcelain (n=1). Glaze colors on the utilitarian redwares were black (n=11), brown (n=3), unglazed (n=6), and one sherd with a dark green glaze. The stoneware sherds included one plain sherd of North American stoneware, ca. 19th century and a fragment of sewer pipe. Ironstone sherds included plain sherds, ca. 1844-present while the CC ware sherds are plain and date ca. 1830-1860. The one pearlware sherd is banded, ca. 1780-1830 while the creamware sherds with a light yellow color, ca. 1775-1820. One indeterminate metal fragment was not placed in a functional group. One fragment of a ferrous metal horseshoe comprised the Activities Group (9.1 percent).

Recommendation. Site 28SA186 is a historic period site identified during a pedestrian survey of plowed agricultural field. The site is located on a small rise and the site boundary was identified by the concentration of artifacts on the rise. The site corresponds The historic component was distributed throughout the site, and most likely represents the remains of a historic occupation ca. the eighteenth to nineteenth century. Although the majority of historic artifacts are redwares, the recovery of eighteenth century ceramics indicates that an early historic occupation is possible at Site 28SA186. While the architectural history of the area is well documented, very little supporting archaeological data is available for the early historic period of the area. Additionally, the historic component may contribute to the potential salt hay farming district that was previously nominated for inclusion to the NRHP. The prehistoric component most likely represents a small campsite occupied during the Middle to Late Woodland period.

MACTEC recommends that Site 28SA186 is potentially eligible for inclusion on the NRHP. This site is recommended as potentially eligible for inclusion to the NRHP under criteria (d) (36 CFR 60.4).

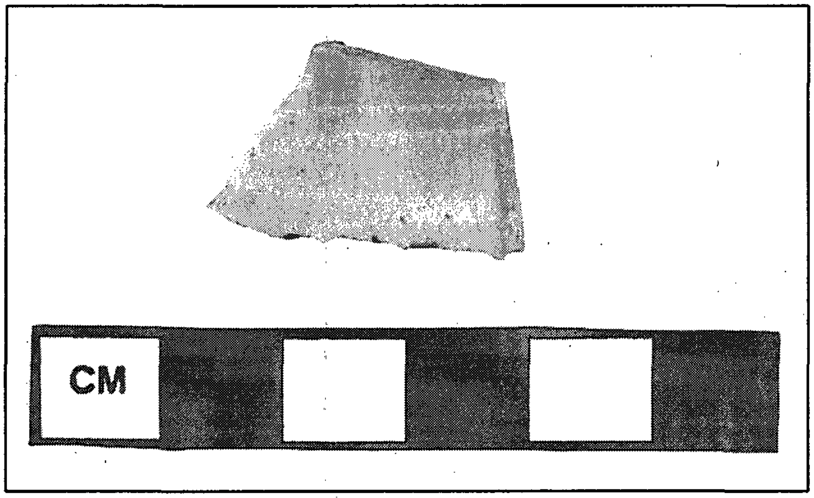

Exhibit 10

Ironstone Sherd Recovered from Site SA28186

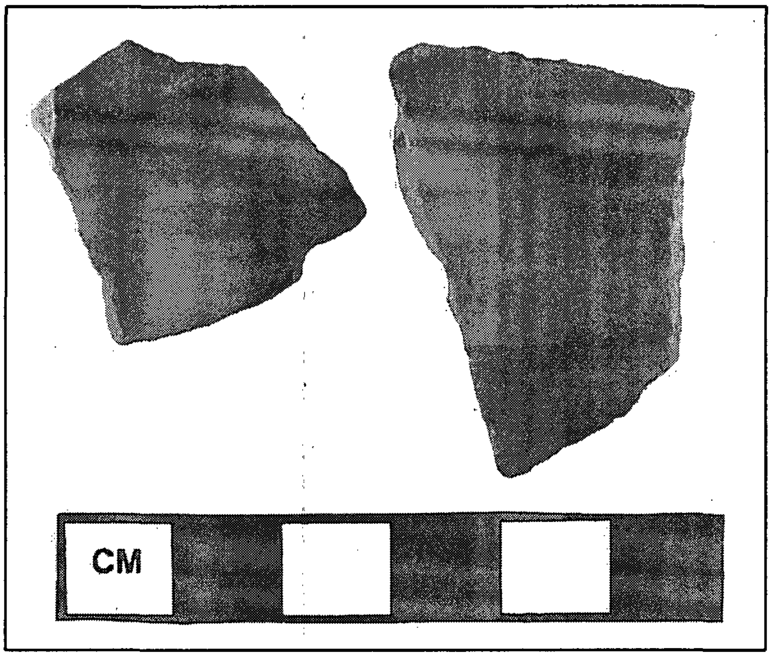

Exhibit 11
Redware Sherds Recovered from Site 28SA186

Table 21. Historic Artifacts Recovered from Site 28SA186.

Artifact	Type	Count	Incept	Terminal
Metal	Staple	1		
Metal	Tin; folded	1		
Flat glass	Light green	2		
Ceramic	Creamware; plain; lighter yellow color	2	1775	1820
Ceramic	Pearlware; banded	1	1780	1830
Ceramic	Utilitarian redware; brown glazed, scalloped	1		
Ceramic	Utilitarian redware; dark green glazed	1		
Ceramic	Utilitarian redware; black glazed	11	late 18th c	19th c
Ceramic	Utilitarian redware; brown glazed	2	late 18th c	19th c
Ceramic	Utilitarian redware; unglazed	6	late 18th c	19th c
Ceramic	North American Stoneware; plain	1	19^{th} c	
Ceramic	Stoneware; dark brown glazed; sewer pipe	1		
Ceramic	Ironstone;plain	3	1844	present
Ceramic	CC; plain	2	1830	1860
Ceramic	Hard paste porcelain	1	19th c	
Ceramic	Late transfer print	1	1830	1860
Ceramic	Indeterminate refined	1		
Curved glass	Aqua	2		
Curved glass	Milk glass	1		
Curved glass	Colorless	2		
Total		**43**		
			Prepared By/Date: JEB 6-19-09 *Checked By/Date: PHG 6-19-09*	

THE ALLOWAY CREEK NECK ROAD ACCESS ALTERNATIVE (ACNRAA)

The Phase I survey conducted for the ACNRAA consisted of pedestrian survey through agricultural fields excavating shovel tests pits when appropriate. In order to gain spatial control, the ACNRAA was surveyed and recorded by a field designation (Fields I, II, II, IV) within the 75-foot (23-meter) right of way. The portion of the right of way adjacent to the existing road consists of a ditch and reduces the survey area to approximately 13-15 meters. Fields II, IV, and VI along the existing access road area had been disced very recently, and heavy rain had recently fallen prior to the field study, as well as during the study. Some low weeds had grown in places, but not sufficiently to reduce visibility below 75 percent. Field IV in the ACNRAA area had been plowed or disced recently, and crop plants had grown to a height of 4 – 5 inches (10 – 13 cm) after discing/seeding. Ground visibility was between 50 and 75 percent in that field, and the recent rain had exposed objects on the surface. Therefore, pedestrian survey was employed in this field also, but with a crew spacing of 7 – 8 feet (2.1 – 2.4 meters) rather than 12 – 14 feet (3.7-4.3 meters).

A review of historic period maps show that historic houses are located in the vicinity but outside of the proposed ACNRAA expansion (Figures 14, 15, and 16). These structures are located on the east and west sides of the ACNRAA with four structures located on the west side. Investigation of the 1890 and 1931 Shiloh-Bay Side, New Jersey topographic maps did not portray structures on them and we were unable to determine when the structures disappeared from the landscape. Shovel tests in the northern portion of the ACNRAA (e1, e1c, e3, e3a, e5, e7, e7b, e11, and e11b) are not associated with any visible structures on the 1842 map. Eighteen delineation shovel tests were excavated and all were negative for cultural material. The artifacts from this area represent field scatter and not the location of a former house. Two structures are depicted outside the ACNRAA expansion between shovel test e22 and Isolated Find 108 (Figure 14). This portion of the ACNRAA is heavily disturbed from the construction of a pond and a large graded area with gravel and concrete blocks (Figure 14). Based on the location of the structures on the 1842 map and the present disturbance, it is unlikely that any intact archaeological deposits are located within this portion of the ROW. Another structure is depicted outside of the ACNRAA just south of Isolated find 109 (Figure 14). This area had excellent surface visibility and no concentration of artifacts was identified within the vicinity of the 1842 house. Any archaeological deposits associated with this structure are most likely located outside of the ACRNAA expansion. Artifacts were also recovered from a disturbed context adjacent to a ditch along the ACNRAA. These include Isolated finds 107, 108, 109, 110, 111, and 112, Cluster 107, and Cluster 110 (see Appendix F). Isolated Finds 110, 111, 112, and Cluster 110 were located southwest of the Chambless House in a disturbed area adjacent to a ditch. No structure is depicted in the area of the artifact concentration and the artifacts are most likely field scatter associated with the Chambliss house. Due to the low density of artifacts and the depiction of structures to the west of the proposed ACRNAA expansion and the recovery from a disturbed area, these artifacts are designated as redeposited field scatter and not associated with intact archaeological deposits.

The Chambless House and property is situated along a 1.5-mile (2.4-km) stretch of the ACNRAA (see Figure 4). The house and associated property have been on the New Jersey State Register since the mid-1980s. The original segment of the Nathaniel Chambless House (HABS-NJ-1202) was constructed in 1730, with additions at unknown later dates. The two-story original structure is historically significant due to its patterned Flemish Bond brick construction by Quaker settlers and its exclusivity to Salem County and western Cumberland County, New Jersey. The widening of the ACNRAA will not directly impact the Chambless House. However road widening may occur within the historical property boundaries associated with the Chambless farmstead. Although the archaeological survey failed to identify any sites or intact deposits associated with the occupation of the Chambless House property, additional consultation with the New Jersey HPO is needed to determine if proposed construction will have any direct or indirect impacts to the Chambless House or associated property.

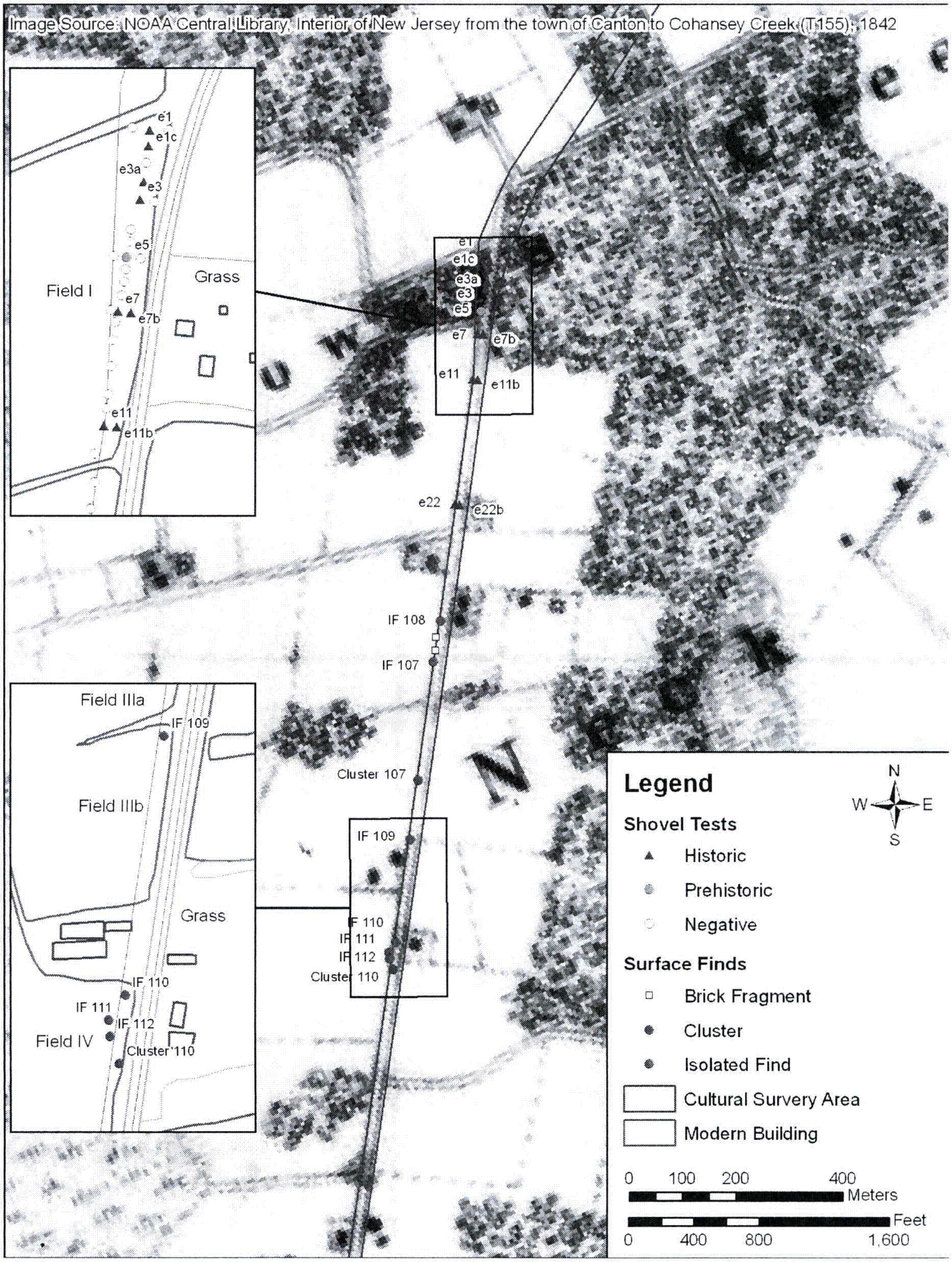

Figure 14. Coastal survey map of 1842 showing historic structures in relation to positive shovel tests, isolated finds, and clusters along the ACNRAA.

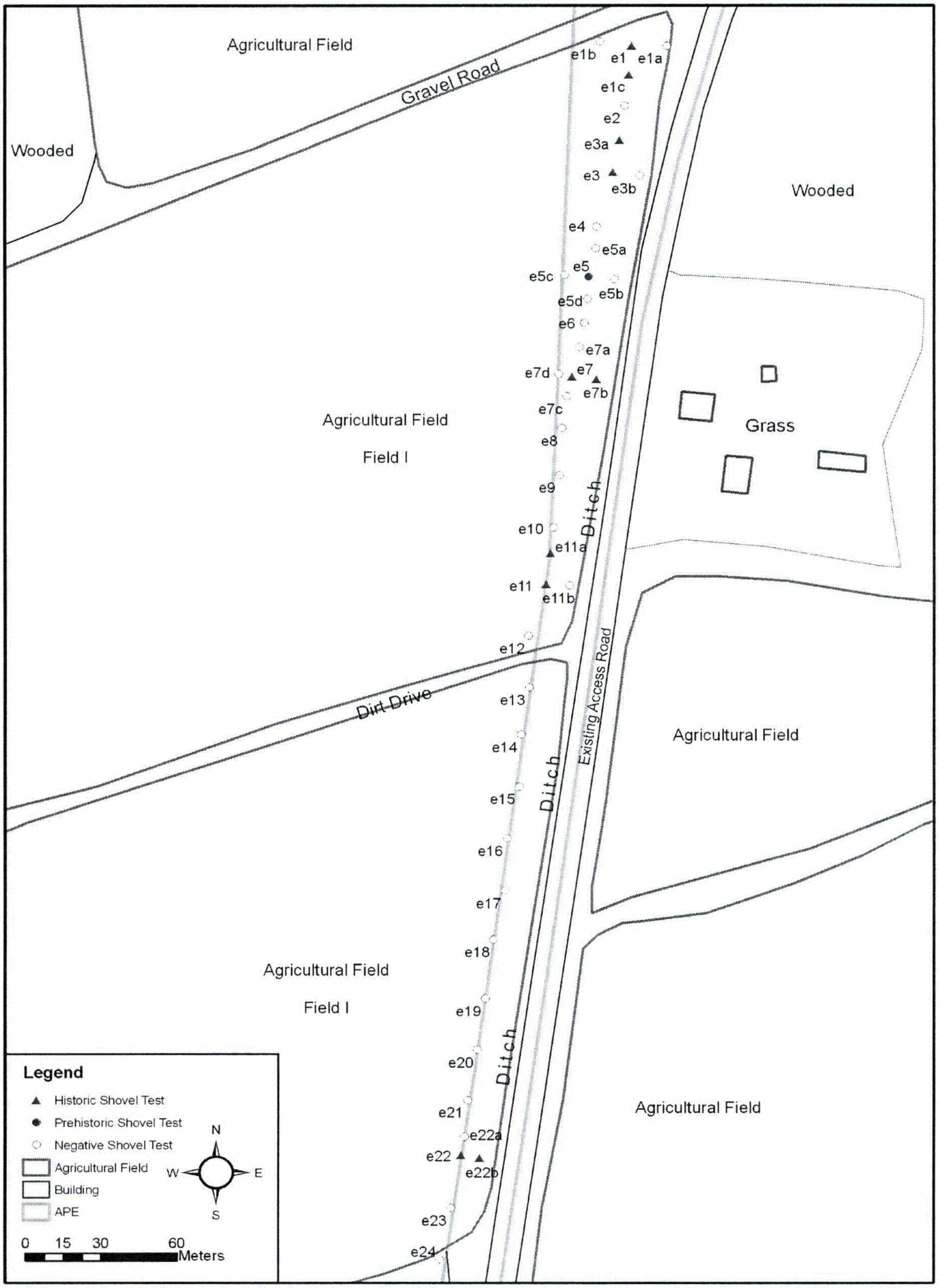

Figure 15. ACNRAA showing locations of positive and negative shovel tests (Continues with Figure 15)

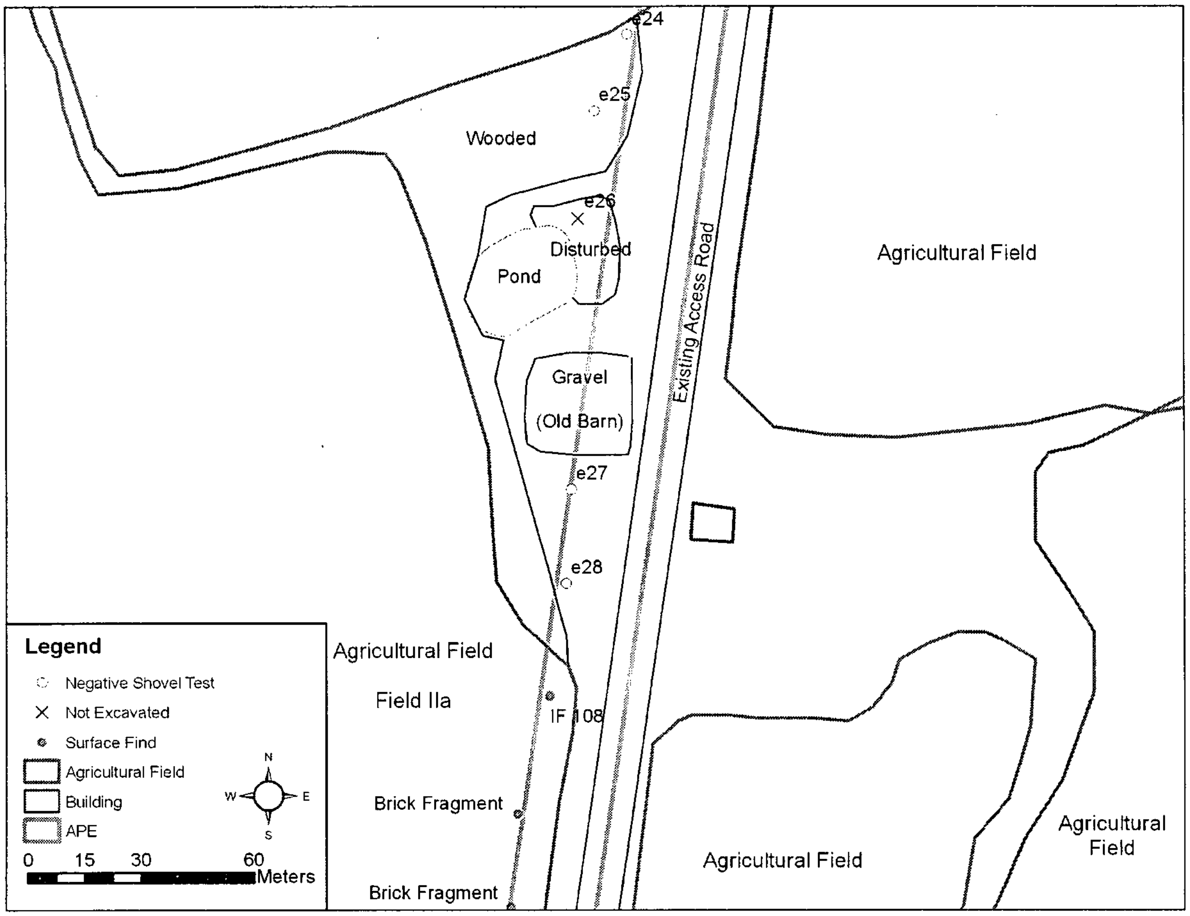

Figure 16. ACNRAA showing shovel tests and previous disturbances. The structure identified on the 1842 coastal map is most likely located just west of the pond.

Table 22. Shovel Tests and Recovered Artifacts along the ACNRAA Expansion

STP	Pos/Neg	Depth (cm)	South Group	Artifact	Count	Incept	Terminal
e1	Positive	55	Kitchen	Curved Glass	1		
e1a	Negative	20					
e1c	Positive	28	Activities	Slag	1		
e2	Negative	60					
e3	Positive	53					
e3a	Positive	35	Architecture	Brick	2		
			Kitchen	Curved Glass	1		
e3b	Negative	36					
e4	Negative	65					
e5	Positive	130	Kitchen	Ceramic	1	Late 18th c	19th c
				Flake			
e5a	Negative	30					
e5b	Negative						
e5c	Negative	35					
e5d	Negative	33					
e6	Negative	60					
e7	Positive	55	Kitchen	Curved Glass	1		
			Activities	Coal			
e7a	Negative	33					
e7b	Positive	30		Fcr			
e7c	Negative	26					
e7d	Negative	33					
e8	Negative	46					
e9	Negative	60					
e10	Negative	45					
e11	Positive	60	Kitchen	Curved Glass	1		
			Indeterminate	Ferrous Metal	1		
e11a	Positive	38	Kitchen	Ceramic	1	1762	1830
			Kitchen	Ceramic	1	Late 18th c	19th c
e11b	Negative	31					
e12	Negative	49					
e13	Negative	130					
e14	Negative	60					
e15	Negative	70					
e16	Negative	60					
e17	Negative	55					
e18	Negative	130					
e19	Negative	44					
e20	Negative	50					
e21	Negative	44					

STP	Pos/Neg	Depth (cm)	South Group	Artifact	Count	Incept	Terminal
e22	Positive	110	Architecture	Flat Glass	1		
e22a	Negative	38					
e22b	Positive	48	Kitchen	Curved Glass	1		
e23	Negative	56					
e24	Negative	65					
e25	Negative	55					
e26	Not Excavated						
e27	Negative	45					
e28	Negative	35					

6. SUMMARY AND CONCLUSIONS

MACTEC conducted a Phase I archaeological survey on sections of two proposed access road alternatives in Salem County, New Jersey. The survey was conducted for PSEG for the development of the ESP application for a new nuclear power facility in Salem County, New Jersey. The archaeological survey was conducted on two possible access alternatives, ACNRAA and the MIRAA. The ACNRAA may entail widening the existing access road from Hancocks Bridge Road to the PSEG Site. A 1-mile (1.6-km) section was surveyed and no archaeological sites were identified.

The MIRAA is a proposed 4.8-mile (7.7-km) access road that begins at the intersection of Money Island Road and Mason Point Road, and runs to the PSEG Site. A 0.9-mile (1.4-km) stretch of the MIRAA (including possible parking lot areas) was surveyed. A total of six archaeological sites were identified. These include sites 28SA179, 28SA180, 28SA181, 28SA182, 28SA183, and 28SA186. These sites are potentially eligible for listing on the National Register of Historic Places. The six sites and recommendations for each site are presented in Table 23.

Table 23. Summary of Identified Historic Properties in the MIRAA

Site Name	State Number	Site Components	Eligibility
Field A (MIRAA)	28SA179	Mid 18th – 19th Century, Middle to Late Woodland Period	Both components potentially eligible
Field B (MIRAA)	28SA180	18th – 19th Century, Middle to Late Woodland Period	Both components potentially eligible
Field D (MIRAA)	28SA181	18th – 19th Century, Middle to Late Woodland Period	Historic component potentially eligible
Field E (MIRAA)	28SA182	18th – 19th Century, Middle to Late Woodland Period	Both components potentially eligible
Large Field (MIRAA)	28SA183	18th – 19th Century, Middle to Late Woodland Period	Both components potentially eligible
Field C (MIRRA)	28SA186	18^{th}-19^{th} Century	Potentially eligible
Prepared By/Date: JEB 6-19-09 Checked By/Date: PHG 6-19-09			

Site 28SA179 is a multicomponent site located in a proposed parking lot area on the east side of Money Island Road. The historic component consists of 76 artifacts that date the site ca. the mid-eighteenth century to the nineteenth century. Although no aboveground features were identified, the high density of Kitchen Group artifacts indicates that a domestic occupation may have been present at the site. Additionally, Site 28SA179 is located in close proximity to the previously identified Elsinboro/Lower Alloways Creek District, which is potentially eligible to the NRHP for the historic salt hay farming that occurred in the area. The prehistoric component consists of 15 artifacts that include cord marked or fabric impressed ceramics which most likely represent a Kipp Island or Webb Phase campsite. Although prehistoric sites are known to exist in the area, very little work has been conducted to determine the temporal, functional, and organizational attributes of these sites. MACTEC recommends that Site 28SA179 is potentially eligible for inclusion on the NRHP.

Site 28SA180 is a multicomponent site located in a proposed parking lot area on the east side of Money Island Road. The historic component consists of 107 artifacts that date the site ca. the mid-eighteenth century to the nineteenth century. Although no aboveground features were identified, the high density of Kitchen Group artifacts indicates that a domestic occupation may have been present at the site. Additionally, Site 28SA180 is located in close proximity to the previously identified Elsinboro/Lower Alloways Creek District, which is potentially eligible to the NRHP for the historic salt hay farming that occurred in the area. The prehistoric component consists of 12 artifacts that include cord marked or fabric impressed ceramics that most likely represent a Kipp Island or Webb Phase campsite. Although prehistoric sites are known to exist in the area, very little work has been conducted to determine the temporal, functional, and organizational attributes of these sites. MACTEC recommends that Site 28SA180 is potentially eligible for inclusion on the NRHP.

Site 28SA181 is a multicomponent site located in a proposed parking lot area located on the east side of Money Island Road. The historic component consists of 50 artifacts that date the site ca. the mid-eighteenth century to the nineteenth century. Although no aboveground features were identified, the high density of Kitchen Group artifacts indicates that a domestic occupation may have been present at the site. Additionally, Site 28SA181 is located in close proximity to the previously identified Elsinboro/Lower Alloways Creek District, which is potentially eligible to the NRHP for the historic salt hay farming that occurred in the area. The prehistoric component consists of four artifacts that include lithic debitage and one ceramic sherd. No further work on the prehistoric component is recommended. MACTEC recommends that Site 28SA181 is potentially eligible for inclusion on the NRHP.

Site 28SA182 is a multicomponent site located in a proposed parking lot area located on the west side of Money Island Road. The historic component consists of 44 artifacts that date the site ca. the mid-eighteenth century to the nineteenth century. Although no aboveground features were identified, the high density of Kitchen Group artifacts indicates that a domestic occupation may have been present at the site. Additionally, Site 28SA182 is located in close proximity to the previously identified Elsinboro/Lower Alloways Creek District, which is potentially eligible to the NRHP for the historic salt hay farming that occurred in the area. The prehistoric component consists of 26 artifacts that include ceramics, lithic debitage, and tools. Although prehistoric sites are known to exist in the area, very little work has been conducted to determine the temporal, functional, and organizational attributes of these sites. MACTEC recommends that Site 28SA182 is potentially eligible for inclusion on the NRHP.

Site 28SA183 is a multicomponent site located in a proposed parking lot area located on the west side of Money Island Road. The historic component consists of 11 artifacts that date the site ca. the mid-eighteenth century to the nineteenth century. Although no aboveground features were identified, the high density of Kitchen Group artifacts indicates that a domestic occupation may have been present at the site. Additionally, Site 28SA183 is located in close proximity to the previously identified Elsinboro/Lower Alloway Creek District, which is potentially eligible to the NRHP for the historic salt hay farming that occurred in the area. The prehistoric component consists of 39 artifacts that include ceramics, lithic debitage, and tools. Although prehistoric sites are known to exist in the area, very little work has been conducted to determine the temporal, functional, and organizational attributes of these sites. MACTEC recommends that Site 28SA183 is potentially eligible for inclusion on the NRHP.

Site 28SA186 is a historic site identified during a pedestrian survey of the area designated as Field C. The field was plowed agricultural field at the time of the survey with surface visibility at 75 to 100%. The site measures approximately feet (90 meters) east/west by feet (60 meters) north/south and encompasses

1.4 acres (ha) The site was identified on a small rise that contained a surface scatter of historic artifacts. The site boundaries were determined by the distribution of artifacts that were contained to the small rise. The 1842 coastal map depicts a structure located in the approximate area of the artifact concentration. The historic component consisted of ceramics, glass, and metal artifacts that date the site to the mid-eighteenth century to the nineteenth century. Additionally, Site 28SA186 is located in close proximity to the previously identified Elsinboro/Lower Alloway Creek District, which is potentially eligible to the NRHP for the historic salt hay farming that occurred in the area. MACTEC recommends that Site 28SA186 is potentially eligible for inclusion on the NRHP.

No archaeological sites were identified in the 1-mile (1.6-km) section of the ACNRAA. Several structures were identified on the 1842 coastal map along the ACNRAA but are outside of the ACNRAA expansion. The area outside of the ROW was walked and a high density of brick fragments and artifacts were identified just west of the ROW in the areas where structures are depicted on the 1842 coastal map. The artifacts were not collected but the high density of artifacts in the outside of the ROW is an indication that any deposits associated with those structures will not be impacted by the ROW expansion. The Chambless House will not be impacted by the current proposed widening of the ACNRAA. However, impacts may occur to the property as it is currently defined on the New Jersey Register of Historic Places. Due to the depiction of historic structures outside of the proposed ACNRAA expansion and the low density of artifacts recovered within the ROW, MACTEC recommends no additional archaeological investigations for the portion of the ACNRAA that was surveyed.

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APPENDIX A

FIELD MAPS AND ARTIFACTS LISTS FOR THE MONEY ISLAND ROAD ACCESS ALTERNATIVE

State Site #	Curation Catalog	Bag#	Field	Cluster	ST#/IF #	South Group	Artifact	Type	Vessel Type	Sherd Type	Decoration	#	Incept	Terminal	Notes
28SA179	131.1	131	A		IF 07	Kitchen	ceramic	redware		body	black glazed	1	late 18th c	19th c	
28SA179	160.1	160	A		IF 14	Kitchen	ceramic	redware		body	black glazed	1	late 18th c	19th c	
28SA179	164.1	164	A		IF 12	Kitchen	ceramic	creamware		body	plain	1	1775	1820	lighter yellow color
28SA179	165.1	165	A		IF 09	Kitchen	ceramic	redware		body	black glazed	1	late 18th c	19th c	
28SA179	165.2	165	A		IF 09	Kitchen	ceramic	ccware			spongeware	1	1830	1860	
28SA179	166.1	166	A		IF 13	Kitchen	ceramic	redware		body	dark brown glazed	1	late 18th c	19th c	2 grooves on exterior, perhaps from pottery wheel
28SA179	168.1	168	A		IF 10	Activities	ferrous metal	washer			complete	1			2.84 inches diameter; central hole diameter 1.18 inches
28SA179	169.1	169	A		IF 05	Kitchen	ceramic	creamware		body	plain	1	1775	1820	burned?
28SA179	171.1	171	A		IF 08	Kitchen	ceramic	redware		body	black glazed	1	late 18th c	19th c	
28SA179	172.1	172	A	9		Kitchen	ceramic	redware		body	reddish brown glazed	1	late 18th c	19th c	
28SA179	172.2	172	A	9		Kitchen	ceramic	redware		body	black glazed	2	late 18th c	19th c	
28SA179	173.1	173	A	10		Kitchen	ceramic	pearlware		rim	blue painted w/blue banded rim	1	1780	1830	
28SA179	173.2	173	A	10		Kitchen	ceramic	redware		body	unglazed	1	late 18th c	19th c	
28SA179	174.1	174	A	12		Kitchen	ceramic	creamware		body	plain	3	1775	1820	lighter yellow color
28SA179	174.2	174	A	12		Kitchen	ceramic	pearlware		body	blue transfer	1	1780	1830	
28SA179	174.3	174	A	12		Kitchen	ceramic	mulberry transfer print		body	mulberry	1	1830	1840	burned
28SA179	174.4	174	A	12		Kitchen	ceramic	redware			unglazed	3	late 18th c	19th c	
28SA179	174.5	174	A	12		Kitchen	ceramic	redware			black glazed	1	late 18th c	19th c	thick rim
28SA179	174.6	174	A	12		Kitchen	ceramic	redware		body	green glazed	1	late 18th c	19th c	
28SA179	175.1	175	A	11		Kitchen	ceramic	ccware		body	plain	1	1830	1860	
28SA179	176.1	176	A	4		Kitchen	ceramic	refined earthenware		body	black glazed; poss. Jackfield	1	1740	1780	
28SA179	176.2	176	A	4		Architecture	brick	indeterminate		fragment		1			ash glazed??
28SA179	176.3	176	A	4		Kitchen	ceramic	creamware		body	plain	1	1775	1820	lighter yellow color
28SA179	176.4	176	A	4		Kitchen	ceramic	redware			light brown glazed	1	late 18th c	19th c	
28SA179	176.5	176	A	4		Kitchen	ceramic	redware			unglazed	2	late 18th c	19th c	
28SA179	176.6	176	A	4		Kitchen	ceramic	redware			black glazed	2	late 18th c	19th c	
28SA179	176.7	176	A	4		Kitchen	curved glass	colorless	panel bottle	body		1			
28SA179	177.1	177	A	10		Activities	ferrous metal	hatchet			fragment	1			
28SA179	178.1	178	A	13		Kitchen	ceramic	late blue transfer print		rim	late blue	1	1830	1860	
28SA179	178.2	178	A	13		Kitchen	ceramic	redware		body	black glazed	1	late 18th c	19th c	
28SA179	179.1	179	A	1		Kitchen	ceramic	redware			unglazed	1	late 18th c	19th c	
28SA179	179.2	179	A	1		Kitchen	ceramic	redware		body	multicolor slip decoration w/brown and black band	1	late 18th c	19th c	darker and lighter greenish-beige slip decoration
28SA179	181.1	181	A	3		Kitchen	ceramic	pearlware		base	plain	1	1780	1830	
28SA179	181.2	181	A	3		Architecture	brick	indeterminate				1			
28SA179	182.1	182	A	8		Kitchen	ceramic	redware			unglazed	3	late 18th c	19th c	
28SA179	182.2	182	A	8		Kitchen	ceramic	redware		rim	black glazed	1	late 18th c	19th c	thick rim
28SA179	182.3	182	A	8		Kitchen	ceramic	redware		body	black glazed	1	late 18th c	19th c	
28SA179	183.1	183	A	2		Kitchen	ceramic	ccware		rim	polychrome	1	1830	1875	
28SA179	183.2	183	A	2		Architecture	flat glass	light green				1			2.92 mm
28SA179	183.3	183	A	2		Indeterminate	ceramic	indeterminate			poss. gastrolith	1			
28SA179	183.4	183	A	2		Architecture	brick	indeterminate		fragment		2			
28SA179	183.5	183	A	2		Kitchen	ceramic	redware			unglazed	1	late 18th c	19th c	
28SA179	183.6	183	A	2		Kitchen	ceramic	redware		rim	black glazed	1	late 18th c	19th c	
28SA179	183.8	183	A	2		Kitchen	ceramic	redware		body	black glazed	1	late 18th c	19th c	
28SA179	184.1	184	A	6		Kitchen	ceramic	redware			unglazed; with incised line	1	late 18th c	19th c	
28SA179	184.2	184	A	6		Kitchen	ceramic	pearlware		body	plain	1	1780	1830	
28SA179	184.3	184	A	6		Kitchen	ceramic	stoneware		rim	white salt glazed; hand painted overglaze red floral	1	1740	1775	very thin rim
28SA179	184.4	184	A	6		Architecture	brick	indeterminate		fragment		1			
28SA179	185.1	185	A		IF 02	Kitchen	ceramic	creamware		body	plain	1	1775	1820	lighter yellow color
28SA179	187.1	187	A	7		Kitchen	ceramic	pearlware		body	banded	1	1780	1830	
28SA179	187.2	187	A	7		Kitchen	ceramic	ccware		body	plain	2	1830	1860	
28SA179	187.3	187	A	7		Kitchen	ceramic	redware			unglazed	7	late 18th c	19th c	
28SA179	187.4	187	A	7		Kitchen	ceramic	redware			brown glazed	1	late 18th c	19th c	interior glazed

State Site #	Curation Catalog	Bag#	Field	Cluster	ST#/IF #	South Group	Artifact	Type	Vessel Type	Sherd Type	Decoration	#	Incept	Terminal	Notes
28SA179	187.5	187	A	7		Kitchen	ceramic	redware			black glazed; 1 w/incised line	2	late 18th c	19th c	
28SA179	187.6	187	A	7		Kitchen	ceramic	redware			yellow slip	1	late 18th c	19th c	
28SA179	187.7	187	A	7		Architecture	brick	indeterminate		fragment		1			
28SA179	190.1	190	A	5		Kitchen	ceramic	redware		body	black glazed	1	late 18th c	19th c	
28SA179	191.1	191	A		IF 03	Architecture	brick	indeterminate			fragment	1			
28SA180	116.1	116	B	16		Kitchen	ceramic	redware		body	black glazed	3	late 18th c	19th c	
28SA180	116.2	116	B	16		Kitchen	ceramic	redware			unglazed	2	late 18th c	19th c	
28SA180	116.3	116	B	16		Kitchen	ceramic	creamware		body	plain	1	1775	1820	lighter yellow color
28SA180	116.4	116	B	16		Kitchen	ceramic	pearlware		body	plain	1	1780	1830	
28SA180	116.5	116	B	16		Kitchen	ceramic	pearlware		body	blue transfer print	1	1780	1830	
28SA180	116.6	116	B	16		Kitchen	ceramic	ccware		body	plain	2	1830	1860	
28SA180	116.7	116	B	16		Architecture	flat glass	light green				1			1.28 mm
28SA180	116.8	116	B	16		Kitchen	ceramic	redware			brown glazed	1	late 18th c	19th c	
28SA180	117.1	117	B	20		Activities	metal	stock				1			
28SA180	117.1	117	B	20		Kitchen	ceramic	stoneware		body	British Brown	1	1690	1775	
28SA180	117.2	117	B	20		Kitchen	curved glass	amber	container	body		1			
28SA180	117.3	117	B	20		Kitchen	curved glass	bright green	container	body		1			
28SA180	117.4	117	B	20		Kitchen	curved glass	green-blue	container	body		1			
28SA180	117.5	117	B	20		Kitchen	ceramic	indeterminate			UID refined	1			
28SA180	117.6	117	B	20		Kitchen	ceramic	ironstone		body	plain	2	1844	present	
28SA180	117.7	117	B	20		Kitchen	ceramic	redware			black glazed	1	late 18th c	19th c	
28SA180	117.8	117	B	20		Kitchen	ceramic	redware			brown glazed	1	late 18th c	19th c	
28SA180	117.9	117	B	20		Kitchen	ceramic	redware			unglazed	1	late 18th c	19th c	
28SA180	118.1	118	B	15		Activities	curved glass	blue-green		embossed	insulator fragments	2	20th c		larger piece ermbossed "HEM ... A."; Hemingray
28SA180	118.2	118	B	15		Kitchen	ceramic	pearlware		body	plain	2	1780	1830	
28SA180	118.3	118	B	15		Kitchen	ceramic	creamware		body	plain	1	1775	1820	lighter yellow color
28SA180	118.4	118	B	15		Kitchen	ceramic	pearlware		rim	polychrome	1	1780	1830	
28SA180	118.5	118	B	15		Kitchen	ceramic	redware		base	black glazed	1	late 18th c	19th c	
28SA180	118.6	118	B	15		Kitchen	ceramic	redware		body	black glazed	3	late 18th c	19th c	
28SA180	118.7	118	B	15		Kitchen	ceramic	redware		body	unglazed	1	late 18th c	19th c	
28SA180	118.8	118	B	15		Architecture	brick	indeterminate		fragment		1			
28SA180	119.1	119	B	19		Kitchen	ceramic	ccware		body	mocha	1	1830	1860	
28SA180	119.2	119	B	19		Kitchen	ceramic	ccware		body	plain	1	1830	1860	
28SA180	119.3	119	B	19		Kitchen	curved glass	colorless		container		1			probably modern
28SA180	119.4	119	B	19		Kitchen	ceramic	redware		body	black glazed	1	late 18th c	19th c	
28SA180	119.5	119	B	19		Kitchen	ceramic	redware		rim	black glazed	1	late 18th c	19th c	thick rim
28SA180	119.6	119	B	19		Kitchen	ceramic	redware			light brown glazed	1	late 18th c	19th c	
28SA180	119.7	119	B	19		Kitchen	ceramic	redware			brown glazed	1	late 18th c	19th c	
28SA180	119.8	119	B	19		Architecture	brick	indeterminate		fragment		1			
28SA180	120.1	120	B		IF 16	Kitchen	ceramic	pearlware		rim	plain	1	1780	1830	
28SA180	121.10	121	B	18		Kitchen	ceramic	indeterminate				2			burned
28SA180	121.1	121	B	18		Kitchen	ceramic	redware		body	unglazed	2	late 18th c	19th c	
28SA180	121.11	121	B	18		Kitchen	ceramic	redware		body	brown glazed	1	late 18th c	19th c	
28SA180	121.12	121	B	18		Kitchen	ceramic	redware		rim	brown glazed w/incised decoration	1	late 18th c	19th c	
28SA180	121.13	121	B	18		Kitchen	ceramic	redware		body	dark brown glazed	1	late 18th c	19th c	
28SA180	121.14	121	B	18		Kitchen	ceramic	redware		body	black glazed	3	late 18th c	19th c	
28SA180	121.15	121	B	18		Architecture	brick	handmade		fragments	ash glazed	2			
28SA180	121.16	121	B	18		Kitchen	curved glass	aqua		body		1			
28SA180	121.17	121	B	18		Kitchen	curved glass	aqua		rim		1			
28SA180	121.18	121	B	18		Indeterminate	metal	indeterminate		fragment		1			
28SA180	121.2	121	B	18		Kitchen	curved glass	olive	bottle	body		1			
28SA180	121.3	121	B	18		Kitchen	ceramic	ccware		body	spongeware	1	1830	1860	
28SA180	121.4	121	B	18		Kitchen	ceramic	ccware			plain	1	1830	1860	
28SA180	121.5	121	B	18		Kitchen	ceramic	pearlware		rim	blue band on rim	1	1780	1830	
28SA180	121.6	121	B	18		Kitchen	ceramic	hard paste porcelain		body	plain	1	19th c		
28SA180	121.7	121	B	18		Kitchen	ceramic	pearlware			blue painted	1	1780	1830	

State Site #	Curation Catalog	Bag#	Field	Cluster	ST#/IF #	South Group	Artifact	Type	Vessel Type	Sherd Type	Decoration	#	Incept	Terminal	Notes
28SA180	121.8	121	B	18		Clothing	ceramic	button			white Prosser 2 hole	1	after 1840		11.8 mm diameter
28SA180	121.9	121	B	18		Kitchen	ceramic	redware		handle	unglazed	1	late 18th c	19th c	
28SA180	123.1	123	B	17		Architecture	flat glass	light green				1			2.41 mm
28SA180	123.10	123	B	17		Kitchen	ceramic	pearlware		body	plain	1	1780	1830	
28SA180	123.2	123	B	17		Kitchen	ceramic	ccware		body	plain	5	1830	1860	
28SA180	123.3	123	B	17		Kitchen	ceramic	redware		body	unglazed	2	late 18th c	19th c	
28SA180	123.4	123	B	17		Kitchen	ceramic	redware		body	brown glazed	3	late 18th c	19th c	
28SA180	123.5	123	B	17		Kitchen	ceramic	redware		body	black glazed	2	late 18th c	19th c	
28SA180	123.6	123	B	17		Kitchen	ceramic	indeterminate			UID refined	1			
28SA180	123.7	123	B	17		Kitchen	curved glass	olive	bottle	body		1			
28SA180	123.8	123	B	17		Kitchen	curved glass	colorless	container	rim		1			probably screw top
28SA180	123.9	123	B	17		Kitchen	ceramic	pearlware		body	blue handpainted	1	1780	1830	
28SA180	207.1	207	B	22		Kitchen	curved glass	olive	bottle	body		1			
28SA180	207.2	207	B	22		Kitchen	curved glass	colorless	container	body		1			with seam
28SA180	207.3	207	B	22		Kitchen	ceramic	pearlware		body	plain	1	1780	1830	
28SA180	207.4	207	B	22		Kitchen	ceramic	indeterminate			UID refined	2			
28SA180	207.5	207	B	22		Kitchen	ceramic	ccware		base	plain	1	1830	1860	
28SA180	207.6	207	B	22		Architecture	brick	handmade		fragment	ash glazed	1			
28SA180	207.7	207	B	22		Kitchen	ceramic	redware			unglazed	1	late 18th c	19th c	
28SA180	207.8	207	B	22		Kitchen	ceramic	redware			black glazed	1	late 18th c	19th c	
28SA180	207.9	207	B	22		Kitchen	ceramic	redware			light brown glazed; yellow band?	1	late 18th c	19th c	
28SA180	209.1	209	B	23		Kitchen	curved glass	aqua		base		1			
28SA180	209.2	209	B	23		Architecture	flat glass	light green				1			1.55 mm
28SA180	209.3	209	B	23		Kitchen	ceramic	redware			black glazed	2	late 18th c	19th c	
28SA180	210.1	210	B	21		Kitchen	ceramic	redware			unglazed	3	late 18th c	19th c	
28SA180	210.2	210	B	21		Kitchen	ceramic	indeterminate			UID refined	1			
28SA180	210.3	210	B	21		Kitchen	ceramic	redware		rim	brown glazed	1	late 18th c	19th c	
28SA180	210.4	210	B	21		Kitchen	ceramic	redware			black glazed	1	late 18th c	19th c	
28SA180	210.5	210	B	21		Kitchen	ceramic	pearlware		body	polychrome	1	1780	1830	
28SA180	236.1	236	B		IF 17	Kitchen	ceramic	redware			unglazed	1	late 18th c	19th c	
28SA181	201.1	201	D	39		Architecture	brick	indeterminate		fragment		1			
28SA181	201.10	201	D	39		Kitchen	ceramic	refined stoneware		rim	molded white salt-glazed	1	1740	1775	
28SA181	201.11	201	D	39		Kitchen	curved glass	aqua	container	lip		1			
28SA181	201.2	201	D	39		Kitchen	ceramic	refined stoneware		body	molded white salt-glazed	1	1740	1775	
28SA181	201.3	201	D	39		Kitchen	ceramic	ccware		body	polychrome	1	1830	1875	
28SA181	201.4	201	D	39		Kitchen	ceramic	pearlware		body	plain	1	1780	1830	
28SA181	201.5	201	D	39		Kitchen	ceramic	hard paste porcelain		body	plain	1	19th c		
28SA181	201.6	201	D	39		Kitchen	ceramic	redware		body	black glazed	6	late 18th c	19th c	
28SA181	201.7	201	D	39		Kitchen	ceramic	redware		rim	black glazed	1	late 18th c	19th c	
28SA181	201.8	201	D	39		Kitchen	ceramic	redware		body	brown glazed	1	late 18th c	19th c	
28SA181	201.9	201	D	39		Kitchen	ceramic	redware		body	unglazed	5	late 18th c	19th c	
28SA181	202.1	202	D	34		Kitchen	ceramic	stoneware		body	bristol exterior, albany slip interior	1	1880s	1920s	
28SA181	202.2	202	D	34		Kitchen	ceramic	pearlware		body	plain	1	1780	1830	
28SA181	202.3	202	D	34		Kitchen	ceramic	ccware		body	plain	1	1830	1860	
28SA181	202.4	202	D	34		Kitchen	ceramic	redware		body	unglazed	1	late 18th c	19th c	
28SA181	213.1	213	D	38		Kitchen	ceramic	redware		body	unglazed	1	late 18th c	19th c	
28SA181	214.1	214	D	40		Kitchen	ceramic	pearlware		body	blue transfer print	1	1780	1830	
28SA181	214.2	214	D	40		Kitchen	ceramic	pearlware		rim	banded pearlware	1	1780	1830	
28SA181	214.3	214	D	40		Kitchen	ceramic	ccware		rim	blue edged	1	1830	1860	
28SA181	214.4	214	D	40		Kitchen	ceramic	creamware		body	plain	2	1775	1820	lighter yellow color
28SA181	214.5	214	D	40		Kitchen	ceramic	pearlware			plain	1	1780	1830	
28SA181	214.6	214	D	40		Kitchen	ceramic	redware			brown glazed	1	late 18th c	19th c	
28SA181	214.7	214	D	40		Kitchen	curved glass	milk glass	canning lid			1			
28SA181	214.8	214	D	40		Tobacco	pipe	ball/kaolin	bowl fragment		plain	1			
28SA181	224.1	224	D		IF 32	Architecture	flat glass	light green				1			2.21 mm
28SA181	225.1	225	D		IF 33	Kitchen	ceramic	redware			unglazed	1	late 18th c	19th c	
28SA181	225.2	225	D		IF 33	Kitchen	curved glass	colorless	container	body		1			

Appendix A
Historic Artifacts

State Site #	Curation Catalog	Bag#	Field	Cluster	ST#/IF #	South Group	Artifact	Type	Vessel Type	Sherd Type	Decoration	#	Incept	Terminal	Notes
28SA181	226.1	226	D		IF 34	Kitchen	ceramic	hard paste porcelain		body	plain	1	19th c		
28SA181	227.1	227	D		IF 35	Kitchen	ceramic	redware		body	black glazed	1	late 18th c	19th c	
28SA181	240.1	240	D	37		Kitchen	ceramic	pearlware		body	black transfer print	1	1780	1830	
28SA181	240.2	240	D	37		Kitchen	ceramic	redware			brown glazed	1	late 18th c	19th c	
28SA181	240.3	240	D	37		Kitchen	ceramic	redware			black glazed	2	late 18th c	19th c	
28SA181	240.4	240	D	37		Kitchen	ceramic	redware			unglazed	2	late 18th c	19th c	
28SA181	240.5	240	D	37		Kitchen	curved glass	aqua	container	body		1			
28SA181	256.1	256	D	35		Kitchen	ceramic	pearlware		body	plain	1	1780	1830	
28SA181	256.2	256	D	35		Kitchen	curved glass	aqua	container	base		1			
28SA181	257.1	257	D	36		Kitchen	ceramic	creamware		body	plain	1	1762	1780	darker yellow color
28SA181	257.2	257	D	36		Kitchen	ceramic	redware		body	black glazed	1	late 18th c	19th c	
28SA181	257.3	257	D	36		Kitchen	curved glass	colorless	container	body		1			
28SA181	257.4	257	D	36		Architecture	flat glass	light green				1			0.93 mm; very thin
28SA181	257.5	257	D	36		Kitchen	ceramic	creamware		body	plain	1	1775	1820	lighter yellow color
28SA182	146.1	146	E		IF 38	Kitchen	curved glass	aqua	container	body		1			
28SA182	148.1	148	E		IF 48	Kitchen	ceramic	ironstone		body	plain	1	1844	present	
28SA182	149.1	149	E		IF 43	Kitchen	ceramic	redware		body	brown glazed	1	late 18th c	19th c	ghost of slip decoration
28SA182	152.1	152	E		IF 39	Kitchen	ceramic	redware		body	black glazed	1	late 18th c	19th c	
28SA182	154.1	154	E		IF 44	Kitchen	ceramic	redware		body	black glazed	1	late 18th c	19th c	
28SA182	155.1	155	E		IF 47	Kitchen	curved glass	bright green	container	body		1			
28SA182	155.2	155	E		IF 47	Kitchen	curved glass	milk glass	canning lid			1			
28SA182	156.1	156	E		IF 41	Kitchen	ceramic	refined stoneware		body	plain white salt-glazed	1	1740	1775	
28SA182	157.1	157	E		IF 42	Activities	ferrous metal	spring				1			
28SA182	158.1	158	E		IF 46	Architecture	flat glass	light green				1			1.61 mm
28SA182	159.1	159	E	45		Kitchen	ceramic	redware		body	black glazed	3	late 18th c	19th c	
28SA182	159.2	159	E	45		Kitchen	ceramic	redware		body	light brown to yellow glazed	1	late 18th c	19th c	
28SA182	159.3	159	E	45		Kitchen	ceramic	chinese export porcelain		base	plain	1	1660	1800	
28SA182	159.4	159	E	45		Kitchen	ceramic	flow blue		rim		1	1844	1860	
28SA182	159.5	159	E	45		Kitchen	ceramic	ccware		body	plain	1	1830	1860	
28SA182	159.6	159	E	45		Kitchen	curved glass	blue-green	container	body		1			
28SA182	159.7	159	E	45		Kitchen	curved glass	very light green	container	body		1			
28SA182	161.1	161	E	42		Kitchen	ceramic	stoneware		body	plain	2	19 th c		North American Stoneware
28SA182	161.2	161	E	42		Kitchen	ceramic	slipware		body	dark yellow glaze	1	1670	1795	
28SA182	162.1	162	E	43		Kitchen	ceramic	stoneware		body	British Brown	1	1690	1775	
28SA182	162.2	162	E	43		Kitchen	ceramic	redware		body	black glazed	1	late 18th c	19th c	
28SA182	162.3	162	E	43		Architecture	brick	handmade		fragment	ash glazed	1			
28SA182	162.4	162	E	43		Kitchen	curved glass	very light green	container	embossed base		1			"2"
28SA182	163.1	163	E		IF 45	Kitchen	ceramic	redware		body	black glazed	1	late 18th c	19th c	
28SA182	197.1	197	E	48		Kitchen	ceramic	ccware		body	plain	1	1830	1860	
28SA182	197.2	197	E	48		Kitchen	ceramic	redware		body	brown glazed w/some slip decoration	1	late 18th c	19th c	
28SA182	199.1	199	E	49		Kitchen	ceramic	redware		body	brown glazed	1	late 18th c	19th c	
28SA182	216.1	216	E	44		Kitchen	ceramic	redware		body	black glazed	2	late 18th c	19th c	
28SA182	216.2	216	E	44		Kitchen	curved glass	aqua	container	finish		1			
28SA182	216.3	216	E	44		Kitchen	ceramic	refined stoneware		body	brown glazed interior and exterior	1			
28SA182	220.1	220	E	47		Kitchen	ceramic	redware		body	brown glazed	2	late 18th c	19th c	
28SA182	220.2	220	E	47		Kitchen	ceramic	redware		body	black glazed	1	late 18th c	19th c	
28SA182	243.1	243	E		IF 64	Kitchen	ceramic	redware		body	unglazed	1	late 18th c	19th c	
28SA182	246.1	246	E		IF 63	Kitchen	ceramic	redware		body	black glazed	1	late 18th c	19th c	
28SA182	248.1	248	E		IF 51	Kitchen	ceramic	redware		body	unglazed	1	late 18th c	19th c	
28SA182	250.1	250	E		IF 56	Kitchen	ceramic	ironstone		body	plain	1	1844	present	
28SA182	252.1	252	E		IF 57	Kitchen	ceramic	redware		body	unglazed	1	late 18th c	19th c	
28SA182	252.2	252	E		IF 57	Kitchen	ceramic	redware		body	black glazed	1	late 18th c	19th c	
28SA182	255.1	255	E		IF 60	Kitchen	ceramic	redware		body	black glazed	1	late 18th c	19th c	
28SA183	13.1	13	BF-Site		ST M82	Kitchen	ceramic	redware			eroded	1	late 18th c	19th c	
28SA183	26.1	26	BF-Site		ST M187	Kitchen	ceramic	ccware		body		1	1830	1860	
28SA183	37.1	37	BF-Site		ST M265	Kitchen	ceramic	redware		body	black glazed	1	late 18th c	19th c	
28SA183	44.1	44	BF-Site		ST M302	Kitchen	curved glass	aqua	tumbler	rim		1			

Appendix A
Historic Artifacts

State Site #	Curation Catalog	Bag#	Field	Cluster	ST#/IF #	South Group	Artifact	Type	Vessel Type	Sherd Type	Decoration	#	Incept	Terminal	Notes	
28SA183	46.1	46	BF-Site		ST M311	Kitchen	ceramic	ccware	plate	rim		1	1830	1860		
28SA183	49.1	49	BF-Site		ST M321	Activities	ferrous metal	horseshoe fragment				1				
28SA183	50.1	50	BF-Site		ST M328	Kitchen	ceramic	redware		rim	brown glazed	1	late 18th c	19th c		
28SA183	53.1	53	BF-Site		ST M340	Indeterminate	ferrous metal	indeterminate				1				
28SA183	110.1	110	BF-Site		ST M198B	Kitchen	curved glass	colorless	container	body		1				
28SA183	111.1	111	BF-Site		ST M198C	Kitchen	curved glass	colorless	container	body		1				
28SA183	112.1	112	BF-Site		ST M198D	Kitchen	curved glass	solarized	container	body		1	1880	1915		
28SA183	115.1	115	BF-Site		ST M307	Kitchen	ceramic	redware		body	black glazed	1	late 18th c	19th c		
	19.1	19	BF		ST M138	Kitchen	curved glass	light aqua	container	body		1				
	20.1	20	BF		ST M137	Architecture	plaster?					2			plaster? Or possibly asbestos tile?	
	20.2	20	BF		ST M137	Indeterminate	ferrous metal	indeterminate				2				
	20.3	20	BF		ST M137	Kitchen	curved glass	colorless	bottle	body	embossed	1			"...NT"	
	20.4	20	BF		ST M137	Kitchen	curved glass	colorless	container	body		2				
	20.5	20	BF		ST M137	Kitchen	curved glass	cobalt blue	container	body		1				
	20.6	20	BF		ST M137	Kitchen	curved glass	blue-green	container	body		1				
	20.7	20	BF		ST M137	Architecture	flat glass	blue-green				1				2.29
	21.1	21	BF		ST M141	Kitchen	ceramic	pearlware		body		1	1780	1830		
	28.1	28	BF		ST M213	Kitchen	curved glass	opaque olive	bottle	body		1				
	30.1	30	BF		ST M215	Architecture	brick	handmade				1				
	58.1	58	BF		ST M369	Architecture	brick	handmade				1				
	58.1	58	BF		ST M369	Kitchen	ceramic	redware		body	brown glazed	1	late 18th c	19th c		
	58.1	58	BF		ST M369	Kitchen	curved glass	blue-green	container	body		1				
	60.1	60	BF		ST M384	Kitchen	ceramic	pearlware		body		1	1780	1830		
	67.1	67	BF		ST M432a	Kitchen	curved glass	colorless	bottle	rim		1	1900		threaded rim ; machine made	
	69.1	69	BF		ST M446	Activities	ferrous metal	square stock fragment				1				
	71.1	71	BF		ST M452	Arms	cuprous metal	brass shotshell base				1			corroded, illegible	
	72.1	72	BF		ST M454	Kitchen	ceramic	pearlware				1	1780	1830		
	72.2	72	BF		ST M454	Architecture	flat glass	light aqua				1				1.92
	73.1	73	BF		ST M458	Kitchen	ceramic	redware		body	dark brown glazed	1	late 18th c	19th c		
	74.1	74	BF		ST M460	Kitchen	ceramic	redware		body	brown glazed	1	late 18th c	19th c		
	75.1	75	BF		ST M464	Kitchen	curved glass	light aqua	container	body		1				
	77.1	77	BF		ST M480	Architecture	flat glass	blue-green				1				1.05
	78.1	78	BF		ST M477	Architecture	nail	indeterminate				1				
	79.1	79	BF		ST M488	Kitchen	curved glass	colorless	container	body		1				
	90.1	90	BF		ST M432a	Architecture	brick	handmade		fragment	ash glazed	1				
	93.1	93	BF		ST M450d	Kitchen	ceramic	creamware		body		1	1762	1830		
	94.1	94	BF		ST M379c	Architecture	brick	handmade				2				
	95.1	95	BF		ST M130a	Indeterminate	ferrous metal	indeterminate				1				
	180.1	180	C		IF 23	Activities	ferrous metal	chisel				1			wood chisel	
	180.2	180	C		IF 23	Kitchen	curved glass	colorless	container	body		1				
	188.1	188	C	28		Kitchen	ceramic	indeterminate		body	UID refined	1			burned	
	188.2	188	C	28		Kitchen	ceramic	ironstone		rim	plain	1	1844	present		
	188.3	188	C	28		Kitchen	ceramic	ccware		body	plain	1	1830	1860		
	188.4	188	C	28		Kitchen	ceramic	creamware		body	plain	1	1775	1820	lighter yellow color	
	188.5	188	C	28		Kitchen	ceramic	redware		body	black glazed	4	late 18th c	19th c		
	188.6	188	C	28		Kitchen	ceramic	redware		rim	black glazed	1	late 18th c	19th c		
	188.7	188	C	28		Kitchen	ceramic	redware		body	brown glazed	1	late 18th c	19th c	ghost of a slip	
	188.8	188	C	28		Kitchen	ceramic	redware		body	unglazed	1	late 18th c	19th c		
	195.1	195	C	32		Kitchen	ceramic	late red transfer print			late red	1	1830	1860		
	195.2	195	C	32		Kitchen	ceramic	redware			black glazed	1	late 18th c	19th c		
	200.1	200	C	33		Kitchen	ceramic	redware			black glazed	1	late 18th c	19th c		
	200.2	200	C	33		Kitchen	ceramic	ironstone		body	plain	1	1844	present		
	200.3	200	C	33		Kitchen	ceramic	ccware			plain	1	1830	1860		
	203.1	203	C	27		Kitchen	ceramic	creamware		handle	plain	1	1775	1820	lighter yellow color	
	203.2	203	C	27		Kitchen	curved glass	milk glass	tableware			1				
	204.1	204	C	25		Kitchen	ceramic	stoneware		body	plain	1	19 th c		North American Stoneware	
	204.2	204	C	25		Kitchen	ceramic	redware			black glazed	1	late 18th c	19th c		

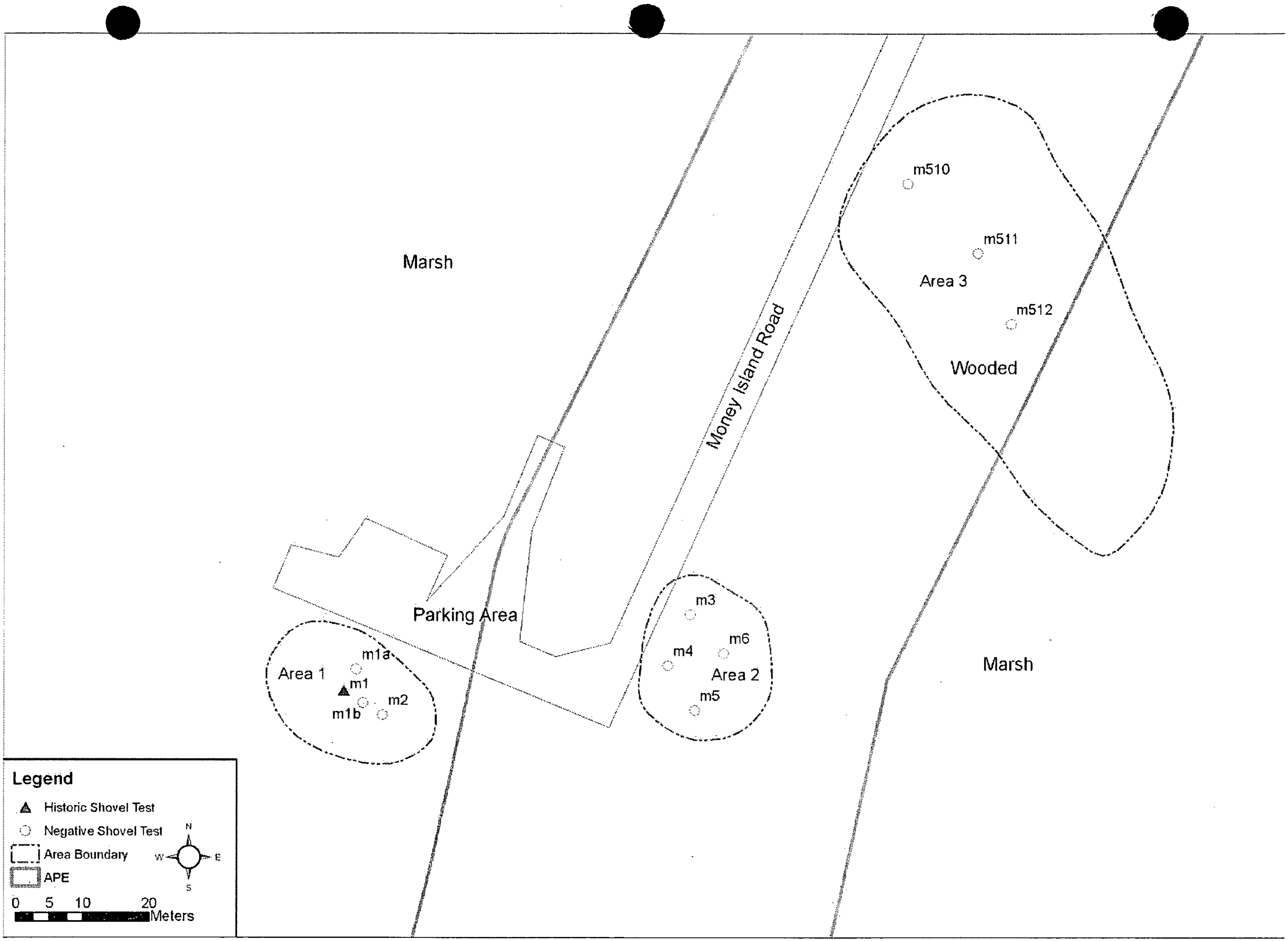
State Site #	Curation Catalog	Bag#	Field	Cluster	ST#/IF #	South Group	Artifact	Type	Vessel Type	Sherd Type	Decoration	#	Incept	Terminal	Notes
	204.3	204	C	25		Architecture	flat glass	light green				2			2.43 mm; 1.79 mm
	205.1	205	C	30		Kitchen	ceramic	hard paste porcelain		base		1	19th c		
	205.2	205	C	30		Kitchen	ceramic	redware			unglazed	2	late 18th c	19th c	
	206.1	206	C	29		Kitchen	ceramic	pearlware		body	banded	1	1780	1830	
	206.2	206	C	29		Kitchen	ceramic	redware			brown glazed	1	late 18th c	19th c	
	206.3	206	C	29		Kitchen	ceramic	redware			black glazed	1	late 18th c	19th c	
	206.4	206	C	29		Kitchen	ceramic	redware			dark greeen glazed	1	late 18th c	19th c	
	208.1	208	C	24		Kitchen	cruved glass	colorless	container	body		1			
	208.2	208	C	24		Kitchen	ceramic	redware			black glazed	1	late 18th c	19th c	
	208.3	208	C	24		Kitchen	ceramic	redware			unglazed	1	late 18th c	19th c	
	212.1	212	C	26		Activities	ferrous metal	staple				1			
	212.2	212	C	26		Kitchen	ceramic	redware			unglazed	2	late 18th c	19th c	
	215.1	215	C	41		Kitchen	ceramic	hard paste porcelain		body	plain	1	19th c		
	215.2	215	C	41		Kitchen	ceramic	redware			black glazed	1	late 18th c	19th c	
	219.1	219	C	31		Activities	ceramic	stoneware		body	dark brown glazed	1			sewer pipe
	219.2	219	C	31		Activities	metal	tin			folded tin	1			
	219.3	219	C	31		Kitchen	ceramic	redware		rim	scalloped; brown glazed	1	late 18th c	19th c	
	219.4	219	C	31		Kitchen	ceramic	ironstone		rim	plain	1	1844	present	
	219.5	219	C	31		Kitchen	curved glass	colorless	container	body		1			
	219.6	219	C	31		Kitchen	curved glass	aqua	container	body		2			
	228.1	228	C		IF 25	Kitchen	ceramic	ironstone		body	plain	1	1844	present	
	229.1	229	C		IF 29	Kitchen	ceramic	ironstone		body	plain	1	1844	present	
	230.1	230	C		IF 30	Kitchen	ceramic	ironstone		rim	plain	1	1844	present	
	231.1	231	C		IF 31	Kitchen	ceramic	refined stoneware			black glazed interior and exterior	1			
	234.1	234	C		IF 26	Kitchen	ceramic	ironstone		body	plain	1	1844	present	
	235.1	235	C		IF 27	Kitchen	ceramic	stoneware		body	blue banded w/bristol glazed interior	1	early 20th C		
	237.1	237	C		IF 19	Kitchen	ceramic	redware			unglazed	1	late 18th c	19th c	
	238.1	238	C		IF 20	Tobacco	tobacco pipe	stem		kaolin		1			3.07 mm bore diameter
	239.1	239	C		IF 21	Kitchen	ceramic	ironstone		body	plain	1	1844	present	
	258.1	258	C		IF 28	Kitchen	ceramic	redware			brown glazed	1	late 18th c	19th c	
	138.1	138	F		IF 120	Activities	metal	spring				1			
	140.1	140	F		IF 123	Kitchen	ceramic	redware		body	dark brown glazed	1	late 18th c	19th c	
	141.1	141	F	121		Kitchen	ceramic	redware		rim	black glazed	1	late 18th c	19th c	
	141.2	141	F	121		Kitchen	ceramic	redware		body	unglazed	1	late 18th c	19th c	
	142.1	142	F	122		Kitchen	ceramic	stoneware		body	British Brown	1	1690	1775	
	142.2	142	F	122		Kitchen	ceramic	redware		body	black glazed	1	late 18th c	19th c	
	142.3	142	F	122		Kitchen	ceramic	redware		rim	unglazed	1	late 18th c	19th c	thick rim
	144.1	144	F		IF 121	Kitchen	curved glass	olive	container	body		1			
	151.1	151	F	123		Kitchen	ceramic	redware		body	black glazed	3	late 18th c	19th c	
	9.1	9	small field		ST M45	Architecture	nail	indeterminate				1			
	9.2	9	small field		ST M45	Indeterminate	ferrous metal	indeterminate				1			
	10.1	10	small field		ST M49	Architecture	nail	indeterminate				1			
	10.2	10	small field		ST M49	Kitchen	ceramic	stoneware		body	salt glazed exterior/Albany slip interior	1			
	7.1	7	SP		ST M1	Kitchen	ceramic	redware		body	speckled brown glaze	1	late 18th c	19th c	
	89.1	89	SP		ST M1b	Kitchen	curved glass	amber	bottle	body		1			

State Site	Catalog #	MACTEC Catalog	Site	Bag	Unit	Feature	STP	Portion	Level	Depth	Size	Vessel Portion	Type	Decoration	Surface_Treatment	Temper	Count	Weight	Rim_shape	Note
28SA179	167.1	167.21.1	Field A	167		IF 11			SURFACE		>=1/2 inch	Body		(blank)	Plain	Sand and Grit	1	0.1		large grit tempering
28SA179	173.3	173.21.1	Field A	173	CLUSTER 10				SURFACE		>=1/2 inch	Body		(blank)	Plain	Indeterminate	1	0.1		no visible temper
28SA179	174.7	174.21.1	Field A	174	CLUSTER 12				SURFACE		>=1/2 inch	Body		(blank)	Plain	Sand	1	0.1		
28SA179	176.10	176.21.1	Field A	176	CLUSTER 04				SURFACE		>=1/2 inch	Body		Indeterminate	Indeterminate	Sand	1	0.1		decorated but too small tpo discern; large sand temperin
28SA179	176.11	176.21.2	Field A	176	CLUSTER 04				SURFACE		>=1/2 inch	Body		(blank)	Plain	Indeterminate	1	0.1		no visible temper
28SA179	183.7	183.21.1	Field A	183	CLUSTER 02				SURFACE		>=1/2 inch	Body		(blank)	Cord Marked, Fabric Impressed	Indeterminate	1	0.1		fabric or cord marked (too small to discern); no visible tempe
28SA179	187.9	187.21.1	Field A	187	CLUSTER 07				SURFACE		>=1/2 inch	Body		(blank)	Plain	Sand	1	0.8		
28SA179	190.2	190.21.1	Field A	190	CLUSTER 05				SURFACE		>=1/2 inch	Body		(blank)	Plain	Sand and Grit	1	0.1		
28SA179	190.3	190.21.2	Field A	190	CLUSTER 05				SURFACE		>=1/2 inch	Body		(blank)	Plain	Sand	1	0.1		
28SA179	118.10	118.21.1	Field B	118	CLUSTER 15				SURFACE		>=1/2 inch	Body		(blank)	Plain	Indeterminate	1	0.1		no visible temper
28SA179	119.10	119.21.1	Field B	119	CLUSTER 19				SURFACE		>=1/2 inch	Body		(blank)	Plain	Grit	1	0.1		
28SA179	121.19	121.21.1	Field B	121	CLUSTER 18				SURFACE		>=1/2 inch	Body		(blank)	Cord Marked	Sand	2	0.1		thick
28SA179	121.20	121.21.2	Field B	121	CLUSTER 18				SURFACE		>=1/2 inch	Body		(blank)	Plain	Indeterminate	1	0.1		no visible temper
28SA179	123.12	123.21.1	Field B	123	CLUSTER 17				SURFACE		>=1/2 inch	Body		(blank)	Plain	Sand and Grit	1	0.1		
28SA179	123.13	123.21.2	Field B	123	CLUSTER 17				SURFACE		>=1/2 inch	Body		(blank)	Cord Marked	Grit	1	0.1		
28SA181	214.11	214.21.1	Field D	214	CLUSTER 40				SURFACE		>=1/2 inch	Body		(blank)	Indeterminate	Sand	1	0.1		thick; indistinguishable decoration
28SA182	150.1	150.21.1	Field E	150		IF 49			SURFACE		>=1/2 inch	Body		(blank)	Plain	Grit	1	0.1		
28SA182	151.1	151.21.1	Field E	151	CLUSTER 23				SURFACE		>=1/2 inch	Body		(blank)	Plain	Sand	1	0.1		
28SA182	153.1	153.21.1	Field E	153		IF 50			SURFACE		>=1/2 inch	Body		(blank)	Plain	Sand	2	0.1		fine sand
28SA182	159.8	159.21.1	Field E	159	CLUSTER 45				SURFACE		>=1/2 inch	Body		(blank)	Indeterminate	Sand	1	0.1		indistinguishable desig
28SA182	192.1	192.21.1	Field E	192	CLUSTER 46				SURFACE		>=1/2 inch	Body		(blank)	Plain	Indeterminate	2	0.1		
28SA182	192.2	192.21.2	Field E	192	CLUSTER 46				SURFACE		>=1/2 inch	Body		(blank)	Indeterminate	Sand	1	0.1		decorated, but too small to discern
28SA182	193.2	193.21.1	Field E	193	CLUSTER 58				SURFACE		>=1/2 inch	Body		(blank)	Indeterminate	Sand	1	0.1		decorated but indistinguishable
28SA182	193.3	193.21.2	Field E	193	CLUSTER 58				SURFACE		>=1/2 inch	Body		(blank)	Plain	Indeterminate	1	0.1		no visible temper
28SA182	199.3	199.21.1	Field E	199	CLUSTER 49				SURFACE		>=1/2 inch	Body		(blank)	Plain	Sand to Grit	1	0.1		
28SA182	218.1	218.21.1	Field E	218		IF 52			SURFACE		>=1/2 inch	Body		(blank)	Plain	Grit	1	0.1		
28SA182	221.1	221.21.1	Field E	221		IF 55			SURFACE		>=1/2 inch	Body		(blank)	Plain	Indeterminate	1	0.1		
28SA182	249.1	249.21.1	Field E	249		IF 53			SURFACE		>=1/2 inch	Body		(blank)	Plain	Sand to Grit	1	0.1		
28SA182	251.1	251.21.1	Field E	251		IF 54			SURFACE		>=1/2 inch	Body		(blank)	Plain	Indeterminate	1	0.1		
28SA182	253.1	253.21.1	Field E	253		IF 58			SURFACE		>=1/2 inch	Body		(blank)	Plain	Sand	1	0.1		
28SA182	254.1	254.21.1	Field E	254		IF 59			SURFACE		>=1/2 inch	Body		(blank)	Plain	Sand	1	0.8		
28SA182	255.2	255.21.1	Field E	255		IF 60			SURFACE		>=1/2 inch	Body		(blank)	Plain	Grit	1	0.1		
28SA183	17.2	17.21.1	BF-Site	17			M123			0-28	>=1/2 inch	Body		(blank)	Eroded	Quartz	1	1.2		
28SA183	16.1	16.23.1	BF-Site	16			M124			0-25	<1/2 inch						2	0.7		
28SA183	24.1	24.21.1	BF-Site	24			M153			0-25	>=1/2 inch	Body		(blank)	Plain	Quartz	1	1.2		
28SA183	113.1	113.21.1	BF-Site	113			M187c			0-19	>=1/2 inch	Body		(blank)	Cord Marked	Sand	1	2.6		
28SA183	2.1	27.21.1	BF-Site	27			M198			0-23	>=1/2 inch	Body		(blank)	Plain	Sand	1	1.4		
28SA183	31.2	31.23.1	BF-Site	31			M220			0-26	<1/2 inch						1	0.8		
28SA183	32.1	32.23.1	BF-Site	32			M227			0-25	<1/2 inch						1	0.8		
28SA183	33.1	33.23.1	BF-Site	33			M246			0-29	<1/2 inch						1	1.1		
28SA183	34.1	34.21.1	BF-Site	34			M248			0-27	>=1/2 inch	Body		(blank)	Plain	Grit	1	2.6		
28SA183	35.1	35.23.1	BF-Site	35			M249				<1/2 inch						1	0.5		
28SA183	36.1	36.21.1	BF-Site	36			M251			0-24	>=1/2 inch	Body		(blank)	Cord Marked	Sand	1	1.2		
28SA183	114.1	114.23.1	BF-Site	114			M253			0-25	<1/2 inch						1	0.7		
28SA183	37.2	37.21.1	BF-Site	37			M265			0-27	>=1/2 inch	Body		(blank)	Plain	Grit	1	2.8		
28SA183	37.3	37.23.1	BF-Site	37			M265			0-27	<1/2 inch						1	0.6		
28SA183	40.1	40.23.1	BF-Site	40			M268			0-25	<1/2 inch						1	0.7		
28SA183	41.1	41.23.1	BF-Site	41			M285			0-28	<1/2 inch						3	1.4		
28SA183	42.1	42.23.1	BF-Site	42			M290			0-40	<1/2 inch						1	0.8		
28SA183	43.1	43.23.1	BF-Site	43			M301				<1/2 inch						2	1.9		
28SA183	44.2	44.23.1	BF-Site	44			M302			0-31	<1/2 inch						1	1.9		
28SA183	45.1	45.21.1	BF-Site	45			M303			0-35	>=1/2 inch	Body		(blank)	Plain	Sand	1	2.9		
28SA183	47.1	47.23.1	BF-Site	47			M310			0-24	<1/2 inch						1	0.5		
28SA183	48.1	48.23.1	BF-Site	48			M313			0-30	<1/2 inch						1	1.8		
28SA183	51.2	51.21.1	BF-Site	51			M329			0-24	>=1/2 inch	Body		(blank)	Plain	Grit	1	2.3		
28SA183	54.1	54.23.1	BF-Site	54			M341			0-30	<1/2 inch						2	0.6		
28SA183	55.1	55.23.1	BF-Site	55			M349			0-21	<1/2 inch						1	0.5		
28SA183	56.1	56.23.1	BF-Site	56			M355			0-20	<1/2 inch						1	1.4		
28SA183	57.1	57.21.1	BF-Site	57			M356			0-26	>=1/2 inch	Body		(blank)	Plain	Grit	1	2.7		
	203.3	203.21.1	Field C	203	CLUSTER 37				SURFACE		>=1/2 inch	Body		(blank)	Plain	Indeterminate	1	0.1		no visible temper
	206.5	206.21.1	Field C	206	CLUSTER 29				SURFACE		>=1/2 inch	Body		(blank)	Plain	Indeterminate	1	0.1		no visible temper
	211.1	211.21.1	Field C	211		IF 18			SURFACE		>=1/2 inch	Body		(blank)	Cord Marked	Sand	1	0.1		
	222.1	222.21.1	Field C	222		IF 36			SURFACE		>=1/2 inch	Body		(blank)	Cord Marked	Indeterminate	1	0.1		no visible temper
	223.1	223.21.1	Field C	223		IF 37			SURFACE		>=1/2 inch	Body		(blank)	Plain	Sand and Grit	1	0.1		
	223.2	223.21.2	Field C	223		IF 37			SURFACE		>=1/2 inch	Body		(blank)	Plain	Indeterminate	1	0.1		no visible temper
	142.4	142.21.1	Field F	142	CLUSTER 122				SURFACE		>=1/2 inch	Body		(blank)	Plain	Grit	1	0.1		
	145.1	145.21.1	Field F	145		IF 120			SURFACE		>=1/2 inch	Body		(blank)	Plain	Indeterminate	1	0.1		
	8.1	8.21.1	small field	8			M10			0-24	>=1/2 inch	Body		(blank)	Eroded	Sand, Quartz, Mica	1	1.9		

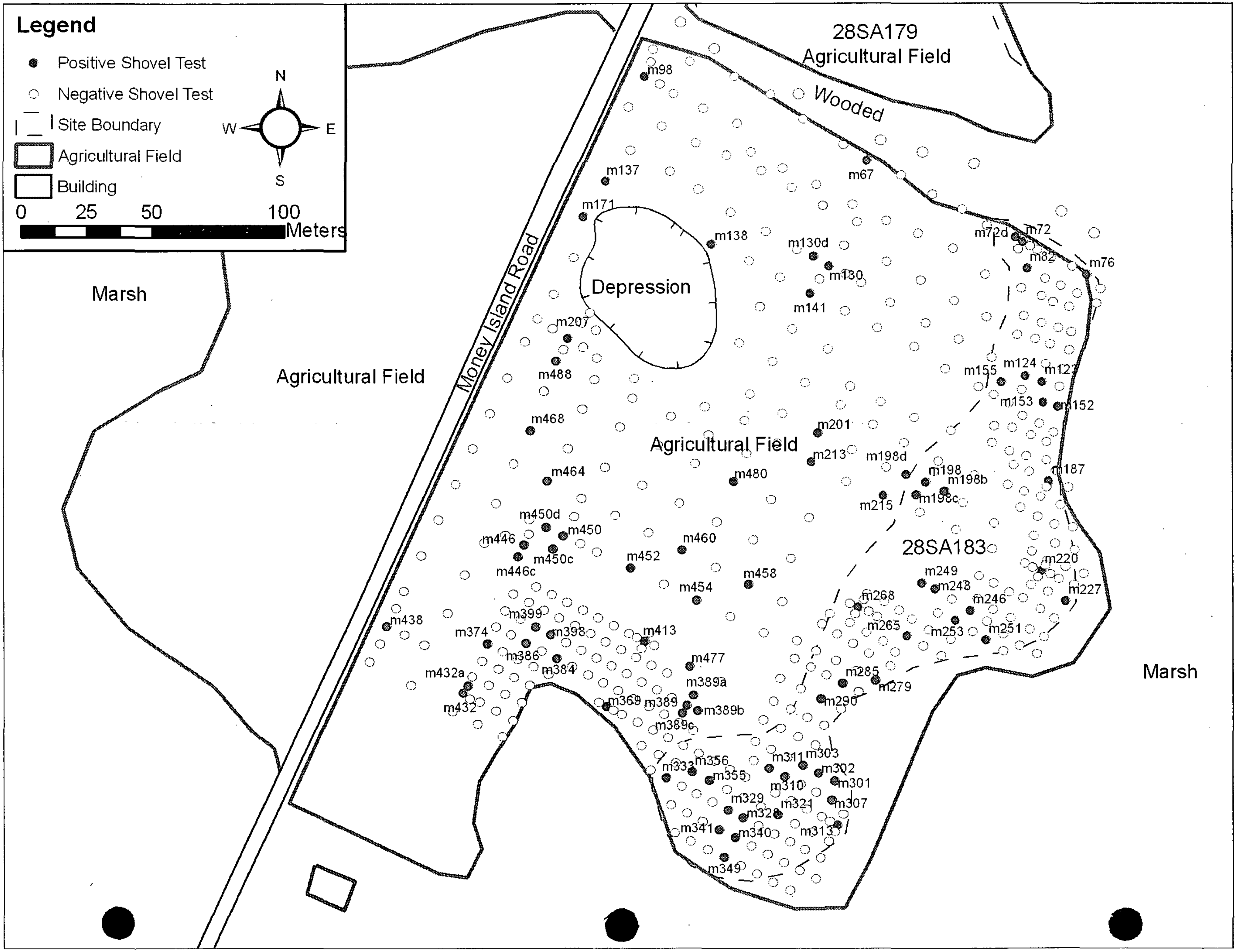
State Site	Catalog #	MACTEC Catalog	Site	Bag	Unit	Feature	STP	Portion	Level	Depth	Size	Vessel Portion	Type	Decoration	Surface_Treatment	Temper	Count	Weight	Rim_shape	Note
	18.1	18.23.1	BF	18			M130			0-26	<1/2 inch						1	1		
	29.1	29.23.1	BF	29			M201			0-25	<1/2 inch						1	0.4		
	30.2	30.21.1	BF	30			M215			0-32	>=1/2 inch	Body		(blank)	Cord Marked	Quartz	3	7.7		
	30.0	30.23.1	BF	30			M215			0-32	<1/2 inch						1	1.3		
	94.2	94.21.1	BF	94			M379c			0-37	>=1/2 inch	Body		(blank)	Plain	Sand	1	1.5		
	62.1	62.21.1	BF	62			M389			0-29	>=1/2 inch	Body		(blank)	Indeterminate	Indeterminate	1	0.1		
	102.1	102.21.1	BF	102			M389c			0-24	>=1/2 inch	Body		(blank)	Plain	Sand	1	1.4		
	63.1	63.23.1	BF	63			M394			0-27	<1/2 inch						2	0.5		
	64.1	64.21.1	BF	64			M398			0-49	>=1/2 inch	Body		(blank)	Indeterminate	Quartz	1	0.8		
	64.2	64.21.2	BF	64			M398			0-49	>=1/2 inch	Body		(blank)	Plain	Sand	1	1.5		
	65.1	65.23.1	BF	65			M399			0-36	<1/2 inch						1	1.4		
	66.1	66.21.1	BF	66			M413			0-28	>=1/2 inch	Body		(blank)	Plain	Sand, Mica	1	2.5		
	68.1	68.23.1	BF	68			M438			0-25	<1/2 inch						1	0.8		
	73.2	73.23.1	BF	73			M438			0-24	<1/2 inch						2	1.1		
	91.1	91.23.1	BF	91			M446c				<1/2 inch						1	0.7		
	70.1	70.23.1	BF	70			M450			0-42	<1/2 inch						1	0.8		
	92.1	92.23.1	BF	92			M450c				<1/2 inch						1	1.3		
	74.2	74.23.1	BF	74			M460			0-25	<1/2 inch						1	0.4		
	78.2	78.21.1	BF	78			M477			0-24	>=1/2 inch	Body		(blank)	Cord Marked	Sand to Grit	1	2		
	15.1	15.23.1	BF	15			M98			0-32	<1/2 inch						1	0.4		

Appendix A
Prehistoric Lithics

State Site #	Curation Catalog #	Bag#	Field	Cluster	ST#/IF #	Other	Excavator	Date	Count	Weight	Artifact	Material	Note
28SA179	170.1	170	A		IF 6				1		unifacial tool	UID chert	greenish beige material from a nodule
28SA179	172.3	172	A	9					1		nodule	low grade chert?	possible ground facets
28SA179	176.8	176	A	4					1		flake	black chert	
28SA179	176.9	176	A	4					1		possible core	nodular chert	
28SA179	182.4	182	A	8					1		flake	very light gray chert	
28SA179	186.1	186	A		IF 1				1		flake	dark brownish green chert	bifacial thinning flake
28SA179	187.8	187	A	7					1		groundstone		possible hone
28SA179	189.1	189	A		IF 4				1		nodule	low grade chert	
28SA180	118.9	118	B	15					1		shatter	tan chert	
28SA180	119.9	119	B	19					1		flake	brown chert	poss. bifacial thinning flake
28SA180	123.10	123	B	17					2		shatter	tan chert	
28SA180	123.11	123	B	17					1		shatter	jasper	
28SA181	214.9	214	D	40					1		biface	gray chert	
28SA181	214.10	214	D	40					1		shatter	brown chert	
28SA181	227.2	227	D		IF 35				1		shatter	quartz	
28SA182	148.2	148	E		IF 48				1		flake	black/pale red chert	
28SA182	162.5	162	E	43					1		flake	quartz	with some cortex
28SA182	193.1	193	E	58					1		biface	black chert	
28SA182	197.3	197	E	48					1		shatter	quartz	
28SA182	199.2	199	E	49					1		flake	quartz	
28SA182	217.1	217	E		IF 40				1		PPK	brown chert	corner notched
28SA182	242.1	242	E		IF 62				1		PPK	quartz	distal fragment
28SA182	245.1	245	E		IF 61				1		groundstone		possible mano
28SA183	11.1	11	BF-Site		ST M72				1		flake	red chalcedony	
28SA183	17.1	17	BF-Site		ST M123				1		flake	brown chert/white context	
28SA183	22.1	22	BF-Site		ST M155				1		flake	black chert	
28SA183	23.1	23	BF-Site		ST M152				1		flake	quartz	
28SA183	31.1	31	BF-Site		ST M220				1		flake	brown chert	
28SA183	51.1	51	BF-Site		ST M329				1		flake	black chert	
28SA183	52.1	52	BF-Site		ST M333				1		flake	quartz	
	260.1	260	BF		ST M67				1		FCR	quartzite	fine grained
	71.2	71	BF		ST M452				1		shatter	brown chert	brown chert with cortex
	75.2	75	BF		ST M464				1		shatter	cortex	chalky dark gray-black cortex
	76.1	76	BF		ST M468				1		FCR	*quartzite*	*fine grained*
	77.2	77	BF		ST M480				1		flake	tan chert	
	232.1	232	C		IF 22				1		shatter	light gray chert	
	233.1	233	C		IF 24				1		shatter	quartz	
	141.3	141	F	121					1		FCR	quartzite	possible FCR



Marsh
Money Island Road
m510
m511
Area 3
m512
Wooded
Parking Area
m3
m6
m4
Area 2
m5
Marsh
m1a
Area 1
m1
m2
m1b
Legend
Historic Shovel Test
Negative Shovel Test
Area Boundary
APE
N
W
E
S
0 5 10 20
Meters



Legend
Positive Shovel Test
Negative Shovel Test
Site Boundary
Agricultural Field
Building
N
S
E
W
0
25
50
100
Meters
Marsh
Agricultural Field
Money Island Road
28SA179
Agricultural Field
Wooded
Depression
Agricultural Field
28SA183
Marsh
m98
m137
m171
m138
m130d
m130
m141
m67
m72d
m72
m82
m76
m207
m488
m468
m464
m155
m124
m123
m153
m152
m201
m213
m198d
m198
m198b
m198c
m215
m187
m480
m450d
m450
m446
m450c
m446c
m452
m460
m458
m454
m220
m227
m249
m248
m268
m246
m265
m253
m251
m438
m399
m374
m398
m386
m384
m413
m477
m432a
m432
m369
m389
m389a
m389b
m389c
m285
m279
m290
m333
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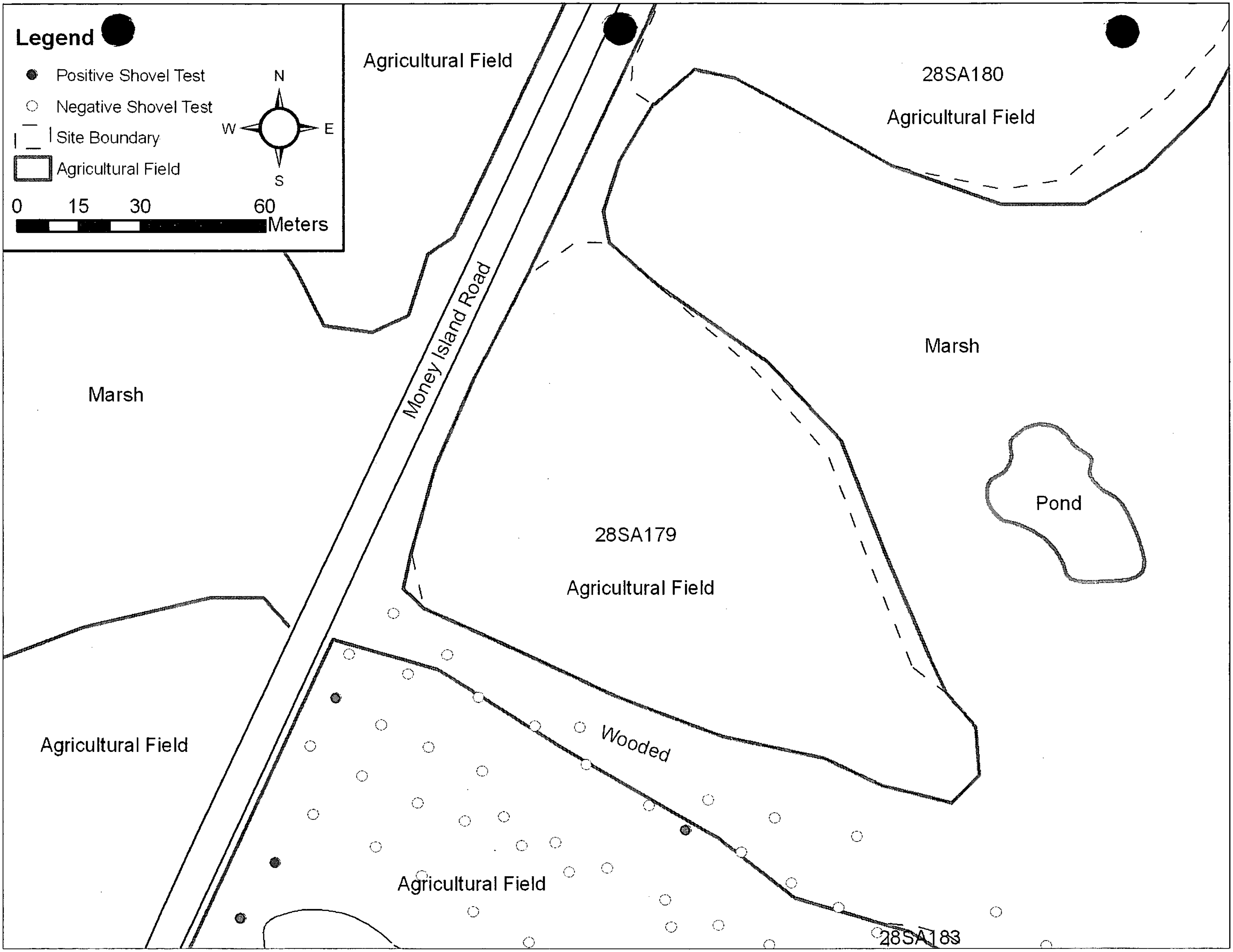
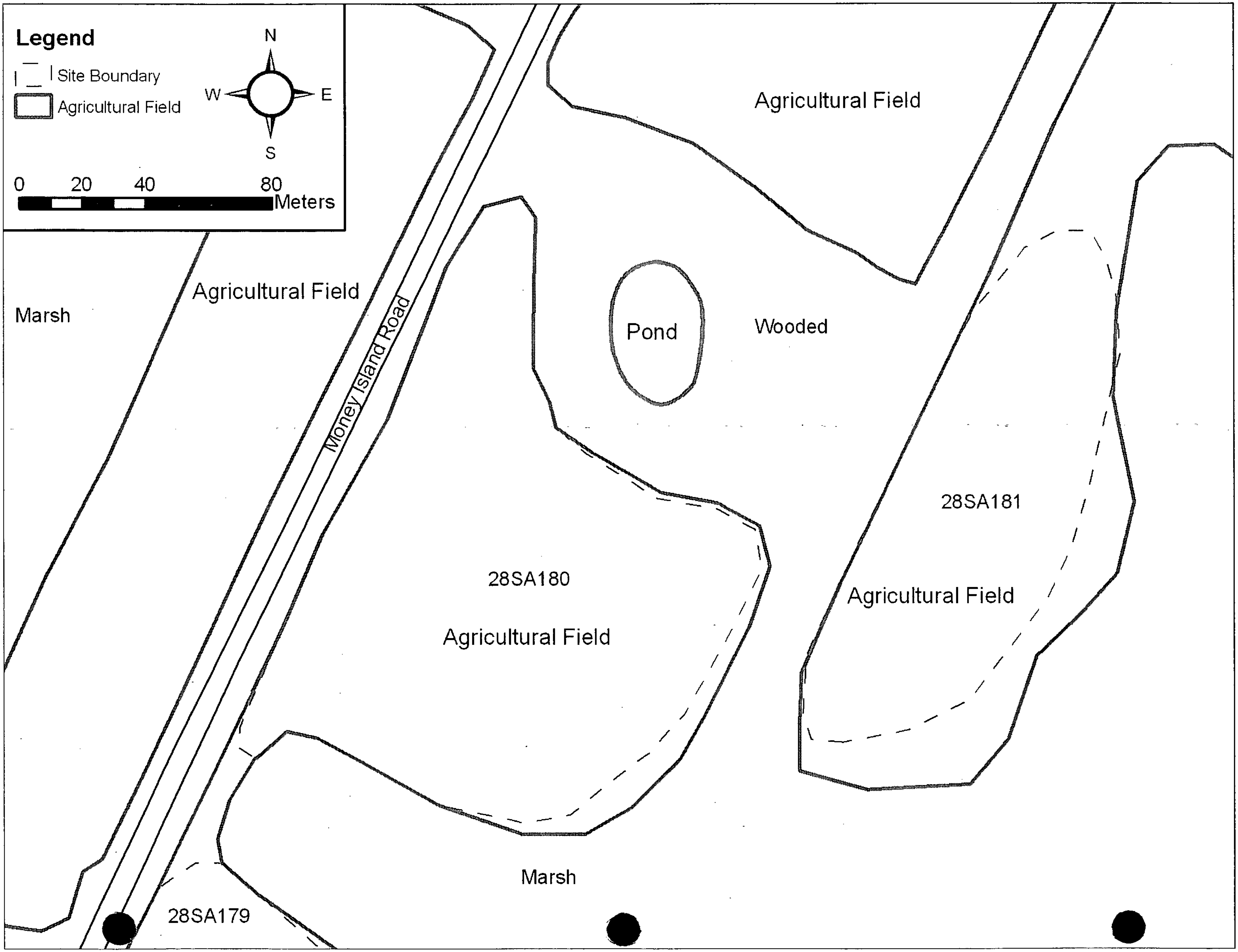
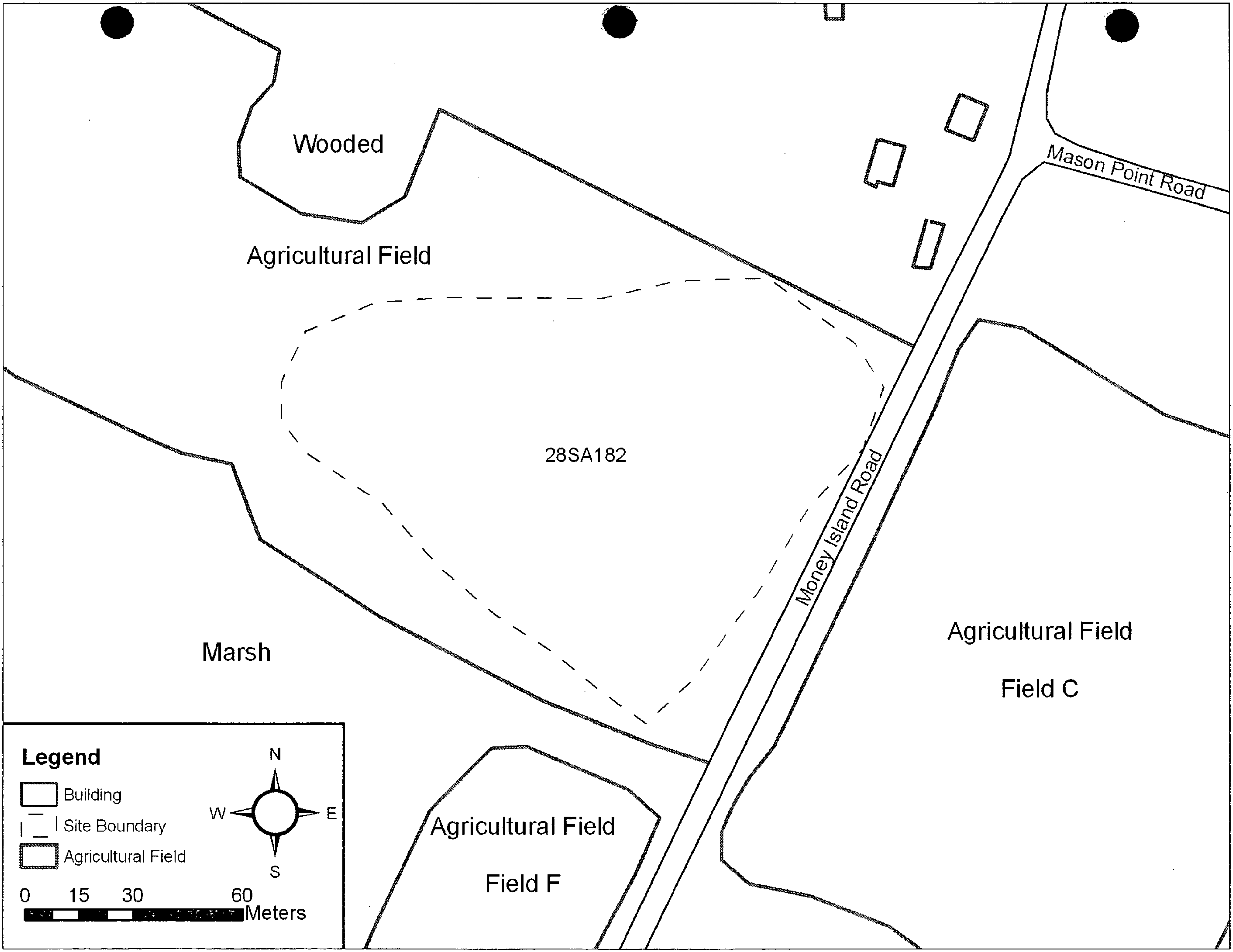
m341
m340
m313
m349

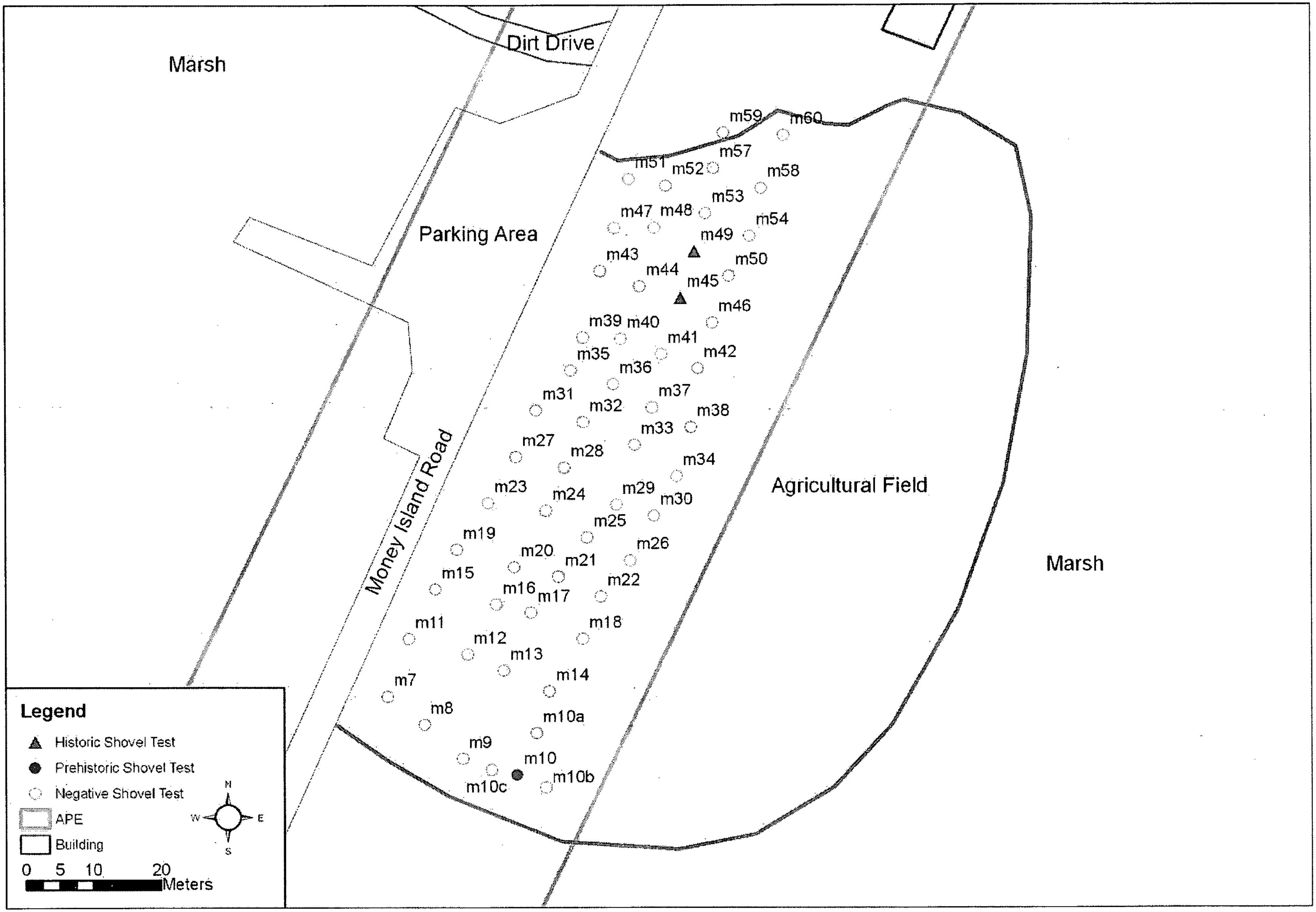

Legend
Positive Shovel Test
Negative Shovel Test
Site Boundary
Agricultural Field
N
S
E
W
0
15
30
60
Meters
Agricultural Field
28SA180
Agricultural Field
Money Island Road
Marsh
Marsh
Pond
28SA179
Agricultural Field
Wooded
Agricultural Field
Agricultural Field
28SA183



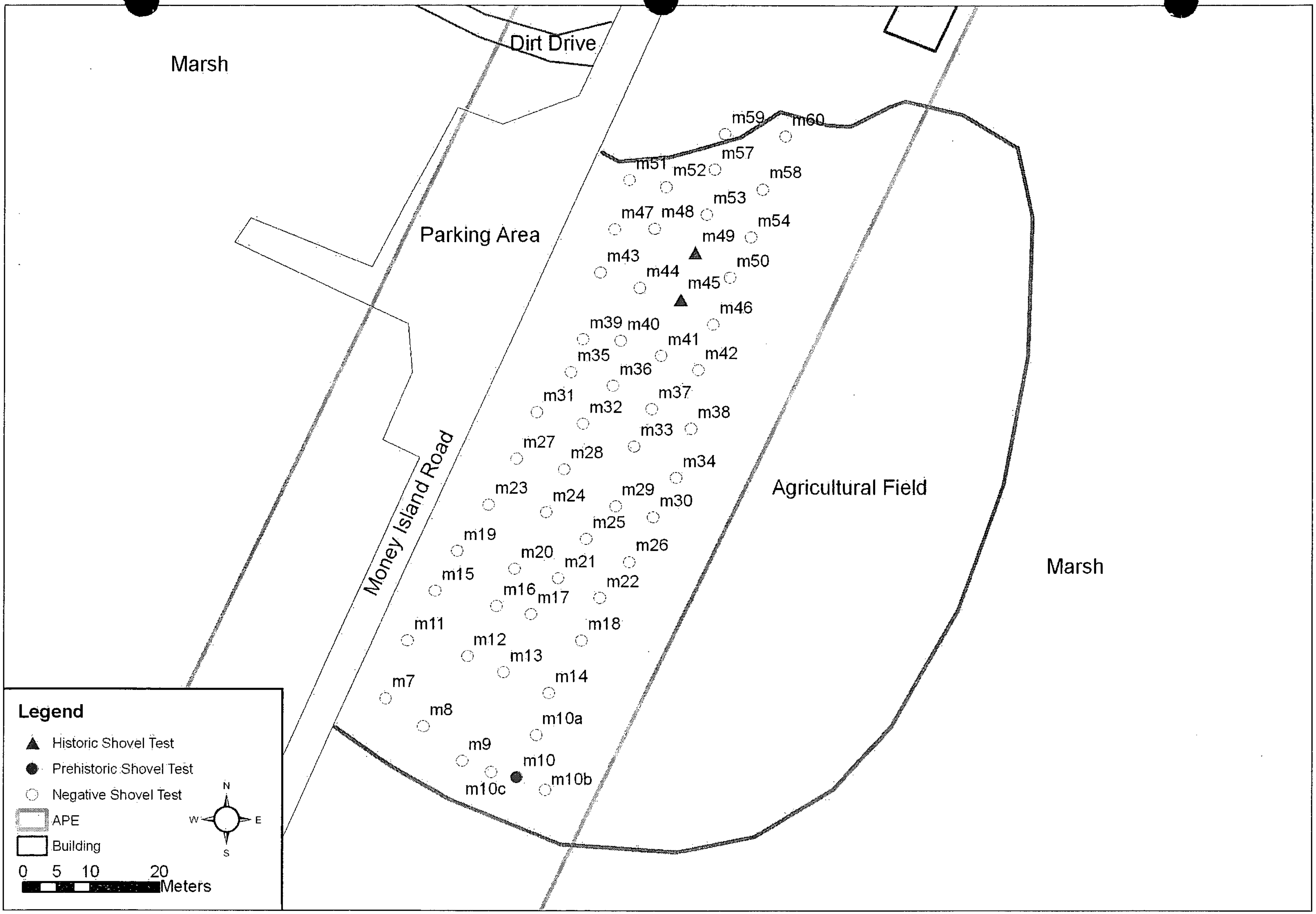
Legend
Site Boundary
Agricultural Field
N
W
E
S
0
20
40
80
Meters
Agricultural Field
Marsh
Agricultural Field
Money Island Road
Pond
Wooded
28SA181
28SA180
Agricultural Field
Agricultural Field
Marsh
28SA179

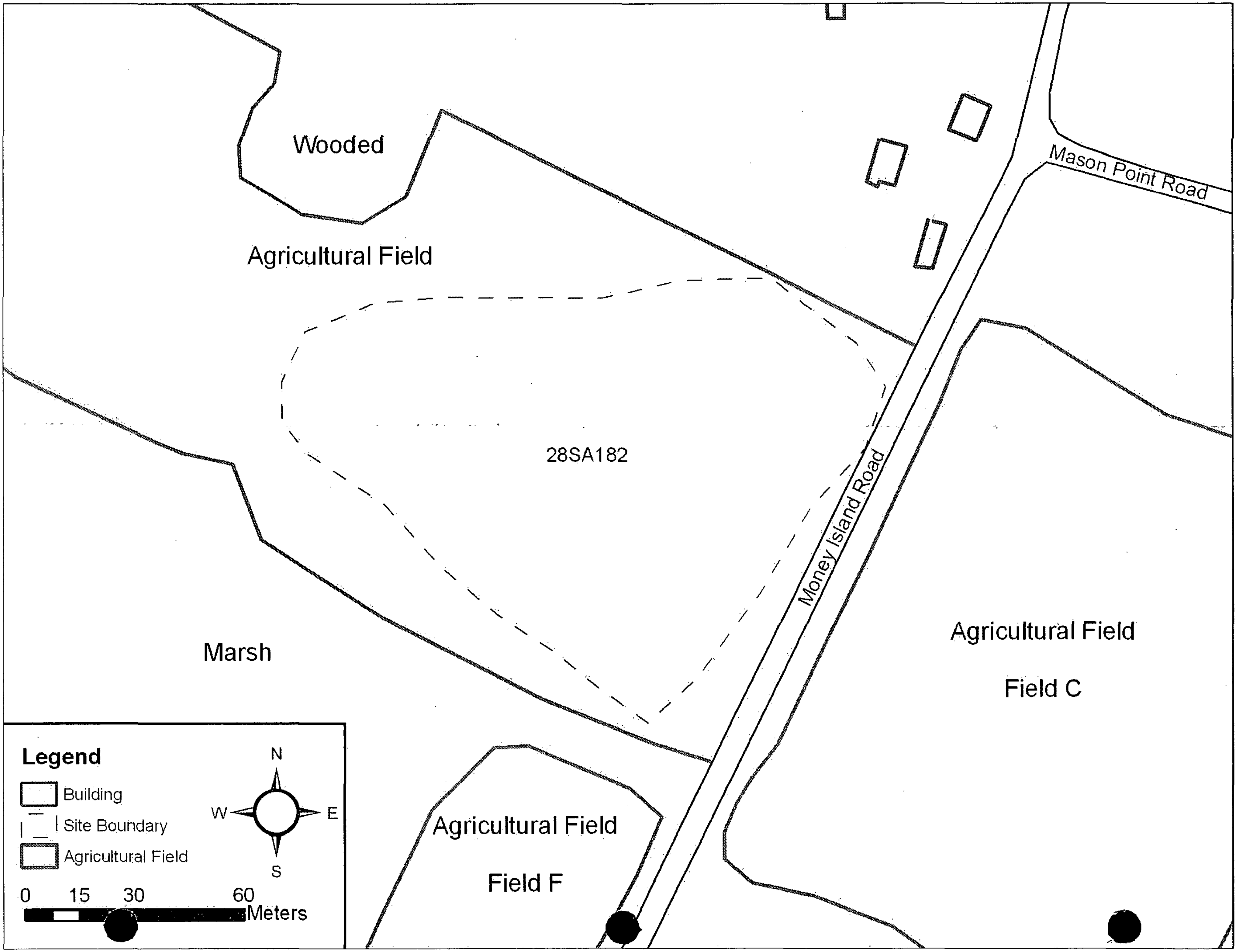


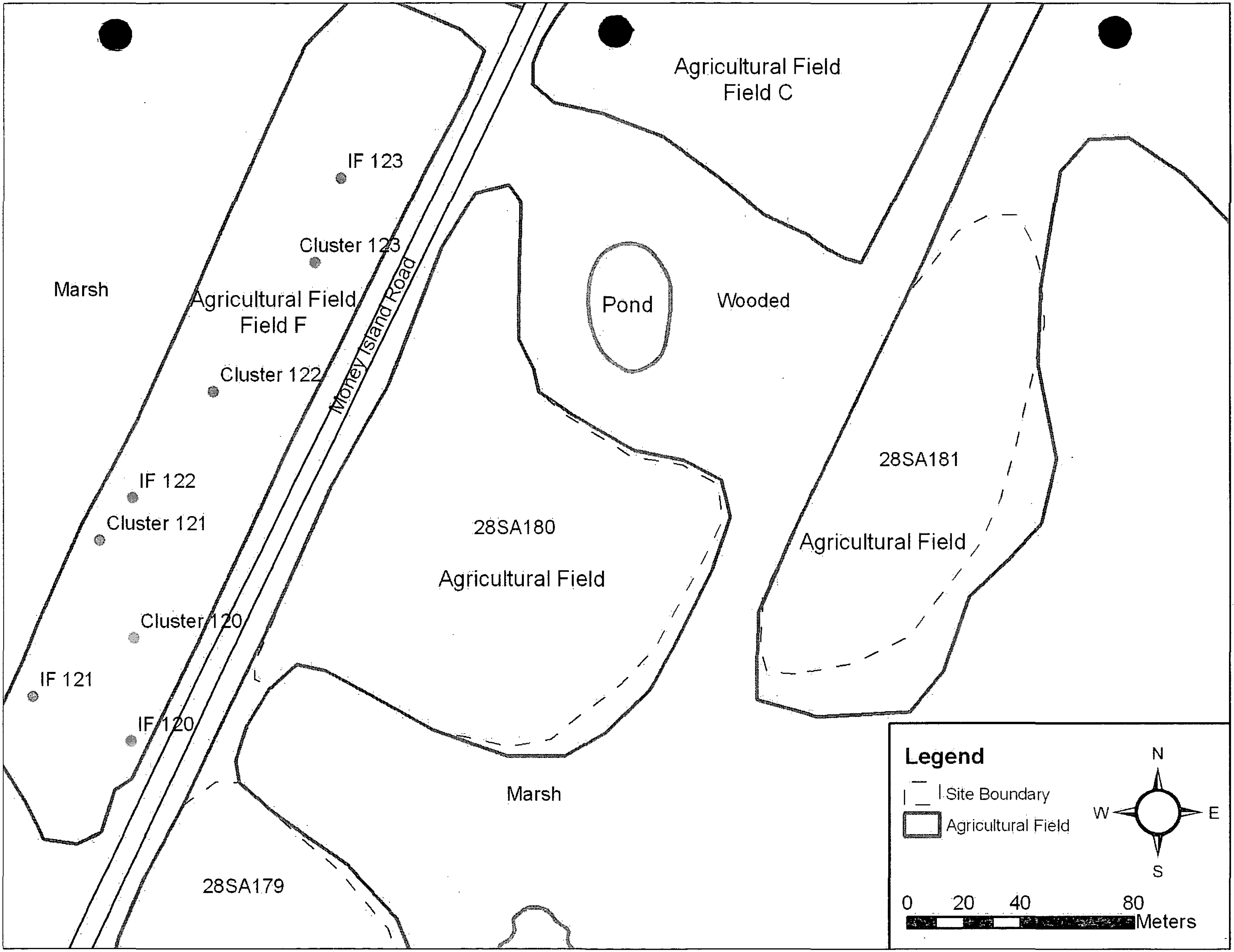
Wooded
Agricultural Field
28SA182
Mason Point Road
Money Island Road
Marsh
Agricultural Field
Field C
Agricultural Field
Field F
Legend
Building
Site Boundary
Agricultural Field
N
W
E
S
0
15
30
60
Meters

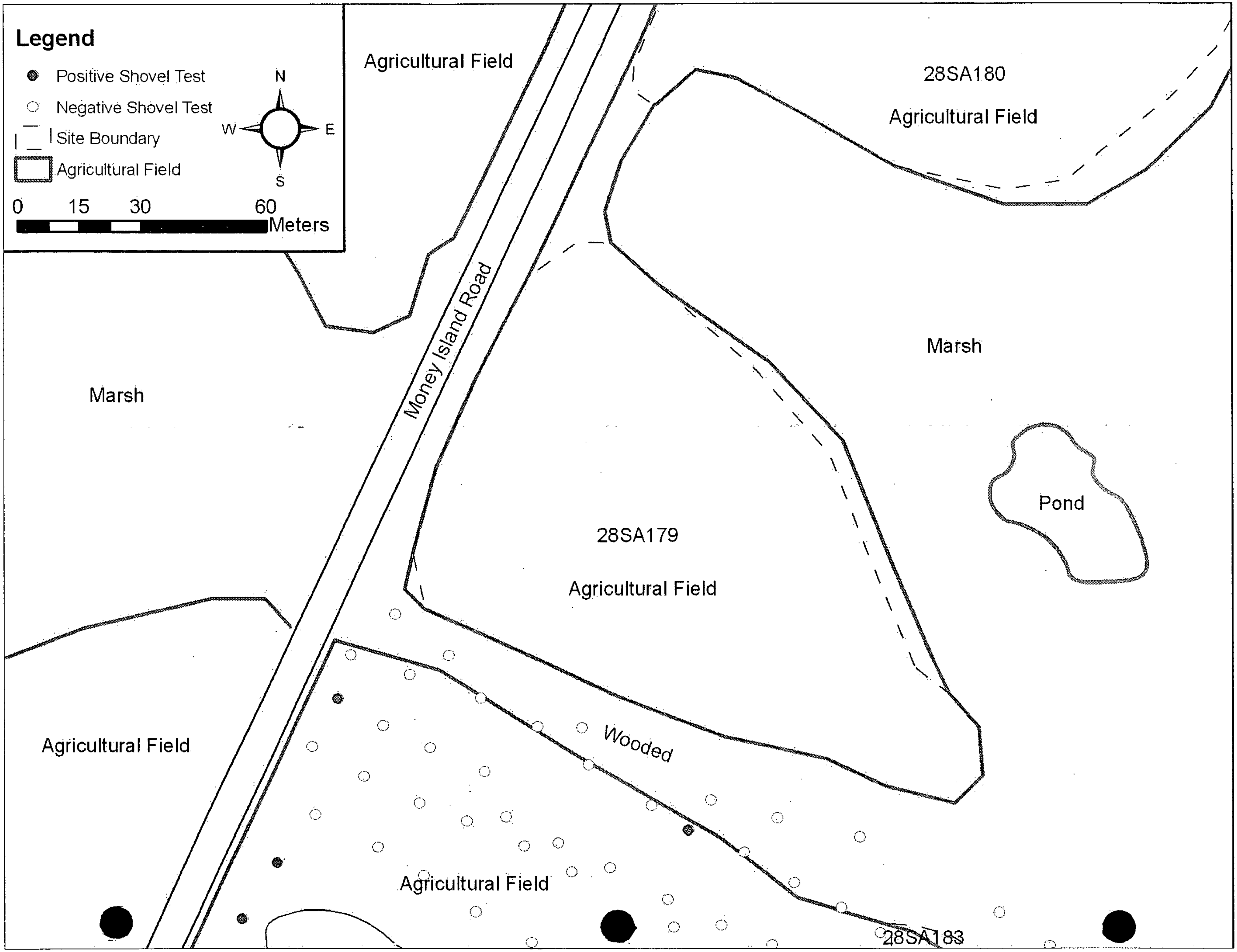


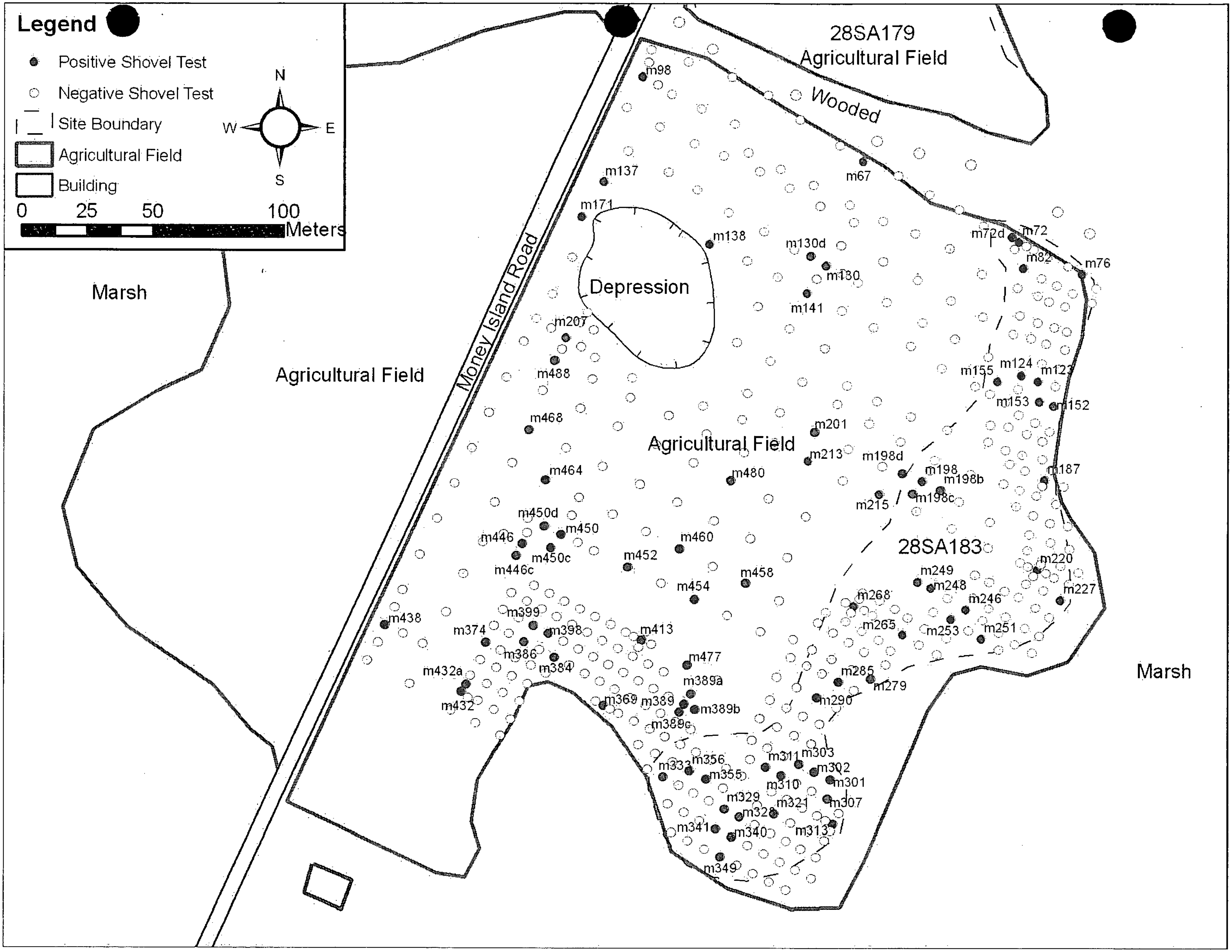
Marsh
Dirt Drive
Parking Area
Money Island Road
Agricultural Field
Marsh
m59
m60
m51
m52
m57
m58
m53
m47
m48
m54
m49
m43
m44
m50
m45
m46
m39
m40
m41
m35
m42
m36
m31
m37
m32
m38
m33
m27
m28
m34
m23
m24
m29
m30
m25
m19
m20
m26
m21
m15
m22
m16
m17
m11
m18
m12
m13
m7
m14
m8
m10a
m9
m10
m10c
m10b
Legend
Historic Shovel Test
Prehistoric Shovel Test
Negative Shovel Test
APE
Building
N
W
E
S
0 5 10 20
Meters


Marsh
Dirt Drive
Parking Area
Money Island Road
Agricultural Field
Marsh
m59
m60
m51
m52
m57
m58
m53
m47
m48
m54
m49
m43
m50
m44
m45
m46
m39
m40
m41
m35
m42
m36
m31
m37
m32
m38
m33
m27
m28
m34
m23
m24
m29
m30
m25
m19
m20
m26
m21
m15
m16
m17
m22
m11
m18
m12
m13
m14
m7
m8
m10a
m9
m10
m10b
m10c
Legend
Historic Shovel Test
Prehistoric Shovel Test
Negative Shovel Test
APE
Building
N
W
E
S
0 5 10 20
Meters


Wooded
Agricultural Field
Mason Point Road
28SA182
Money Island Road
Marsh
Agricultural Field
Field C
Agricultural Field
Field F
Legend
Building
Site Boundary
Agricultural Field
N
W
E
S
0
15
30
60
Meters


Agricultural Field
Field C
IF 123
Cluster 123
Marsh
Agricultural Field
Field F
Money Island Road
Pond
Wooded
Cluster 122
28SA181
IF 122
Cluster 121
28SA180
Agricultural Field
Agricultural Field
Cluster 120
IF 121
IF 120
Marsh
28SA179
Legend
Site Boundary
Agricultural Field
N
W
E
S
0
20
40
80
Meters


Legend
Positive Shovel Test
Negative Shovel Test
Site Boundary
Agricultural Field
N
S
E
W
0 15 30 60
Meters
Agricultural Field
28SA180
Agricultural Field
Money Island Road
Marsh
Marsh
Pond
28SA179
Agricultural Field
Wooded
Agricultural Field
Agricultural Field
28SA183



Legend
Positive Shovel Test
Negative Shovel Test
Site Boundary
Agricultural Field
Building
0 25 50 100
Meters
N
W
E
S
28SA179
Agricultural Field
Wooded
Marsh
Agricultural Field
Money Island Road
Depression
Agricultural Field
28SA183
Marsh
m98
m137
m171
m138
m67
m130d
m130
m141
m72d
m72
m82
m76
m207
m488
m468
m464
m155
m124
m123
m153
m152
m201
m213
m198d
m198
m198b
m198c
m215
m187
m480
m450d
m450
m446
m450c
m446c
m460
m452
m458
m454
m220
m249
m248
m227
m246
m268
m265
m253
m251
m438
m399
m374
m398
m386
m384
m413
m477
m432a
m432
m369
m389
m389a
m389b
m389c
m285
m279
m290
m333
m356
m355
m311
m303
m302
m301
m310
m329
m321
m307
m328
m341
m340
m313
m349

APPENDIX B

FIELD MAPS AND ARTIFACTS LISTS FOR THE ALLOWAY CREEK NECK ROAD ACCESS ALTERNATIVE

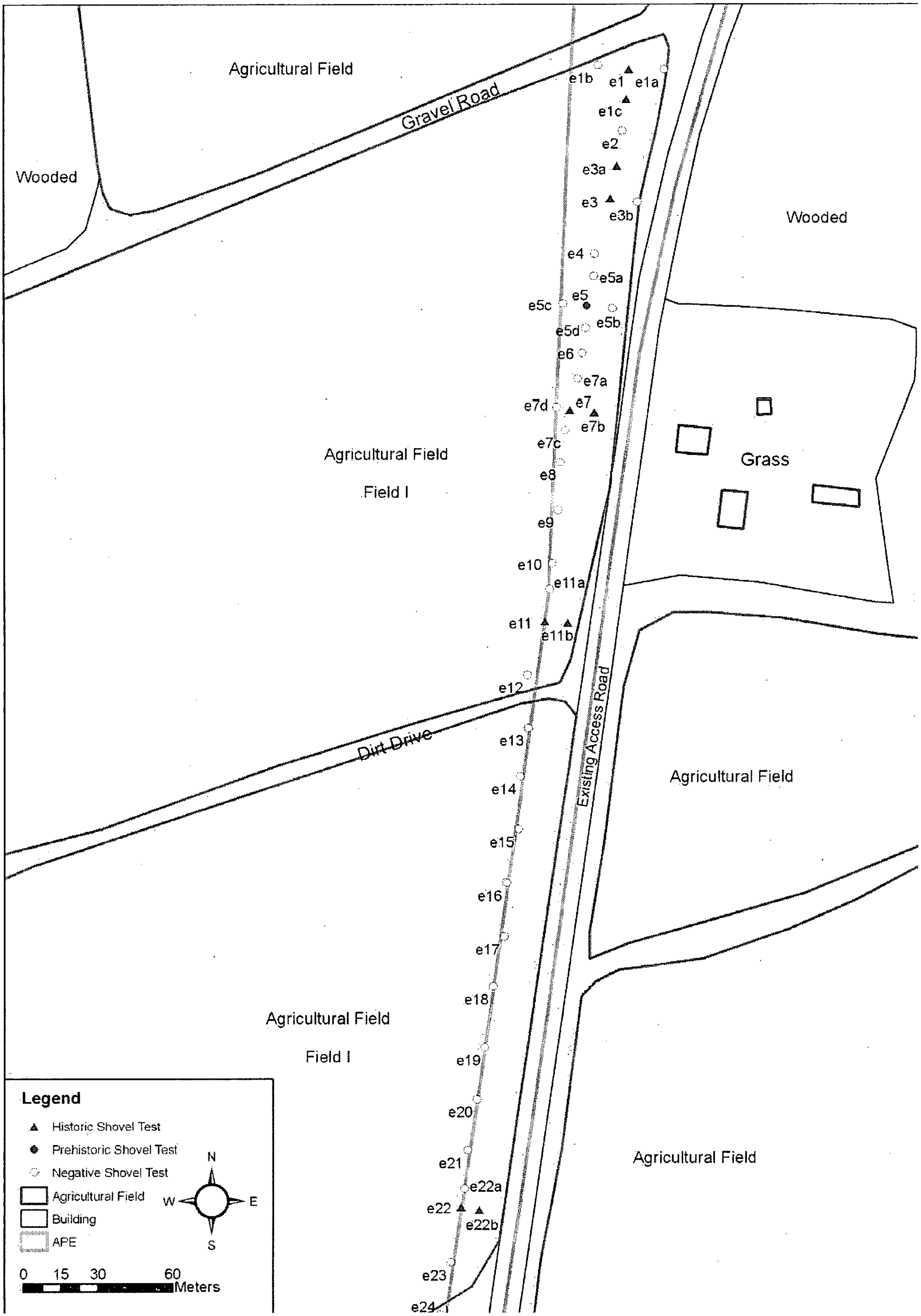
Appendix B
Prehistoric Ceramics

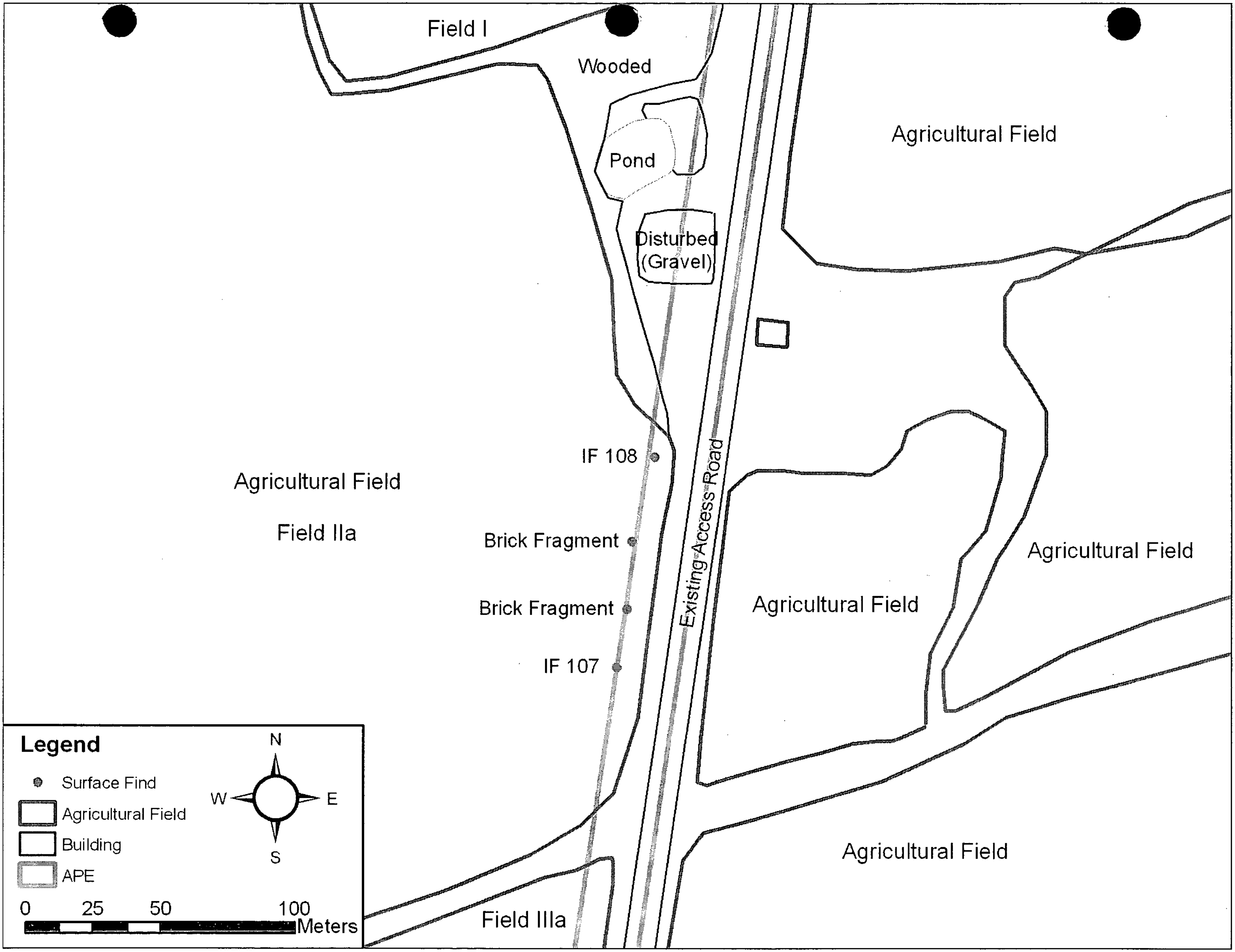
State Site	Catalog #	MACTEC Catalog	Site	Bag	Unit	Feature	STP	Portion	Level	Depth	Size	Vessel Portion	Type	Decoration	Surface_Treatment	Temper	Count	Weight	Rim_shape	Note
	139.9	139.21.1	Field IV	139	CLUSTER 110				SURFACE		>=1/2 inch	Body		(blank)	Indeterminate	Indeterminate	2	0.1		

Appendix B
Prehistoric Lithics

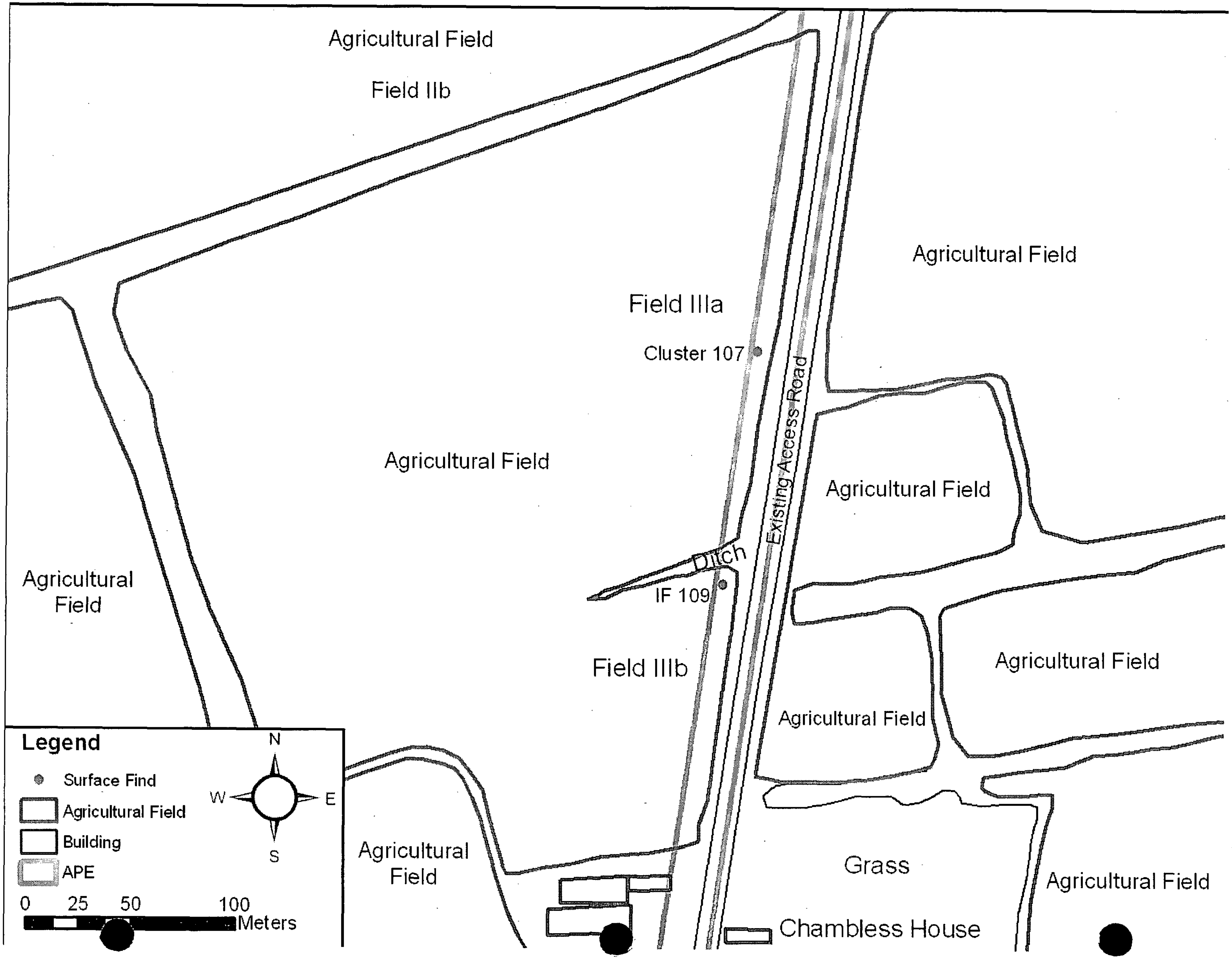
State Site #	Curation Catalog #	Bag#	Field	Cluster	ST#/IF #	Other	Excavator	Date	Count	Weight	Artifact	Material	Note
	3.2	3	I		ST E5				1		flake	dark brown chert	
	106.1	106	I		ST E7b				1		FCR	quartzite	possible flake
	103.1	103	I		ST E19				1		mica	mica	
	127.3	127	IIIa	107					1		shatter	cortex	chalky gray cortex

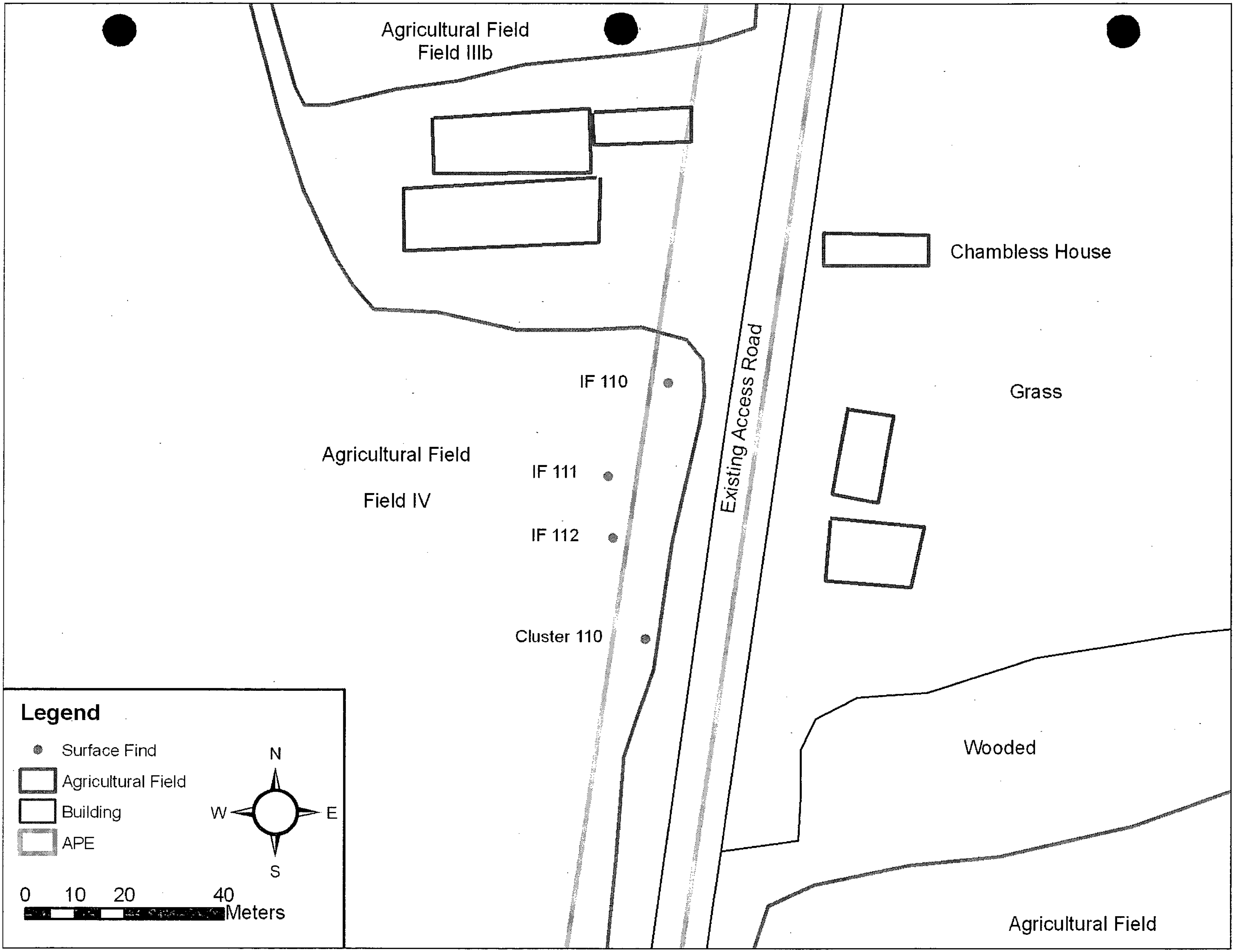
State Site #	Curation Catalog	Bag#	Field	Cluster	ST#/IF #	Depth	Other	Excavator	Date	South Group	Artifact	Type	Vessel Type	Sherd Type	Decoration	#	Incept	Terminal	Notes	
	1	1.1	I		ST E1					Kitchen	curved glass	olive	bottle	body		1				
	3.1	3	I		ST E5					Kitchen	ceramic	redware		body	speckled brown glaze	1	late 18th c	19th c		
	4.1	4	I		ST E7					Activities	coal					1				
	4.1	4	I		ST E7					Kitchen	curved glass	colorless	container	body		1				
	5.1	5	I		ST E11					Kitchen	curved glass	colorless	container	body		1				
	5.2	5	I		ST E11					Indeterminate	ferrous metal	indeterminate				1				
	6.1	6	I		ST E22					Architecture	flat glass	light aqua				1				2.3
	104.1	104	I		ST E1C					Activities	slag					1				
	105.1	105	I		ST E3a					Architecture	brick	handmade				2				
	105.2	105	I		ST E3a					Kitchen	curved glass	amber	bottle	body		1				
	107.1	107	I		ST E11a					Kitchen	ceramic	creamware		body		1	1762	1830		
	107.2	107	I		ST E11a					Kitchen	ceramic	redware		body	black glaze	1	late 18th c	19th c		
	108.1	108	I		ST E22b					Kitchen	curved glass	colorless	container	body		1				
	125.1	125	II a		IF 107					Kitchen	ceramic	refined redware			molded w/brown glaze on interior and exterior	1				
	128.1	128	II a		IF 108					Kitchen	curved glass	aqua	container	body		1			burned	
	124.1	124	III b		IF 109					Kitchen	ceramic	hard paste chinese export porcelain		body	plain	1	1660	1800		
	127.1	127	IIIa	107						Kitchen	ceramic	ccware	plate	body		2	1830	1860		
	127.2	127	IIIa	107						Kitchen	ceramic	ccware	plate	body	blue spatter	1	1830	1860		
	126.1	126	IV		IF 110					Kitchen	ceramic	ccware		rim	molded flutes	1	1830	1860		
	129.1	129	IV		IF 111					Kitchen	ceramic	ironstone		rim	plain	1	1844	present		
	139.1	139	IV	110						Architecture	brick	handmade		fragment	ash glazed	1				
	139.2	139	IV	110						Architecture	brick	indeterminate		fragment		1				
	139.3	139	IV	110						Kitchen	ceramic	creamware		body	plain	1	1775	1820	lighter yellow color	
	139.4	139	IV	110						Kitchen	ceramic	indeterminate			refined; burned	1				
	139.5	139	IV	110						Kitchen	ceramic	redware		rim	brown glazed	1	late 18th c	19th c		
	139.6	139	IV	110						Kitchen	ceramic	redware		body	black glazed	2	late 18th c	19th c		
	139.7	139	IV	110						Kitchen	curved glass	colorless	contaner	body		1				
	139.8	139	IV	110						Architecture	flat glass	light green				1			1.83 mm	
	147.1	147	IV		IF 112					Kitchen	curved glass	olive		base		1				


Agricultural Field
Gravel Road
Wooded
e1b
e1
e1a
e1c
e2
e3a
e3
e3b
Wooded
e4
e5a
e5c
e5
e5b
e5d
e6
e7a
e7d
e7
e7b
e7c
Agricultural Field
Field I
e8
Grass
e9
e10
e11a
e11
e11b
e12
Dirt Drive
Existing Access Road
e13
e14
Agricultural Field
e15
e16
e17
e18
Agricultural Field
Field I
e19
e20
e21
e22a
e22
e22b
e23
e24
Agricultural Field
Legend
Historic Shovel Test
Prehistoric Shovel Test
Negative Shovel Test
Agricultural Field
Building
APE
N
W
E
S
0 15 30 60
Meters

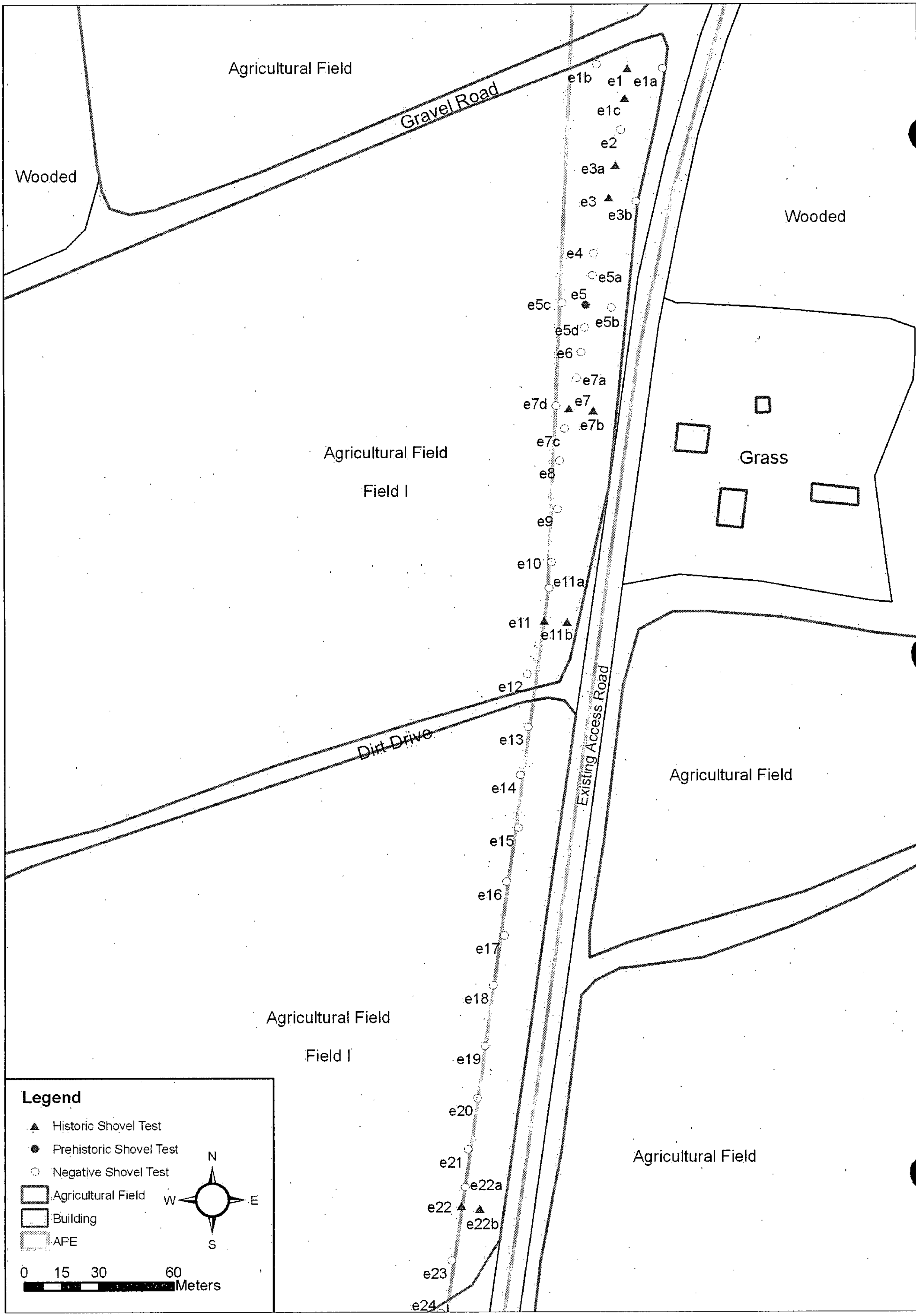


Field I
Wooded
Pond
Disturbed (Gravel)
Agricultural Field
Agricultural Field
Field IIa
IF 108
Brick Fragment
Brick Fragment
IF 107
Existing Access Road
Agricultural Field
Agricultural Field
Agricultural Field
Field IIIa
Legend
Surface Find
Agricultural Field
Building
APE
N
W
E
S
0 25 50 100 Meters

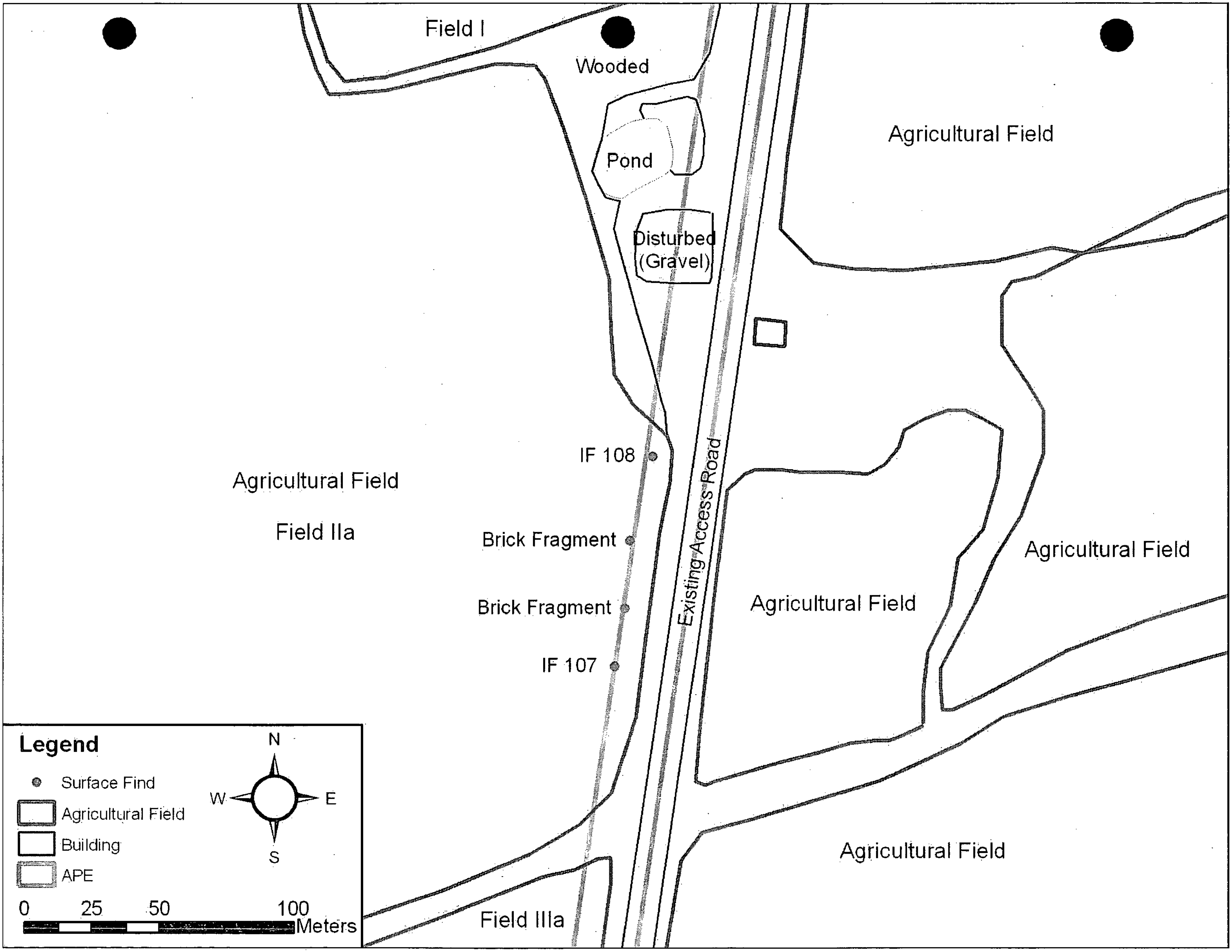

Agricultural Field
Field IIb
Agricultural Field
Field IIIa
Cluster 107
Existing Access Road
Agricultural Field
Agricultural Field
Ditch
IF 109
Agricultural Field
Field IIIb
Agricultural Field
Agricultural Field
Legend
Surface Find
Agricultural Field
Building
APE
N
W
E
S
0 25 50 100
Meters
Agricultural Field
Grass
Agricultural Field
Chambless House

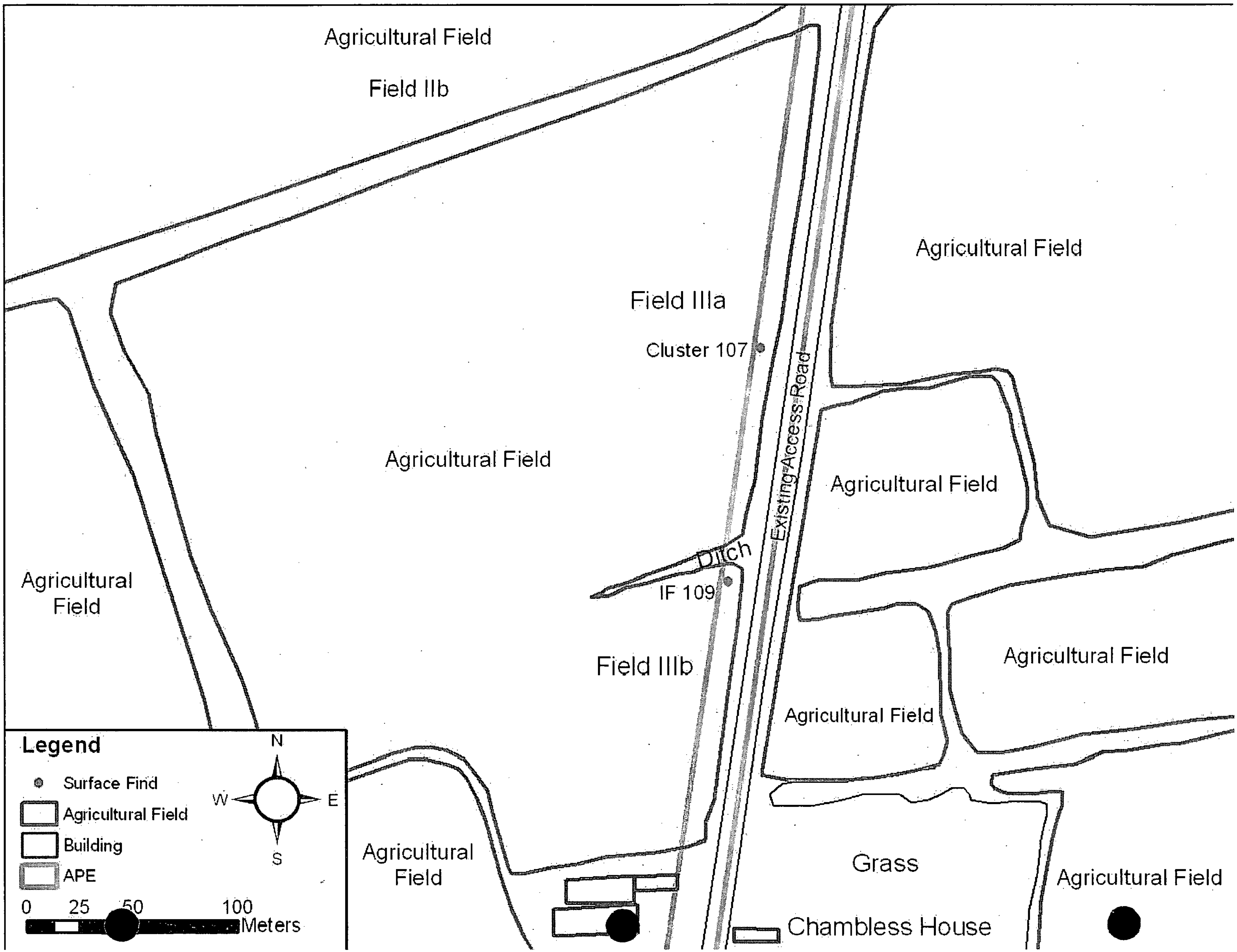


Agricultural Field
Field IIIb
Chambless House
IF 110
Existing Access Road
Grass
Agricultural Field
Field IV
IF 111
IF 112
Cluster 110
Legend
Surface Find
Agricultural Field
Building
APE
N
W
E
S
Wooded
0
10
20
40
Meters
Agricultural Field

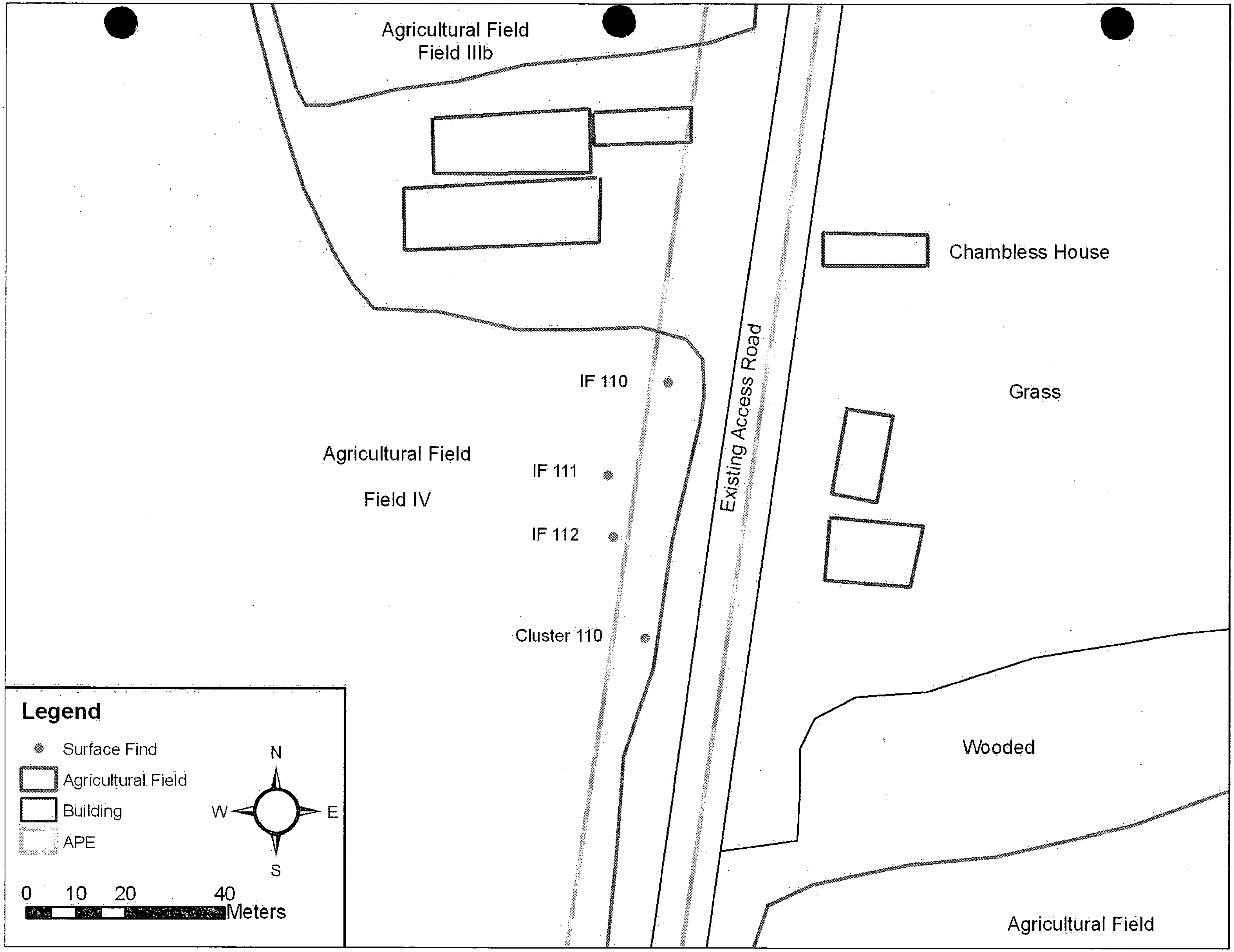


Agricultural Field
Gravel Road
Wooded
Wooded
e1b
e1
e1a
e1c
e2
e3a
e3
e3b
e4
e5a
e5
e5c
e5b
e5d
e6
e7a
e7d
e7
e7b
e7c
Agricultural Field
Field I
Grass
e8
e9
e10
e11a
e11
e11b
e12
Dirt Drive
e13
Existing Access Road
Agricultural Field
e14
e15
e16
e17
e18
Agricultural Field
Field I
e19
e20
e21
e22a
e22
e22b
e23
e24
Agricultural Field
Legend
Historic Shovel Test
Prehistoric Shovel Test
Negative Shovel Test
Agricultural Field
Building
APE
N
W
E
S
0 15 30 60
Meters


Field I
Wooded
Pond
Disturbed
(Gravel)
Agricultural Field
Agricultural Field
Field IIa
IF 108
Brick Fragment
Brick Fragment
IF 107
Existing Access Road
Agricultural Field
Agricultural Field
Agricultural Field
Field IIIa
Legend
Surface Find
Agricultural Field
Building
APE
N
W
E
S
0
25
50
100
Meters



Agricultural Field
Field IIb
Agricultural Field
Field IIIa
Cluster 107
Existing Access Road
Agricultural Field
Agricultural Field
Agricultural Field
Ditch
IF 109
Field IIIb
Agricultural Field
Agricultural Field
Legend
Surface Find
Agricultural Field
Building
APE
N
W
E
S
0
25
50
100
Meters
Agricultural Field
Grass
Chambless House
Agricultural Field



Agricultural Field
Field IIIb
Chambless House
Existing Access Road
IF 110
Grass
Agricultural Field
Field IV
IF 111
IF 112
Cluster 110
Legend
Surface Find
Agricultural Field
Building
APE
N
W
E
S
0 10 20 40
Meters
Wooded
Agricultural Field

APPENDIX C

SITE FORMS

NEW JERSEY STATE MUSEUM
ARCHAEOLOGICAL SITE REGISTRATION PROGRAM
BUREAU OF ARCHAEOLOGY AND ETHNOLOGY
P.O. BOX 530, TRENTON, N.J. 08625-0530
Phone (609) 292-8594; Fax (609) 292-7636

Site Name: The Money Site **SITE #: 28**

☐ Check this box if you prefer to have this site information restricted to professional archaeologists, academics and environmental researchers conducting project background research. If so, this form will be considered donated information according to New Jersey State Law.

NJ State Atlas Coordinates:

USGS 7.5 Minute Series Quad.: Delaware City

State Plane Coordinates (required): NAD 83 Zone 2900 (feet) North 255273 East 209402

UTM Coordinates (required): Zone 18 North NAD 83 North 4375707 East 456823

County: Salem **Township: Elinsboro**

Location (descriptive): East side of Money Island Road, south of Mason Point Road

Period of Site: Woodland/Historic (18th-20th Centuries)

Cultural Affiliation(s) (if known):

Owner's (Tenant's) Name:
Address
Phone:
Attitude Toward Preservation:

Surface Features: None

Prominent Landmarks: Adjacent to Alloway Creek Drainage

Vegetation Cover: Agricultural Field

Nearest Water Source: Mill Creek **Distance: 600 meters (2000 feet)**

Soil Type: Mattapax silt loam, 2 to 5 percent slopes **Erosion: Minimal**

Stratified (if known):

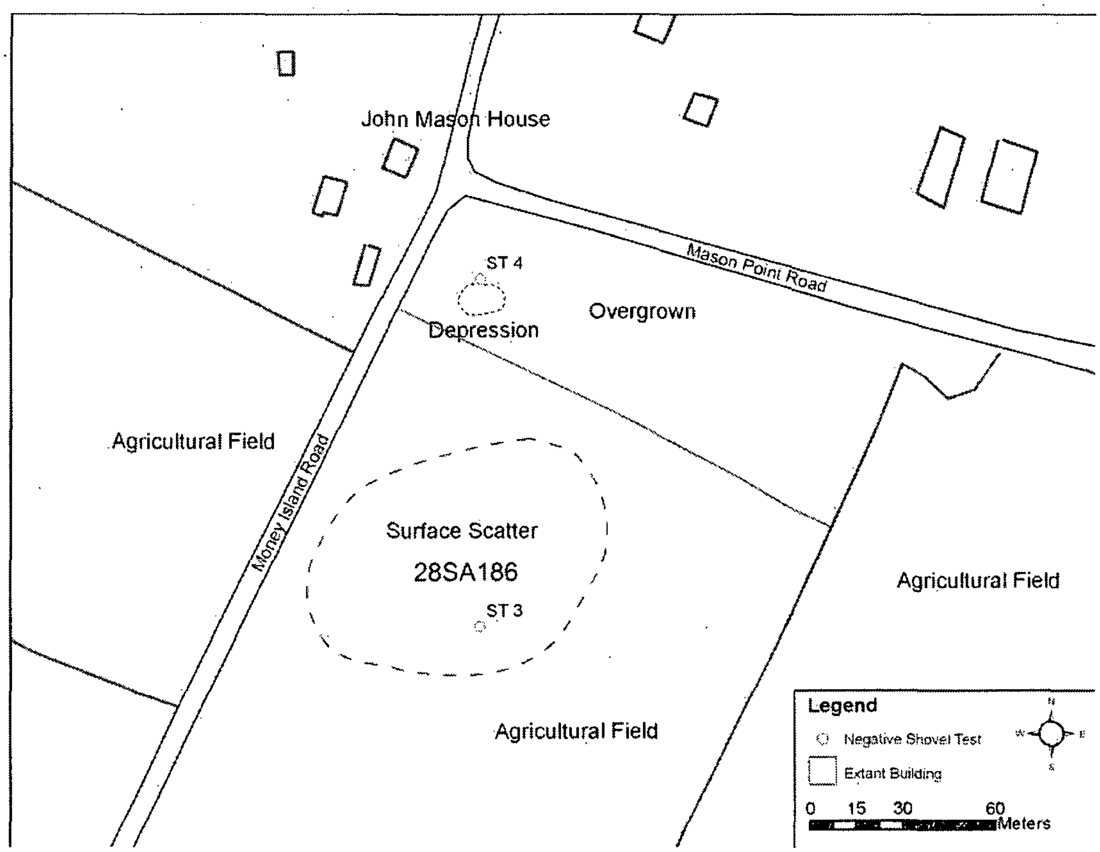
Threat of Destruction (if known): Road right of way

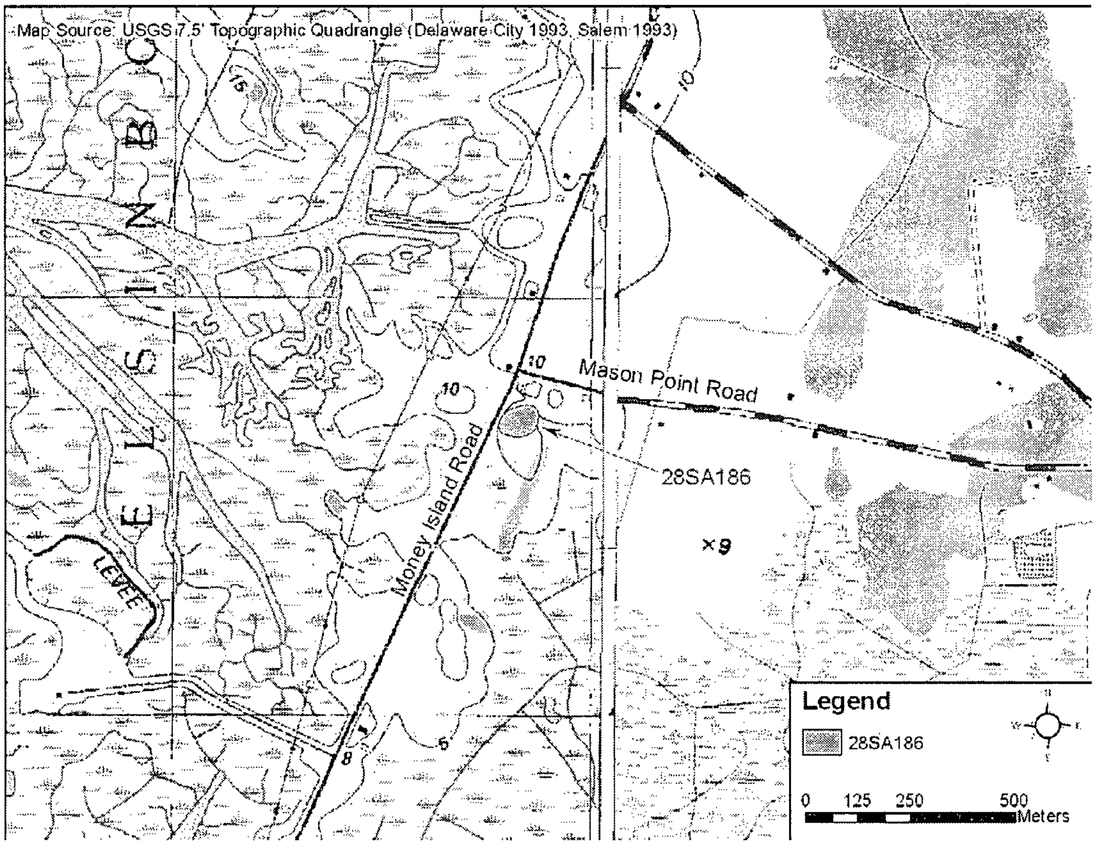
Previous Work and References (list below):

Name	Date	Reference (n/a if unpublished)
1.		
2.		
3.		

Collections:

Name	Date	Collection Stored	Previous Designation
1.			


John Mason House
Mason Point Road
ST 4
Depression
Overgrown
Agricultural Field
Money Island Road
Surface Scatter
28SA186
ST 3
Agricultural Field
Agricultural Field
Legend
Negative Shovel Test
Extant Building
0 15 30 60
Meters



Observations: Site is located in an agricultural field immediately southwest of the John Mason House, built 1695. This field was denoted as Field C during prior survey work for selected portions of two proposed access road. Pedestrian survey was used to identify artifact concentrations that were then further investigated through several judgmental shovel tests. The site encompasses 1.41 acres (5694 M^2) and is centered around a small rise in northern half of the field. Sixty-three historic and prehistoric artifacts were recovered from 28SA186.

Interpretations: The historic artifacts from 28SA186 appear to represent a domestic occupation. Utilitarian redwares from the late eighteen century comprise the majority of the artifacts. Mid to late eighteenth century ceramics include decorated types of pearlware and plain creamware. A single decorated stoneware fragment represents the twentieth century. Based on historic maps of the area at least two structures were known to have existed in this area relative to the Mason House. The function or type of these structures is unknown, but the location of the scatter roughly matches up with one of the above mentioned structures. The presence of prehistoric artifacts indicates this area of uplands was utilized in the prehistoric past.

Recommendations: While these artifacts were recovered from surface contexts, it is likely that intact features and deposits are present based on the presence of upland soils and offers the opportunity to gather significant historical information related to the agricultural and domestic history in this region of New Jersey. MACTEC recommends that this site is potentially eligible for inclusion on the NRHP. Additional work should be completed at this site to evaluate its NRHP significance. This area will be impacted by the expansion of the existing road ROW.

Table 1. Historic Artifacts from 28SA186.

Artifact	Type	Count	Incept	Terminal
ferrous metal	chisel	1		
curved glass	colorless	1		
ceramic	indeterminate; UID refined	1		
ceramic	ironstone; plain	1	1844	present
ceramic	ccware; plain	1	1830	1860
ceramic	creamware; plain	1	1775	1820
ceramic	redware; black glazed	4	late 18th c	19th c
ceramic	redware; black glazed	1	late 18th c	19th c
ceramic	redware; brown glazed	1	late 18th c	19th c
ceramic	redware; unglazed	1	late 18th c	19th c
ceramic	late red transfer print	1	1830	1860
ceramic	redware; black glazed	1	late 18th c	19th c
ceramic	redware; black glazed	1	late 18th c	19th c
ceramic	ironstone; plain	1	1844	present
ceramic	ccware; plain	1	1830	1860
ceramic	creamware; plain	1	1775	1820
curved glass	milk glass	1		
ceramic	stoneware; plain	1	19 th c	
ceramic	redware; black glazed	1	late 18th c	19th c
flat glass	light green	2		
ceramic	hard paste porcelain	1	19th c	
ceramic	redware; unglazed	2	late 18th c	19th c
ceramic	pearlware; banded	1	1780	1830
ceramic	redware; brown glazed	1	late 18th c	19th c
ceramic	redware; black glazed	1	late 18th c	19th c
ceramic	redware; dark green glazed	1	late 18th c	19th c
curved glass	colorless	1		
ceramic	redware; black glazed	1	late 18th c	19th c
ceramic	redware; unglazed	1	late 18th c	19th c
ferrous metal	staple	1		

ceramic	redware; unglazed	2	late 18th c	19th c
ceramic	hard paste porcelain; plain	1	19th c	
ceramic	redware; black glazed	1	late 18th c	19th c
ceramic	stoneware; dark brown glazed	1		
metal	tin; folded tin	1		
ceramic	redware; scalloped; brown glazed	1	late 18th c	19th c
ceramic	ironstone; plain	1	1844	present
curved glass	colorless	1		
curved glass	aqua	2		
ceramic	ironstone; plain	1	1844	present
ceramic	ironstone; plain	1	1844	present
ceramic	ironstone; plain	1	1844	present
ceramic	refined stoneware; black glazed interior and exterior	1		
ceramic	ironstone; plain	1	1844	present
ceramic	stoneware; blue banded w/ bristol glazed interior	1	early 20th C	
ceramic	redware; unglazed	1	late 18th c	19th c
tobacco pipe	stem	1		
ceramic	ironstone; plain	1	1844	present
ceramic	redware; brown glazed	1	late 18th c	19th c

Table 2. Prehistoric Artifacts from 28SA186.

Artifact	Material	Count
shatter	light gray chert	1
shatter	quartz	1
Plain	Indeterminate	1
Plain	Indeterminate	1
Cord Marked	Sand	1
Cord Marked	Indeterminate	1
Plain	Sand and Grit	1
Plain	Indeterminate	1

Recorder's Name (Company): Steve Cole, MACTEC Engineering and Consulting, Inc.
Address: 9725 Cogdill Road Knoxville, TN 37931
Phone: 865-588-8544
Date Recorder at Site: 1 Nov 2009

NEW JERSEY STATE MUSEUM
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BUREAU OF ARCHAEOLOGY AND ETHNOLOGY
P.O. BOX 530, TRENTON, N.J. 08625-0530
Phone (609) 292-8594; Fax (609) 292-7636

SITE #: 28-SA183

Site Name:
Field BF

☐ Check this box if you prefer to have this site information restricted to professional archaeologists, academics and environmental researchers conducting project background research. If so, this form will be considered donated information according to New Jersey State Law.

NJ State Atlas Coordinates:

USGS 7.5 Minute Series Quad.: Delaware City
State Plane Coordinates (required): NAD83 Zone 2900 (feet) North 253149 East 208840
UTM Coordinates (required): Zone 18 North NAD83 North 4375134 East 456612

County: Salem **Township:** Elsinboro

Location (descriptive): east side of Money Island Road, south of Mason Point Road

Period of Site: Woodland/Historic

Cultural Affiliation(s) (if known): Kipp Island or Webb Phase

Owner's (Tenant's) Name: State of New Jersey
Address
Phone:
Attitude Toward Preservation: unknown

Surface Features: none

Prominent Landmarks: none

Vegetation Cover: plowed field

Nearest Water Source: Mill Creek **Distance:** 275 meters (900 feet)

Soil Type: Mattapax silt loam, 2 to 5 percent slopes **Erosion:** No

Stratified (if known):

Threat of Destruction (if known): Road right of way

Previous Work and References (list below):

Name	Date	Reference (n/a if unpublished)
1.		
2.		
3.		

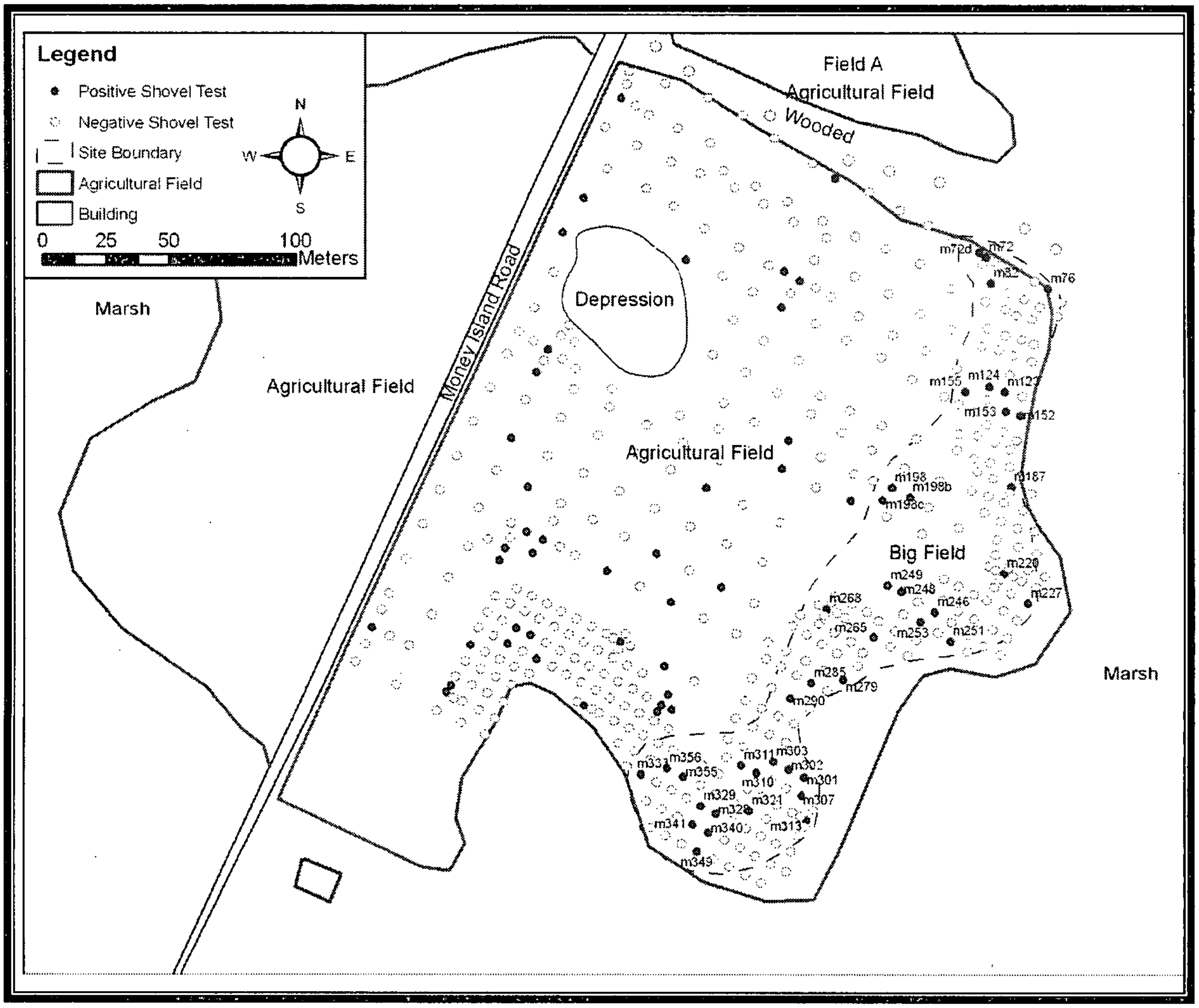
Collections:

Name	Date	Collection Stored	Previous Designation
1.			

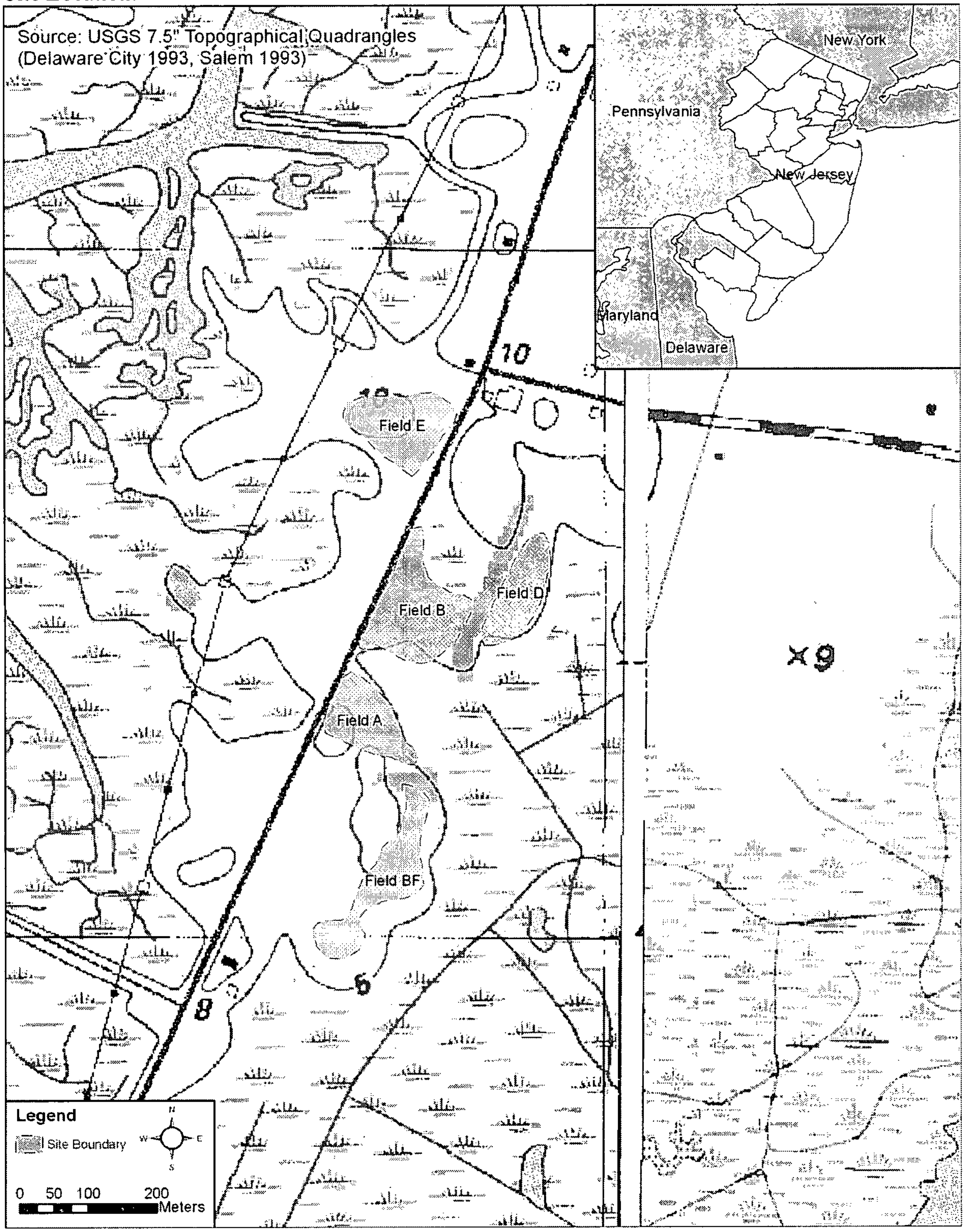
Sketch Map of the Site:

Indicate the chief topological features, such as streams, swamps, shorelines, and elevations (approximate). Also show buildings and roads. Indicate the site location by enclosing the site area with a dotted line. Use a scale (approximate) to indicate distance and dimensions.

North



Site Location.



Observations, Remarks, or Recommendations: The site identified in Field BF is concentrated along the eastern boundary of the field and encompasses 3.2 acres. This high probability area contained forty positive shovel tests. The ST interval in this area was 25 ft (7.5 m). A total of 50 historic and prehistoric artifacts were recovered.

Interpretations

The presence of prehistoric artifacts below the plowzone indicates this area of uplands was utilized in the prehistoric past. The presence of cord marked decoration places the occupation in the Middle Woodland period, with the Kipp Island or Webb Phase having cord marked or fabric impressed pottery. Little can be inferred from the small collection of lithic debitage recovered from the shovel testing in this area. The utilitarian redware recovered is common on New England sites and dates to the late eighteenth to nineteenth century. The CC ware also dates to the nineteenth century. These common household ceramics are a relatively minor component to this site.

Recommendations

Intact deposits are present based on the recovery of prehistoric and historic artifacts. The presence of upland soils and proximity to water indicate this location was a favorable habitation site in the prehistoric past. MACTEC recommends that this site is potentially eligible for inclusion on the NRHP. Additional work should be completed at this site to evaluate its NRHP significance. This area will be impacted by the expansion of the existing road ROW.

Table 1. Historic Artifacts from Field BF Site.

Artifact	Type	Count	Incept	Terminal
ferrous metal	horseshoe fragment	1		
ferrous metal	indeterminate	1		
ceramic	utilitarian redware; black glazed	2	late 18th c	19th c
ceramic	utilitarian redware; brown glazed	1	late 18th c	19th c
ceramic	utilitarian redware; eroded	1	late 18th c	19th c
ceramic	cc ware; plain	2	1830	1860
curved glass	aqua	1		
curved glass	soalrized	1	1880	1915
curved glass	colorless	1		
Total		**11**		

Table 2. Prehistoric Artifacts from Field BF Site.

Artifact	Material	Count
prehistoric ceramic	cordmarked; sand tempered	2
prehistoric ceramic	plain; sand tempered	2
prehistoric ceramic	plain; quartz tempered	1
prehistoric ceramic	eroded; quartz tempered	1
prehistoric ceramic	plain; grit tempered	4
prehistoric ceramic	indeterminate decoration/temper	22
lithic	flake; quartz	2
lithic	flake; black chert	2
lithic	flake; brown chert	2
lithic	flake; chalcedony	1
Total		**39**

Recorder's Name (Company): Steve Cole, MACTEC Engineering and Consulting, Inc.

Address: 9725 Cogdill Road, Knoxville, TN 37931

Phone: 865-588-8544

Date Recorder at Site: 04-13-09 thru 04-24-09

NEW JERSEY STATE MUSEUM
ARCHAEOLOGICAL SITE REGISTRATION PROGRAM
BUREAU OF ARCHAEOLOGY AND ETHNOLOGY
P.O. BOX 530, TRENTON, N.J. 08625-0530
Phone (609) 292-8594; Fax (609) 292-7636

SITE #: 28- SA182

Site Name:
Field E

☐ Check this box if you prefer to have this site information restricted to professional archaeologists, academics and environmental researchers conducting project background research. If so, this form will be considered donated information according to New Jersey State Law.

NJ State Atlas Coordinates:

USGS 7.5 Minute Series Quad.: Delaware City
State Plane Coordinates (required): NAD83 Zone 2900 (feet) North 255369 East 209053
UTM Coordinates (required): Zone 18 North NAD83 North 4375735 East 456717

County: Salem **Township:** Elsinboro

Location (descriptive): West side of Money Island Road and south of Mason Point Road

Period of Site: Archaic/Woodland/Historic

Cultural Affiliation(s) (if known):

Owner's (Tenant's) Name: State of New Jersey
Address
Phone:
Attitude Toward Preservation: unknown

Surface Features: None

Prominent Landmarks: Adjacent to wetlands

Vegetation Cover: Agricultural field

Nearest Water Source: Mill Creek **Distance:** 550 meters (180 feet)

Soil Type: Mattapax silt loam, 2 to 5 percent slopes **Erosion:** No

Stratified (if known):

Threat of Destruction (if known): Road right of way

Previous Work and References (list below):

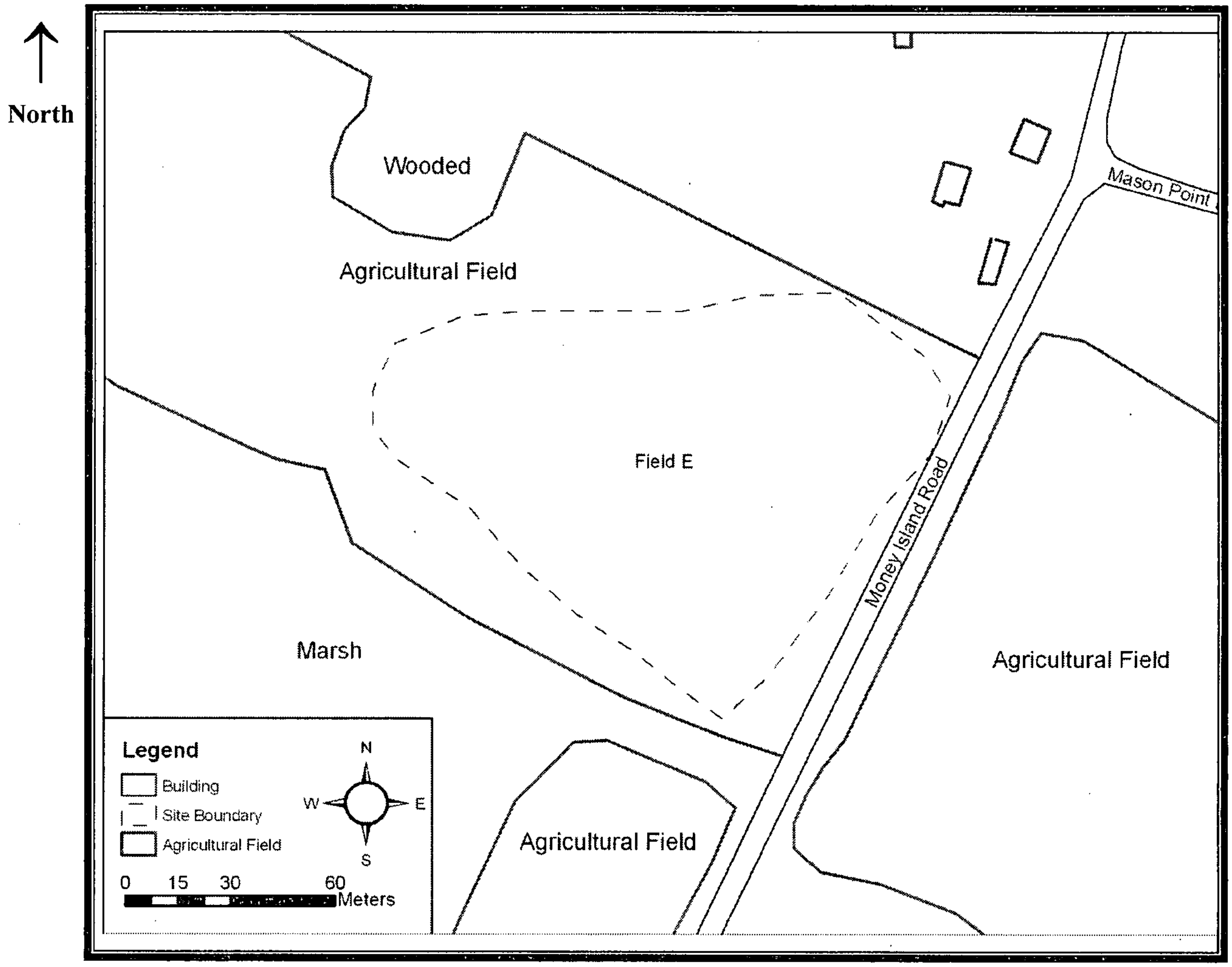
Name	Date	Reference (n/a if unpublished)
1.		
2.		
3.		

Collections:

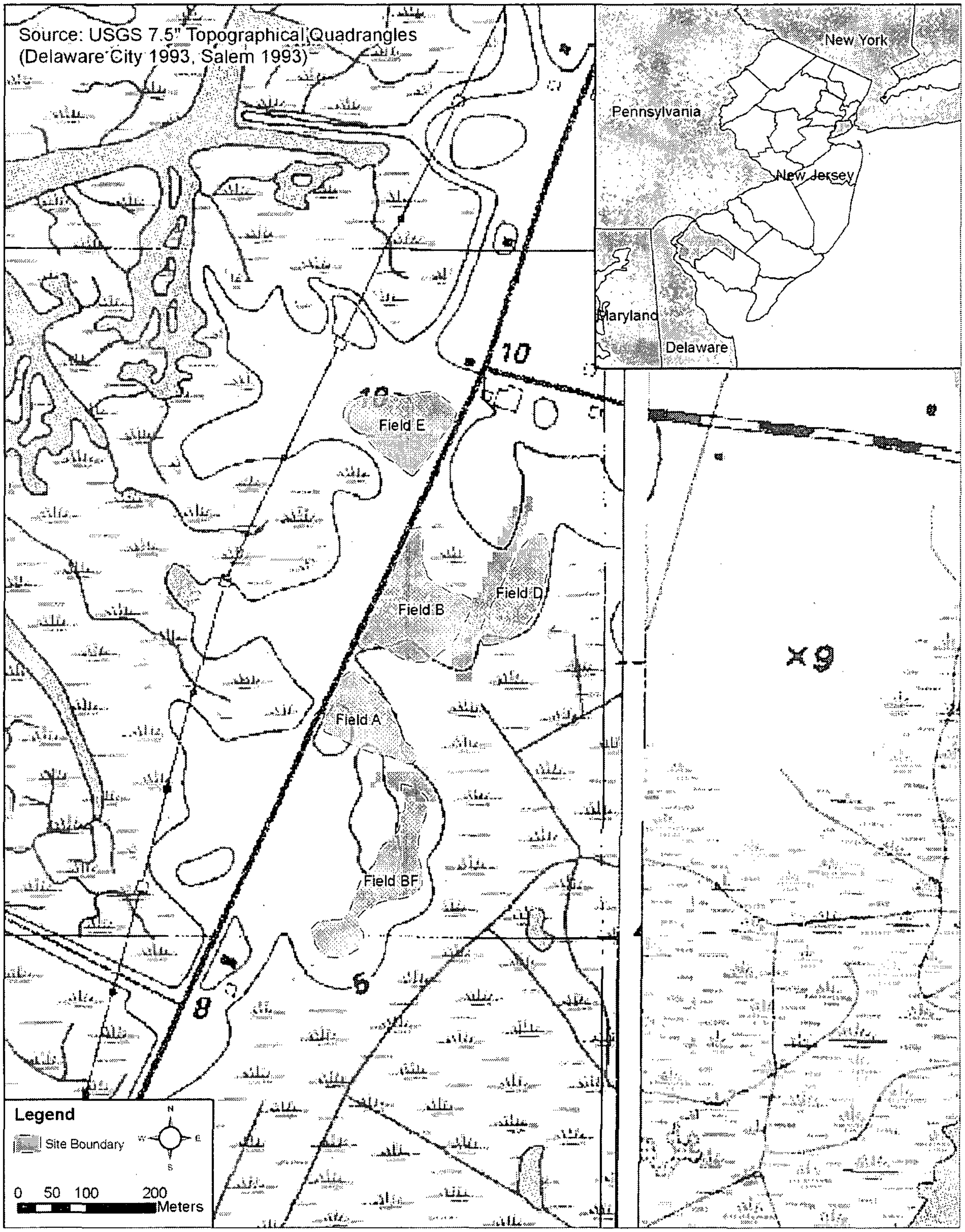
Name	Date	Collection Stored	Previous Designation
1.			

Sketch Map of the Site:

Indicate the chief topological features, such as streams, swamps, shorelines, and elevations (approximate). Also show buildings and roads. Indicate the site location by enclosing the site area with a dotted line. Use a scale (approximate) to indicate distance and dimensions.



Site Location.



Observations, Remarks, or Recommendations: Field E site encompasses 3 acres (12,466 m^2) and is situated on the west side of Money Island Road and south of Mason Point Road. Pedestrian survey was used to investigate Field E. Transects were oriented north to south across the field and four meters between each transect.

Interpretations

The historic artifacts from the Field E site represent a domestic occupation. Utilitarian redwares from the late eighteenth century comprise the majority of the assemblage. Earlier British Brown Stoneware pushes the occupation to the late seventeenth century. Other Colonial era artifacts include white salt glazed stoneware. The Chinese Export porcelain also can be placed in the Colonial time period. Mid to late eighteenth century ceramics include decorated types of pearlware and plain creamware. It is unknown at this time whether a farmstead existed in this location. The presence of prehistoric artifacts indicates this area of uplands was utilized in the prehistoric past. The corner notched PP/K fragment recovered can generally be attributed to the Archaic Period. A period of occupation during the Woodland period can also be inferred due to the presence of the ceramics, although a more narrow assignment of period cannot be done due to lack of identifiable decoration.

Recommendations

While these artifacts were recovered from surface contexts, it is likely that intact features and deposits are present based on the presence of upland soils and offers the opportunity to gather significant historical information related to the agricultural and domestic history in this region of New Jersey. MACTEC recommends that this site is potentially eligible for inclusion on the NRHP. Additional work should be completed at this site to evaluate its NRHP significance. This area will be impacted by the expansion of the existing road ROW.

Table 1. Historic Artifacts from Field E Site.

Artifact	Type	Count	Incept	Terminal
ferrous metal	spring	1		
brick	handmade; ash glazed	1		
flat glass	light green	1		
ceramic	Chinese export porcelain	1	1660	1800
ceramic	utilitarian redware; black glazed	13	late 18th c	19th c
ceramic	utilitarian redware; brown glazed	5	late 18th c	19th c
ceramic	utilitarian redware; light brown to yellow glazed	1	late 18th c	19th c
ceramic	utilitarian redware; unglazed	3	late 18th c	19th c
ceramic	white salt glazed stoneware; plain	1	1740	1775
ceramic	refined stoneware; brown glazed interior and exterior	1		
ceramic	slipware; dark yellow glazed	1	1670	1795
ceramic	British Brown stoneware	1	1690	1775
ceramic	North American Stoneware; gray w/cobalt decoration	2	19th c	
ceramic	cc ware; plain	2	1830	1860
ceramic	flow blue	1	1844	1860
ceramic	ironstone; plain	2	1844	present
curved glass	aqua	2		
curved glass	blue-green	1		
curved glass	bright green	1		
curved glass	light green	1		
curved glass	milk glass	2		
Total		**44**		

Table 2. Prehistoric Artifacts from Field E Site.

Artifact	Material	Count
prehistoric ceramic	plain; grit tempered	3
prehistoric ceramic	plain; sand tempered	5
prehistoric ceramic	plain; sand to grit tempered	2
prehistoric ceramic	plain; indeterminate temper	5
prehistoric ceramic	indeterminate; sand tempered	3
lithic	biface; black chert	1
lithic	flake; black-pale red chert	1
lithic	flake; quartz	2
lithic	PPK fragment; brown chert	1
lithic	PPK fragment; quartz	1
lithic	shatter; quatz	1
lithic	groundstone	1
Total		**26**

Recorder's Name (Company): Steve Cole, MACTEC Engineering and Consulting, Inc.
Address: 9725 Cogdill Road, Knoxville, TN 37931
Phone: 865-588-8544
Date Recorder at Site: 04-13-09 thru 04-24-09

NEW JERSEY STATE MUSEUM
ARCHAEOLOGICAL SITE REGISTRATION PROGRAM
BUREAU OF ARCHAEOLOGY AND ETHNOLOGY
P.O. BOX 530, TRENTON, N.J. 08625-0530
Phone (609) 292-8594; Fax (609) 292-7636

Site Name:
Field D

SITE #: 28- SA181

☐ Check this box if you prefer to have this site information restricted to professional archaeologists, academics and environmental researchers conducting project background research. If so, this form will be considered donated information according to New Jersey State Law.

NJ State Atlas Coordinates:

USGS 7.5 Minute Series Quad.: Delaware City
State Plane Coordinates (required): NAD83 Zone 2900 (feet) North 254601 East 209570
UTM Coordinates (required): Zone 18 North NAD83 North 4375502 East 456876

County: Salem **Township:** Elsinboro

Location (descriptive): east side of Money Island Road, south of Mason Point Road

Period of Site: Woodland/Historic

Cultural Affiliation(s) (if known):

Owner's (Tenant's) Name: State of New Jersey
Address
Phone:
Attitude Toward Preservation: unknown

Surface Features: None

Prominent Landmarks: Adjacent to wetlands

Vegetation Cover: Agricultural field

Nearest Water Source: Mill Creek **Distance:** 600 meters (2000 feet)

Soil Type: Mattapax silt loam, 2 to 5 percent slopes **Erosion:** No

Stratified (if known):

Threat of Destruction (if known): Road right of way

Previous Work and References (list below):

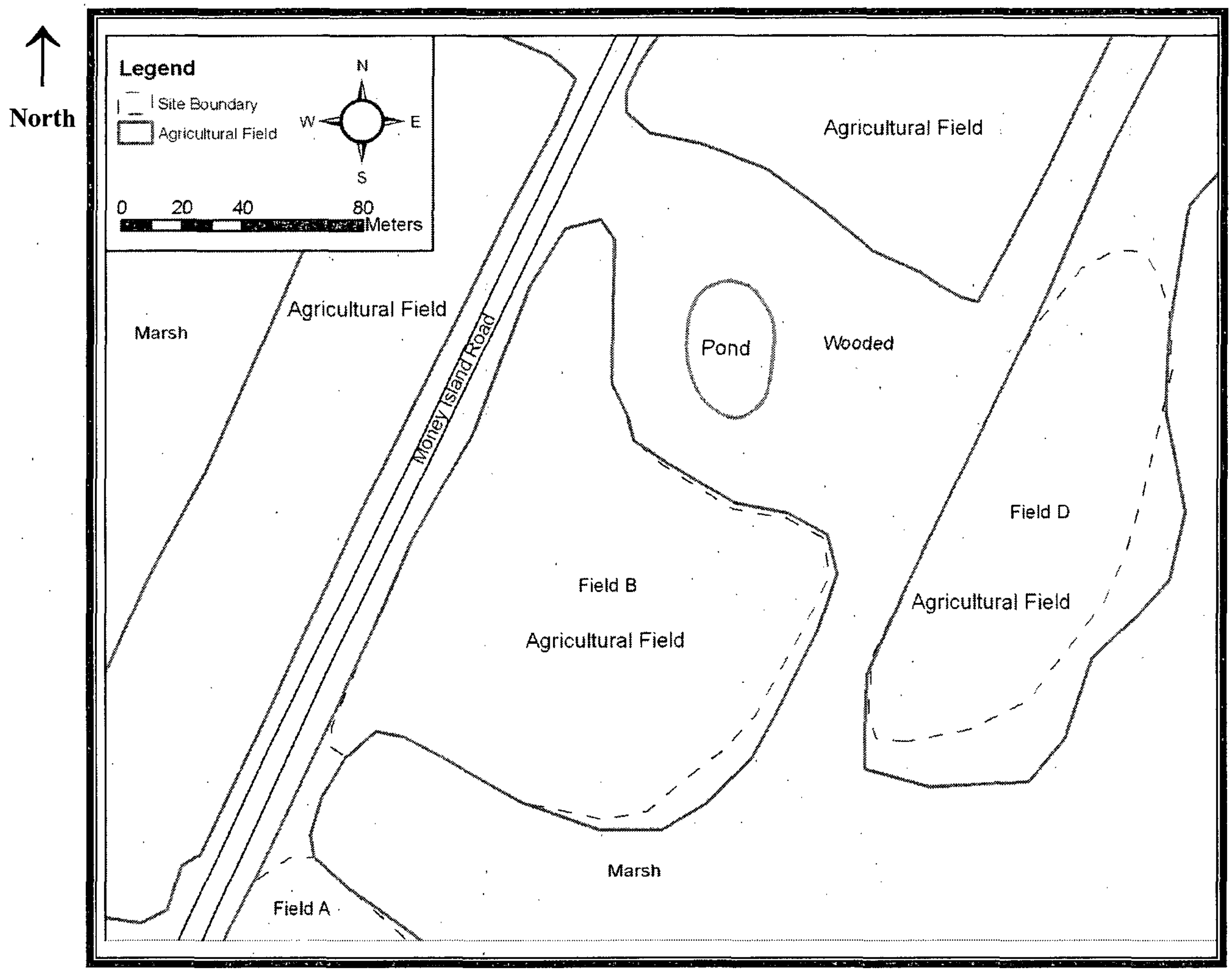
	Name	Date	Reference (n/a if unpublished)
1.			
2.			
3.			

Collections:

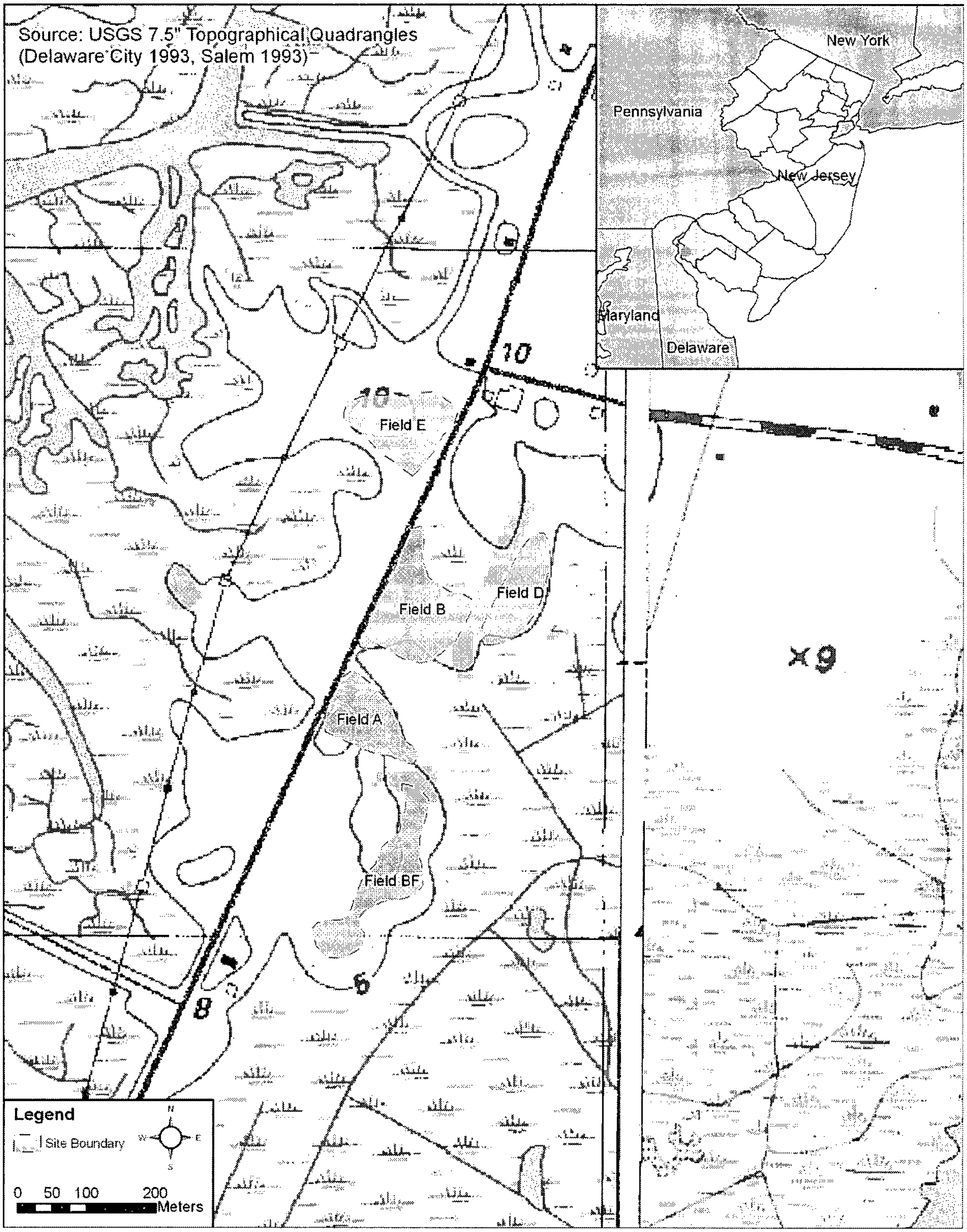
	Name	Date	Collection Stored	Previous Designation
1.				

Sketch Map of the Site:

Indicate the chief topological features, such as streams, swamps, shorelines, and elevations (approximate). Also show buildings and roads. Indicate the site location by enclosing the site area with a dotted line. Use a scale (approximate) to indicate distance and dimensions.



Site Location.



Observations, Remarks, or Recommendations: Field D site encompasses 2.17 acres (8,778 m^2) and is located on the east side of Money Island Road and south of Mason Point Road. Pedestrian survey was used to investigate Field D and transects were situated north to south across the field and four meters between each transect. Several clusters of artifacts were identified. Fifty-three historic and prehistoric artifacts were identified in Field D.

Interpretation

The historic artifacts from the Field D site represent a domestic occupation. Utilitarian redwares from the late eighteenth century comprise the majority of the assemblage. Mid to late eighteenth century ceramics include decorated types of pearlware and plain creamware. Later artifacts from the twentieth century are present as well. It is unknown at this time whether a farmstead existed in this location. The presence of prehistoric artifacts indicates this area of uplands was utilized in the prehistoric past. The ceramic sherd recovered can generally be attributed to the Woodland Period.

Recommendations

While these artifacts were recovered from surface contexts, it is likely that intact features and deposits are present based on the presence of upland soils and offers the opportunity to gather significant historical information related to the agricultural and domestic history in this region of New Jersey. MACTEC recommends that this site is potentially eligible for inclusion on the NRHP. Additional work should be completed at this site to evaluate its NRHP significance. This area will be impacted by the expansion of the existing road ROW.

Table 1. Historic Artifacts from Field D.

Artifact	Type	Count	Incept	Terminal
brick	indeterminate	1		
flat glass	light green	2		
ceramic	creamware; plain; lighter yellow color	3	1775	1820
ceramic	creamware; plain; darker yellow color	1	1762	1780
ceramic	pearlware; banded	1	1780	1830
ceramic	pearlware; black transfer print	1	1780	1830
ceramic	pearlware; blue transfer print	1	1780	1830
ceramic	pearlware; plain	3	1780	1830
ceramic	utilitarian redware; black glazed	11	late 18th c	19th c
ceramic	utilitarian redware; brown glazed	3	late 18th c	19th c
ceramic	utilitarian redware; unglazed	9	late 18th c	19th c
ceramic	white salt glazed stoneware; molded	2	1740	1775
ceramic	cc ware; blue edged	1	1830	1860
ceramic	cc ware; polychrome	1	1830	1860
ceramic	cc ware; plain	1	1830	1860
ceramic	hard paste porcelain	2	19th c	
ceramic	Bristol glazed interior; albany slip interior stoneware	1	1880s	1920s
ceramic	indeterminate refined	1		
curved glass	aqua	3		
curved glass	milk glass	1		
curved glass	colorless	1		
Total		**50**		

Table 2. Prehistoric Artifacts from Field D.

Artifact	Material	Count
prehistoric ceramic	indeterminate; sand tempered	1
lithic	shatter; brown chert	1
lithic	shatter; quartz	1
lithic	biface; gray chert	1
Total		**4**

Recorder's Name (Company):	Steve Cole, MACTEC Engineering and Consulting, Inc.
Address:	9725 Cogdill Road, Knoxville, TN 37931
Phone:	865-588-8544
Date Recorder at Site:	04-13-09 thru 04-24-09

Revised 2007

NEW JERSEY STATE MUSEUM
ARCHAEOLOGICAL SITE REGISTRATION PROGRAM
BUREAU OF ARCHAEOLOGY AND ETHNOLOGY
P.O. BOX 530, TRENTON, N.J. 08625-0530
Phone (609) 292-8594; Fax (609) 292-7636

SITE #: 28- SA180

Site Name:
Field B

☐ Check this box if you prefer to have this site information restricted to professional archaeologists, academics and environmental researchers conducting project background research. If so, this form will be considered donated information according to New Jersey State Law.

NJ State Atlas Coordinates:

USGS 7.5 Minute Series Quad.: Delaware City
State Plane Coordinates (required): NAD83 Zone 2900 (feet) North 254531East 209055
UTM Coordinates (required): Zone 18 North NAD83 North 4375480 East 456719

County: Salem **Township:** Elsinboro

Location (descriptive): east side of Money Island Road, south of Mason Point Road

Period of Site:

Cultural Affiliation(s) (if known): Woodland/Historic

Owner's (Tenant's) Name: State of New Jersey
Address
Phone:
Attitude Toward Preservation: unknown

Surface Features: None

Prominent Landmarks: Adjacent to wetlands

Vegetation Cover: Agricultural field

Nearest Water Source: Mill Creek **Distance:** 450 meters (1500 feet)

Soil Type: Mattapax silt loam, 2 to 5 percent slopes **Erosion:** No

Stratified (if known):

Threat of Destruction (if known): Road right of way

Previous Work and References (list below):

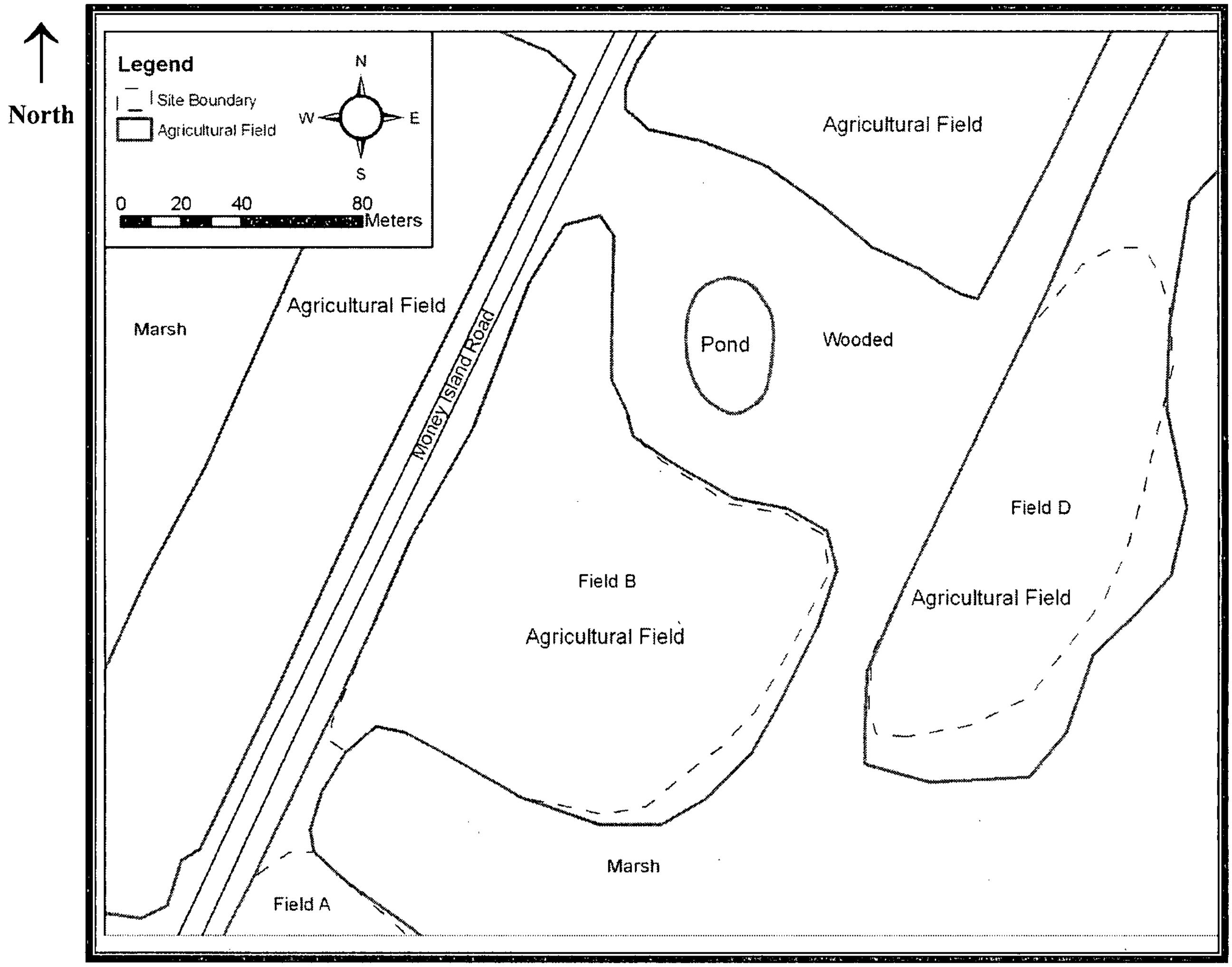
	Name	Date	Reference (n/a if unpublished)
1.			
2.			
3.			

Collections:

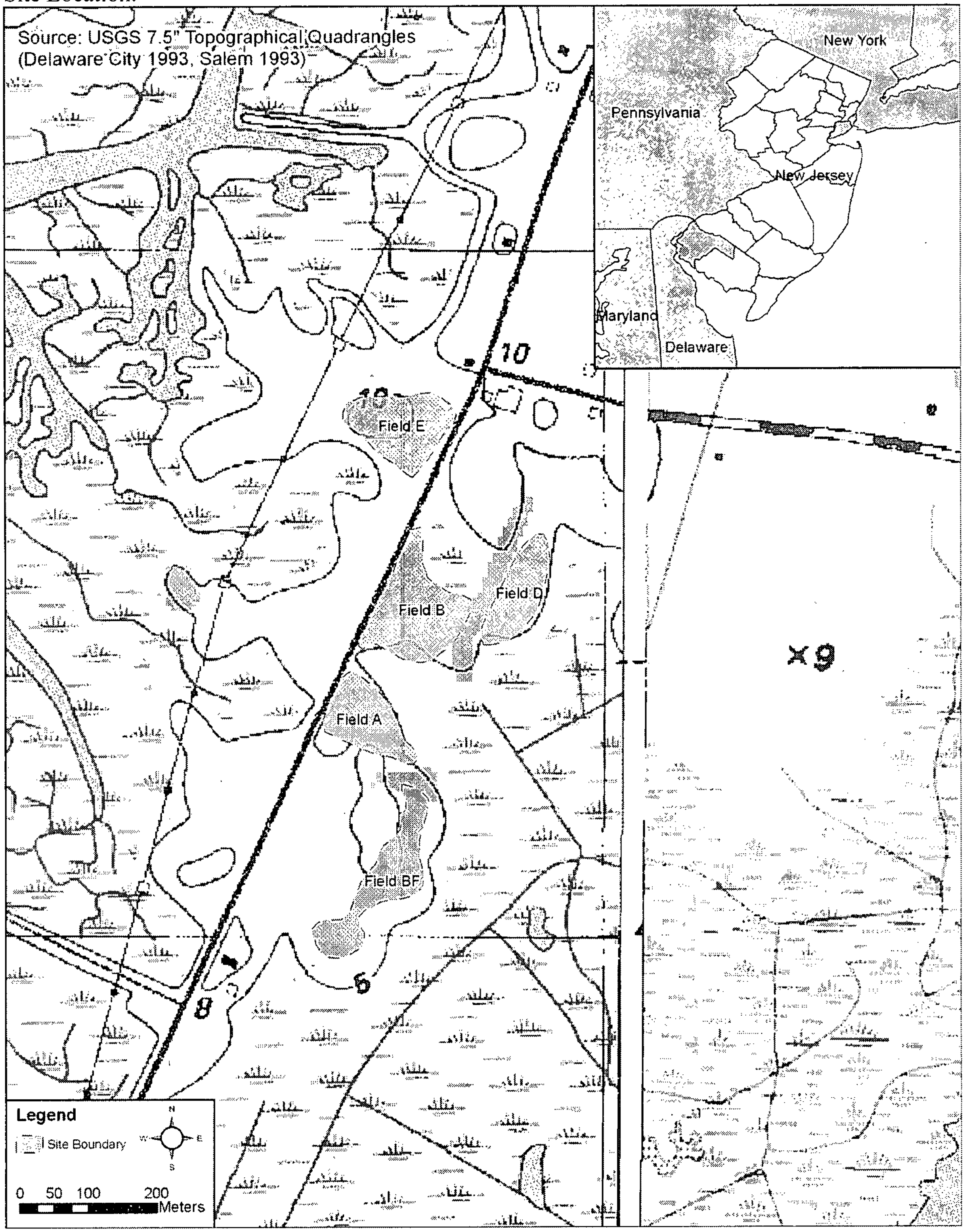
	Name	Date	Collection Stored	Previous Designation
1.				

Sketch Map of the Site:

Indicate the chief topological features, such as streams, swamps, shorelines, and elevations (approximate). Also show buildings and roads. Indicate the site location by enclosing the site area with a dotted line. Use a scale (approximate) to indicate distance and dimensions.



Site Location.



Observations, Remarks, or Recommendations: Field B encompasses 4.05 acres (16,405 m^2) and is located on the east side of Money Island Road and south of Mason Point Road. Pedestrian survey was used to investigate Field B and transects were situated north to south across the field and four meters between each transect. Several clusters of artifacts were identified. One hundred and thirteen historic and prehistoric artifacts were identified in Field B.

Interpretation

The historic artifacts from the Field B site represent a domestic occupation. Utilitarian redwares from the late eighteenth century comprise the majority of the assemblage. Mid to late eighteenth century ceramics include decorated types of pearlware and plain creamware. The presence of prehistoric artifacts indicates this area of uplands was utilized in the prehistoric past. Ceramics recovered can generally be attributed to the Middle to Late Woodland Period.

Recommendations

While these artifacts were recovered from surface contexts, it is likely that intact features and deposits are present based on the presence of upland soils and offers the opportunity to gather significant historical information related to the agricultural and domestic history in this region of New Jersey. MACTEC recommends that this site is potentially eligible for inclusion on the NRHP. This area will be impacted by the expansion of the existing road ROW.

Table 1. Historic Artifacts from Field B Site.

Artifact	Type	Count	Incept	Terminal
curved glass	blue green insulator fragments	2	20th c	
ferrous metal	stock	1		
brick	handmade; ash glazed	3		
brick	indeterminate	2		
flat glass	light green	3		
ceramic	white; 2 hole Prosser button	1	after 1840	
ceramic	creamware; plain	2	1775	1820
ceramic	pearlware; blue banded rim	1	1780	1830
ceramic	pearlware; blue painted	2	1780	1830
ceramic	pearlware; blue transfer print	1	1780	1830
ceramic	pearlware; polychrome	2	1780	1830
ceramic	pearlware; plain	6	1780	1830
ceramic	utilitarian redware; black glazed	19	late 18th c	19th c
ceramic	utilitarian redware; brown glazed	9	late 18th c	19th c
ceramic	utilitarian redware; light brown glazed	2	late 18th c	19th c
ceramic	utilitarian redware; dark brown glazed	1	late 18th c	19th c
ceramic	utilitarian redware; unglazed	14	late 18th c	19th c
ceramic	British Brown stonware	1	1690	1775
ceramic	cc ware; mocha	1	1830	1860
ceramic	cc ware; spongeware	1	1830	1860
ceramic	cc ware; plain	10	1830	1860
ceramic	ironstone; plain	2	1844	present
ceramic	hard paste porcelain	1	19th c	
ceramic	indeterminate refined	7		
curved glass	amber	1		
curved glass	aqua	3		
curved glass	bright green	1		
curved glass	green-blue	1		
curved glass	olive	3		
curved glass	colorless	3		
indeterminate	metal	1		
Total		**107**		

Table 2. Prehistoric Artifacts from Field B Site.

Artifact	Material	Count
prehistoric ceramic	cord marked; grit tempered	1
prehistoric ceramic	cord marked; sand tempered	2
prehistoric ceramic	plain; grit tempered	1
prehistoric ceramic	plain; sand and grit tempered	1
prehistoric ceramic	plain; indeterminate temper	2
lithic	flake; poss. bifacial thinning flake;brown chert	1
lithic	shatter; tan chert	3
lithic	shatter; jasper	1
Total		**12**

Recorder's Name (Company):	Steve Cole, MACTEC Engineering and Consulting, Inc.
Address:	9725 Cogdill Road, Knoxville, TN 37931
Phone:	865-588-8544
Date Recorder at Site:	04-13-09 thru 04-24-09

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NEW JERSEY STATE MUSEUM
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BUREAU OF ARCHAEOLOGY AND ETHNOLOGY
P.O. BOX 530, TRENTON, N.J. 08625-0530
Phone (609) 292-8594; Fax (609) 292-7636

Site Name:
Field A

SITE #: 28- SA179

☐ Check this box if you prefer to have this site information restricted to professional archaeologists, academics and environmental researchers conducting project background research. If so, this form will be considered donated information according to New Jersey State Law.

NJ State Atlas Coordinates:

USGS 7.5 Minute Series Quad.: Delaware City
State Plane Coordinates (required): NAD83 Zone 2900 (feet) North254011 East 208809
UTM Coordinates (required): Zone 18 North NAD83 North 4375321 East 456645

County: Salem **Township:** Elsinboro

Location (descriptive): east side of Money Island Road, south of Mason Point Road

Period of Site: Woodland/Historic

Cultural Affiliation(s) (if known): Prehistoric- Kipp Island /Webb Phase or Riggins Fabric Impressed/Historic

Owner's (Tenant's) Name: State of New Jersey
Address
Phone:
Attitude Toward Preservation: unknown

Surface Features: None

Prominent Landmarks: Adjacent to wetlands

Vegetation Cover: Agricultural field

Nearest Water Source: Mill Creek **Distance:** 335 meters (1100 feet)

Soil Type: Mattapax silt loam, 2 to 5 percent slopes **Erosion:** No

Stratified (if known): unknown

Threat of Destruction (if known): Road right of way

Previous Work and References (list below):

Name	Date	Reference (n/a if unpublished)
1.		
2.		
3.		

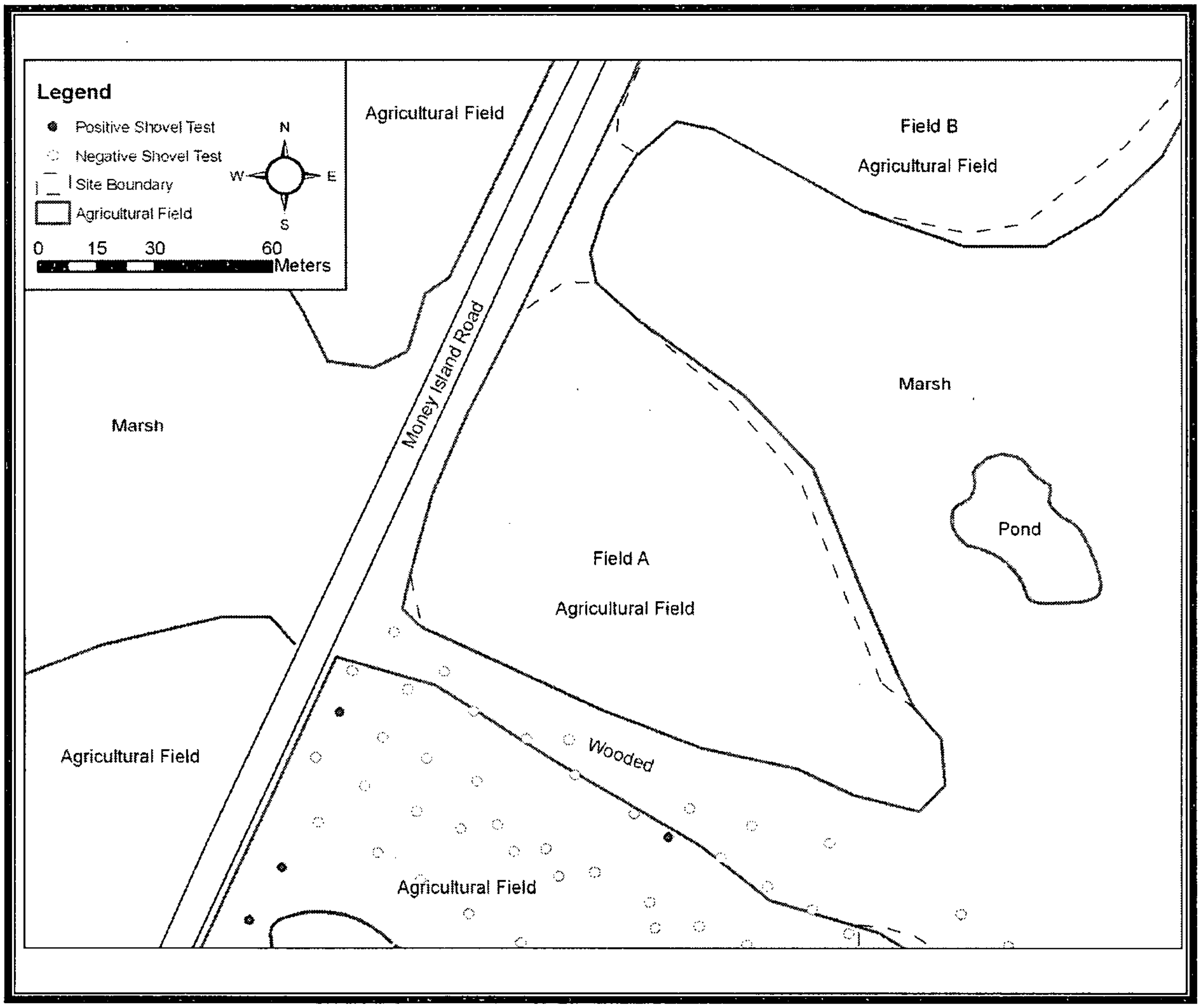
Collections:

Name	Date	Collection Stored	Previous Designation
1.			

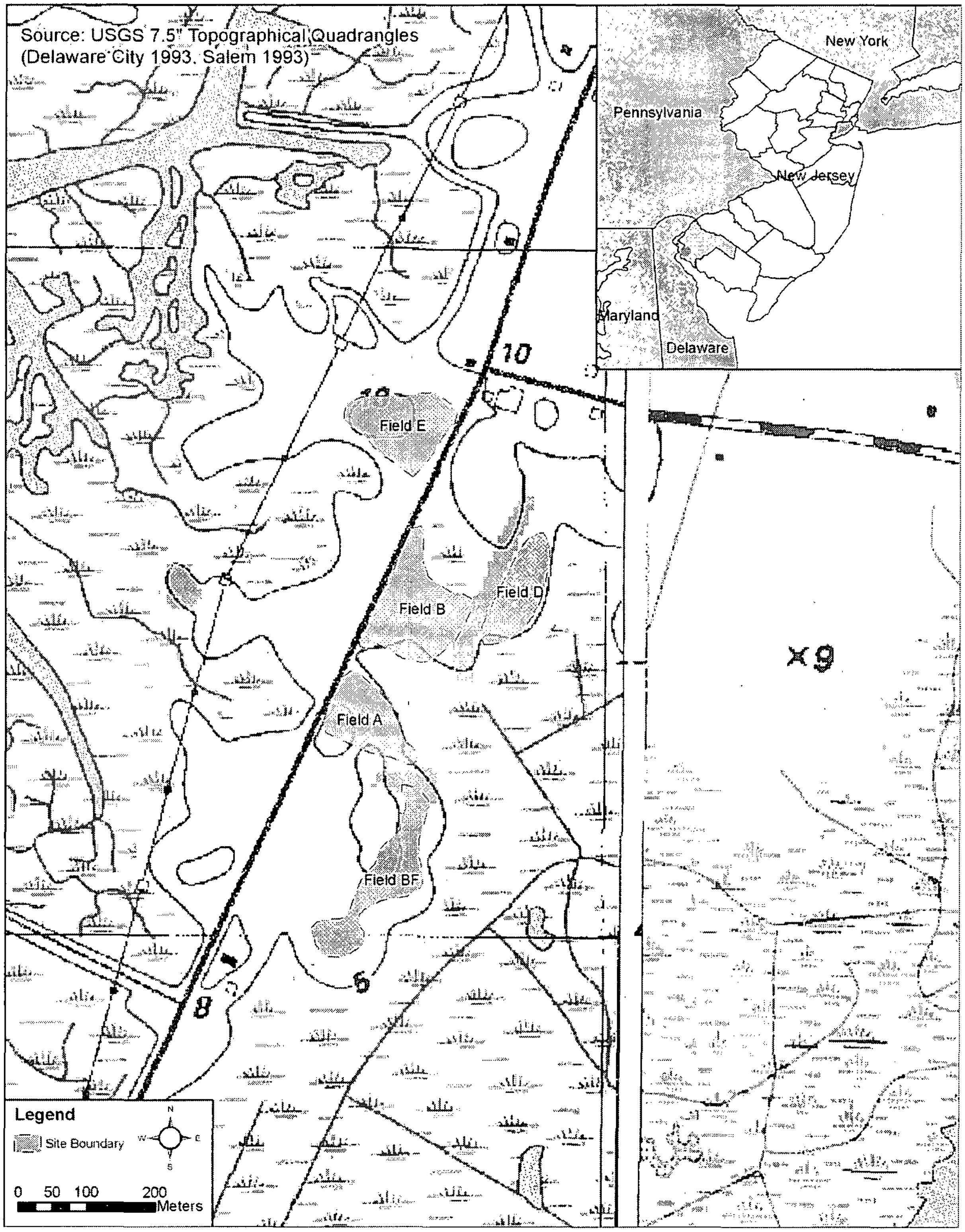
Sketch Map of the Site:

Indicate the chief topological features, such as streams, swamps, shorelines, and elevations (approximate). Also show buildings and roads. Indicate the site location by enclosing the site area with a dotted line. Use a scale (approximate) to indicate distance and dimensions.

North



Site Location:



Observations, Remarks, or Recommendations: Field A encompasses 2.46 acres (9,968 m^2) and is located on the east side of Money Island Road and south of Mason Point Road. Pedestrian survey was used to investigate Field A and transects were situated east to west across the field and four meters between each transect. Several clusters of artifacts were identified. Ninety-three historic and prehistoric artifacts were identified in Field A.

Interpretation

The historic artifacts from the Field A site represent a domestic occupation. Utilitarian redwares from the late eighteenth century comprise the majority of the assemblage. Colonial era artifacts identified include white-salt glazed stoneware and Jackfield redware. Mid to late eighteenth century ceramics include decorated types of pearlware and plain creamware. The presence of cord marked or fabric impressed decoration places the occupation in the Middle to Late Woodland period, with the Kipp Island or Webb Phase having cord marked or fabric impressed pottery in the Middle Woodland and Riggins Fabric Impressed in the Late Woodland. The material may represent an ephemeral small camp.

Recommendations

While these artifacts were recovered from surface contexts, it is likely that intact features and deposits are present based on the presence of upland soils and the relative age of the artifacts, primarily the ceramics, and offers the opportunity to gather significant historical information related to the agricultural and domestic history in this region of New Jersey. MACTEC recommends that this site is potentially eligible for inclusion on the NRHP. This area will be impacted by the expansion of the existing road ROW.

Table 1. Historic Artifacts from Field A Site.

Artifact	Type	Count	Incept	Terminal
ferrous metal	hatchet	1		
ferrous metal	washer	1		
brick	UID	7		
flat glass		1		
ceramic	creamware; plain	7	1775	1820
ceramic	pearlware; banded	1	1780	1830
	pearlware; blue painted w/banded rim	1	1780	1830
	pearlware; blue transfer print	1	1780	1830
	pearlware; plain	2	1780	1830
ceramic	utilitarian redware; black glazed	17	late 18th c	19th c
	utilitarian redware; brown glazed	1	late 18th c	19th c
	utilitarian redware; light brown glazed	1	late 18th c	19th c
	utilitarian redware; dark brown glazed	1	late 18th c	19th c
	utilitarian redware; reddish-brown glazed	1	late 18th c	19th c
	utilitarian redware; green glazed	1	late 18th c	19th c
	utilitarian redware; yellow slip	1	late 18th c	19th c
	utilitarian redware; multicolor slip w/banding	1	late 18th c	19th c
	utilitarian redware; unglazed	19	late 18th c	19th c
ceramic	refined earthernware; poss. Jackfield; black glazed	1	1740	1780
ceramic	white salt glazed stoneware; hand painted overglaze red floral	1	1740	1775
ceramic	cc ware; plain	3	1830	1860
	cc ware; polychrome	1	1830	1860
	cc ware; spongeware	1	1830	1860
ceramic	late blue transfer print	1	1830	1860
ceramic	late mulberry transfer print	1	1830	1840
curved glass	colorless	1		
indeterminate	ceramic; possible gastrolith	1		
Total		**76**		

Table 2. Prehistoric Artifacts from Field A Site.

Artifact	Material	Count
prehistoric ceramic	cord marked, fabric impressed; indeterminate temper	1
prehistoric ceramic	indeterminate; sand tempered	1
prehistoric ceramic	plain; indeterminate temper	2
prehistoric ceramic	plain; sand tempered	3
prehistoric ceramic	plain; sand and grit tempered	2
lithic	flake; black chert	1
lithic	flake; light gray chert	1
lithic	flake; dark brownish green chert	1
lithic	low grade chert nodule	1
lithic	core; nodular chert	1
lithic	groundstone	1
Total		**15**

Recorder's Name (Company):	Steve Cole, MACTEC Engineering and Consulting, Inc.
Address:	9725 Cogdill Road, Knoxville, TN 37931
Phone:	865-588-8544
Date Recorder at Site:	04-13-09 thru 04-24-09

Revised 2007

APPENDIX D

EVALUATION OF POTENTIAL PALEOSOLS UNDER ARTIFICIAL ISLAND

EVALUATION OF POTENTIAL PALEOSOLS UNDER ARTIFICIAL ISLAND

PSEG EARLY SITE PERMIT APPLICATION SALEM COUNTY, NEW JERSEY

Prepared for:
PSEG Power, LLC

Submitted to:
Sargent & Lundy, LLC

Prepared by:

MACTEC

MACTEC Engineering and Consulting, Inc.
9725 Cogdill Road
Knoxville, TN 37932

J. Emmett Brown, RPA
Senior Archaeologist
Cultural Resource Manager

Patrick H. Garrow, RPA
Senior Principal Archaeologist

MACTEC Project 3250-08-5280

November 24, 2009

TABLE OF CONTENTS

List of Abbreviations and Acronyms

ER	environmental report
ESP	early site permit
HPO	Historic Preservation Office
NRC	U.S. Nuclear Regulatory Commission

1. INTRODUCTION

PSEG is preparing an Early Site Permit (ESP) Application for a new plant adjacent to the existing Hope Creek Generating Station and Salem Generating Stations in Salem County, New Jersey. The PSEG Site is located in the western portion of Lower Alloways Creek Township approximately 5 miles from the community of Hancocks Bridge.

Construction of the new plant will require the excavation of materials to establish the foundations of the new plant on competent geologic formations.

As part of the ESP Application process, MACTEC contacted the New Jersey Historic Preservation Office (NJHPO) in compliance with Section 106 of the National Historic Preservation Act. One aspect of this discussion was the potential for archaeological resources on Artificial Island. During a meeting on August 11, 2009, NJHPO, MACTEC and PSEG agreed that near surface historical sites were not a concern since Artificial Island was constructed after 1900 using hydraulic fill from river dredging activities. However, NJHPO expressed a concern that intact paleosols (a layer of fossilized soil, usually buried beneath more recent soil horizons) may have been buried and preserved underneath the hydraulic fill material. It was agreed that MACTEC would review the soil stratigraphy of the PSEG Site by examining soil borings conducted by MACTEC in 2009. This report provides a summary of that review and the assessment of the potential for buried historic sites on Artificial Island.

2. HISTORIC BACKGROUND

Artificial Island was constructed of dredge spoils, generated by the U.S. Army Corps of Engineers to establish and maintain navigation in the Delaware River channel and bay for boat and deep water vessel traffic. Dredging was primarily restricted to harbors until the use of deep water vessels required a deeper channel. Deep water vessels required a depth of 20 to 24 feet to operate safely in the Delaware River channel. Channel dredging began in earnest during the late 1800s and continues to the present day. While channel dredging facilitated commercial traffic, disposal of dredge material was required. Dredge material was typically deposited in the river bed or at government owned naval yards. The amount of dredge material (an estimated 10.7 million cubic yards in six years) soon overwhelmed traditional dumping locations and the government stopped receiving dredge material in 1895. This issue was exacerbated by the construction of a channel from Philadelphia to the Delaware Bay, which produced approximately 34,953,000 cubic yards of material including 24,000 cubic yards of excavated rock. Six locations along the bay were chosen for the disposal of dredge spoils including the creation of a disposal area at the Baker and Stony Point Shoal areas. This location would eventually be called Artificial Island. Artificial Island was created with bulkheads that enclosed Baker Shoal and Stony Point Shoal with construction of the bulkhead beginning about 1900. The dumping of fill and dredge material resulted in an elongated island that paralleled the shoreline, but was later connected to the shore with periodic disposal of hydraulic fill in shallow water between the island and shore. Placement of hydraulic fill on Artificial Island has continued intermittently from about 1900 through the present (Snyder and Gus 1974).

PSEG Power, LLC (PSEG) currently owns about 734 acres (ac.) of land in the extreme western portion (locally referred to as Artificial Island) of Lower Alloways Creek Township on the eastern shore of the Delaware River. The property was acquired beginning in 1968 from the USACE and the NJDEP. Currently, about 373 ac. of this property is used by the Hope Creek and Salem Generating Stations (153 and 220 ac., respectively), which are also owned by PSEG. The remaining 361 ac. of the property are undeveloped, and are comprised of upland areas, a variety of wetland types, and maintained stormwater management facilities such as swales and detention basins. Much of this undeveloped land has previously been disturbed for various power plant uses.

3. METHODOLOGY

Boring Logs from the geotechnical exploration, performed as part of the ESP Application process, were reviewed for this assessment. Figure 1 presents a depiction of the location of geotechnical borings conducted as part of the ESP investigation. Four soil borings were chosen to present the soil stratigraphy of the area. These included borings EB-2, EB-3, NB-1 and NB-8. Characteristics of soils recovered from each boring were considered for their potential to represent paleosols that may correlate with a potential cultural landform capable of containing archaeological features.

4. RESULTS

The representative soil borings examined included NB-1, NB-8, EB-2 and EB-3 (Figures 2 through 5, respectively). Stratigraphy depicted in these figures for each of the borings is consistent and does not present evidence that intact paleosols are present beneath the fill or dredge material. The soil stratigraphy consists of an upper layer formed by fill and dredge material which overlies alluvial soils. The base of the hydraulic fill (surface of alluvium) ranged from elevation -22 to -33 feet (North American Vertical Datum 1988 [NAVD88]) with an average elevation of -29 feet NAVD88 in the northern portion of the site, and an average elevation of -21 feet NAVD88 in the eastern portion of the site (MACTEC 2009). Of the four borings considered, boring EB-3 exhibited the highest elevation for the base of the hydraulic fill at elevation -22 feet NAVD88. Hydraulic fill consists typically of dark gray to dark greenish-gray, highly plastic clay and silt with traces of some organic material, and locally interbedded discontinuous layers of clayey and silty fine to medium grained sand up to 5 feet thick. The thickness of the hydraulic fill ranges from approximately 24 to 44 feet, with an average thickness of approximately 33 feet across the northern and eastern portions of the site (MACTEC 2009). Directly underneath the hydraulic fill are river channel and alluvium deposits dominated by sands and sandy silts that range from 9 to 24 feet in thickness. Since the shallowest top elevation of these alluvial deposits was -22 feet, and based on the historical documents reviewed, the area now known as Artificial Island was well below the water surface prior to placement of the hydraulic fill.

Tables 1 and 2 summarize depths/elevations and relative ages of the formations recognized within the stratigraphy represented by the selected borings. Other areas of the site exhibit a relatively consistent range of strata elevations. The soil formations found beneath the alluvial channel deposits date beyond the range of known human occupation and therefore have no potential to contain archaeological resources.

5. CONCLUSION

Within the hydraulic fill strata, there is no potential for intact archaeological deposits, as it was once sediment in the Delaware River, dredged and redeposited in its current location (PSEG 1988). Likewise, the artificial fill directly above the hydraulic fill does not contain any intact archaeological deposits, as it was brought in during previous construction (beginning in 1968). In the event cultural materials exist in these deposits, they were likely removed from their original archaeological context during dredging and/or construction and would be of little or no archaeological significance.

The alluvium below the artificial and hydraulic fill has a low potential to contain intact prehistoric archaeological deposits. Boring results show that the alluvial deposits below the PSEG site comprised the former bed of the Delaware River (below elevation -21.5 ft NAVD88) (see Figures 2 through 5). As there are no former living surfaces present, the likelihood of the existence of intact, archaeologically significant deposits are negligible. No evidence of buried paleosols, shipwrecks, or other sunken cultural resources was detected in the borings, and no references to such resources were noted in the available historic or site construction records.

6. REFERENCES

MACTEC Engineering and Consulting, Inc.
2009. "Geotechnical Exploration and Testing, PSEG Site Application, Lower Alloways Creek Township, New Jersey," Rev. 0.

Public Service Enterprise Group (PSEG)
1988. "Hope Creek Generating Station Safety Analysis Report," p. 2.4.5.

Snyder,Frank and Brian Guss
1974. *The District, A History of the Philadelphia District U.S. Army Corps of Engineers, 1866-1971*, Electronic Document, http://140.194.76.129/publications/misc/un16/toc.htm Philadelphia District Website, accessed November 24, 2009.

Table 1
Artificial Island Soil Boring Examples Showing Stratigraphic Units and Elevations

	Top of Geological Unit (feet)			
Formation	EB-3	EB-2	NB-1	NB-8
Collar Elev.(NAVD88) U.S. ft.	16.5	14.1	12.8	8.9
Hydraulic Fill	12	7	11	7
Alluvium	-22	-25	-33	-24
Kirkwood Formation-Upper	-37	-49	-42	-39
Kirkwood Formation-Lower	-77	-84	-50	Not Encountered
Vincentown Formation	-91	-90	-56	-55
Hornerstown Formation	-128	-129	-105	-114
Navesink Formation	-148	-149	-126	-133
Mount Laurel Formation	-168	-169	-150	-157
Wenonah Formation	-279	Boring Terminated	-252	-259
Marshalltown Formation	-293		-267	-277
Englishtown Formation	-319		-292	Boring Terminated
Woodbury Formation	-368		-336	
Merchantville Formation	-398		-372	
Magothy Formation	-429		-402	
Potomac Formation	-484		-454	
Boring Termination	**-615.0**	**-186.6**	**-588.1**	**-292.1**

Source - "Geophysical Boring Logs, PSEG Site ESP Application", MACTEC 2009)
NOTES:
1. Materials from ground surface to top of hydraulic fill are not included in this table. These materials are mixed debris and old fill (artificial fill).
2. Elevations shown for the geologic units are rounded to the nearest foot and obtained from the ESPA Geotechnical Boring Logs.

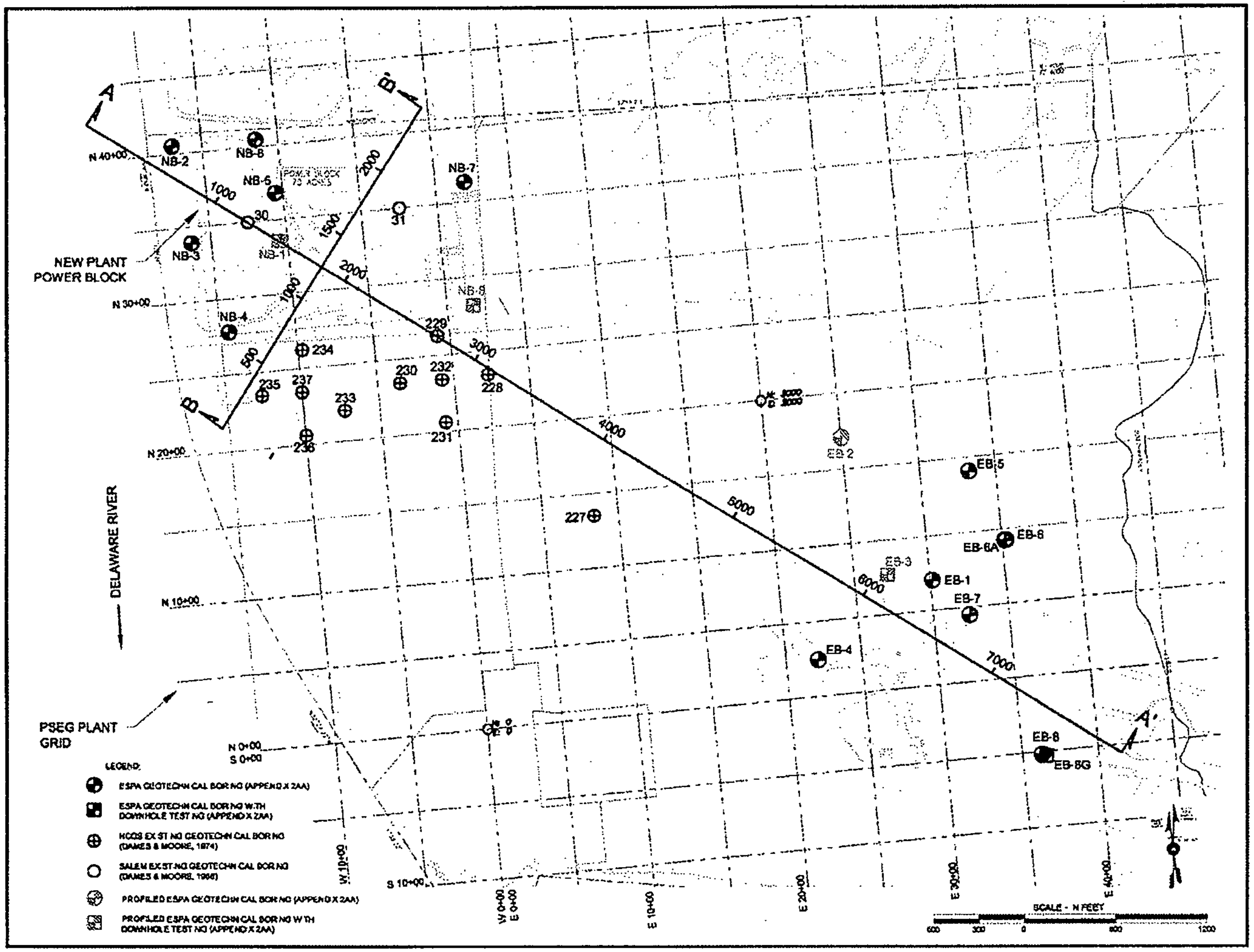
Checked By/Date: PHG/10-30-09
Prepared By/Date: JEB/10-30-09

Table 2
Geologic Age Categories and Associated Geologic Formations for Artificial Island

Geologic Period	Age (in million years ago)	Associated Formations	Potential for Historic Properties
Quaternary	1.75 - present Human Occupation, 12,000 years ago to present	Alluvium Artificial and Hydraulic Fill	Low to None
Neogene (Upper Tertiary)	23 – 1.75	Kirkwood Formation	None
Paleogene (Lower Tertiary)	65.5 – 23	Hornerstown Formation Vincentown Formation	None
Upper Cretaceous	99.6 – 65.5	Magothy Formation Merchantville Formation Woodbury Englishtown Formation Formation Marshalltown Formation Wenonah Formation Mount Laurel Formation Navesink Formation	None
Lower Cretaceous	145.5 – 99.6	Potomac Formation	None

Prepared By/Date: JEB/10-30-09
Checked By/Date: PHG/10-30-09

Figure 1. ESP Geotechnical Boring Locations Showing Representative Borings Illustrated in the Report



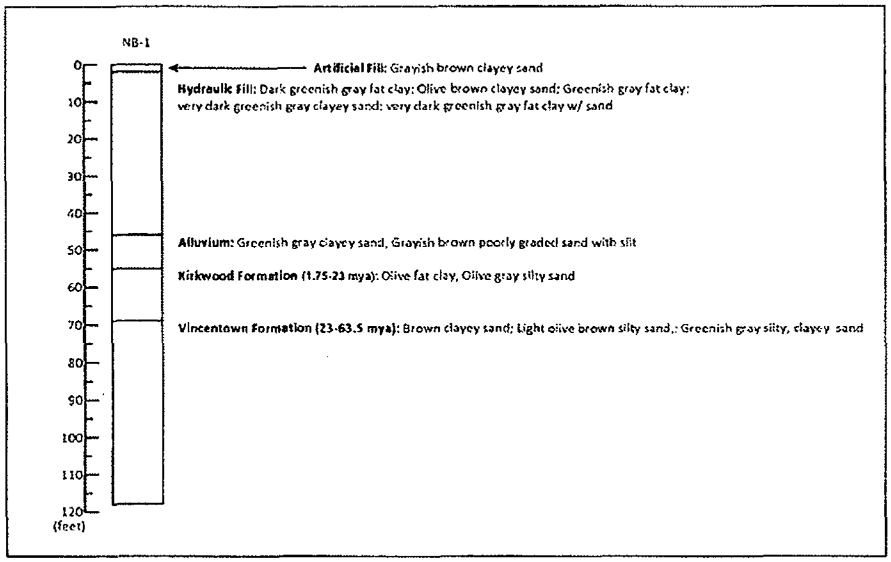


Figure 2. Partial Soil Profile Showing Soil Strata at Boring NB-1 (Surface Elevation 12.8 NAVD88). Age in millions of years ago (mya)

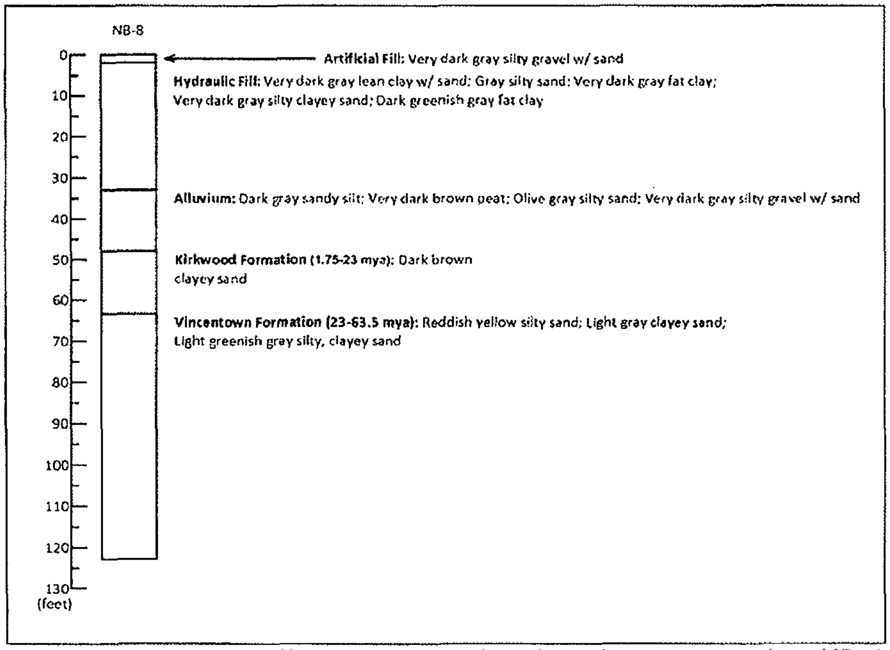


Figure 3. Partial Soil Profile Showing Soil Strata at Boring NB-8 (Surface Elevation 8.9 NAVD88). Age in millions of years ago (mya)

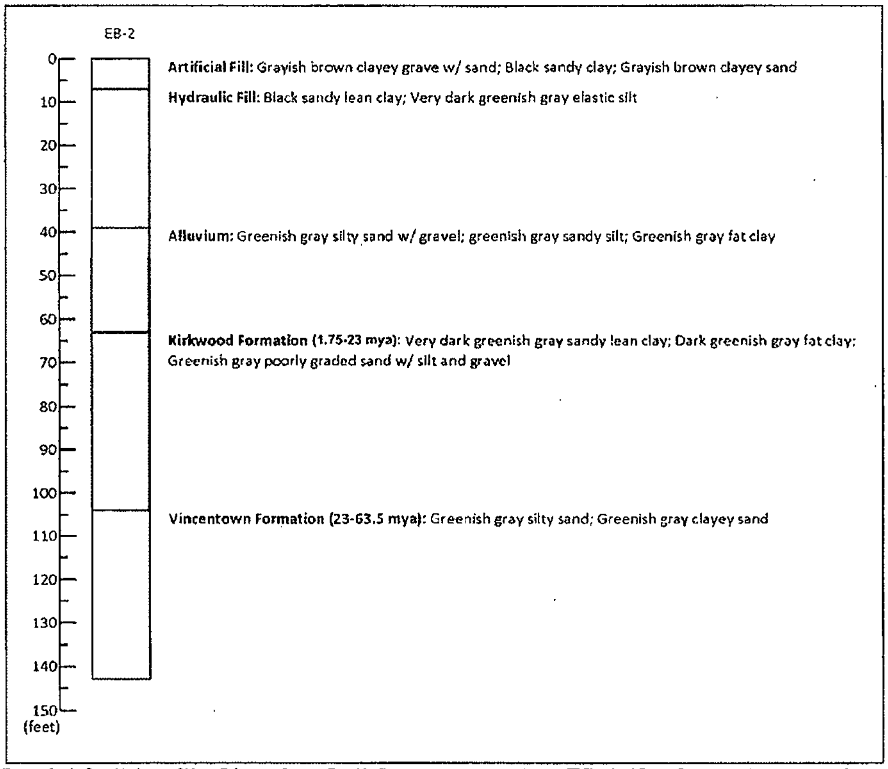


Figure 4. Partial Soil Profile Showing Soil Strata at Boring EB-2 (Surface Elevation14.1 NAVD88). Age in millions of years ago (mya)

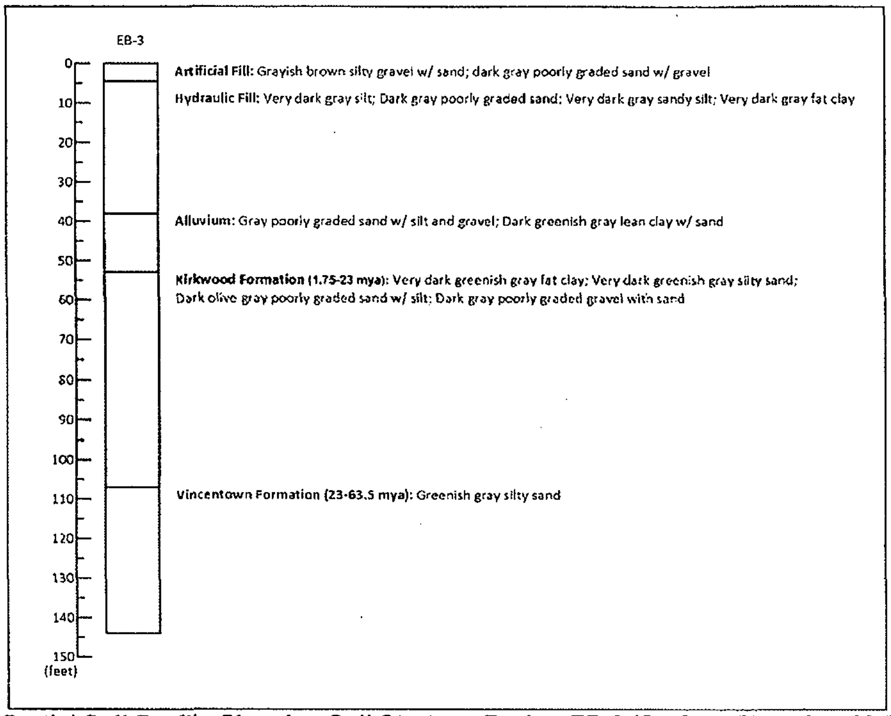


Figure 5. Partial Soil Profile Showing Soil Strata at Boring EB-3 (Surface Elevation 16.5 NAVD88)
Age in millions of years ago (mya)

APPENDIX E

RESUMES OF KEY PERSONNEL

J. Emmett Brown, RPA
Senior Archaeologist / Cultural Resource Group Leader

MACTEC

15 total years of experience

Education
Master of Arts Anthropology, 2002, University of Alabama
Bachelor of Arts Anthropology, 1995, University of Alabama at Birmingham

Registrations
Registered Professional Archaeologist, US

Career Summary

Mr. Brown is a Senior Archaeologist whose primary responsibilities are in the development, coordination, and implementation of archaeological projects. His experience includes acting as Senior Archaeologist, Principal Investigator, and Field Director on projects throughout the Northeastern, Mid-Atlantic, and Southeastern U.S. His experience includes work for universities, state departments of transportation, federal agencies, private land developers, and retail establishments. He has previously served as an office manager for an archaeological firm in charge of marketing, budgets and proposals, client management, and management of field work and report reproduction.

Project Experience

Project Manager: Phase I Archaeological Survey, Florida NRCS, Flying Eagle Wildlife Management Area, Shinn Ditch Restoration Plan, Shinn Ditch Tract, Citrus County, Florida. Archaeological investigations of selected portions of Southwest Florida Water Management District (SWFWMD) Flying Eagle property under direction of Natural Resources Conservation Service (NRCS) and SWFWMD. Property is located in Citrus County, Florida, near Inverness. Investigation conducted after construction of four ditch blocks and one of four proposed culvert modifications designed to restore historic hydrologic conditions to wetlands that had been drained by construction of Shinn Ditch in 1956. Purpose of study was to identify and delineate archaeological resources within Area of Potential Effect (APE) and included a pedestrian survey of ditch plugs and culvert modifications, limited shovel testing of two previously identified sites- Alligator Ford and the Whitelaw Field homestead- and GPS mapping of other documented sites on property. Maps were created depicting project boundaries, ditch plugs, culvert modifications, Shinn Ditch, and archaeological and historic sites.

Archaeological investigations resulted in identification of two previously unrecorded sites. Site 8Ci1349 consists of a non-diagnostic lithic scatter located on Ditch Plug 3. The Whitelaw Field homestead (8Ci1348) consists of three separate scatters of historic household debris on the surface, a fireplace, and a well pipe protruding from the ground. MACTEC archaeologists conducted shovel testing at previously recorded Alligator Ford (8Ci199) site in order to locate site boundaries. Previously recorded sites 8Ci197, 8Ci221, 8Ci198, 8Ci203, and 8Ci196 were visited for mapping purposes but were not excavated during this investigation. It is highly probable Site 8Ci196 and the "site" identified as Indian Pot apparently did not, and never have, existed as archaeological sites. It appears none of the sites will be impacted by completion of project as planned. Care should be taken to keep heavy equipment off potentially significant or significant archaeological sites (Whitelaw Field, Alligator Ford, Powell's Town, Tatham Mound, and Bayonet Field) in the future. Each site should be well documented on base property maps, and care should be taken in the future to avoid impacting those sites in any manner.

Project Manager: Archaeological Reconnaissance Survey, Florida NRCS, Winding Waters Wetland Reserve Program Project Area, West Palm Beach County, Florida. Archaeological investigations of selected portions of Department of Environmental Resources Management (DERM) Winding Waters Natural Area under direction of Natural Resources Conservation Service (NRCS) and DERM. Investigation conducted prior to alteration and filling in of existing canals. Purpose of study was to identify previously recorded archaeological sites and areas of high probability for archaeological resources within Area of Potential Effect (APE) based on USDA soils maps and aerial maps. A pedestrian survey and limited shovel testing were conducted in areas of high and medium probability, with a focus on high probability soils and vegetation types. GPS mapping of each shovel test was performed.

A predictive model was utilized in order to facilitate reconnaissance based on soils, vegetation, and historic maps. No areas were determined to have a high probability to yield archaeological resources, and most of medium probability area was located within wetland creation boundary. Eleven shovel tests and a scrape along edge of EPB-9 Canal revealed no archaeological resources to be present, and indicated most soils were often inundated. No areas of high probability to yield archaeological sites were found to exist at Winding Waters Natural Area, and no archaeological or historical sites were identified in or near the site. Based on field findings it is unlikely significant archaeological resources are present within study area. MACTEC therefore recommended no further archaeological investigations be conducted within the project area prior to project construction.

Project Manager: Archaeological Site Reconnaissance, Florida NRCS, Loxahatchee Slough Wetland Reserve Program Project Area, Sand Hill Crane East Restoration Project, West Palm Beach County, Florida. Archaeological investigations of selected portions of Department of Environmental Resources Management (DERM) Loxahatchee Slough Natural Area, within Sandhill Crane East Restoration Area under direction of Natural Resources Conservation Service (NRCS) and DERM. Investigation conducted prior to alteration and filling in of existing canals. Purpose of study was to identify previously recorded archaeological sites and areas of high probability for archaeological resources within Area of Potential Effect (APE) based on USDA soils maps and aerial maps. A pedestrian survey and limited shovel testing were conducted in areas of high and medium probability, with a focus on high probability soils and vegetation types. GPS mapping of each shovel test was performed.

Investigations by MACTEC personnel resulted in identification of one previously unrecorded site (8Pb14419) consisting of a single pottery sherd and a number of animal bone fragments. Archaeological testing was recommended for 8Pb14419 if it is an area of planned construction. Two previously recorded sites were identified near project area and consist of a CSX Railroad (8Pb12209) and a small historic cemetery (8Pb13525). Positions of these sites were recorded by GPS and sites were photographed. It is unlikely, based on results of the study, that additional cultural resources were located within the study area. It was recommended the existing Ocean to Lake hiking trail be re-routed to avoid site 8Pb14419. In addition, unless Site 8Pb14419 would be disturbed by planned or proposed wetland restoration construction activities or inundation due to restoration of the Loxahatchee Slough Wetland Reserve Program project area, no additional cultural resources investigations were warranted.

Senior Archaeologist: Confidential Client, Confidential Site, Reservoir Breach Emergency Response and Restoration Services. Responsible as Principal Investigator on a 412-acre site where 8 archaeological sites were found, two where Early to Mid-Archaic Period artifacts were discovered making them eligible for the National Register of Historic Places; managed all aspects of 2-1/2 months of field work and authored the report recommending further study on the two NRHP-eligible sites identified. Scope: Emergency response (within 48 hours), restoration program management, environmental / natural resources restoration services, natural resources monitoring, debris removal, erosion control and master planning services in wake of reservoir breach during which 1.5 billion gallons of water and debris flooded river and valley below a pumped storage utility plant along a major river.

Senior Archaeologist: Confidential Client, Confidential Site Nuclear Plant COL Application Environmental Consulting Services. Responsible for managing all aspects of Phase I archaeological survey and geoarchaeological testing (Geoprobe deep testing looking for buried soil horizons), finding no archaeological sites or artifacts; identified a buried Middle Archaic Soil Horizon and terraces of the Missouri River Flood Plain with further study of the Middle Archaic Soil Horizon planned. Scope: Range of environmental services at site of nuclear plant. Tasks have included waters of the U.S. (wetlands and streams) delineation and cultural resources survey for replacement of discharge line; terrestrial and aquatic faunal surveys, terrestrial vegetation inventories, regulatory review and project planning for plant Unit 2 COLA (Combined Operating License Application); and NQA-1 laboratory testing services.

Project Coordinator: Elizabethtown / Hardin County Industrial Foundation, Inc. Glendale Property Cultural Resources, Threatened & Endangered Species Studies, Glendale Kentucky. Cultural resources study and Threatened and Endangered Species (T&ES) Study in preparation for potential development of 1,500-acre site of a formerly occupied industrial and rail operation with fuel storage tanks; MACTEC previously conducted Phase II environmental site assessment at property. Oversaw Phase I fieldwork on 1,500 acres of development.

Project Manager: Michael Baker John Henry State Park Phase I Cultural Resources Survey, Talcott West Virginia. Phase I cultural resources survey of 26-acre historic park property including two railroad tunnels and right-of-way. Provided oversight of budget, staffing, and scheduling.

Project Manager: US49 Environmental Impact Statements, Pearl Mississippi. Phase I cultural resource survey of US49 corridor from south of Florence to Interstate 20 near the SR 475 Interchange in Rankin Co, MS. Two 25-mile roadway corridor alternatives.

Project Manager: Wellmont Health Systems Reedy Creek Bridge Construction Phase I Cultural Resources Survey, Kingsport Tennessee. Phase I archaeological / cultural resources survey of a 16-acre site near an area where a new bridge and roadway leading to the Holston Valley Medical Center are being constructed as part of the Health System's "Project Platinum" modernization effort.

Project Manager: Yellowbend Rail Connector Project Phase I Cultural Resources Survey, McGehee Arkansas. Phase I Cultural Resources Survey of 97-acre rail corridor. Provided oversight of budget, staffing, and scheduling. Served as Principal Investigator providing quality assurance of fieldwork procedures.

Senior Archaeologist: City of Peoria Springdale Cemetery Roadway Rehabilitation Geotechnical Services, Peoria, Illinois. Responsible for providing oversight for walkover of cemetery area to delineate extent of property to avoid disturbance of the area during stream restoration activities which were completed without any disturbance of cemetery area. Scope: Geotechnical study and construction design for patching, bituminous overlay, and drainage improvements to 1.17 miles of roadway at city cemetery. Services also included plans, specifications and estimates (PS&E); site survey, ROW investigation, traffic study / IDS, reporting, meetings and client coordination.

Other than MACTEC Experience

Archaeological Survey Investigations

Task Manager / Principal Investigator: Phase I Archaeological Survey, West Virginia Department of Transportation, Coalfields Transportation Project, Big Ridge Section, Big Ridge, West Virginia, August - October 2006. This project included Phase I testing for approximately 2 miles of new highway location.

Task Manager / Principal Investigator: Phase I Archaeological Survey, Mississippi Department of Transportation, State Route 6 / U.S. 278 Marks Realignment and I-55 Realignment, Marks, Mississippi, March - June 2006. Project included Phase I testing for approximately 7 miles of realignment for the proposed State Route 6 / U.S. 278.

Project Manager / Principal Investigator: Phase I Archaeological and Architectural Survey, 90th Readiness Command, Camp Pike, Arkansas, November 2005 - January 2006. This project consisted of an archaeological and architectural survey of 4.75 acres.

Task Manager / Principal Investigator: Phase I Archaeological Survey, West Virginia Department of Transportation, Willowwood Bridge, Hinton, West Virginia, October 2005 - May 2006. Provided management of the Phase I field work, laboratory analysis, and report production.

Task Manager / Principal Investigator: Phase I Archaeological Survey, Arkansas Department of Transportation, Prairie Grove Bypass, Prairie Grove, Arkansas, September 2005. Project consisted of a 3-mile bypass around the town of Prairie Grove. Responsible for management of Phase I field work, laboratory analysis, and report production.

Task Manager / Principal Investigator: Phase I Archaeological Survey, Mississippi Department of Transportation, SR6, Clarksdale to Batesville, Mississippi, March - October 2005. Project consisted of Phase I archaeological survey of 40 miles of roadway.

Task Manager / Principal Investigator: Phase I Archaeological Survey, West Virginia Department of Transportation, Corridor H Connector Road, Route 10/10, Hardy County, West Virginia. Project consisted of Phase I archaeological survey of 0.91 miles of roadway.

Principal Investigator / Report Author: Phase I Archaeological Survey, West Virginia Department of Transportation, Shawnee Highway near I-77 Ghent Interchange, Raleigh County, West Virginia. Phase I archaeological survey of 2.03 miles of highway.

Archaeological Researcher: Archaeological Site File / NRHP Records Search, Dominion Resources, Radio Tower Site, Boone County, West Virginia. Site file research and author of letter report concerning the placement of a cell tower.

Field Director / Report Author: Phase I Archaeological Survey, Moorefield Preferred Bypass from Dumpling Run Creek to U.S. Highway 220, Hardy County, West Virginia. Served as field director and co-author on final report.

Field Archaeologist: Phase I Archaeological Survey, Killen Power Station, Duke Energy, and Butler, Pennsylvania. Served as field archaeologist.

Field Director / Report Author: Phase I Archaeological Survey, Clipper Wind Project, Clipper Inc., Garrett County, Maryland. Seven-mile archaeological survey for the placement of wind generators. Served as field director and authored the findings section for the final report.

Field Director: Phase I Archaeological Survey, Columbia Gas Transmission, Homestead Pipeline Survey, Substations in New Market and Richmond, Virginia. Archaeological testing of proposed expansion of gas metering stations.

Field Director / Report Author: Archaeological Monitoring, Maryland Highway Administration, Hancock Street, Hancock, Maryland. Onsite archaeological monitoring during the removal and replacement of sidewalks. Served as field director and authored the findings section of the final report. Over 10 archaeological features were documented.

Assistant Field Director / Report Author: Phase I Archaeological Survey, Maryland State Highway Administration, Back River Neck Survey, Essex, Maryland. Served as an assistant field director and co-author on final report.

Field Archaeologist: Phase I Archaeological Survey, West Virginia Department of Transportation, Ann Clutter Gravesite, Greenland Gap, West Virginia, February - March 2005. Project consisted of hand excavation of exploratory trenches to identify historic era burials.

Field Archaeologist: Phase I Archaeological Surveys as part of Strategic Environmental Appraisals (SEAs) and Ecosystem Environmental Baseline Studies, U.S. Department of Homeland Security, Texas, Arizona, California, Washington, Idaho, Montana, North Dakota, Minnesota, Michigan, New York, Vermont, New Hampshire, Maine, and Alaska. Phase I archaeological surveys on the Alaskan-Canadian border as part of the U.S. Visit project. Phase I archaeological surveys to identify possible cultural resources on the four U.S. border crossing stations located in Alaska (Skagway, Poker Creek, Haines Junction, and Dalton Cache). The work included background research, shovel testing, and pedestrian surveys.

Field Archaeologist: Phase I Archaeological Survey, Private Land Development Company, Collingtion Survey, Prince George's County, Maryland. Phase I archaeological survey of 30+ acres. Responsible for field investigation and documentation.

Field Archaeologist: Phase I Archaeological Survey, Dena Power Company, Dena Frederick Power Station, Point of Rocks, Maryland. Responsible for field investigation and documentation.

Field Archaeologist: Phase I Archaeological Survey, Private Land Development Company, The Estates at Leewood, Fairfax, Virginia. Responsible for field investigation and documentation.

Field Archaeologist: Phase I Archaeological Survey, State of Maryland, Maple Farms Survey, Baltimore, Maryland. Responsible for field investigation and documentation.

Field Archaeologist: Phase I Archaeological Survey, State of Maryland, Barton Outfall Survey, Barton, Maryland. Responsible for field investigation and documentation.

Field Archaeologist: Phase I Archaeological Survey, Iroquois Gas and Transmission Company, ELIE Survey, Long Island (River Neck), New York. Responsible for field investigation and documentation.

Field Archaeologist: Phase I Archaeological Survey, El Paso Gas Transmission Company, Independence Pipeline Segment 2, Canton, Ohio, and Western Pennsylvania. Responsible for field investigation and documentation.

Field Archaeologist: Phase I Archaeological Survey, Private Land Development Company, Village Creek Survey, Birmingham, Alabama. Responsible for field investigation and documentation.

Archaeological Testing Excavations

Field Archaeologist: Archaeological Testing, Maryland Veterans Health Administration, Fort Howard, Baltimore, Maryland. Responsible for excavation of archaeological units and documentation of features.

Field Archaeologist: Archaeological Testing, U.S. Department of Defense, Patuxent River Naval Air Base Station, St. Mary's County, Maryland. Responsible for excavation of archaeological units and documentation of features.

Field Archaeologist: Archaeological Testing, Maryland State Highway Administration, Mt. Atena, Maryland. Responsible for excavation of archaeological units and documentation of features.

Field Archaeologist: Archaeological Testing, West Virginia Department of Transportation, Proposed Pauper Cemetery, Bluefield, West Virginia. Responsible for excavation of archaeological units and documentation of features. No human internments were identified as a result of the site testing.

Field Archaeologist: Archaeological Testing, West Virginia Department of Transportation, Ours Springhead Site, Moorefield, West Virginia. Responsible for excavation of archaeological units and documentation of features. This project was part of the Corridor H Study.

Data Recovery Excavations

Field Archaeologist: Data Recovery, West Virginia Department of Transportation, Excavations at Blennerhassett Island, West Virginia. Project was conducted to mitigate the impact of a proposed bridge over the island. Responsible for archaeological excavation, documentation of archaeological features, and artifact identification.

Field Archaeologist: Data Recovery, University of Alabama Field School, Excavations at 1LU496 (Dust Cave), Florence, Alabama. Responsible for archaeological excavation, documentation of archaeological features, and artifact identification.

Field Archaeologist: Data Recovery, Wal-Mart Inc., Woodland Village Site, Canton, Georgia. Responsible for excavation and documentation of Woodland village site.

Zooarchaeological Analysis

Field Archaeologist / Zooarchaeologist: Tel Beth Shemesh Excavations, Beth Shemesh, Israel, 1994 - 1997. The Beth Shemesh excavation was a joint project between Harvard University (United States), Ben Gurion University (Israel), and Bar-Ilan University Israel). The site is considered to be the Biblical site of Beth Shemesh (II Kings) and is located 10 miles west of Jerusalem. The intent was to understand the economic organization of the site, the role of the site in Biblical history, and the ethnic makeup of the site as either Israelite or Philistine. Worked as an archaeologist and zooarchaeologist for the excavation. Presented results from the excavation at the annual meeting for the American Schools of Oriental Research held in Nashville, Tennessee.

Field Archaeologist / Field Zooarchaeologist: Samara River Valley Project, Samara, Russia. One of the first collaborative efforts between American and Russian archaeologists after the fall of the Soviet Union. The project was conducted by Hartwick College (New York) and the Samara Pedagogical institute (Samara, Russia). Served as an archaeologist and zooarchaeologist for the project that consisted of excavating a Late Bronze Age village, three Late Bronze Age herding camps, and three Late Bronze Age burial mounds. The goal was to develop a model outlining the socioeconomic organization for the Indo-Aryan peoples during the Late Bronze Age. Results from the fieldwork have been presented at scholarly conferences in the Unites States, Greece, and England. In addition, co-authored an article published in the academic journal *Eurasia Antiqua.*

Field Archaeologist / Field Zooarchaeologist: University of Chicago and University of Samara, Kibit 1 Excavations, Samara Oblast, Russia. The Kibit 1 excavation is located on the border between the Republic of Tartarstan and Russia. The goal was to evaluate Late Bronze Age settlements situated on the steppe - forest steppe zone, their socioeconomic organization, and their role in the production and distribution of copper and bronze. Served as an archaeologist and zooarchaeologist responsible for analysis of all faunal material. Results of the excavation were presented at the annual meeting of the European Association of Archaeologists held in Cork, Ireland.

Field Zooarchaeological Laboratory Co-Manager: Hartwick College and the Samara Institute of History, Samara, Russia, 1999 - 2002. Duties included co-management of the zooarchaeology lab in the field. Analysis of over 12,000 animal bones from Iron Age deposits.

Field Zooarchaeological Laboratory Manager: University of Alabama at Birmingham and the Albright Institute of Archaeology, Jerusalem, Israel, 2000. Duties included the management of the zooarchaeology lab at the Albright Institute of Archaeology.

Faunal Analysis

Field Zooarchaeologist: Faunal Analysis, Site 46SU3, Fort Ancient Village Site, Summers County, West Virginia.

Field Zooarchaeologist: Faunal Analysis as part of Phase II Testing, Site 46GB, Sulphur Springs, Greenbrier County, West Virginia. Analyzed faunal assemblage from mid 19th to early 20th century hotel site.

Field Zooarchaeologist: Faunal Analysis, Tel el Wawiyat, Upper Galilee, Israel. Analyzed over 4,000 animal bones from Late Bronze and Early Iron Age deposits.

Field Zooarchaeologist: Faunal Analysis, Tel Beth Shemesh, Beth Shemesh, Israel. Analyzed over 6,900 animal bones from Late Bronze and Early Iron Age deposits.

Field Zooarchaeologist: Faunal Analysis, University of Alabama at Birmingham, Tel Ekron, Israel. This project was conducted for Dr. Brian Hesse (University of Alabama at Birmingham) and the Albright Institute in Jerusalem, Israel. Analyzed over 8,000 animal bones from Early Iron age strata.

Field Zooarchaeologist: Faunal Analysis, Baitugan Survey, Samara, Russia. Analyzed 381 animal bones from Iron Age deposits.

Publications and Presentations

Paper Presentations

- 2005, With Laura Popova, P.F. Kuznetsox, O.D. Mochalov, and M.T. McLeester. "Living and Working in the Forest-Stepe in the Late Bronze Ageg: An In Depth Look at Kibit 1". Paper presented at the annual meeting for the European Association of Archaeologists, Cork, Ireland.
- 2005, "The Role of Cultural and Natural Biases in the Analyses of Animal Bones". Paper presented at the 2005 Spring Workshop held by the West Virginia Council of Archaeologists, Elkins, West Virginia.
- 2005, With Dave Peterson, Pavel Kuznetsov, Oleg Mochalov, Peter Northover, and Audrey Brown. "Metalwork in the Social and Cultural Landscape of Bronze Age Pastoralists." Paper presented at the Second University of Chicago Eurasian Archaeology Conference, Chicago, Illinois.
- 2004, "Prehistoric Subsistence Patterns in the Appalachian Plateau: Another Look at 46SU3". Paper presented at the annual meeting for the West Virginia Society of Archaeology, Charleston, West Virginia.
- 2003, With Raymond Ezell. "Archaeology and Domestic History of James Machir's Caledonia Farmstead (46HY369), Hardy County, West Virginia". Paper presented at the annual meeting of the West Virginia Society of Archaeology, Charleston, West Virginia.
- 2003, With Raymond Ezell. "Archaeology and Domestic History of James Machir's Caledonia Farmstead (46HY369), Hardy County, West Virginia". Paper presented at the annual Mid-South Archaeological Conference in Murray State, Murray, Kentucky.
- 2003, With Nerissa Russell and Audrey Goodman. "The Animals of Krasno-Samarskoe". Paper presented at the annual meeting for the Society of American Archaeology in Milwaukee, Wisconsin.
- 2002, With Dr. Brian Hesse. "From Village to State". Paper presented at the annual meeting for the American Schools of Oriental Research, Nashville, Tennessee.
- 2002, With Nerissa Russell, David Anthony, Audrey Brown, Anne Ppike-Tay, and Pavel Kosintev. "A Bronze Age Dog Sacrifice in the Russian Steppes". Paper presented at the International Conference of Archaeozoology, Durham, England.
- 2002, With Nerissa Russell and Audrey Brown. "Going to the Dogs: The Animals of Krasno-Samarskoe". Paper presented at the European Association of Archaeologists, Thessalonki, Greece.

Technical Reports

- 2006, *Phase I Archaeological Survey of the Coalfields Expressway, Big Ridge Section, Raleigh County, West Virginia.* Submitted to the West Virginia Department of Transportation, Charleston, West Virginia.
- 2006, *Archaeological Phase I Survey of the SR6/US278 Marks Realignment and the I-55 Realignment Addendum to State Job SDP-007-00 (004) V21/102733 0010000.* Submitted to the Mississippi Department of Transportation, Jackson, Mississippi.
- 2006, *Phase I Archaeological Survey of the Proposed New Willowwood Bridge near Hinton, Summers County, West Virginia.* Submitted to the West Virginia Department of Transportation, Charleston, West Virginia.
- 2006, *Phase I Archaeological and Architecture Survey for 4.75 Acres at Camp Pike, Pulaski County, Arkansas.* Submitted to JR2 Engineering, Inc., Tampa, Florida.
- 2006, With James Mooney, Susan Wilkerson, Troy Mean, and James Wilson. *Phase I Archaeological Survey of the I-69 SIU-13, ElDorado to McGhee, Arkansas.* submitted to the Arkansas Department of Transportation, Little Rock, Arkansas.
- 2005, With James Mooney, Susan Wilkerson, Troy Mead, James Wilson, and Gary Mead. *Archaeological Phase I Survey of SR6/278 from Clarksdale to Batesville, Mississippi.* Submitted to the Mississippi Department of Transportation, Jackson, Mississippi.
- 2005, *Phase I Cultural Resource Survey: Corridor H Connector Road, Route 10/10, Hardy County, West Virginia.* Submitted to the West Virginia Department of Transportation, Charleston, West Virginia.
- 2004, *Archaeological Survey for the Placement of a Drainage Pipe between Station 1225 and Station 1226, Addendum Report to the Phase I Archaeological Survey of the Shawnee Highway near the I-77 Ghent Highway Interchange, Raleigh County, West Virginia.* Submitted the West Virginia Department of Transportation.
- 2004, With Raymond Ezell. *Phase I Archaeological Survey of the Shawnee Highway near the Ghent Interchange, Raleigh County, West Virginia.* Submitted to the West Virginia Department of Transportation.
- 2003, With Raymond Ezell. *Phase II Archaeological Testing at the Purported Pauper Cemetery Site (46MC64) on Stony Ridge in Mercer County, West Virginia.* Submitted to the West Virginia Department of Transportation.

- 2003, With Raymond Ezell and Carolyn Kender. *Phase I Archaeological Survey for the Moorefield Preferred Bypass from Dumpling Run Creek to U.S. Highway 220.* Submitted to the West Virginia Department of Transportation.
- 2002, *Faunal Remains from Tel el Wawiyat and Tel Beth Shemesh: An Analysis of Pastoral Production during the Late Bronze - Early Iron Age Transition.* Unpublished Master's Thesis, University of Alabama, Anthropology Department.
- 2002, With April L. Fehr, Kathleen M. Child, William H. Lowthert, Brian Cleven, and Jennifer Evans. *Phase II Archaeological and Historical Investigations at Sites 18MO368 and 18MO460 for Project No. MO746B11, MD97 from Gold Mine Road to North of Holiday Inn Drive, Montgomery County, Maryland, Archaeological Report 278.* Submitted to the Maryland State Department of Transportation.
- 2002, With Tom Davis and Brian Stone. *Phase I Archaeological Survey for the Proposed MD43 Extended Wetland Mitigation Site 25.* R. Christopher Goodwin & Associates, Inc. Submitted to the Maryland State Highway Administration.
- 2001, With Audrey Brown. *Preliminary Faunal Report for the 2001 Baitugan Survey.* Submitted to Dave Peterson at the University of Chicago.
- 2000, With Nerissa Russell. *Faunal Report for the 1999 Season at Krasno-Samarskoe.* Submitted to the Samara Valley Project.
- 1997, With Dr. Brian Hesse and Tim Griffith. *Animal Husbandry in the Early Iron Age at Beth Shemesh.* Submitted to the Tel Beth Shemesh Excavations.

Publications

- 2006, With Audrey Brown. A Brief Appendix of Faunal Remains. Beyond the Steppe and Sown Proceedings of the 2002 University of Chicago Conference on Eurasian Archaeology (editors, David Peterson, Laura Popva, and Adam T. Smith). Colloquia Pontica 13, Brill, Boston, USA.
- 2006, With Anthony, David W., Dorcas Brown, Audrey Brown, Aleksandar Kokhlov, Pavel Kuznetsov, Oleg Mochalov, Eileen Murphy, Anne Pike-Tay, Laura Popova, Arlene Rosen, Nerissa Russell, and Alison Weisskopf. *The Samara Valley Project: Late Bronze Age Economy and Ritual in the Russian Steppes.* Eurasia Antiqua.

Patents and Individual Honors

- 2006, Phase I Archaeological Survey for the Proposed Willowwood Bridge, Hinton, West Virginia. Nominated for a West Virginia Department of Transportation Excellence Award in Environmental Engineering.
- 2005, Selected as the Young S.A.M.E. Engineer by Michael Baker Jr. Inc. (Charleston, West Virginia, office) for the Army Corps of Engineers Huntington District.

Patrick H. Garrow, RPA (Pat)
Senior Principal Archaeologist

MACTEC

44 total years of experience

Education

Master of Arts Anthropology, 1968, University of Georgia
Bachelor of Art Anthropology, 1966, University of Georgia
Associate of Art Social Sciences, 1963, Christopher Newport College of the College of William & Mary
Coursework Graduate Studies in Anthropology, University of Georgia

Registrations

Registered Professional Archaeologist, US

Career Summary

Mr. Garrow is a Senior Principal Archaeologist with over four decades of broad-based experience in ethnohistory, historical archaeology, prehistoric archaeology, urban archaeology, historic cemetery studies, and cultural resource studies. He has directed projects located throughout the continental United States and the American territories in the Caribbean. He has served as Principal Investigator, Project Manager, or Senior Technical Advisor on over 650 projects.

Mr. Garrow has extensive experience directing or providing quality control for transportation projects. He has been involved in projects for departments of transportation in Maryland, North Carolina, South Carolina, Tennessee, and Mississippi. His projects have included surveys, testing, and data recoveries, and have ranged from small surveys to extremely large and complex data recoveries.

Mr. Garrow has experience in archaeology and cultural resource management, and has conducted or supervised projects for virtually every federal agency. Examples of his military experience includes serving as Principal Investigator, Senior Technical Advisor, or Project Principal for studies at Fort Hood, Fort Polk, Fort Stewart, Fort Sam Houston, and Robbins Air Force Base. He has directed projects through prime contractors for GSA, such as survey, testing, and data recovery of the proposed Knoxville Courthouse site in Knoxville, Tennessee. His direct work for GSA has included a cultural resource survey of the proposed courthouse in London, Kentucky. Mr. Garrow's broad experience in cultural resource management studies and specific experience with federal agencies will greatly facilitate successful completion of work orders under this project.

Project Experience

Principal Investigator: U.S. Department of Veterans Affairs - National Cemetery Administration, Florence National Cemetery Expansion Phase III Archaeological Services, Florence, South Carolina. Responsible for providing Principal review and technical oversight. Scope: Phase III archaeological data recovery for 10-acre site at national cemetery dating back to U.S. Civil War interments, planned for expansion; services to investigate possible encroachment onto site of former Civil War-era Prisoner Stockade. Over 500 archaeological features recorded and more than 150 excavated.

Archaeologist: Dominion Resources Services, Inc. Southwest Virginia Clean Coal Power Plant Cultural Resources Services, Virginia City (St. Paul), Virginia. Responsible for conducting cemetery studies and performing Phase I archaeological survey. Scope: Cultural resource services including cemetery studies, Phase I archaeological survey and historic preservation studies in preparation for construction of new 500-600-megawatt clean coal power station in southwest Virginia near St. Paul. The 350-acre facility and ash disposal area is to be built on the site of a reclaimed surface coal mine; site also includes a cemetery area covering a quarter of an acre, with a possible 40 to 50 grave sites. MACTEC logged over 770 labor hours during Phase I services, and over 350 during cemetery studies.

Principal: Confidential Client, Confidential Site, Expert Witness Services and Document Review. Responsible for providing expert witness services to defendant in litigation that included an archaeological site on a development project property. Scope: Expert witness services and document review regarding archaeological sites found on parcels under development by plaintiff. Services included document review, consultations, depositions and testimony.

Principal: Tennessee Department of Transportation Historical and Archaeological Surveys, Technical Services, Various Locations Statewide, Tennessee. Responsible for providing review of project documents and provided quality control and oversight. Scope: Phase I historical and archaeological surveys at more than 10 bridge construction and renovation projects and various roadway construction projects, along with environmental consulting services, at sites throughout Tennessee.

Principal Archaeologist: Confidential Client, Confidential Site, Reservoir Breach Emergency Response and Restoration Services. Responsible for providing principal review of reports, and technical oversight. Scope: Emergency response (within 48 hours), restoration program management, environmental / natural resources restoration services, natural resources monitoring, debris removal, erosion control and master planning services in wake of reservoir breach during which 1.5 billion gallons of water and debris flooded river and valley below a pumped storage utility plant along a major river.

Principal Environmental Scientist: Wal-Mart Stores, Inc. Quincy Store Phase II & III Archaeological Testing and Mitigation Services, Quincy, West Virginia. Responsible for preparing the project proposal and coordinated the Phase II preparation with the client and with state regulators; performed as principal investigator for field activities and provided oversight of field activities; authored and / or reviewed significant portions of project review and provided technical quality control oversight. Scope: Phase II archaeological testing and Phase III mitigation services, including data recovery (excavation), in conjunction with development of 181,000-SF commercial retail store on 20 acres at complex archaeological site exhibiting subsurface evidence of agricultural settlements from several prehistoric eras.

Principal Archaeologist: Advanced Vehicle Research Center of North Carolina Phase I Cultural Resource Survey, Garysburg, North Carolina. *Responsible for assisting with preparation of the proposal and budget; provided principal review* for the report. Scope: Survey of four archaeological sites for artifact retrieval and classification, classification of soil types, description of historical settlement of the area, shovel test pits with photographic documentation, determination of eligibility for inclusion in National Register of Historic Places, and recommendations for avoiding disturbance of qualifying areas during construction of alternative fuels research facility.

Principal Archaeologist: Tennessee Department of Transportation Knoxville Beltway (S.R. 475) Cave and Rock Shelters Cultural Resources Survey, Farragut, Tennessee. Responsible for providing technical quality control for the archaeological survey report. Scope: Phase I archaeological / cultural resources survey of cave and rock shelters in area of proposed 40-mile corridor of State Route 475 (also known as the "Knoxville Beltway"), connecting with Interstate Highway 75.

Principal Investigator - Archaeology: Wal-Mart Stores, Inc. Lebanon Store Phase I Archaeological Survey, Lebanon, Kentucky. Responsible for assisting in preparation of project proposal and principal review of reporting. Scope: Screening archaeological survey of 80-acre Wal-Mart store site with 38 test pits and artifact retrieval and classification.

Principal Professional: Gwinnett County Department of Public Utilities Lower Big Haynes Force Main Wetlands Delineation, Natural and Cultural Resources Assessments, Loganville, Grayson, Georgia. Responsible for providing principal review and project oversight. Scope: Natural and cultural resources services for planned installation of new 36-inch diameter ductile iron force main (approximately 80,000 LF) from Loganville to Grayson. Review of NWI map and existing survey data indicated that installation would involve crossing several streams and potential wetland areas.

Principal Professional, Principal Professional: Santee Cooper Pee Dee Electrical Generating Station Environmental Assessment Update, Pamplico, South Carolina. Responsible for providing principal review and project oversight. Scope: Update of Environmental Assessment (EA) for proposed Pee Dee Electrical Generating Station pursuant with NEPA requirements. Site is approximately 2,900 acres, including transmission and rail corridors, and currently consists of predominantly undeveloped woodlands with some agricultural properties and dismantled rail-bed also on site. Also prepared Phase I ESA and Cultural Resources / Archeological Literature Review and Reconnaissance Survey.

Principal Archaeologist: U.S. Army Corps of Engineers - Mobile and Fort Worth Districts, Fort Sam Houston Environmental Impact Statement (NEPA Documentation) for BRAC Program, Fort Sam Houston (San Antonio), Texas. Responsible for serving as Principal Archaeologist for review and authoring of report. Scope: Preparation of Environmental Impact Statement, encompassing NEPA documentation and analysis, for realignment under the Base Realignment and Closure program of Fort Sam Houston, Texas.

Principal Archaeologist: United States Gypsum Company Washingtonville Site Development Due Diligence Services, Washingtonville, Pennsylvania. Responsible for conducting cultural resources assessments of property and developed reports for submittal to state agencies. Scope: Environmental due diligence services for selection of 100-acre property for construction of a new $180 million wallboard manufacturing facility to produce synthetic gypsum products using recovered coal ash from neighboring electric generation facility. Assisted in permitting of facility construction, including wetlands delineation, cultural resources evaluations, and air permitting.

Principal Review: U.S. Department of the Interior - National Park Service / Knox County Metropolitan Planning Commission, Great Smokey Mountains National Park Cades Cove Environmental Impact Statement Development, Townsend (nearest city), Tennessee. Responsible for providing technical quality control for the archaeological survey report. Scope: Development of Tier 1 EIS for Development Concept and Management Plan of Cades Cove Valley of Great Smokey Mountains National Park. Conducted ethno-historical and ethnographic investigations; documented affected environment for soils, water resources, floodplains, cultural resources, air quality, geomorphological and archeological site testing / evaluation, and noise and light pollution.

Archaeologist: U.S. Department of Veterans Affairs - National Cemetery Administration, Graterford and Pennhurst Sites Environmental Assessments, Graterford and Spring City, Pennsylvania. Responsible for serving as Principal for a preliminary cultural resources assessment of the abandoned Pennhurst State School and Hospital site in Chester County, Pennsylvania. Involved background research and a field reconnaissance of a portion of the grounds. Scope: Environmental assessments of two land parcels in Pennsylvania for potential construction of national cemeteries by the U.S. Department of Veterans Affairs.

Ethnohistory

Powhatan Tribes Ethnohistorical Research. This study involved extensive historical research on the Powhatan Indian tribes of eastern Virginia that was based primarily on existing literature. The research was conducted in preparation of a Masters thesis, and was subsequently published as an issue of *The Chesopican*, by the Chesopican Archaeological Association.

Mattamuskeet Tribes Ethnohistorical Research. The Mattamuskeet study was done as an independent project while employed as a Senior Archaeologist by the State of North Carolina. The research used archival sources, primarily public records, to reconstruct the history of the Mattamuskeet Indians of eastern North Carolina. The research innovated the use of public archival records in ethnohistorical research, and enabled the identification of contemporary descendents of the Mattamuskeets who had otherwise lost all knowledge of their Indian heritage. This study was published by the state of North Carolina.

Principal Investigator: Ravensford Land Exchange Project, Cherokee, North Carolina,National Park Service. The project involved an intensive survey, a geomorphology study, and archaeological testing of historic and prehistoric sites found on the property. The project was conducted for the Park Service with funding from the Eastern band of the Cherokee and was completed in 2002.

Historical Archaeology

Principal Investigator: Oktibbeha Phase III Archaeological Survey, Mississippi Department of Transportation, Oktibbeha, Mississippi. Site was within corridor of proposed road expansion and involved excavation of historic domestic site with multiple outbuilding of the 19th and 20th century.

Principal Investigator: Cooper River Rediversion Canal, South Carolina, National Park Service. Served as Principal Investigator and report contributor for investigations of the slave quarters of two Colonial-era plantations. The technical report and published articles produced as a result of this study are considered to be landmark documents in the development of African-American archaeology and the archaeological study of slavery. The project was completed in 1982.

Oxon Hill Manor, Maryland, Maryland Department of Transportation. Served as Principal Investigator and senior report author for a multi-year excavation and analysis study of a plantation site that dated from the early eighteenth century to the late nineteenth century. This project was the single largest archaeological investigation ever underwritten by the Maryland Department of Transportation.

East- West Connector, Georgia, Cobb County Department of Transportation. Served as Principal Investigator and senior report author for survey, testing, and data recovery investigations of a corridor proposed for road construction. Included in those investigations was data recovery excavations and analyses undertaken on a late nineteenth to early twentieth century residence that had burned early in the twentieth century with its full contents. The origin and cause of the fire that consumed the house was determined, and the layout of the house and its material contents were reconstructed. This project provided valuable insights into the day-to-day life of a mill worker's family in northern Georgia in the early the twentieth century.

Hilton Head Cross Island Connector, South Carolina Department of Transportation. Served as Principal Investigator and senior report author for testing and data recovery investigations of the Possum Point Site on Hilton Head Island, South Carolina. The project focused on the Frazer Cabin, a site occupied during the late nineteenth to early twentieth century by an African American Gullah family.

Ash House Data Recovery, University of Connecticut. Served as Principal Investigator and senior report author for data recovery investigations of a Colonial House site in Mansfield, Connecticut. This project included extensive archival research and archaeological investigations of a house site believed to initially date to ca. 1751.

Archaeology of Military Sites

Battle of Atlanta, Atlanta Metropolitan Area. Served as Principal Investigator, Project Manager, or Senior Technical Advisor for dozens of projects conducted in the Atlanta Metropolitan Area that included historical and archaeological resources from the Civil War era Battle of Atlanta. Specific examples of projects include the Barrett Parkway that crossed a section of the Lost Mountain Confederate defense line, and the East-West Connector which was proximate to the Battle of Ruffs Mill. Both of those projects were locate in Cobb County, Georgia.

Ballast Point Ceramic Study, U.S. Navy, California. Performed an analysis on all historic ceramics that had been recovered through years of excavation on Naval Command, Control, and Surveillance Center property at Ballast Point in San Diego. Included among the collections were ceramics from an early nineteenth century Spanish Fort, material from two nineteenth century whaling stations, and military artifacts from the late nineteenth and twentieth centuries.

Principal Investigator and Senior Author: Camp Lincoln Data Recovery, Van Buren, Missouri. Served as Principal Investigator and senior author for data recovery investigations of an eight-acre tract transferred from federal to private hands for construction of a new National Park Service complex. The multi-component site investigated during this project included a camp used by elements of the Union Army of Southeastern Missouri in late December 1862 and early January 1863. The investigation utilized systematic metal detecting with Total Station mapping of all finds, as well as unit excavation and machine stripping of selected areas. Surfer maps presented on base maps generated from Total Station data were used to present distribution data concerning the recovered artifacts. The field and laboratory analyses indicated that the portion of the camp investigated during that project had been used by the 11th Wisconsin Infantry, the 1st Wisconsin Cavalry, and the 24th Missouri Infantry. The project was completed in 2000.

Prehistoric Archaeology

King Site Investigations, Georgia, National Geographic Society and National Endowment for the Humanities Grants. Served initially as Principal Investigator and then Field Director for the King Site excavations in Floyd County, Georgia. This multi-year project investigated three acres of a sixteenth century village that contained the only solid evidence of direct sixteenth century Spanish contact in the interior Southeast. The investigations were done through Shorter College and later through Berry College and the University of Georgia.

Cerillos River Valley Investigations, Puerto Rico, Jacksonville District, Corps of Engineers. Served as Principal Investigator and senior report author for testing and data recovery on prehistoric sites within a proposed reservoir in the mountains above Ponce, Puerto Rico. One of the sites proved to be a small, local ceremonial center, a site type that previously had not been documented in Puerto Rico.

Live Oak Landfill, Georgia, Waste Management, Inc. Served as Senior Technical Advisor and Principal Investigator. The Live Oak Landfill project investigated a landfill expansion site in the Atlanta metropolitan area. Survey, testing, and data recovery investigations were conducted. The data recovery investigations dealt with two soapstone quarries that were used for the production of stone bowls between 3,000 and 4,000 years ago. Numerous broken bowls were found, as well as tools used in quarrying and quarry scars and bowl blanks that were still attached to outcrops. Both technical and popular reports were produced to document the investigations.

The Georgia International Horse Park Site, Georgia, City of Conyers. Served as Principal Investigator for archaeological survey, testing, and data recovery for a site used as the Equestrian Venue for the 1996 Olympic Games. The data recovery investigations centered on the 90 acre Chase site, which had been occupied from over 10,000 years ago to the early twentieth century.

GNB Recycling Facility, Georgia. Served as Principal Investigator for archaeological survey and testing on a property proposed for use as a battery recycling center. Included among the tested sites was a Mississippian village of a type that had not previously been identified in an upland, interior setting in the region.

Urban Archaeology

Washington Civic Center, District of Columbia. Served as Principal Investigator and senior report author for an investigation of a two-block area of Washington, D.C. proposed for construction of a Civic Center. The project was done for the government of the District of Columbia, and resulted in the development of a number of analytical techniques that have since become standard analytical tools.

Telco Block, Manhattan, New York. Served as Project Manager for data recovery investigations of a block in Lower Manhattan planned for construction of an office building. The site, located near the Fulton Fish Market and the Wall Street financial district, was continually used for commercial purposes from 1750, when the block was created with landfill, to the time of the excavation.

175 Water Street, Manhattan, New York. Served as Project Manager for the 175 Water Street block, which was adjacent to the Telco block but done for a different client. The backyards of commercial establishments that had occupied the block from 1750 to the mid-twentieth century were intensively excavated. The most significant find made on this excavation was an intact, eighteenth century ship that had been intentionally sunk and used as a bulkhead during the creation of the block. The ship was 85 feet long and 26 feet wide, and was the second most well preserved ship of that age or older (after the *Vassa)* that had been found worldwide up to that time. The identity of the ship was not established, but it was apparently built somewhere on the Chesapeake Bay in ca. 1710.

Wilmington Boulevard, Delaware. Served initially as Project Manager and later as Principal Investigator and prepared a major portion of the report. The Wilmington Boulevard project covered a multi-block area of downtown Wilmington, Delaware, and was done for the Delaware Department of Transportation prior to construction of a ramp for 1-95. The report produced as a result of this project is a basic comparative volume for urban archaeological projects in Wilmington.

Phoenix Blocks I and 2, Arizona. Served as Senior Technical Advisor and report coauthor. This the first of a series of data recovery investigations conducted for the City of Phoenix, and was prepared to be the baseline comparative study for the City. The study area consisted of two blocks in the original town plan that had been part of a residential neighborhood since the I 870s. Extensive prehistoric and historic resources were found, and the prehistoric components were analyzed and reported by others.

New Bern Holiday Inn, North Carolina. Served as Principal Investigator and report co-author. The study site was a block on the waterfront in downtown New Bern that contained the archaeological remains of an eighteenth century tannery and a nineteenth century turpentine distillery. Archaeological testing was conducted on this site for Mardeck, Ltd.

Old San Juan Ballàja Site, Puerto Rico. Served as Senior Technical Advisor. The Ballàja project consisted of archaeological testing of two blocks in the oldest part of San Juan that was done for the National Park Service. Extensive archaeological resources dating from the seventeenth to twentieth centuries were found and documented. The project was completed in 1988.

Knoxville GSA Courthouse, Tennessee. Served as Principal Investigator and senior report author. The GSA Courthouse site was a block in downtown Knoxville, Tennessee, that was proposed for construction of a new federal courthouse. The services provided on this project included background historical research, architectural survey and assessment, archaeological testing, and archaeological data recovery. The excavated features and deposits included one possible privy from the 1790s and numerous major features that dated from 1868 to ca. 1914. The investigations were done under contract to Barber & McMurry, Inc. for the General Services Administration.

Knoxville Waterfront Redevelopment, Knoxville, Tennessee. Served as Principal Investigator and report co-author. The Knoxville Waterfront Redevelopment project encompassed a stretch of the Tennessee Rover in downtown Knoxville that now includes Volunteer Landing and other developments. The services provided on this project included background historical research and archaeological survey and testing. The survey and testing located areas where intact archaeological features were located, which were later investigated by others during a data recovery investigation. The project was conducted under contract to the Tennessee Valley Authority.

Memphis Area Transit Authority Site, Tennessee. Served as Senior Technical Advisor and then as Principal Investigator and report author. This project involved background research, testing, and limited data recovery in the "Pinch" area of Memphis, Tennessee. The most intensively investigated resources consisted of a large cistern related to the M&O Railroad, which went bankrupt in 1 867and a foundation related to the later L&N Railroad. A very large collection of leather artifacts was recovered and conserved from the cistern.

Chattanooga Riverfront Project. Served as Senior Technical Advisor for the River City Company of the City of Chattanooga. This large project involved a range of consultant services that included review of the project draft Memorandum of Agreement, preparation of scopes of work, providing input on selection of subconsultants, inspecting field investigations while they were in progress, reviewing technical reports, and conducting archaeological monitoring of selected construction areas. The services provided on this project helped the client meet an extremely ambitious completion schedule.

Historic Cemetery Studies

Nancy Creek Primitive Baptist Church Cemetery, Georgia. Served as Principal Investigator and report co-author. This project, done in Chamblee, Georgia, involved moving 55 historic graves that were in the path of construction of a MARTA rail line. The work was done by a team that included grave removal specialists, archaeologists, and physical anthropologists. The graves were moved without incident, and the results were documented in a technical report.

Big Lazer Creek Cemetery, Georgia. Served as Principal Investigator and report co-author. This project was done under contract to the Georgia Department of Natural Resources and involved moving 12 graves exposed during construction of a fishing lake in Talbot County, Georgia. The graves were successfully moved and the results were documented in a project technical report.

Hopewell Baptist Church Litigation, Georgia. Served as Principal Investigator, Court's Expert, and Plaintiffs Expert Witness. This project was done as a part of a civil suit filed by a family against a church in the Atlanta, Georgia, area. The church was sued forbulldozing a portion of their own cemetery for planned construction without first moving the graves. Litigation lasted 2 1/2 years, during which time Mr. Garrow was appointed as the Court's Expert and conducted several investigations in and around the cemetery. The 220 graves within the construction zone were eventually moved to a protected part of the cemetery, and 116 additional graves were preserved in place. The civil suit was decided in favor of the plaintiffs, and both actual and punitive damages were assessed against the church.

Cope Family Cemetery, North Carolina. Served as Principal Investigator and report author. This project was done for a private client in Raleigh, North Carolina, and involved monitoring the removal of over 20 graves from a small family cemetery. The purpose of the monitoring was to determine if intact graves were indeed present, as another contractor had previously claimed to have moved all human remains from the cemetery for reburial in a commercial cemetery. Each grave proved to be intact.

Edwards-Attaway Cemetery, Georgia. Served as Principal Investigator, Expert Witness, and report author. The Edwards-Attaway cemetery project was a landmark case in terms of shaping the current Georgia burial law. A burial removal permit was initially granted under Georgia's previous law, but litigation resulted in that law being declared unconstitutional. A new law was passed, and the permit to move Edwards-Attaway was the first one granted under that statute. Parties opposed to the disinterment/reinterment immediately appealed the permit. The applicant also filed suit to test the constitutionality of the new law. The permit was eventually affirmed and the new law upheld. The 56 graves in the cemetery were archaeologically excavated and moved to a new cemetery. The project was documented in a technical report.

Small Cemetery Delineation Projects, Georgia. Served as Principal Investigator and report author for over 50 cemetery delineations under the current *Georgia Abandoned Cemeteries and Burial Grounds Act* for both private and public clients.

Cultural Resource Surveys

Chickamauga Reservoir Resurvey, Tennessee Valley Authority. Served as Principal Investigator for a multi-year survey of Chickamauga Reservoir in southern Tennessee that focused primarily on shoreline areas.

Proposed Champlain Pipeline Natural Gas Pipeline Corridor, Vermont, New Hampshire, and Massachusetts. Served as Project Manager and Senior Technical Advisor. This project investigated a proposed pipeline corridor that extended from the Canadian border in western Vermont to several points in Massachusetts. This project was cancelled after the background research and part of the archaeological survey was completed.

Turpentine Run Flood Control Project, St. Thomas, US. Virgin Islands. Served as Principal Investigator and report author. This project, conducted for the Jacksonville District of the Corps of Engineers, focused on creek improvement areas on the eastern end of St. Thomas.

Atlanta Gas Pipeline Corridor, Northwest Georgia. Served as Principal Investigator and report co-author. This project involved survey of a pipeline corridor for Atlanta Gas Light Company that extended from Ball Ground, Georgia to Chattanooga, Tennessee. The corridor was rerouted around almost all significant sites and was constructed under a greatly restricted schedule.

Plant Vogtle Transmission Line Surveys, various locations in Georgia. Served as Principal Investigator, and editor, author, or co-author of a series of reports. This project involved investigation of over 300 miles of transmission line corridors that crossed Georgia from north to south and east to west. Over 300 archaeological sites were found and assessed, and testing and data recovery was done on sites that could not be avoided during construction.

Professional Affiliations

- Member, Register of Professional Archaeologists, (Formerly the Society of Professional Archaeologists), Member since 1977, Registrar, 2004 – 2006, Registrar, 2000 – 2001, SAA Representative on the Board of Directors, 1997 – 1998, Second Alternate on the Standards Board, 1996 - 1998
- Member, Society for American Archaeology, Cultural Resource Management Committee 2004-Present, Chairman of the Membership Committee 1996-1998, Member of the Native American Relations Committee 1995-1996, Member of the Public Education Committee 1995-1998
- Member, Society for Historical Archaeology, Conference Chair, 1998 Atlanta Meeting, Chair of Conference Committee, 1998-Present
- Society for Georgia Archaeology, President 1978, Vice President 2001-2002, Newsletter Editor 1986-1992, Member of Board of Directors 1991-1993
- Greater Atlanta Archaeological Society, Founder and Member of Board of Directors 1988-1990
- Gwinnett Historical Society
- Jefferson County TN Historical Society , Newsletter Editor 2004-Present
- Tennessee Council for Professional Archaeology, Member of Board of Directors 2004-Present
- North Carolina National Register Review Board Member, 1981-1982
- Georgia National Register Review Board member, 1981-1984
- Southeast Cultural Resource Management Task Force Delegate and Topic Spokesman, 1984 Southeastern Archaeology Conference
- Georgia Council of Professional Archaeologists, Member of Board of Directors 1992-1994 and 1997-1999
- *Tennessee Archaeology* Editorial Board 2004-Present

Publications and Presentations

Books and Monographs

- 1970 Ed., with Wyman Trotti,*Readings in Cultural Anthropology,* Selected Academic Readings, Simon and Schuster, Inc., New York.
- 1973 With Marvin T. Smith, *The King Site (9F1-S) Excavations April, 1971 and through August,*
- *1973: Collected Papers.* Patrick H. Garrow, Rome, Georgia.
- 1974 *An Ethnohistorical Study of the Powhatan Tribes,* The Chesopiean Archaeological Association, Volume 12, Numbers 1-2, February-April, Norfolk.
- 1975 *The Mattaniuskeet Documents: A Study in Social History,* Archaeology Section, Division of Archives and History, Department of Cultural Resources, Raleigh, 3 printings.
- 1979 With Robert W. Foss and Silas D. Hurry, *Archaeological Investigations of the Edenton Snuff and Tobacco Manufacture.* North Carolina Archaeological Council No. 12. Raleigh, 2 printings.
- 1984 Editor, with Terry Klein, *Final Archaeological Investigations at the Wilmington Boulevard Monroe Street to King Street Wilmington, Delaware* . Delaware Department of Transportation, Archaeological Series No. 29.
- Compiler, with George S. Lewis, *The Profile Papers,* The Society for Georgia Archaeology Special Publication Number 1.

Published Articles

- 1967 "An Ethnohistorical Study of Early English Indian Policy", *Working Papers in Sociology and Anthropology,* Volume 1, Number 1, University of Georgia, Athens.
- 1968 "The Kecoughtan Indians", *Horn* Book *Series,* Syms-Eaton Museum, Hampton.
- 1968 "The Religious and Burial Practices of the Kecoughtan Indians', *Horn Book Series,* SymsEaton Museum, Hampton.

- 1973 "The Role of the Amateur in Archaeology", *Tennessee Archaeological Society, Newsletter,* Vol. XVIII, No. 2 Chattanooga, Page 37.
- Reprinted in *The Ways and Means to Archaeology. Prehistoric Man,* by Hranicky and Kerby, printed by the authors, Arlington, Page 97.
- 1973 With Marvin T. Smith, "The Settlement Pattern of the King Site", *The King Site Excavations April, 1971* through *August, 1973: Collected* Paper.w Patrick H. Garrow, Rome, Pages 1-10.
- 1973 With Marvin T. Smith, "Preliminary Functional Analysis of a Contact Period Structure in North Georgia", *The King Site Excavations April, 1971 through August, 1973. Collected Papers,* Patrick H. Garrow, Rome.
- 1973 "Two Stoneworkers from the King Site", *The King Site Excavations April, 1971 through August, 1973: Collected* Papers, Patrick H. Garrow, Rome, pages 20-29.
- 1974 "An Introduction to Archaeology", *The Tar Heel Junior Historian,* Volume 14, Number 1, pages 2-3.
- 1975 "The Mouse Creek 'Focus': A Reevaluation", *Southeastern Archaeological Conference,*
- *Bulletin 18,* Memphis, pages 86-91.
- 1975 With Gordon L. Hight, "Photographic Innovations from the King Site", *Southeastern Archaeological Conference,* Bulletin *18,* Memphis, pages 86-91.
- 1975 With David J. Hally and Wyman Trotti, "Preliminary Analysis of the King Site Settlement Plan," *Southeastern* Archaeological *Conference, Bulletin 18,* Memphis, pages 55-62.
- 1975 "The Amateur in Archaeology," *New Leaves,* Volume 1, Number 1, North Carolina Department of Cultural Resources, Division of Archives and History, Raleigh.
- 1975 "The Woodland Period North of the Fall Line", *Early Georgia* , 3(1), Athens.
- 1976 "The Mattamuskeet Indians", *New Leaves,* Volume 1, Number 1, North Carolina Department of Cultural Resources, Division of Archives and History, Raleigh.
- 1979 "The Historic Cabin Site: The Last Trace of the Cherokee Town of Coosawattee," *Early Georgia* , Volume 7, Number 1, Athens.
- 1979 "Contract Archaeology in the Business Arena", *Proceedings of the Compliance Workshop,* Publication No. 9, North Carolina Archaeological Council and the Archaeology Branch, Raleigh, North Carolina.
- 1980 With Jack F. Bernhardt, "Archaeology: Important New Aspect of Pipeline Route Selection," *Pipeline and Gas Journal,* April.
- 1980 "Private Sector Professional Services in Cultural Resource Management," *Edison Electric Institute Task Force on Cultural Resource Management.*
- 1981 "Archaeological Excavation of a Whiskey Still in Northwest Georgia," *Historical Archaeology Conference Journal,* Volume *15.*
- 1982 Response to "The 'Small Business Act' and Archaeological Research," *Southeastern Archaeology,* Volume 1, Number 2.
- 1983 Review of: Sapelo Papers: Researches in the History and Prehistory of Sapelo Island, Georgia, Daniel P. Juengst, Editor, In *Historical Archaeology,* Volume 17, Number 2.
- 1984 "The Identification and Use of Context Types in Urban Archaeology." *Southeastern Archaeology,* Volume 3, Number 2.
- 1985 With Thomas R. Wheaton, "Archaeological Evidence of Acculturation in the Carolina Low Country," In Plantation *Archaeology,* Edited by Teresa Singleton, Academic Press, New York.
- 1986 "The Mattamuskeet Indians," *High Tides,* Spring Volume.
- 1986 "Public Documents as Primary Sources for Ethnohistorical Research: The Mattamuskeet Model", in *Ehnohistory: A Researcher's Guide.* Edited by Dennis Wiedman, Studies in Third World Societies Number 35. pp 1-23.
- 1987 "The Use of Converging Lines for Determining Socio-Economic Status," in *Consumer Choices in* Historical *Archaeology,* Edited by Suzanne Spencer-Wood, Plenum Press.
- 1989 "A Preliminary Seriation of Coffin Hardware Forms in Nineteenth and Twentieth Century Georgia," *Early Georgia* 1987(15) 1-2. pp 19-45.
- 1989 "Ceramics as Reflectors of Nineteenth Century Social Life", in *Pottery and Porcelain on Peachtree Street,* edited by Delores M. Martin. Thirty-Fourth Annual Wedgewood International Seminar. Atlanta. pp. 67-79.
- 1989 "Georgia Lamarchacology." *The Profile* (63). The Society for Georgia Archaeology. p. 9.
- 1989 "The Bottle Glass/Ceramic Comparison: A Potential Tool for Comparing Socioeconomic Status Levels." South *Carolina Antiquities,* Volume 21, Numbers 1 and 2. Columbia. pp. 1-10.

- 1990 With Thomas R. Wheaton, "Colonoware Ceramics: The Evidence from Yaughan and Curriboo," in *Studies in South Carolina Archaeology: Essays in Honor of Robert L. Stephenson.*
- Anthropological Studies 8. Occasional Papers of the South Carolina Institute of Archaeology and Anthropology The University of South Carolina. Columbia. In Press.
- 1992 With George S. Lewis, "Ahead to the Past." *The Profile* (75). The Society for Georgia Archaeology. p. 8.
- 1993 "Ethics and Contract Archaeology." *Practicing Anthropology,* Vol. 15, No. 3. pp. 10-13. Reprinted in *SOPA Newsletter,* Vol. 17, No. 9/10, 1993. pp. 1-4.
- 1993 "Analysis of Ceramics from an Early Twentieth Century Mill Worker's House in Cobb County, Georgia. *Ohio Valley Historical Archaeology* 10:55-66.
- 1994 "The Remains of a Vanished Culture." *Federal Archeology Report,* Vol. 7, No. 1. pp. 3-4.
- 1994 With Barbara Avery Garrow and Pat A. Thomas, "Women in Contract Archaeology," In *Women in Archaeology,* Edited by Cheryl Claason, University of Pennsylvania Press.
- 1996 With Charles R. Cobb, "Woodstock Culture and the Question of Mississippian Emergence. *American Antiquity* Vol. 61, No. 1, pp. 2 1-37.
- 1998 "Archaeological Investigations of the Courthouse Block, Knoxville, Tennessee." *Mid-South Archaeological Conference Journal,* Memphis, Tennessee (In Press).
- 1998 With Tad Britt, "Excavation and Analysis of a Late 19th Century Privy in the Knoxville Commercial District." *Ohio Valley Historical Archaeology* 12.
- 2000 "Beneath the City: Urban Archaeology in Tennessee." *Tennessee Historical Quarterly* (Fall) pp 218-231.
- 2000 "Urban Archaeology in Tennessee: Exploring the Cities of the Old South," In *The Archaeology of Southern Urban Landscapes,* edited by Amy Young. University of Alabama Press.
- 2004 "Camp Lincoln and the Army of Southeastern Missouri" In *Missouri Archaeologist,* edited by James R. Wettstaed and Tim Baumann, University of Alabama Press (In Press).
- 2005 "Working on the Railroad: Investigations of the M&O and L&N Terminal Site, Memphis, Tennessee." Tennessee Archaeology Vol. 1, No. 2, pp. 98-124.

Selected Presented Papers

- 1972 "Historic Cherokee Pottery from Ridge's Ferry and Coosawattee, Georgia." Presented before the Conference on Historic Site Archaeology, Morgantown, West Virginia.
- 1975 "The Mattamuskeet Documents: A Study in Social History." Presented before the American Society for Ethnohistory, Gainesville, Florida.
- 1976 "Private Sector Involvement in Archaeology." Presented before the Annual Meeting of the Society for Georgia Archaeology, Augusta, Georgia.
- 1978 "The New and The Old: The Bedford-Pine and Edenton Archaeological Investigations." Presented before the Annual Meeting of the Society for American Archaeology, Urban Historical Archaeology Symposium, Tucson, Arizona.
- 1978 "The Edenton Historical Preservation Project." Presented before the Annual Meeting of the Society for Historical Archaeology, Nashville, Tennessee.
- 1979 With Thomas R. Wheaton, "African Slave Archaeology: The Yaughan Plantation Example." Presented before the Annual Meeting of the Historic Sites Conference, St. Augustine, Florida.
- 1980 "Investigations at Yaughan and Curriboo Plantations." Presented before the Annual Meeting of the Southeastern Archaeological Conference and the Society for Historical Archaeology, New Orleans, Louisiana.
- 1981 "Analysis of Ceramics from a Mid-Nineteenth Century Family Dump in Washington, D.C." Presented before the Annual Meeting of the Historic Sites Conference, Columbia, South Carolina.
- 1983 "Dating Nineteenth Century Ceramics." Presented before the Annual Meeting of the Society for Historical Archaeology, Denver, Colorado.
- 1982 - 1983 Slide Presentation of The <u>Ronson</u> Ship Excavations, presented at various universities and agencies throughout the country.
- 1985 "Artifacts From the Nancy Creek Primitive Baptist Church Cemetery, Chamblee, Georgia." Presented before the Annual Meeting of the Society for Georgia Archaeology, Savannah, Georgia.
- 1986 "Oxon Hill Plantation 1710/11-1895." Presented before the Annual Meeting of the Middle Atlantic Archaeological Conference, Rehobeth Beach, Delaware.

- 1986 "Excavations of an 18th Century Well at Oxon Hill Manor." Presented before the 12th Annual Conference on South Carolina Archeology, Columbia, South Carolina.
- 1986 "An Approach to Urban Archaeology." Presented before the Annual Meeting of the Georgia Academy of Sciences, Milledgeville, Georgia.
- 1990 "Archaeologists as Expert Witnesses." Presented before the 89th Annual Meeting of the American Anthropological Society, New Orleans, Louisiana.
- 1992 "At Rest in the Arms of Hopewell." Presented before the Annual Meeting of the Society for Historical Archaeology, Kingston, Jamaica.
- 1992 "Ethics and Contract Archaeology." Presented before the Annual Meeting of the Society for Applied Anthropology, Memphis, Tennessee.
- 1992 "The Status and Future of Urban Archaeology." Presented before the Annual Meeting of the Society for American Archaeology, Pittsburgh, Pennsylvania.
- 1992 "Archaeological Investigations of the Sandy Creek Cemetery." Presented before the Spring Meeting of the Society for Georgia Archaeology, Savannah, Georgia.
- 1993 "Analysis of Ceramics From an Early Twentieth Century Mill Worker's House in Cobb County, Georgia." Presented before the Annual Meeting of the Conference on Historic and Underwater Archaeology, Kansas City and the Symposium on Ohio Valley Urban and Historical Archaeology, Makamba, Illinois.
- 1994 "Archaeology and the Olympics." Presented before the Spring Meeting of the North Carolina Archaeological Society, Raleigh, North Carolina.
- 1994 "Posthellum Life on Hilton I-lead Island: The Frazier Cabin Site." Presented before the Joint Annual Meeting of the Southeastern Archaeological Conference and the Midwest Archaeological Conference, Lexington, Kentucky.
- 1994 "The Gwinnett Stone Mounds." Presented before the Spring Meeting of the Society for Georgia Archaeology, Statesboro, Georgia.
- 1995 "Historic Cemetery Studies Under the Georgia Abandoned Cemeteries and Burial Grounds Act." Presented before the Annual Meeting of the Conference on Historic and Underwater Archaeology, Washington, D.C.
- 1995 "Archaeological Investigations of the Courthouse Block, Knoxville, Tennessee." Presented before the 7th Annual Meeting of Current Research in Tennessee Archaeology, Nashville, Tennessee.
- 1995 "Archaeological Investigations of the Courthouse Block, Knoxville, Tennessee." Presented before the Annual Meeting of the Symposium on Ohio Valley Urban and Historical Archaeology, Greenville, Ohio.
- 1995 "La Iglesia de Maragtiez: A Local Ceremonial Center in the Cerillos River Valley, Ponce, Puerto Rico." Presented before the Annual Meeting of the Society for American Archaeology, Minneapolis, Minnesota.
- 1995 "Excavation and Analysis of a Late 19th Century Privy in the Knoxville Commercial District." Presented before the Annual Meeting of the Southeastern Archaeological Conference, Knoxville, Tennessee and the 1996 Annual Meeting of the Symposium on Ohio Valley Urban and Historical Archaeology, Louisville, Kentucky.
- 1995 "Public Education on Cultural Resource Management Projects." Presented before the Annual Chacmool Conference, University of Calgary, Calgary, Alberta, Canada.
- 1996 "Archaeological Investigations of the Courthouse Block, Knoxville, Tennessee." Presented before the Annual Meeting of the Conference on Historic and Underwater Archaeology, Cincinnati, Ohio, and the 17th Annual Meeting of the Mid-South Archaeological Conference, Memphis, Tennessee (June, 1996).
- 1996 "Urban Archaeology in Tennessee: Exploring the Cities of the Old South." Presented before the Annual Meeting of the Southeastern Archaeological Conference, Birmingham, Alabama.
- 1999 "The Excavation and Interpretation of Large 1-listoric Features." Presented before the Annual Meeting of the Annual Meeting of the Conference on Historic and Underwater Archaeology, Salt Lake City, and the South Central Historical Archaeology Conference, Memphis.
- 1999 "Working on the Railroad: Investigations of the M&O and L&N Terminal Site, Memphis, Tennessee." Presented before the Annual Mid-South Archaeological Conference, Jackson, Tennessee.
- 2000 "The Woodland Period North of the Fall Line," Presented before the Annual Meeting of the Southeastern Archaeological Conference, Macon, Georgia.
- 2001 "The Camp Lincoln Study: Investigation of a Temporary Civil War Camp Site," Presented before the Annual Meeting of the Society for Historical Archaeology, Long Beach, California.

- 2002 "Working on the Railroad: Investigations of the M&O and L&N Terminal Site, Memphis, Tennessee." Presented before the Annual Meeting of the Society for Historical Archaeology, Mobile, Alabama.
- 2002 With Nathan Morphew "Historical and Archaeological Investigations of the Ash House, Mansfield, Connecticut." Presented before the Annual Meeting of the Council for Northeast Historical Archaeology, Wilmington, Delaware.
- 2003 Nathan Morphew "Historical and Archaeological Investigations of the Ash House, Mansfield, Connecticut." Presented before the Annual Meeting of the Society for Historical Archaeology, Providence, Rhode Island.
- 2005 "Investigation of a 19th Century Urban Farmstead in Raleigh, North Carolina." Presented before the Annual Meeting of the Society for Historical Archaeology, York, United Kingdom.

APPENDIX F

SHOVEL TEST LOG

PSEG-ESP Shovel Test Log

ST	Pos/Neg	Date	Depth (cm)	Munsell Color/Texture	Artifacts	Initials	Comments	Bag No.
E-1	Pos	13/Apr/09	0-35	10YR 4/3 ClLo	1 Glass	CSE		1
E-1	Pos	13/Apr/09	35-55	10YR 6/2 mottled w/ 10YR 6/8 Cl		CSE		
E-1 A	Pos	24/Apr/09	0-16	10YR 4/3 SiLo	1 piece of mica, prob natural	SCC		103
E-1 A	Pos	24/Apr/09	16-20	10YR 5/1 mottled w/ 10YR 5/6 SiLo		SCC		
E-1 C	Pos	24/Apr/09	0-22	10YR 4/3 SiLo	Unid Metal @ 0-15 cmbg	SCC		104
E-1 C	Pos	24/Apr/09	22-28	10YR 5/3 mottled w/ 10YR 5/6 SiLo		SCC		
E-2	Neg	13/Apr/09	0-31	2.5Y 5/2 SaLo		BMRS	Moisture in strat B increases with depth	
E-2	Neg	13/Apr/09	31-60	10yr 6/1 mottled w/ 10YR 5/6 SaClLo		BMRS		
E-3	Pos	13/Apr/09	0-36	7.5YR 4/1 ClLo- wet	1 green bottle glass	KW	~ 25 cmbs - artifact	2
E-3	Pos	13/Apr/09	36-53	7.5YR 7/1 SiClLo		KW		
E-3 A	Pos	24/Apr/09	0-23	10YR 4/3 SiLo	2 Brick Frags/ 1 Glass	SCC	Coal- not collected	105
E-3 A	Pos	24/Apr/09	23-35	10YR 5/3 mottled w/ 10YR 5/6 SiLo		SCC		
E-3 B	Neg	24/Apr/09	0-32	10YR 4/3 SiLo		SCC	1 Coal frag	
E-3 B	Neg	24/Apr/09	32-36	10YR 5/3 mottled w/ 10YR 5/6 SiLo		SCC		
E-4	Neg	13/Apr/09	0-30	10YR 5/2 SiLo		DSA	30 below- redox mottling	
E-4	Neg	13/Apr/09	30-45	10YR 6/6 w/ Gley 1 6/10GY SaLo		DSA		
E-4	Neg	13/Apr/09	45-65	Gley 2 4/10BG SaLo		DSA		
E-5	Pos	13/Apr/09	0-22	2.5Y 5/2 SaLo	1 Flake/ 1 Redware	BMRS		3
E-5	Pos	13/Apr/09	22-95	10yr 6/1 mottled w/ 10YR 5/6 SaClLo		BMRS	Auger started at 60 cmbs	
E-5	Pos	13/Apr/09	95-130	10yr 6/1 mottled w/ 10YR 5/6 SaCl	Charcoal/ Iron Concretions	BMRS	Water table at 100 cmbs, pooling at 95 cmbs	
E-5 A	Neg	24/Apr/09	0-24	2.5Y 5/3 SaLo		SCC		
E-5 A	Neg	24/Apr/09	24-30	2.5Y 6/6 ClLo		SCC		
E-5 B	Neg	24/Apr/09		2.5Y 5/3 SaLo		SCC		
E-5 B	Neg	24/Apr/09		2.5Y 6/6 ClLo		SCC		
E-5 C	Neg	24/Apr/09	0-23	2.5Y 5/3 SaLo		SCC	3 Cinder- not collected	
E-5 C	Neg	24/Apr/09	23-35	2.5Y 6/6 ClLo		SCC		
E-5 D	Neg	24/Apr/09	0-27	2.5Y 5/3 SaLo		SCC	1 Sm Brick Frag; 2 Brown Bottle Frags- 1 threaded lip, one base w/ "...tter" none kept	
E-5 D	Neg	24/Apr/09	27-33	2.5Y 6/6 ClLo		SCC		
E-6	Neg	13/Apr/09	0-25	10YR 4/3 ClLo		CSE		
E-6	Neg	13/Apr/09	25-60	7.5YR 5/8 ClLo		CSE		

ST	Pos/Neg	Date	Depth (cm)	Munsell Color/Texture	Artifacts	Initials	Comments	Bag No.
E-7	Pos	13/Apr/09	0-28	10YR 5/4 SiLo	1 Glass	DSA	28 cm below- redox mottling	4
E-7	Pos	13/Apr/09	28-55	10YR 5/6 ClSi		DSA		
E-7 A	Neg	24/Apr/09	0-28	2.5Y 5/3 SaLo		SCC	4 Cinder- not collected	
E-7 A	Neg	24/Apr/09	28-33	2.5Y 6/6 ClLo		SCC		
E-7 B	Pos	24/Apr/09	0-22	2.5Y 5/3 SaLo	Brick/ FCR	SCC		106
E-7 B	Pos	24/Apr/09	22-30	2.5Y 6/6 ClLo		SCC		
E-7 C	Neg	24/Apr/09	0-23	2.5Y 4/3 SaLo		SCC		
E-7 C	Neg	24/Apr/09	23-26	2.5Y 6/6 Lo		SCC		
E-7 D	Neg	24/Apr/09	0-24	10YR 4/4 SaLo		SCC		
E-7 D	Neg	24/Apr/09	24-33	7.5Y 5/6 ClLo		SCC		
E-8	Neg	13/Apr/09	0-32	2.5Y 5/3 SiLo		KW		
E-8	Neg	13/Apr/09	32-43	2.5Y 5/6 ClLo		KW		
E-9	Neg	13/Apr/09	0-40	10YR 4/3 ClLo		CSE	High Prob- 7.5M (8 pace), Med-15M (15 pace), Low-22.5M (23 pace)	
E-9	Neg	13/Apr/09	40-60	7.5YR 6/8 mottle ClLo		CSE		
E-10	Neg	13/Apr/09	0-32	2.5Y 5/2 SaLo		BMRS	2 Brick fragments (1.5 cm long), discarded	
E-10	Neg	13/Apr/09	32-45	10yr 6/1 mottled w/ 10YR 5/6 SaClLo		BMRS		
E-11	Pos	13/Apr/09	0-40	10YR 4/4 SiLo	2 Glass/ 1 Iron Nail	DSA	mottling begins at 40	5
E-11	Pos	13/Apr/09	40-60	2.5Y 6/3 ClSi		DSA		
E-11 A	Pos	24/Apr/09	0-33	2.5Y 5/3 Lo	2 Hist Sherds (red at 0-20 & white 20-33)	SCC	25 ft north of E-11	107
E-11 A	Pos	24/Apr/09	33-38	7.5YR 5/8 mottled w/ 7.5 YR 5/1 ClLo		SCC		
E-11 B	Neg	24/Apr/09	0-24	2.5Y 5/3 Lo		SCC	25 ft east of E-11	
E-11 B	Neg	24/Apr/09	24-31	7.5YR 5/8 mottled w/ 7.5 YR 5/1 ClLo		SCC		
E-12	Neg	13/Apr/09	0-30	2.5Y 5/3 SiLo		KW	~ 12cm- beer can and brick frag	
E-12	Neg	13/Apr/09	30-49	2.5Y 5/6 ClLo		KW		
E-13	Neg	13/Apr/09	0-29	2.5Y 5/2 SaLo		BMRS	Coal and Brick in PZ, Discarded	
E-13	Neg	13/Apr/09	29-44	10YR 5/4 SaLo		BMRS		
E-13	Neg	13/Apr/09	44-85	2.5Y 6/6 SiClLo		BMRS		
E-13	Neg	13/Apr/09	85-95	2..5Y 7/1 Si		BMRS		
E-13	Neg	13/Apr/09	95-105	2.5Y 7/1 mottled w/ 7.5YR 5/6 SiCl		BMRS		
E-13	Neg	13/Apr/09	105-130	7.5YR 5/6 Sa		BMRS	130 cmbs 2.5Y 7/1 Cl at water table, Augers	
E-14	Neg	13/Apr/09	0-40	10YR 4/3 ClLo		CSE		
E-14	Neg	13/Apr/09	40-60	10YR 5/6 ClLo		CSE		
E-15	Neg	13/Apr/09	0-35	10YR 5/4 SiLo		DSA		
E-15	Neg	13/Apr/09	35-55	10YR 5/6 SiLo		DSA		
E-15	Neg	13/Apr/09	55-70	2.5Y 5/4 SaLo		DSA	Mottling begins around 70 cm	
E-16	Neg	13/Apr/09	0-32	7.5YR 4/3 SiLo		KW		

PSEG-ESP Shovel Test Log

ST	Pos/Neg	Date	Depth (cm)	Munsell Color/Texture	Artifacts	Initials	Comments	Bag No.
E-16	Neg	13/Apr/09	32-60	10YR 5/8 ClLo		KW		
E-16	Neg	24/Apr/09	0-27	10YR 5/3 or 4/3 SiLo		SCC	1 Coal Frag- not collected	
E-16	Neg	24/Apr/09	27-35	10YR 5/1 mottled w/ 10YR 5/6 SiLo		SCC		
E-17	Neg	13/Apr/09	0-20	10YR 4/3 ClLo w/ pebbles		CSE		
E-17	Neg	13/Apr/09	20-55	10YR 5/6 ClLo w/ some gravel		CSE		
E-18	Neg	13/Apr/09	0-28	10YR 5/4 SiLo		DSA		
E-18	Neg	13/Apr/09	28-130	10YR 5/6 SaLo		DSA	Water table at 115 cm	
E-19	Neg	13/Apr/09	0-28	10YR 5/3 SaLo		BMRS	Discarded Coal in PZ	
E-19	Neg	13/Apr/09	28-44	2.5Y 6/6 ClLo		BMRS		
E-20	Neg	13/Apr/09	0-33	10YR 5/3 SiLo		KW	Gravel <10%	
E-20	Neg	13/Apr/09	33-50	10YR 5/6 ClLo		KW		
E-20	Neg	13/Apr/09	50+	Rock Impass		KW		
E-21	Neg	13/Apr/09	0-25	10YR 5/3 SaLo		BMRS	Discarded Coal in PZ	
E-21	Neg	13/Apr/09	25-44	10YR 5/6 SaClLo		BMRS		
E-22	Pos	13/Apr/09	0-45	10YR 4/3 ClLo	1 Glass	CSE		6
E-22	Pos	13/Apr/09	45-55	10YR 5/6 ClLo		CSE		
E-22	Pos	13/Apr/09	55-70	10YR 5/6 mottled Lo		CSE	Auger	
E-22	Pos	13/Apr/09	70-110	10YR 5/6 mottled Cl		CSE		
E-22 A	Neg	24/Apr/09	0-30	2.5Y 4/3 Lo		SCC	25 ft north of E-22	
E-22 A	Neg	24/Apr/09	30-38	10YR 5/6 SiLo		SCC		
E-22 B	Pos	24/Apr/09	0-26	2.5Y 4/3 Lo	Glass Frag	SCC	25 ft east of E-22	108
E-22 B	Pos	24/Apr/09	26-48	10YR 5/6 SiLo		SCC	Gradual/ Diffuse boundary	
E-23	Neg	13/Apr/09	0-40	10YR 5/3 SiLo		KW		
E-23	Neg	13/Apr/09	40-56	10YR 5/6 ClLo- Wet		KW		
E-24	Neg	13/Apr/09	0-30	10YR 4/4 SaLo		DSA		
E-24	Neg	13/Apr/09	30-65	10YR 5/6 SaCl		DSA		
E-25	Neg	13/Apr/09	0-28	10YR 5/3 SaLo		BMRS	1 Gravel-sized brick frag, Discarded	
E-25	Neg	13/Apr/09	28-42	10YR 5/4 SaLo		BMRS		
E-25	Neg	13/Apr/09	42-55	10YR 6/6 SaClLo		BMRS		
E-26		22/Apr/09				BMRS	No Dig- Disturbed	
E-27	Neg	22/Apr/09	0-22	10YR 4/3 SiLo		BMRS		
E-27	Neg	22/Apr/09	22-35	10YR 5/4 SiClLo		BMRS		
E-27	Neg	22/Apr/09	35-45	10YR 5/6 SiClLo		BMRS		
E-28	Neg	22/Apr/09	0-23	10YR 3/2 mottled Cl-wet		CSE	1 substantial chunk red brick in lower strat (not collected)	
E-28	Neg	22/Apr/09	23-35	10Yr 5/2 mottled Cl-wet		CSE		
E-39	Neg	23/Apr/09	0-34	2.5Y 5/2 SaLo		BMRS		
E-39	Neg	23/Apr/09	34-45	10YR 6/2 w/ 7.5YR 5/8 (redox) SaClLo		BMRS		
M-1	Pos	14/Apr/09	0-24	10YR 5/4 SaLo	1 Redware	BMRS		7
M-1	Pos	14/Apr/09	24-38	10YR 6/6 SiClLo		BMRS		

PSEG-ESP Shovel Test Log

ST	Pos/Neg	Date	Depth (cm)	Munsell Color/Texture	Artifacts	Initials	Comments	Bag No.
M-1 B	Neg	23/Apr/09	0-27	10YR 4/3 SiLo		BMRS	12.5 ft east of M-1	
M-1 B	Neg	23/Apr/09	27-30	10YR 6/6 SiClLo		BMRS		
M-3	Neg	14/Apr/09	0-34	2.5Y 4/2 SaLo		KW	Marsh land Soil	
M-3	Neg	14/Apr/09	34-39	2.5Y 3/6 ClLo		KW	Marsh land Soil	
M-3	Neg	14/Apr/09	39+	Water		KW	Marsh land Soil	
M-4	Neg	14/Apr/09	0-30	7.5YR 2.5/1 Cl- Wet		CSE		
M-4	Neg	14/Apr/09	30-40	GLEY1 2.5/N Cl- Wet		CSE	Innundated below 40 cm	
M-5	Neg	14/Apr/09	0-15	10YR 3/2 SiCl (wetland)		BMRS		
M-6	Neg	14/Apr/09	0-30	10YR 4/4 SiLo		DSA	1 Modern bottle glass- not collected	
M-6	Neg	14/Apr/09	30-	10YR 5/6 SiCl		DSA		
M-6	Neg	14/Apr/09	0-15	10YR 3/2 SiCl (wetland)		BMRS		
M-7	Neg	14/Apr/09	0-30	10YR 4/3 SiLo		DSA		
M-7	Neg	14/Apr/09	30-	10YR 6/4 SiCl		DSA		
M-8	Neg	14/Apr/09	0-30	10YR 4/2 SiLo		KW		
M-8	Neg	14/Apr/09	30-41	10YR 6/6 ClLo- Subsoil		KW		
M-9	Neg	14/Apr/09	0-30	10YR 5/6 Cl- Wet		CSE	Innundated below 30 cm	
M-10	Neg	23/Apr/09	0-30	10YR 4/3 SiLo		SCC	North radial off M1 (12.5 feet)	
M-10	Neg	23/Apr/09	30+	10YR 4/4 ClLo		SCC		
M-10	Pos	14/Apr/09	0-24	10YR 5/3 SaLo	Prehist. Ceramic	BMRS	Edge of wetland grassy field	
M-10	Pos	14/Apr/09	24-44	10YR 6/6 SaClLo		BMRS		
M-10 A	Neg	23/Apr/09	0-25	10YR 4/3 SiLo		BMRS	North radial 12.5 ft from M-10	
M-10 A	Neg	23/Apr/09	25-30	10YR 5/6 SiClLo		BMRS		
M-10 b	Neg	23/Apr/09	0-25	10YR 4/3 SiLo		SCC	West radial off M-10- 12.5 ft west of M-10	
M-10 b	Neg	23/Apr/09	25-30+	10YR 5/6 Lo		SCC		
M-10 B	Neg	23/Apr/09	0-24	10YR 4/3 SiLo		BMRS	12.5 ft east of M-10	
M-10 B	Neg	23/Apr/09	24-29	10YR 5/6 SiClLo		BMRS		
M-11	Neg	14/Apr/09	0-27	10YR 4/3 SiLo		DSA		
M-11	Neg	14/Apr/09	27-	10YR 6/4 SiCl		DSA		
M-12	Neg	14/Apr/09	0-23	10YR 5/4 SiLo		KW		
M-12	Neg	14/Apr/09	23-41	10YR 5/6 ClLo		KW		
M-13	Neg	14/Apr/09	0-35	5YR 4/2 ClLo		CSE	Rain	
M-13	Neg	14/Apr/09	35-50	10YR 5/8 ClLo		CSE		
M-14	Neg	14/Apr/09	0-25	10YR 5/3 SaLo		BMRS		
M-14	Neg	14/Apr/09	25-85	10YR 6/6 SaClLo		BMRS	Auger began at 50 cmbs. Water at 85.	
M-14	Neg	14/Apr/09	85-115	10YR 5/6 Sa		BMRS	Pools at 1 M	
M-14	Neg	14/Apr/09	115-120	10YR 5/6 SaClLo		BMRS		
M-15	Neg	14/Apr/09	0-29	10YR 4/3 SiLo		DSA		
M-15	Neg	14/Apr/09	29-	10YR 6/4 SiCl		DSA		
M-16	Neg	14/Apr/09	0-26	10YR 5/4 SiLo		KW		
M-16	Neg	14/Apr/09	26-40	10YR 5/6 ClLo (subsoil)		KW		
M-17	Neg	14/Apr/09	0-30	5YR 4/6 ClLo- Wet		CSE		
M-17	Neg	14/Apr/09	30-40	10YR 5/8 ClLo- Wet		CSE		
M-18	Neg	14/Apr/09	0-28	10YR 5/3 SaLo		BMRS		

PSEG-ESP Shovel Test Log

ST	Pos/Neg	Date	Depth (cm)	Munsell Color/Texture	Artifacts	Initials	Comments	Bag No.
M-18	Neg	14/Apr/09	28-50	10YR 6/6 SaClLo		BMRS		
M-19	Neg	14/Apr/09	0-30	10YR 4/3 SiLo		DSA		
M-19	Neg	14/Apr/09	30-	10YR 6/4 SiCl		DSA		
M-20	Neg	14/Apr/09	0-22	10YR 5/4 SiLo		KW		
M-20	Neg	14/Apr/09	22-42	10YR 5/6 ClLo		KW		
M-21	Neg	14/Apr/09	0-30	5YR 4/6 ClLo- Wet		CSE		
M-21	Neg	14/Apr/09	30-40	10YR 5/8 ClLo- Wet		CSE		
M-22	Neg	14/Apr/09	0-27	10YR 5/4 SaClLo		BMRS		
M-22	Neg	14/Apr/09	27-48	10YR 6/6 SaClLo		BMRS		
M-23	Neg	14/Apr/09	0-28	10YR 4/3 SiLo		DSA		
M-23	Neg	14/Apr/09	28-	10YR 6/4 SiCl		DSA		
M-24	Neg	14/Apr/09	0-21	10YR 5/4 SiLo		KW		
M-24	Neg	14/Apr/09	21-40	10YR 5/6 SaLo		KW		
M-25	Neg	14/Apr/09	0-25	5YR 4/6 ClLo- Wet		CSE	Rain	
M-25	Neg	14/Apr/09	25-45	10YR 5/8 ClLo- Wet		CSE		
M-26	Neg	14/Apr/09	0-24	10YR 5/4 SaClLo		BMRS		
M-26	Neg	14/Apr/09	24-45	10YR 6/6 SaClLo		BMRS		
M-27	Neg	14/Apr/09	0-25	10YR 4/4 SiLo		DSA		
M-27	Neg	14/Apr/09	25-	10YR 6/4 SiCl		DSA		
M-28	Neg	14/Apr/09	0-21	10YR 5/4 SiLo		KW		
M-28	Neg	14/Apr/09	21-39	10YR 5/6 ClLo		KW		
M-29	Neg	14/Apr/09	0-30	5YR 4/6 ClLo- Wet		CSE		
M-29	Neg	14/Apr/09	30-40	10YR 5/8 ClLo- Wet		CSE		
M-30	Neg	14/Apr/09	0-28	10YR 5/4 SaClLo		BMRS		
M-30	Neg	14/Apr/09	28-100	10YR 6/6 SaClLo		BMRS	Began auger at 50 cm	
M-30	Neg	14/Apr/09	100-115	10YR 6/6 Sa		BMRS	First water at 100, Pools at 115	
M-30	Neg	14/Apr/09	115-120	10YR 5/4 w/ 10YR 6/6 SaClLo		BMRS		
M-31	Neg	14/Apr/09	0-25	10YR 4/4 SiLo		DSA		
M-31	Neg	14/Apr/09	25-	10YR 6/4 SiCl		DSA		
M-32	Neg	14/Apr/09	0-20	10YR 5/4 SiLo		KW		
M-32	Neg	14/Apr/09	20-32	10YR 5/6 ClLo		KW		
M-33	Neg	14/Apr/09	0-30	5YR 4/6 ClLo- Wet		CSE		
M-33	Neg	14/Apr/09	30-40	10YR 5/8 ClLo- Wet		CSE		
M-34	Neg	14/Apr/09	0-28	10YR 5/4 SaClLo		BMRS	Discarded Slag and Coal	
M-34	Neg	14/Apr/09	28-47	10YR 6/6 SaClLo		BMRS		
M-35	Neg	14/Apr/09	0-26	10YR 4/4 SiLo		DSA		
M-35	Neg	14/Apr/09	26-	10YR 6/4 SiCl		DSA		
M-36	Neg	14/Apr/09	0-19	10YR 5/4 SiLo		KW		
M-36	Neg	14/Apr/09	19-31	10YR 5/6 ClLo		KW		
M-37	Neg	14/Apr/09	0-30	10YR 4/2 ClLo- Wet		CSE	Rain	
M-37	Neg	14/Apr/09	30-40	2.5Y 7/6 ClLo- Wet		CSE		
M-38	Neg	14/Apr/09	0-24	10YR 5/4 SaClLo		BMRS	Discarded Coal	

PSEG-ESP Shovel Test Log

ST	Pos/Neg	Date	Depth (cm)	Munsell Color/Texture	Artifacts	Initials	Comments	Bag No.
M-38	Neg	14/Apr/09	24-40	10YR 6/6 SaClLo		BMRS		
M-39	Neg	14/Apr/09	0-23	10YR 4/4 SiLo		DSA		
M-39	Neg	14/Apr/09	23-	10YR 6/4 SiCl		DSA		
M-40	Neg	14/Apr/09	0-22	10YR 5/4 SiLo		KW		
M-40	Neg	14/Apr/09	22-32	10YR 5/6 ClLo		KW		
M-41	Neg	14/Apr/09	0-25	10YR 4/2 ClLo- Wet		CSE	Rain	
M-41	Neg	14/Apr/09	25-40	2.5Y 7/6 ClLo- Wet		CSE		
M-42	Neg	14/Apr/09	0-28	10YR 5/4 SaClLo		BMRS	Discarded Slag	
M-42	Neg	14/Apr/09	28-38	10YR 6/6 SaClLo		BMRS		
M-43	Neg	14/Apr/09	0-22	10YR 4/4 SiLo		DSA		
M-43	Neg	14/Apr/09	22-	10YR 6/4 SiCl		DSA		
M-44	Neg	14/Apr/09	0-27	10YR 5/4 SiLo		KW	In drainage- disturbed	
M-44	Neg	14/Apr/09	27-30	10YR 5/6 ClLo		KW		
M-45	Pos	15/Apr/09	0-25	7.5YR 5/1 ClLo- Wet	1 Nail & 1 UNID metal frag	CSE		9
M-45	Pos	15/Apr/09	25-30	7.5YR 6/8 ClLo- Wet		CSE		
M-46	Neg	14/Apr/09	0-22	10YR 5/4 SaClLo		CSE		
M-46	Neg	14/Apr/09	22-34	10YR 6/6 SaClLo		CSE		
M-47	Neg	14/Apr/09	0-17	10YR 4/4 SiLo		DSA		
M-47	Neg	14/Apr/09	17-	10YR 6/4 SiCl		DSA		
M-48	Neg	14/Apr/09	0-22	10YR 5/4 SiLo		KW	Brick Frag-not collected/Larger rocks-disturbed	
M-48	Neg	14/Apr/09	22-38	10YR 5/6 ClLo		KW		
M-49	Pos	15/Apr/09	0-21	7.5YR 3/3 SiLo	1 Nail, 1 brown glaze stoneware	KW	Artifacts- 15 cm (in plowzone)	10
M-49	Pos	15/Apr/09	21-39	7.5YR 5/6 ClLo		KW		
M-50	Neg	15/Apr/09	0-21	10YR 5/4 SaClLo		BMRS		
M-50	Neg	15/Apr/09	21-65	10YR 6/6 SaClLo		BMRS	Began auger at 40 cm	
M-50	Neg	15/Apr/09	65-80	10YR 5/6 SaLo		BMRS		
M-50	Neg	15/Apr/09	80-110	10YR 6/4 w/ 7.5YR 5/6 SiLo		BMRS		
M-50	Neg	15/Apr/09	110-125	10YR 5/6 Coarse Sand		BMRS	Water at 115 cmbs	
M-51	Neg	14/Apr/09	0-13	10YR 4/4 SiLo		DSA		
M-51	Neg	14/Apr/09	13-	10YR 6/4 SiCl		DSA		
M-52	Neg	14/Apr/09	0-16	10YR 4/4 SiLo		DSA	Small pieces of coal	
M-52	Neg	14/Apr/09	16-	10YR 6/4 SiCl		DSA		
M-53	Neg	15/Apr/09	0-22	7.5YR 3/3 SiLo- large rocks		KW		
M-53	Neg	15/Apr/09	22-36	7.5YR 5/6 ClLo		KW		
M-54	Neg	15/Apr/09	0-19	10YR 4/3 SiLo		DSA		
M-54	Neg	15/Apr/09	19-	10YR 4/4 SiCl		DSA		
M-57	Neg	15/Apr/09	0-25	7.5YR 5/1 ClLo		CSE		
M-57	Neg	15/Apr/09	25-30	7.5YR 6/8 ClLo		CSE		
M-58	Neg	15/Apr/09	0-19	10YR 4/3 SiLo		DSA	1 piece coal	
M-58	Neg	15/Apr/09	19-	10YR 4/4 SiCl		DSA		
M-59	Neg	15/Apr/09	0-21	7.5YR 3/3 SiLo		KW	Small amount of coal present	

PSEG-ESP Shovel Test Log

ST	Pos/Neg	Date	Depth (cm)	Munsell Color/Texture	Artifacts	Initials	Comments	Bag No.
M-59	Neg	15/Apr/09	21-38	7.5YR 5/6 ClLo		KW		
M-60	Neg	15/Apr/09	0-15	10YR 3/2 SaLo		BMRS		
M-60	Neg	15/Apr/09	15-65	10YR 6/6 ClLo		BMRS		
M-60	Neg	15/Apr/09	65-95	10YR 6/4 SaClLo		BMRS		
M-60	Neg	15/Apr/09	95-110	10YR 5/4 Coarse Sand		BMRS	Water at 105 cmbs	
M-61	Neg	15/Apr/09	0-30	10YR 4/2 ClLo- Wet		CSE	Occassional Coal Frags, not collected	
M-61	Neg	15/Apr/09	30-35	10YR 5/6 ClLo- Wet		CSE		
M-62	Neg	15/Apr/09	0-22	10YR 4/3 SiLo		DSA	Pet wood? Bone?	
M-62	Neg	15/Apr/09	22-30	10YR 4/4 SiCl		DSA		
M-63	Neg	14/Apr/09	0-24	7.5YR 4/2 SiLo		KW	Medium Prob	
M-63	Neg	14/Apr/09	24-42	7.5YR 5/6 ClLo		KW		
M-64	Neg	15/Apr/09	0-28	10YR 5/4 SaLo		BMRS		
M-64	Neg	15/Apr/09	28-115	10YR 6/6 ClLo		BMRS		
M-64	Neg	15/Apr/09	115-120	10YR 5/4 Coarse Sand		BMRS		
M-65	Neg	15/Apr/09	0-28	10YR 4/3 SiLo		DSA		
M-65	Neg	15/Apr/09	28-30	10YR 5/6 SiCl		DSA		
M-66	Neg	14/Apr/09	0-22	7.5YR 4/2 SiLo		KW		
M-66	Neg	14/Apr/09	22-43	7.5YR 5/6 ClLo		KW		
M-67	Neg	15/Apr/09	0-28	10YR 4/2 LoCl	1	CSE	#260	
M-67	Neg	15/Apr/09	28-35	10YR 5/6 LoCl		CSE		
M-68	Neg	15/Apr/09	0-26	10YR 5/4 SaLo		BMRS		
M-68	Neg	15/Apr/09	26-40	10YR 6/6 ClLo		BMRS		
M-69	Neg	15/Apr/09	0-24	10YR 4/3 SiLo		DSA		
M-69	Neg	15/Apr/09	24-26	10YR 5/6 SiCl		DSA		
M-70	Neg	14/Apr/09	0-21	7.5YR 4/2 SiLo		KW		
M-70	Neg	14/Apr/09	21-39	7.5YR 5/6 ClLo		KW		
M-71	Neg	15/Apr/09	0-20	10YR 4/2 LoCl		CSE		
M-71	Neg	15/Apr/09	20-30	10YR 5/6 LoCl		CSE		
M-72	Pos	15/Apr/09	0-20	10YR 5/4 SaLo		BMRS		
M-72	Pos	15/Apr/09	20-32	10YR 6/4 SiLo	1 Flake	BMRS		11
M-72	Pos	15/Apr/09	32-42	10YR 6/6 ClLo		BMRS		
M-72 A	Neg	24/Apr/09	0-20	10YR 4/4 Lo		SCC	12.5 ft south of M-72	
M-72 A	Neg	24/Apr/09	20-25	10YR 4/6 SiClLo		SCC		
M-72 B	Neg	24/Apr/09	0-22	10YR 4/3 Lo		SCC	12.5 ft east of M-72	
M-72 B	Neg	24/Apr/09	22-28	10YR 4/6 SiClLo		SCC		
M-72 D	Pos	24/Apr/09	0-21	10YR 4/4 Lo	Prehist Sherd (lost in grass)	SCC	12.5 ft west of M-72	109
M-72 D	Pos	24/Apr/09	21-30	10YR 4/6 SiLo		SCC		
M-73	Neg	15/Apr/09	0-28	10YR 4/2 LoCl		CSE		
M-73	Neg	15/Apr/09	28-33	10YR 5/6 LoCl		CSE		
M-74	Neg	14/Apr/09	0-23	7.5YR 4/2 SiLo		KW	High Prob	
M-74	Neg	14/Apr/09	23-40	7.5YR 5/6 ClLo		KW		
M-75	Neg	15/Apr/09	0-21	10YR 4/3 SiLo		DSA		

ST	Pos/Neg	Date	Depth (cm)	Munsell Color/Texture	Artifacts	Initials	Comments	Bag No.
M-75	Neg	15/Apr/09	21-24	10YR 5/6 SiCl		DSA		
M-76	Pos	15/Apr/09	0-22	10YR 4/3 ClLo	Bone	DSA	Plowzone is more clayey	12
M-76	Pos	15/Apr/09	22-24	10YR 5/6 SiCl		DSA		
M-77	Neg	14/Apr/09	0-27	7.5YR 4/2 SiLo		KW	Shovel Test offset- 3M from marshy proj border	
M-77	Neg	14/Apr/09	27-39	7.5YR 5/6 ClLo		KW		
M-78	Neg	15/Apr/09	0-25	7.5YR 4/3 Cl		CSE	1 Squash seed, not collected-not carbonized	
M-78	Neg	15/Apr/09	25-30	7.5YR 6/8 Cl		CSE		
M-79	Neg	15/Apr/09	0-25	10YR 5/4 SaLo		BMRS		
M-79	Neg	15/Apr/09	25-40	10YR 6/6 ClLo		BMRS		
M-80	Neg	14/Apr/09	0-29	7.5YR 4/2 SiLo		KW		
M-80	Neg	14/Apr/09	29-43	7.5YR 5/6 ClLo		KW		
M-81	Neg	15/Apr/09	0-30	7.5YR 4/2 LoCl		CSE		
M-81	Neg	15/Apr/09	30-33	7.5YR 5/6 LoCl		CSE		
M-82	Pos	15/Apr/09	0-25	10YR 4/3 ClLo	1 Sherd	DSA		13
M-82	Pos	15/Apr/09	25-28	10YR 5/6 SiCl		DSA		
M-83	Neg	15/Apr/09	0-22	10YR 5/4 SiLo		BMRS		
M-83	Neg	15/Apr/09	22-35	10YR 6/6 ClLo		BMRS		
M-84	Neg	14/Apr/09	0-22	7.5YR 4/2 SiLo		KW		
M-84	Neg	14/Apr/09	22-38	7.5YR 5/6 ClLo		KW		
M-85	Neg	15/Apr/09	0-24	10YR 5/4 SiLo	1 plastic, discarded	BMRS		14
M-85	Neg	15/Apr/09	24-40	10YR 6/6 ClLo		BMRS		
M-86	Neg	15/Apr/09	0-25	7.5YR 4/2 LoCl		CSE		
M-86	Neg	15/Apr/09	25-30	7.5YR 5/6 LoCl		CSE		
M-87	Neg	15/Apr/09	0-25	10YR 4/3 ClLo		DSA		
M-87	Neg	15/Apr/09	25-35	7.5YR 5/6 SaLo		DSA		
M-88	Neg	14/Apr/09	0-24	7.5YR 4/2 SiLo		KW		
M-88	Neg	14/Apr/09	24-34	7.5YR 5/6 ClLo		KW		
M-89	Neg	15/Apr/09	0-25	10YR 4/2 LoCl		CSE		
M-89	Neg	15/Apr/09	25-35	10YR 5/6 LoCl		CSE		
M-90	Neg	15/Apr/09	0-26	10YR 5/4 SiLo		BMRS		
M-90	Neg	15/Apr/09	26-90	10YR 6/6 ClLo		BMRS	Auger at 40	
M-90	Neg	15/Apr/09	90-125	10YR 5/4 Sa		BMRS		
M-90	Neg	15/Apr/09	125-130	10YR 6/2 SiSa		BMRS	Water at 125 cmbs	
M-91	Neg	15/Apr/09	0-28	10YR 4/2 LoCl		CSE	1 Squash seed, not collected-not carbonized	
M-91	Neg	15/Apr/09	28-35	10YR 5/6 LoCl		CSE		
M-92	Neg	15/Apr/09	0-24	10YR 4/3 SiLo		DSA		
M-92	Neg	15/Apr/09	24-30	10YR 5/6 SiCl		DSA		
M-93	Neg	14/Apr/09	0-24	7.5YR 4/2 SiLo		KW		
M-93	Neg	14/Apr/09	24-39	7.5YR 5/6 ClLo		KW		
M-94	Neg	15/Apr/09	0-22	10YR 5/4 SiLo		BMRS		
M-94	Neg	15/Apr/09	22-37	10YR 6/6 ClLo		BMRS		

PSEG-ESP Shovel Test Log

ST	Pos/Neg	Date	Depth (cm)	Munsell Color/Texture	Artifacts	Initials	Comments	Bag No.
M-95	Neg	15/Apr/09	0-25	10YR 4/2 LoCl		CSE	1 Squash (probable watermelon) seed, not collected	
M-95	Neg	15/Apr/09	25-35	10YR 5/6 LoCl		CSE		
M-96	Neg	15/Apr/09	0-24	10YR 4/3 SiLo		DSA		
M-96	Neg	15/Apr/09	24-27	10YR 5/6 SiCl		DSA		
M-97	Neg	14/Apr/09	0-31	7.5YR 4/2 SiLo		KW		
M-97	Neg	14/Apr/09	31-41	7.5YR 5/6 ClLo		KW		
M-98	Pos	15/Apr/09	0-32	10YR 5/4 SiLo	1 Prehist. Ceramic	BMRS		15
M-98	Pos	15/Apr/09	32-46	10YR 6/6 ClLo		BMRS		
M-98 A	Neg	24/Apr/09	0-27	10YR 4/4 SaLo		SCC	25 ft north of M-98	
M-98 A	Neg	24/Apr/09	27-35	10YR 4/6 SiLo		SCC		
M-98 B	Neg	24/Apr/09	0-25	10YR 4/4 SaLo		SCC	25 ft east of E-98	
M-98 B	Neg	24/Apr/09	25-36	10YR 4/6 SiLo		SCC		
M-98 C	Neg	24/Apr/09	0-22	10YR 4/4 SaLo		SCC	25 ft south of M-98	
M-98 C	Neg	24/Apr/09	22-30	10YR 4/6 SiLo		SCC		
M-99	Neg	15/Apr/09	0-25	10YR 4/3 SiLo		DSA	1 piece brick, not collected. 1 Modern bottle glass	
M-99	Neg	15/Apr/09	25-30	10YR 5/6 SiCl		DSA		
M-100	Neg	15/Apr/09	0-25	10YR 4/2 mottled w/ 10YR 5/6 LoCl		CSE		
M-100	Neg	15/Apr/09	25-30	10YR 5/6 LoCl		CSE		
M-101	Neg	14/Apr/09	0-23	7.5YR 4/2 SiLo		KW	Plowzone contained charcoal- burnt roots	
M-101	Neg	14/Apr/09	23-33	7.5YR 5/6 ClLo		KW		
M-102	Neg	15/Apr/09	0-28	10YR 5/4 SiLo		BMRS		
M-102	Neg	15/Apr/09	28-40	10YR 6/6 ClLo		BMRS		
M-103	Neg	15/Apr/09	0-22	10YR 4/3 SiLo		DSA		
M-103	Neg	15/Apr/09	22-28	10YR 5/6 SiCl		DSA		
M-104	Neg	15/Apr/09	0-30	10YR 4/2 LoCl		CSE	2 Squash seeds, not collected	
M-104	Neg	15/Apr/09	30-35	10YR 5/6 LoCl		CSE		
M-105	Neg	14/Apr/09	0-30	7.5YR 4/2 SiLo		KW		
M-105	Neg	14/Apr/09	30-51	10YR 4/1 SiLo w/ charcoal		KW		
M-105	Neg	14/Apr/09	51-71	7.5YR 5/6 ClLo		KW		
M-106	Neg	15/Apr/09	0-32	10YR 5/4 SiLo		BMRS		
M-106	Neg	15/Apr/09	32-42	10YR 6/6 ClLo		BMRS		
M-107	Neg	15/Apr/09	0-24	10YR 4/3 SiLo		DSA		
M-107	Neg	15/Apr/09	24-27	10YR 5/6 SiCl		DSA		
M-108	Neg	15/Apr/09	0-30	10YR 4/2 LoCl- wet		CSE	Numerous small chunks of coal, not collected	
M-108	Neg	15/Apr/09	30-335	10YR 5/6 LoCl- wet		CSE		
M-109	Neg	15/Apr/09	0-24	10YR 4/3 SiLo		DSA		
M-109	Neg	15/Apr/09	24-27	10YR 5/6 SiCl		DSA		
M-110	Neg	15/Apr/09	0-28	10YR 5/4 SiLo		BMRS		
M-110	Neg	15/Apr/09	28-40	10YR 6/6 ClLo		BMRS		

ST	Pos/Neg	Date	Depth (cm)	Munsell Color/Texture	Artifacts	Initials	Comments	Bag No.
M-111	Neg	14/Apr/09	0-26	7.5YR 4/2 SiLo- Minor Charcoal		KW		
M-111	Neg	14/Apr/09	26-37	7.5YR 5/6 ClLo		KW		
M-112	Neg	15/Apr/09	0-24	10YR 5/6 SiLo		BMRS		
M-112	Neg	15/Apr/09	24-34	10YR 6/6 ClLo		BMRS		
M-113	Neg	15/Apr/09	0-25	10YR 4/2 LoCl- wet		CSE		
M-113	Neg	15/Apr/09	25-30	10YR 5/6 LoCl- wet		CSE		
M-114	Neg	15/Apr/09	0-24	10YR 4/4 SiLo		DSA		
M-114	Neg	15/Apr/09	24-30	10YR 5/6 SiCl		DSA		
M-115	Neg	16/Apr/09	0-29	10YR 4/4 SiLo		KW		
M-115	Neg	16/Apr/09	29-53	10YR 5/6 ClLo		KW		
M-115	Neg	16/Apr/09	53+	Water		KW		
M-116	Neg	16/Apr/09	0-25	10YR 4/4 Cl- wet		CSE		
M-116	Neg	16/Apr/09	25-35	10YR 5/6 Cl- Wet		CSE		
M-117	Neg	16/Apr/09	0-26	10YR 5/4 SiLo		BMRS		
M-117	Neg	16/Apr/09	26-40	10YR 6/6 ClLo		BMRS		
M-118	Neg	16/Apr/09	0-28	10YR 5/4 SiLo		BMRS		
M-118	Neg	16/Apr/09	28-40	10YR 6/6 ClLo		BMRS		
M-119	Neg	16/Apr/09	0-30	10YR 4/4 SiLo		KW		
M-119	Neg	16/Apr/09	30-42	10YR 5/6 ClLo		KW		
M-120	Neg	16/Apr/09	0-29	10YR 5/4 SiLo		BMRS		
M-120	Neg	16/Apr/09	29-44	10YR 6/6 ClLo		BMRS		
M-121	Neg	16/Apr/09	0-30	10YR 4/4 Cl- wet		CSE		
M-121	Neg	16/Apr/09	30-40	10YR 5/6 Cl- Wet		CSE		
M-122	Neg	16/Apr/09	0-28	10YR 4/4 SiLo		KW		
M-122	Neg	16/Apr/09	28-40	10YR 5/6 ClLo		KW		
M-122	Neg	16/Apr/09	40+	Water		KW		
M-123	Pos	16/Apr/09	0-28	10YR 5/4 SiLo	1 Sherd, 1 Flake, 1 Shell, 1 FCR	BMRS		17
M-123	Pos	16/Apr/09	28-43	10YR 6/6 ClLo		BMRS		
M-124	Pos	16/Apr/09	0-25	10YR 4/4 Cl- wet	1 Ceramic Sherd, 1 Plastic	CSE	2 Squash seeds	16
M-124	Pos	16/Apr/09	25-30	10YR 5/6 Cl- Wet		CSE		
M-125	Neg	16/Apr/09	0-30	10YR 4/2 ClLo		CSE	1 Squash seed, not collected	
M-125	Neg	16/Apr/09	30-60	10YR 4/4 ClLo		CSE		
M-125	Neg	16/Apr/09	60-75	10YR5/4 SiCl		CSE		
M-125	Neg	16/Apr/09	75-95	10YR 5/6 ClLo		CSE		
M-125	Neg	16/Apr/09	95-110	10YR 5/6 SaLo		CSE		
M-125	Neg	16/Apr/09	110-130	10YR 5/6 SiLo		CSE		
M-126	Neg	16/Apr/09	0-31	10YR 5/4 SiLo		BMRS		
M-126	Neg	16/Apr/09	31-45	10YR 6/6 ClLo		BMRS		
M-127	Neg	16/Apr/09	0-29	10YR 4/4 SiLo		KW		
M-127	Neg	16/Apr/09	29-40	10YR 5/6 ClLo		KW		

PSEG-ESP Shovel Test Log

ST	Pos/Neg	Date	Depth (cm)	Munsell Color/Texture	Artifacts	Initials	Comments	Bag No.
M-128	Neg	16/Apr/09	0-31	10YR 5/4 SiLo		BMRS		
M-128	Neg	16/Apr/09	31-45	10YR 6/6 ClLo		BMRS		
M-129	Neg	16/Apr/09	0-25	10YR 4/4 SiLo		KW		
M-129	Neg	16/Apr/09	25-40	10YR 5/6 ClLo		KW		
M-130	Pos	16/Apr/09	0-26	10YR 5/4 SiLo	1 Sherd	BMRS		18
M-130	Pos	16/Apr/09	26-40	10YR 6/6 ClLo		BMRS		
M-130 A	Pos	23/Apr/09	0-28	10YR 4/4 SiLo	1 Metal	BMRS	25 ft north of ST# M-130	95
M-130 A	Pos	23/Apr/09	28-33	2.5Y 4/6 SiClLo		BMRS		
M-130 C	Neg	23/Apr/09	0-25	10YR 4/3 SiLo		CSE	25 Feet south of ST# M-130	
M-130 C	Neg	23/Apr/09	25-29	10YR 4/6 ClLo		CSE		
M-130 D	Neg	23/Apr/09	0-25	10YR 4/4 SiLo		BMRS	25 ft west of ST# M-130	
M-130 D	Neg	23/Apr/09	25-29	2.5Y 4/6 SiClLo		BMRS		
M-131	Neg	16/Apr/09	0-22	10YR 4/4 SiLo		KW		
M-131	Neg	16/Apr/09	22-37	10YR 5/6 ClLo		KW		
M-132	Neg	16/Apr/09	0-23	10YR 3/4 Mottled ClLo		CSE		
M-132	Neg	16/Apr/09	23-30	10YR 5/6 ClLo		CSE		
M-133	Neg	16/Apr/09	0-23	10YR 5/4 SiLo		BMRS		
M-133	Neg	16/Apr/09	23-35	10YR 6/6 ClLo		BMRS		
M-134	Neg	16/Apr/09	0-25	10YR 4/4 SiLo		KW		
M-134	Neg	16/Apr/09	25-37	10YR 5/6 Cl		KW		
M-135	Neg	16/Apr/09	0-30	10YR 3/4 Lo		CSE	Several small chucks of coal. 2 Squash seeds, not collected	
M-135	Neg	16/Apr/09	30-35	10YR 5/6 Lo		CSE		
M-136	Neg	16/Apr/09	0-29	10YR 5/4 SiLo		BMRS		
M-136	Neg	16/Apr/09	29-45	10YR 6/6 ClLo		BMRS		
M-137	Pos	16/Apr/09	0-32	10YR 4/4 SiLo w/ gravel	4 clear glass, 1 aqua glass, 1 blue glass, 2 nails, 1 prehistoric sherd	KW	Artifacts- ~25 cmbs, shovel test close to "pond"	20
M-137	Pos	16/Apr/09	32+	Water- wet marsh soil		KW		
M-138	Pos	16/Apr/09	0-30	10YR 3/4 ClLo	1 Glass	CSE	Numerous chunks of angular coal	19
M-138	Pos	16/Apr/09	30-35	10YR 5/6 ClLo- Wet		CSE		
M-139	Neg	16/Apr/09	0-28	10YR 5/4 SiLo		BMRS	Discarded Coal	
M-139	Neg	16/Apr/09	28-46	10YR 6/6 ClLo		BMRS		
M-140	Neg	16/Apr/09	0-28	10YR 5/4 SiLo		BMRS		
M-140	Neg	16/Apr/09	28-40	10YR 6/6 ClLo		BMRS		
M-141	Pos	16/Apr/09	0-23	10YR 3/4 ClLo	1 Ceramic Sherd	CSE	Several small chucks of coal	21
M-141	Pos	16/Apr/09	23-33	10YR 5/6 ClLo		CSE		
M-142	Neg	16/Apr/09	0-26	10YR 4/4 SiLo		KW		
M-142	Neg	16/Apr/09	26-40	10YR 5/6 ClLo		KW		
M-143	Neg	16/Apr/09	0-28	10Yr 3/3 SiLo		BMRS		
M-143	Neg	16/Apr/09	28-45	2.5 Y 5/4 ClLo		BMRS		
M-144	Neg	16/Apr/09	0-25	10YR 4/4 SiLo		KW		

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ST	Pos/Neg	Date	Depth (cm)	Munsell Color/Texture	Artifacts	Initials	Comments	Bag No.
M-144	Neg	16/Apr/09	25-40	10YR 5/6 ClLo		KW		
M-145	Neg	16/Apr/09	0-20	10YR 3/4 ClLo		CSE		
M-145	Neg	16/Apr/09	20-30	10YR 5/6 ClLo		CSE		
M-146	Neg	16/Apr/09	0-23	10YR 4/4 SiLo		BMRS		
M-146	Neg	16/Apr/09	23-40	10YR 5/6 ClLo		BMRS		
M-147	Neg	16/Apr/09	0-32	10YR 4/4 SiLo		BMRS		
M-147	Neg	16/Apr/09	32-47	10YR 5/6 w/ 10YR 5/4 SaClLo		BMRS		
M-148	Neg	16/Apr/09	0-29	10YR 4/4 SiLo		KW		
M-148	Neg	16/Apr/09	29-60	10YR 5/6 ClLo		KW		
M-148	Neg	16/Apr/09	60-86	10YR 5/4 ClLo		KW		
M-148	Neg	16/Apr/09	86-102	10YR 5/6 ClLo		KW		
M-148	Neg	16/Apr/09	102-130	10YR 5/6 SaLo		KW	Auger test, water at 102 cm	
M-149	Neg	16/Apr/09	0-27	10YR 4/4 SaLo		CSE		
M-149	Neg	16/Apr/09	27-33	10YR 4/6 ClLo		CSE		
M-150	Neg	16/Apr/09	0-25	7.5YR 4/4 SiLo		SCC		
M-150	Neg	16/Apr/09	25-37	7.5YR 4/6 ClLo		SCC		
M-151	Neg	16/Apr/09	0-20	10YR 4/4 SaLo		CSE		
M-151	Neg	16/Apr/09	20-30	10YR 4/6 ClLo		CSE		
M-152	Pos	16/Apr/09	0-18	7.5YR 4/4 SiLo	Quartz Flake	SCC		23
M-152	Pos	16/Apr/09	18-27	7.5YR 4/4 SiLo		SCC		
M-152	Pos	16/Apr/09	27-32	7.5YR 4/6 ClLo		SCC		
M-153	Pos	16/Apr/09	0-25	10YR 4/4 SaLo	1 Pottery Sherd	CSE		24
M-153	Pos	16/Apr/09	25-30	10YR 4/6 ClLo		CSE		
M-154	Neg	16/Apr/09	0-21	7.5YR 4/2 SiLo		KW		
M-154	Neg	16/Apr/09	21-37	7.5YR 5/6 ClLo		KW		
M-155	Pos	16/Apr/09	0-24	10YR 5/4 SiLo	1 Flake	BMRS		224
M-155	Pos	16/Apr/09	24-40	10YR 6/6 ClLo		BMRS		
M-156	Neg	16/Apr/09	0-17	10YR 4/3 SiLo		BMRS	Wet surface	
M-156	Neg	16/Apr/09	17-32	7.5YR 4/6 ClLo		BMRS		
M-157	Neg	16/Apr/09	0-25	10YR 4/4 SaLo		CSE		
M-157	Neg	16/Apr/09	25-35	10YR 4/6 ClLo		CSE		
M-158	Pos	16/Apr/09	0-20	7.5YR 4/4 some mottling w/ 7.5YR 4/6 SiLo		SCC		
M-158	Neg	16/Apr/09	20-23	7.5YR 4/6 ClLo		SCC		
M-159	Neg	16/Apr/09	0-21	7.5YR 4/2 SiLo		KW		
M-159	Neg	16/Apr/09	21-37	7.5YR 5/6 ClLo		KW		
M-160	Neg	16/Apr/09	0-18	10YR 4/3 SiLo		BMRS	Next to wetland. Discarded plastic	
M-160	Neg	16/Apr/09	18-36	7.5YR 4/6 ClLo		BMRS		
M-161	Neg	16/Apr/09	0-22	7.5YR 4/2 SiLo		KW		
M-161	Neg	16/Apr/09	22-38	7.5YR 5/6 ClLo		KW		
M-162	Neg	16/Apr/09	0-28	10YR 4/4 SaLo		CSE		
M-162	Neg	16/Apr/09	28-35	10YR 4/6 ClLo		CSE		

PSEG-ESP Shovel Test Log

ST	Pos/Neg	Date	Depth (cm)	Munsell Color/Texture	Artifacts	Initials	Comments	Bag No.
M-163	Neg	16/Apr/09	0-23	10YR 5/4 SiLo		BMRS		
M-163	Neg	16/Apr/09	23-40	10YR 5/6 ClLo		BMRS		
M-164	Neg	16/Apr/09	0-29	7.5YR 4/2 SiLo		KW		
M-164	Neg	16/Apr/09	29-40	7.5YR 5/6 ClLo		KW		
M-165	Neg	16/Apr/09	0-30	10YR 3/4 SaLo		CSE		
M-165	Neg	16/Apr/09	30-35	10YR 5/6 ClLo		CSE		
M-166	Neg	16/Apr/09	0-24	10YR 5/4 SiLo		BMRS		
M-166	Neg	16/Apr/09	24-42	2.5Y 6/4 ClLo		BMRS		
M-167	Neg	16/Apr/09	0-23	7.5YR 4/2 SiLo		KW		
M-167	Neg	16/Apr/09	23-41	7.5YR 5/6 ClLo		KW		
M-168	Neg	16/Apr/09	0-20	10YR 3/4 SaLo		CSE		
M-168	Neg	16/Apr/09	20-30	10YR 5/6 ClLo		CSE		
M-169	Neg	16/Apr/09	0-25	10YR 4/4 SiLo		SCC		
M-169	Neg	16/Apr/09	25-36	10YR 4/6 ClLo		SCC		
M-170	Neg	17/Apr/09	0-27	10YR 4/3 SaLo		CSE		
M-170	Neg	17/Apr/09	27-33	10YR 5/6 ClLo		CSE		
M-171	Neg	17/Apr/09	0-41	10YR 4/2 SiLo	3 Clear Glass	KW	Note- all three glass frags are thick modern glass, discarded	25
M-171	Neg	17/Apr/09	41+	Water/ Wetland Soil- Cl		KW		
M-172	Neg	16/Apr/09	0-45	10YR 4/3 SiLo		DSA		
M-172	Neg	16/Apr/09	45-47	10YR 5/6 SiCl		DSA		
M-173	Neg	17/Apr/09	0-26	10YR 4/4 SiLo		BMRS		
M-173	Neg	17/Apr/09	26-42	10YR 6/6 ClLo		BMRS		
M-174	Neg	17/Apr/09	0-25	10YR 4/4 SiLo		BMRS		
M-174	Neg	17/Apr/09	25-36	10YR 6/3 SiClLo		BMRS		
M-175	Neg	17/Apr/09	0-20	10YR 4/3 SaLo		CSE		
M-175	Neg	17/Apr/09	20-30	10YR 5/6 ClLo		CSE		
M-176	Neg	16/Apr/09	0-22	10YR 4/3 SiLo		DSA		
M-176	Neg	16/Apr/09	22-33	10YR 5/6 SiCl		DSA		
M-177	Neg	17/Apr/09	0-23	10YR 4/4 SiLo		KW		
M-177	Neg	17/Apr/09	23-38	10YR 5/6 ClLo		KW		
M-178	Neg	17/Apr/09	0-24	10YR 4/4 SiLo		BMRS		
M-178	Neg	17/Apr/09	24-36	2.5 Y 6/4 ClLo		BMRS		
M-179	Neg	17/Apr/09	0-25	10YR 4/4 SaLo		CSE		
M-179	Neg	17/Apr/09	25-32	10YR 4/6 ClLo		CSE		
M-180	Neg	16/Apr/09	0-30	10YR 4/3 SiLo		DSA	1 piece coal	
M-180	Neg	16/Apr/09	30-35	10YR 5/6 SiCl		DSA		
M-181	Neg	17/Apr/09	0-24	7.5YR 4/4 SiLo		KW		
M-181	Neg	17/Apr/09	24-34	7.5YR 5/6 ClLo		KW		
M-182	Neg	17/Apr/09	0-23	10YR 3/4 SiLo		BMRS		
M-182	Neg	17/Apr/09	23-35	10YR 6/6 ClLo		BMRS		
M-183	Neg	17/Apr/09	0-20	10YR 4/4 SaLo		CSE		
M-183	Neg	17/Apr/09	20-30	10YR 4/6 ClLo		CSE		

PSEG-ESP Shovel Test Log

ST	Pos/Neg	Date	Depth (cm)	Munsell Color/Texture	Artifacts	Initials	Comments	Bag No.
M-184	Neg	16/Apr/09	0-19	10YR 4/3 SiLo		DSA		
M-184	Neg	16/Apr/09	19-29	10YR 5/6 SiCl		DSA		
M-185	Neg	16/Apr/09	0-31	7.5YR 4/4 SiLo		KW		
M-185	Neg	16/Apr/09	31-41	7.5YR 5/6 ClLo		KW		
M-186	Neg	17/Apr/09	0-23	10YR 5/4 SiLo		BMRS		
M-186	Neg	17/Apr/09	23-42	10YR 6/6 ClLo		BMRS		
M-187	Pos	17/Apr/09	0-25	10YR 4/3 SaLo	1 Historic Ceramic Sherd	CSE		26
M-187	Pos	17/Apr/09	25-30	10YR 5/6 ClLo		CSE		
M-187 A	Neg	17/Apr/09	0-20	10YR 4/3 SiLo		SCC	12.5 ft north of ST# 187	
M-187 A	Neg	17/Apr/09	20-24	10YR 4/4 Lo		SCC		
M-187 C	Pos	17/Apr/09	0-19	10YR 4/3 SiLo	Prehist Sherd	SCC	12.5 ft south of ST# 187	113
M-187 C	Pos	17/Apr/09	19-28	10YR 4/4 Lo		SCC		
M-188	Neg	16/Apr/09	0-26	10YR 4/3 SiLo		DSA		
M-188	Neg	16/Apr/09	26-29	10YR 5/6 SiCl		DSA		
M-189	Neg	16/Apr/09	0-24	10YR 4/3 SiLo		DSA		
M-189	Neg	16/Apr/09	24-29	10YR 5/6 SiCl		DSA		
M-190	Neg	17/Apr/09	0-28	10YR 4/3 ClLo		CSE		
M-190	Neg	17/Apr/09	28-30	10YR 5/6 ClLo		CSE		
M-191	Neg	16/Apr/09	0-24	7.5YR 4/4 SiLo		KW		
M-191	Neg	16/Apr/09	24-39	7.5YR 5/6 ClLo		KW		
M-192	Neg	17/Apr/09	0-23	10YR 5/4 SiLo		BMRS		
M-192	Neg	17/Apr/09	23-37	10YR 6/6 ClLo		BMRS		
M-193	Neg	17/Apr/09	0-28	10YR 3/3 SiLo		BMRS	Next to wetland	
M-193	Neg	17/Apr/09	28-40	10YR 6/6 ClLo		BMRS		
M-194	Neg	17/Apr/09	0-17	10YR 4/3 SiLo		DSA		
M-194	Neg	17/Apr/09	17-25	10YR 5/6 SiCl		DSA		
M-195	Neg	16/Apr/09	0-24	7.5YR 4/4 SiLo		KW	Root Disturbance	
M-195	Neg	16/Apr/09	24-36	7.5YR 5/6 ClLo		KW		
M-196	Neg	17/Apr/09	0-25	10YR 4/3 SaLo		CSE		
M-196	Neg	17/Apr/09	25-30	10YR 5/6 ClLo		CSE		
M-197	Neg	17/Apr/09	0-26	10YR 3/4 SiLo		BMRS		
M-197	Neg	17/Apr/09	26-40	10YR 6/6 ClLo		BMRS		
M-198	Pos	17/Apr/09	0-23	10YR 4/3 SiLo	1 Ceramic	DSA		27
M-198	Pos	17/Apr/09	23-30	10YR 5/6 SiCl		DSA		
M-198 A	Neg	24/Apr/09	0-22	10YR 4/4 SiLo		SCC	25 ft north of M-198. Clear irregular boundary is typical.	
M-198 A	Neg	24/Apr/09	22-31	10YR 4/4 Lo		SCC		
M-198 B	Pos	24/Apr/09	0-25	10YR 4/3 SiLo	Clear Glass	SCC	25 ft east of M-198	110
M-198 B	Pos	24/Apr/09	25-33	10YR 4/4 Lo		SCC		
M-198 C	Pos	24/Apr/09	0-32	10YR 4/3 SiLo	Clear Glass	SCC	25ft south of M-198	111
M-198 C	Pos	24/Apr/09	32-36	10YR 4/4 Lo		SCC		
M-198 D	Pos	24/Apr/09	0-37	10YR 4/3 SiLo	Clear Glass	SCC	25 ft west of M-198	112

PSEG-ESP Shovel Test Log

ST	Pos/Neg	Date	Depth (cm)	Munsell Color/Texture	Artifacts	Initials	Comments	Bag No.
M-198 D	Pos	24/Apr/09	37-45	10YR 6/4 Lo		SCC		
M-199	Neg	17/Apr/09	0-28	7.5YR 4/4 SiLo		KW		
M-199	Neg	17/Apr/09	28-41	7.5YR 5/6 ClLo		KW		
M-200	Neg	17/Apr/09	0-23	10YR 4/3 SaLo		CSE		
M-200	Neg	17/Apr/09	23-30	10YR 5/6 ClLo		CSE		
M-201	Pos	17/Apr/09	0-25	10YR 4/3 SiLo	1 Sherd	BMRS		29
M-201	Pos	17/Apr/09	25-50	10YR 6/6 w/ 10YR 3/3 ClLo		BMRS	Large rodent burrow in sub-soil	
M-202	Neg	17/Apr/09	0-22	10YR 4/3 SiLo		DSA		
M-202	Neg	17/Apr/09	22-27	10YR 5/6 SiCl		DSA		
M-203	Neg	17/Apr/09	0-24	7.5YR 4/4 SiLo		KW		
M-203	Neg	17/Apr/09	24-42	7.5YR 5/6 ClLo		KW		
M-204	Neg	17/Apr/09	0-27	10YR 4/3 ClLo		CSE		
M-204	Neg	17/Apr/09	27-30	10YR 5/4 ClLo		CSE		
M-205	Neg	17/Apr/09	0-17	10YR 4/3 SiLo		DSA		
M-205	Neg	17/Apr/09	17-28	10YR 5/6 SiCl		DSA		
M-206	Neg	17/Apr/09	0-28	10YR 4/3 SiLo		BMRS		
M-206	Neg	17/Apr/09	28-40	10YR 6/6 ClLo		BMRS		
M-207	Neg	17/Apr/09	0-23	10YR 4/3 ClLo		CSE		
M-207	Neg	17/Apr/09	23-30	10YR 5/4 ClLo		CSE		
M-207 A	Neg	24/Apr/09	0-23	10YR 4/4 SaLo		SCC	25 ft north of M-207	
M-207 A	Neg	24/Apr/09	23-32	10YR 4/6 Lo		SCC		
M-207 B	Neg	24/Apr/09	0-27	10YR 4/3 SiLo		SCC	25 ft east of M-207	
M-207 B	Neg	24/Apr/09	27-32	10YR 4/4 Lo		SCC		
M-207 C	Neg	24/Apr/09	0-18	10YR 4/3 SiLo		SCC	25 ft south of M-207	
M-207 C	Neg	24/Apr/09	18-25	10YR 4/4 Lo		SCC		
M-207 D	Neg	24/Apr/09	0-25	10YR 4/3 SiLo		SCC	25 ft west of M-207	
M-207 D	Neg	24/Apr/09	25-30	10YR 4/4 Lo		SCC		
M-208	Neg	17/Apr/09	0-25	7.5YR 4/4 SiLo		KW		
M-208	Neg	17/Apr/09	25-40	7.5YR 5/6 ClLo		KW		
M-208 A	Neg	24/Apr/09	0-22	10YR 4/4 SiLo		SCC	25 ft north of M-208	
M-208 A	Neg	24/Apr/09	22-31	10YR 4/4 or 4/6 Lo		SCC		
M-209	Neg	17/Apr/09	0-26	10YR 4/3 SiLo		DSA		
M-209	Neg	17/Apr/09	26-34	10YR 5/6 SiCl		DSA		
M-210	Neg	17/Apr/09	0-35	10YR 3/3 SiLo		BMRS	Next to pond	
M-210	Neg	17/Apr/09	35-46	10YR 3/2 SiClLo		BMRS		
M-211	Neg	17/Apr/09	0-29	7.5YR 4/4 SiLo		KW		
M-211	Neg	17/Apr/09	29-39	7.5YR 5/6 ClLo		KW		
M-212	Neg	17/Apr/09	0-22	10YR 4/3 SiLo		DSA		
M-212	Neg	17/Apr/09	22-31	10YR 5/6 SiCl		DSA		
M-213	Pos	17/Apr/09	0-23	10YR 4/3 ClLo	1 Angular Lithic	CSE		28
M-213	Pos	17/Apr/09	23-28	10YR 5/4 ClLo		CSE		
M-214	Neg	17/Apr/09	0-24	7.5YR 4/4 SiLo		KW		
M-214	Neg	17/Apr/09	24-40	7.5YR 5/6 ClLo		KW		

PSEG-ESP Shovel Test Log

ST	Pos/Neg	Date	Depth (cm)	Munsell Color/Texture	Artifacts	Initials	Comments	Bag No.
M-215	Pos	17/Apr/09	0-32	10YR 4/3 SiLo	4 Sherds, 1 FCR	BMRS		30
M-215	Pos	17/Apr/09	32-45	2.5Y 6/4 SiClLo		BMRS		
M-216	Neg	17/Apr/09	0-27	10YR 4/3 SiLo		DSA		
M-216	Neg	17/Apr/09	27-36	10YR 5/6 SiCl		DSA		
M-217	Neg	17/Apr/09	0-28	10YR 4/3 SiLo		DSA		
M-217	Neg	17/Apr/09	28-37	10YR 5/6 SiCl		DSA		
M-218	Neg	17/Apr/09	0-25	10YR 4/3 SaLo		CSE		
M-218	Neg	17/Apr/09	25-30	10YR 5/6 ClLo		CSE		
M-219	Neg	17/Apr/09	0-27	7.5YR 4/4 SiLo		KW		
M-219	Neg	17/Apr/09	27-40	7.5YR 5/6 ClLo		KW		
M-220	Pos	17/Apr/09	0-26	10YR 4/3 SiLo	1 Flake, 1 Sherd	BMRS		31
M-220	Pos	17/Apr/09	26-40	10YR 6/6 ClLo		BMRS		
M-220 A	Neg	23/Apr/09	0-26	10YR 4/3 SiLo		BMRS	25 ft north of ST# M-220	
M-220 A	Neg	23/Apr/09	26-30	10YR 5/6 SiClLo		BMRS		
M-220 B	Neg	23/Apr/09	0-23	10YR 4/3 SiLo		SCC	25 ft east of M-220	
M-220 B	Neg	23/Apr/09	23-28+	10YR 5/6 ClLo		SCC		
M-220 D	Neg	23/Apr/09	0-27	10YR 4/3 SiLo		SCC	25 ft south of M-220	
M-220 D	Neg	23/Apr/09	27-30+	10YR 5/6 ClLo		SCC		
M-220 D	Neg	23/Apr/09	0-31	10YR 4/3 SiLo		BMRS	25 ft west of ST# M-220	
M-220 D	Neg	23/Apr/09	31-38	10YR 5/6 SiClLo		BMRS		
M-221	Neg	17/Apr/09	0-26	10YR 4/3 SiLo		DSA		
M-221	Neg	17/Apr/09	26-35	10YR 5/6 SiCl		DSA		
M-222	Neg	17/Apr/09	0-26	10YR 4/3 ClLo		CSE		
M-222	Neg	17/Apr/09	26-30	10YR 5/6 ClLo		CSE		
M-223	Neg	17/Apr/09	0-25	7.5YR 4/4 SiLo		KW		
M-223	Neg	17/Apr/09	25-39	7.5YR 5/6 ClLo		KW		
M-224	Neg	17/Apr/09	0-23	10YR 4/3 SiLo		BMRS		
M-224	Neg	17/Apr/09	23-35	10YR 6/6 ClLo		BMRS		
M-225	Neg	17/Apr/09	0-23	10YR 4/3 SiLo		DSA		
M-225	Neg	17/Apr/09	23-33	10YR 5/6 SiCl		DSA		
M-226	Neg	17/Apr/09	0-26	10YR 4/3 SaLo		CSE		
M-226	Neg	17/Apr/09	26-29	10YR 5/6 ClLo		CSE		
M-227	Pos	17/Apr/09	0-25	10YR 4/3 SiLo	1 Sherd	BMRS		32
M-227	Pos	17/Apr/09	25-37	10YR 6/6 ClLo		DSA		
M-228	Neg	17/Apr/09	0-25	10YR 4/3 SiLo		DSA		
M-228	Neg	17/Apr/09	25-33	10YR 5/6 SiCl		DSA		
M-229	Neg	17/Apr/09	0-27	7.5YR 4/4 SiLo		KW		
M-229	Neg	17/Apr/09	27-41	7.5YR 5/6 ClLo		KW		
M-230	Neg	17/Apr/09	0-28	10YR 5/3 ClLo		CSE		
M-230	Neg	17/Apr/09	28-31	10YR 5/6 ClLo		CSE		
M-231	Neg	17/Apr/09	0-26	10YR 4/3 SiLo		BMRS		
M-231	Neg	17/Apr/09	26-40	10YR 6/6 ClLo		BMRS		
M-232	Neg	17/Apr/09	0-25	10YR 4/3 SiLo		DSA		

PSEG-ESP Shovel Test Log

ST	Pos/Neg	Date	Depth (cm)	Munsell Color/Texture	Artifacts	Initials	Comments	Bag No.
M-232	Neg	17/Apr/09	25-36	10YR 5/6 SiCl		DSA		
M-233	Neg	17/Apr/09	0-25	7.5YR 4/4 SiLo		KW		
M-233	Neg	17/Apr/09	25-36	7.5YR 5/6 ClLo		KW		
M-234	Neg	17/Apr/09	0-26	10YR 4/3 SiLo		DSA	1 Coal piece	
M-234	Neg	17/Apr/09	26-33	10YR 5/6 SiCl		DSA		
M-235	Neg	17/Apr/09	0-26	10YR 4/3 SiLo		BMRS		
M-235	Neg	17/Apr/09	26-38	10YR 6/6 ClLo		BMRS		
M-236	Neg	17/Apr/09	0-21	10YR 4/3 SiLo		DSA	1 Coal piece	
M-236	Neg	17/Apr/09	21-32	10YR 5/6 SiCl		DSA		
M-237	Neg	17/Apr/09	0-23	10YR 4/3 SiLo		BMRS		
M-237	Neg	17/Apr/09	23-40	10YR 6/6 ClLo		BMRS		
M-238	Neg	17/Apr/09	0-24	7.5YR 4/4 SiLo		KW		
M-238	Neg	17/Apr/09	24-36	7.5YR 5/6 ClLo		KW		
M-239	Neg	17/Apr/09	0-25	10YR 5/3 SaLo		CSE		
M-239	Neg	17/Apr/09	25-30	10YR 5/6 ClLo		CSE		
M-240	Neg	17/Apr/09	0-24	10YR 4/3 SiLo		BMRS		
M-240	Neg	17/Apr/09	24-35	10YR 6/6 ClLo		BMRS		
M-241	Neg	17/Apr/09	0-27	10YR 4/3 SiLo		DSA		
M-241	Neg	17/Apr/09	27-35	10YR 5/6 SiCl		DSA		
M-242	Neg	17/Apr/09	0-25	7.5YR 4/4 SiLo		KW		
M-242	Neg	17/Apr/09	25-36	7.5YR 5/6 ClLo		KW		
M-243	Neg	17/Apr/09	0-25	10YR 5/3 SaLo		CSE		
M-243	Neg	17/Apr/09	25-30	10YR 5/6 ClLo		CSE		
M-244	Neg	17/Apr/09	0-23	10YR 4/3 SiLo		DSA		
M-244	Neg	17/Apr/09	23-34	10YR 5/6 SiCl		DSA		
M-245	Neg	17/Apr/09	0-28	10YR 4/3 SiLo		BMRS		
M-245	Neg	17/Apr/09	28-40	10YR 6/6 ClLo		BMRS		
M-246	Pos	17/Apr/09	0-29	10YR 4/3 SiLo	Ceramic	DSA		33
M-246	Pos	17/Apr/09	29-36	10YR 5/6 SiCl		DSA		
M-247	Neg	17/Apr/09	0-26	7.5YR 4/4 SiLo		KW		
M-247	Neg	17/Apr/09	26-36	7.5YR 5/6 ClLo		KW		
M-248	Pos	17/Apr/09	0-27	10YR 5/3 SaLo	1 Prehist. Ceramic	CSE		34
M-248	Pos	17/Apr/09	27-33	10YR 5/6 ClLo		CSE		
M-249	Pos	17/Apr/09		10YR 4/3 SiLo	1 Sherd	BMRS		35
M-249	Pos	17/Apr/09		10YR 6/6 ClLo		BMRS		
M-250	Neg	17/Apr/09	0-26	10YR 4/3 SiLo		BMRS		
M-250	Neg	17/Apr/09	26-40	10YR 6/6 ClLo		BMRS		
M-251	Pos	17/Apr/09	0-24	10YR 4/3 SiLo	1 Sherd	DSA		36
M-251	Pos	17/Apr/09	24-38	10YR 5/6 SiCl		DSA		
M-252	Neg	17/Apr/09	0-25	10YR 5/3 SaLo		CSE		
M-252	Neg	17/Apr/09	25-30	10YR 5/6 ClLo		CSE		
M-253	Pos	18/Apr/09	0-25	7.5 YR 4/4 SiLo	1 Residual Sherd	KW	Artifact at ~ 20cmbs	114
M-253	Pos	18/Apr/09	25-40	7.5YR 5/6 ClLo		KW		

ST	Pos/Neg	Date	Depth (cm)	Munsell Color/Texture	Artifacts	Initials	Comments	Bag No.
M-254	Neg	17/Apr/09	0-23	10YR 4/3 SiLo		DSA	1 Coal piece	
M-254	Neg	17/Apr/09	23-35	10YR 5/6 SiCl		DSA		
M-255	Neg	17/Apr/09	0-23	10YR 5/3 SaLo		CSE		
M-255	Neg	17/Apr/09	23-30	10YR 5/6 ClLo		CSE		
M-256	Neg	17/Apr/09	0-18	10YR 4/3 SiLo		BMRS		
M-256	Neg	17/Apr/09	18-33	10YR 6/6 ClLo		BMRS		
M-257	Neg	17/Apr/09	0-23	10YR 4/3 SiLo		DSA	1 Piece tile	
M-257	Neg	17/Apr/09	23-36	10YR 5/6 SiCl		DSA		
M-258	Neg	17/Apr/09	0-25	10YR 5/3 SaLo		CSE		
M-258	Neg	17/Apr/09	25-35	10YR 5/6 ClLo Mottled		CSE		
M-259	Neg	18/Apr/09	0-25	7.5 YR 4/4 SiLo		KW		
M-259	Neg	18/Apr/09	25-38	7.5YR 5/6 ClLo		KW		
M-260	Neg	17/Apr/09	0-25	10YR 4/3 SiLo		BMRS		
M-260	Neg	17/Apr/09	25-35	10YR 6/6 ClLo		BMRS		
M-261	Neg	18/Apr/09	0-23	10YR 4/3 SiLo		BMRS		
M-261	Neg	18/Apr/09	23-35	10YR 6/6 ClLo		BMRS		
M-262	Neg	18/Apr/09	0-19	10YR 5/4 ClLo		CSE		
M-262	Neg	18/Apr/09	19-28	10YR 6/8 ClLo		CSE		
M-263	Neg	18/Apr/09	0-23	10YR 4/3 SiLo		DSA		
M-263	Neg	18/Apr/09	23-35	10YR 5/6 SiCl		DSA		
M-264	Neg	18/Apr/09	0-29	7.5YR 4/4 SiLo		KW		
M-264	Neg	18/Apr/09	29-41	7.5YR 5/6 ClLo		KW		
M-265	Pos	18/Apr/09	0-27	10YR 4/3 SiLo	2 Prehist Ceramic/ 1 Redware	BMRS		37
M-265	Pos	18/Apr/09	27-40	10YR 6/6 ClLo		BMRS		
M-266	Neg	18/Apr/09	0-25	10YR 5/4 ClLo		CSE		
M-266	Neg	18/Apr/09	25-30	10YR 6/8 ClLo		CSE		
M-267	Neg	18/Apr/09	0-21	10YR 4/3 SiLo		DSA		
M-267	Neg	18/Apr/09	21-30	10YR 5/6 SiCl		DSA		
M-268	Pos	18/Apr/09	0-25	10YR 4/3 SiLo	1 Sherd	KW		40
M-268	Pos	18/Apr/09	25-38	10YR 5/6 ClLo		KW		
M-268 A	Neg	23/Apr/09	0-23	10YR 4/3 SiLo		SCC	12.5 ft north of M-268 B	
M-268 A	Neg	23/Apr/09	23-26+	10YR 5/6 ClLo		SCC		
M-268 B	Neg	23/Apr/09	0-23	10YR 4/3 SiLo		SCC	12.5 ft east of M-268	
M-268 B	Neg	23/Apr/09	23-25+	10YR 5/6 ClLo		SCC		
M-268 C	Neg	23/Apr/09	0-20	10YR 4/3 SiLo		SCC	12.5 ft south of M-268	
M-268 C	Neg	23/Apr/09	20-24+	10YR 5/6 ClLo		SCC		
M-268 D	Neg	23/Apr/09	0-23	10YR 4/3 SiLo		SCC	12.5 ft west of M-268	
M-268 D	Neg	23/Apr/09	23-30+	10YR 5/6 ClLo		SCC		
M-269	Neg	18/Apr/09	0-28	10YR 4/3 SiLo		DSA		
M-269	Neg	18/Apr/09	28-30	10YR 5/6 SiCl		DSA		
M-270	Neg	18/Apr/09	0-27	10YR 4/3 SiLo		BMRS		
M-270	Neg	18/Apr/09	27-40	10YR 6/6 ClLo		BMRS		

PSEG-ESP Shovel Test Log

ST	Pos/Neg	Date	Depth (cm)	Munsell Color/Texture	Artifacts	Initials	Comments	Bag No.
M-271	Neg	18/Apr/09	0-29	10YR 5/4 ClLo		CSE		
M-271	Neg	18/Apr/09	29-32	10YR 6/8 ClLo		CSE		
M-272	Neg	18/Apr/09	0-26	10YR 4/3 SiLo		KW		
M-272	Neg	18/Apr/09	26-40	10YR 5/6 ClLo		KW		
M-273	Neg	18/Apr/09	0-23	10YR 4/3 SiLo		DSA		
M-273	Neg	18/Apr/09	23-34	10YR 5/6 SiCl		DSA		
M-274	Neg	18/Apr/09	0-28	10YR 4/3 SiLo		BMRS		
M-274	Neg	18/Apr/09	28-40	10YR 6/6 ClLo		BMRS		
M-275	Neg	18/Apr/09	0-25	10YR 5/4 ClLo		CSE		
M-275	Neg	18/Apr/09	25-30	10YR 6/8 ClLo		CSE		
M-276	Neg	18/Apr/09	0-25	10YR 4/3 SiLo		KW		
M-276	Neg	18/Apr/09	25-36	10YR 5/6 SiCl		KW		
M-277	Neg	18/Apr/09	0-23	10YR 4/3 SiLo		DSA		
M-277	Neg	18/Apr/09	23-35	10YR 5/6 SiCl		DSA		
M-278	Neg	18/Apr/09	0-26	10YR 4/3 SiLo		BMRS		
M-278	Neg	18/Apr/09	26-40	10YR 6/6 ClLo		BMRS		
M-279	Pos	18/Apr/09	0-28	10YR 5/4 ClLo	1 Scrap Metal, 1 Prehist Sherd	CSE		39
M-279	Pos	18/Apr/09	28-31	10YR 6/8 ClLo		CSE		
M-280	Neg	18/Apr/09	0-25	10YR 4/3 SiLo		DSA		
M-280	Neg	18/Apr/09	25-35	10YR 5/6 SiCl		DSA		
M-281	Neg	18/Apr/09	0-25	10YR 4/3 SiLo		BMRS		
M-281	Neg	18/Apr/09	25-38	10YR 6/6 ClLo		BMRS		
M-282	Neg	18/Apr/09	0-26	10YR 4/3 SiLo		KW		
M-282	Neg	18/Apr/09	26-39	10YR 5/6 SiCl		KW		
M-283	Neg	18/Apr/09	0-25	10YR 5/4 ClLo		CSE		
M-283	Neg	18/Apr/09	25-30	10YR 6/8 ClLo		CSE		
M-284	Neg	18/Apr/09	0-32	10YR 4/3 SiLo		DSA	1 piece brick	
M-284	Neg	18/Apr/09	32-37	10YR 5/6 SiCl		DSA		
M-285	Pos	18/Apr/09	0-28	10YR 4/3 SiLo	3 Prehist Sherds	BMRS	Discarded Brick	41
M-285	Pos	18/Apr/09	28-43	10YR 6/6 ClLo		BMRS		
M-286	Neg	18/Apr/09	0-23	10YR 4/3 SiLo		KW		
M-286	Neg	18/Apr/09	23-36	10YR 5/6 SiCl		KW		
M-287	Neg	18/Apr/09	0-25	10YR 4/3 SiLo		DSA	1 Brick, 1 Coal	
M-287	Neg	18/Apr/09	25-35	10YR 5/6 SiCl		DSA		
M-288	Neg	18/Apr/09	0-23	10YR 5/4 ClLo		CSE		
M-288	Neg	18/Apr/09	23-30	10YR 6/8 ClLo		CSE		
M-289	Neg	18/Apr/09	0-27	10YR 4/3 SiLo		BMRS	BOT. Discarded Brick	
M-289	Neg	18/Apr/09	27-40	10YR 6/6 ClLo		BMRS		
M-290	Pos	18/Apr/09	0-40	10YR 4/3 ClLo	Sherd	DSA	Coal, Brick, FCR, Charcoal	42
M-290	Pos	18/Apr/09	40-75	10YR 3/3 ClLo		DSA	Water table about 70	
M-291	Neg	18/Apr/09	0-30	10YR 5/4 ClLo		CSE	1 Small piece FCR, not collected	
M-291	Neg	18/Apr/09	30-35	10YR 6/8 ClLo		CSE		

PSEG-ESP Shovel Test Log

ST	Pos/Neg	Date	Depth (cm)	Munsell Color/Texture	Artifacts	Initials	Comments	Bag No.
M-292	Neg	18/Apr/09	0-24	10YR 4/3 SiLo		KW		
M-292	Neg	18/Apr/09	24-38	10YR 5/6 SiCl		KW		
M-293	Neg	18/Apr/09	0-28	10YR 4/3 SiLo		BMRS	BoT	
M-293	Neg	18/Apr/09	28-43	2.5YR 6/4 ClLo		BMRS		
M-294	Neg	18/Apr/09	0-23	10YR 4/3 SiLo		KW		
M-294	Neg	18/Apr/09	23-40	10YR 5/6 SiCl		KW		
M-295	Neg	18/Apr/09	0-25	10YR 5/4 ClLo		CSE		
M-295	Neg	18/Apr/09	25-30	10YR 6/6 ClLo		CSE		
M-296	Neg	18/Apr/09	0-23	10YR 4/3 SiLo		BMRS	EOT	
M-296	Neg	18/Apr/09	23-36	10YR 6/6 ClLo		BMRS		
M-297	Neg	18/Apr/09	0-38	10YR 5/4 ClLo		CSE		
M-297	Neg	18/Apr/09	38-43	10YR 6/8 ClLo		CSE		
M-298	Neg	18/Apr/09	0-32	10YR 4/3 SiLo		DSA	Coal/ Brick	
M-298	Neg	18/Apr/09	32-39	10YR 5/6 SiCl		DSA		
M-299	Neg	18/Apr/09	0-29	10YR 4/3 SiLo		BMRS		
M-299	Neg	18/Apr/09	29-40	10YR 6/6 ClLo		BMRS		
M-300	Neg	18/Apr/09	0-26	10YR 4/3 SiLo		KW		
M-300	Neg	18/Apr/09	26-39	10YR 5/6 SiCl		KW		
M-301	Pos	18/Apr/09	0-32	10YR 4/3 SiLo	1-3 Sherds	DSA		43
M-301	Pos	18/Apr/09	32-48	10YR 5/6 SiCl		DSA		
M-302	Pos	18/Apr/09	0-31	10YR 4/3 SiLo	1 Prehist. Ceramic/ 1 Glass	BMRS		44
M-302	Pos	18/Apr/09	31-45	10YR 6/6 ClLo		BMRS		
M-303	Pos	18/Apr/09	0-35	10YR 5/4 ClLo	1 Prehist Sherd	CSE		45
M-303	Pos	18/Apr/09	35-40	10YR 6/6 ClLo		CSE		
M-304	Neg	18/Apr/09	0-31	7.5YR 4/4 SiLo		KW		
M-304	Neg	18/Apr/09	31-43	7.5YR 5/6 ClLo		KW		
M-305	Neg	18/Apr/09	0-31	10YR 4/3 SiLo		BMRS		
M-305	Neg	18/Apr/09	31-41	10YR 6/6 ClLo		BMRS		
M-306	Neg	18/Apr/09	0-26	7.5YR 4/4 SiLo		KW		
M-306	Neg	18/Apr/09	26-41	7.5YR 5/6 ClLo		KW		
M-307	Pos	18/Apr/09	0-29	10YR 4/3 SiLo	Glazed Sherd	DSA		115
M-307	Pos	18/Apr/09	29-37	10YR 5/6 SiCl		DSA		
M-308	Neg	18/Apr/09	0-28	10YR 5/4 ClLo		CSE		
M-308	Neg	18/Apr/09	28-38	10YR 6/6 ClLo		CSE		
M-309	Neg	18/Apr/09	0-29	10YR 4/3 SiLo		BMRS		
M-309	Neg	18/Apr/09	29-41	10YR 6/6 ClLo		BMRS		
M-310	Pos	18/Apr/09	0-24	7.5YR 4/4 SiLo	1 Sherd	KW	Artifact ~ 22 cmbs	47
M-310	Pos	18/Apr/09	24-38	7.5YR 5/6 ClLo		KW		
M-311	Pos	18/Apr/09	0-23	10YR 5/4 ClLo	1 Historic Ceramic Sherd	CSE		46
M-311	Pos	18/Apr/09	23-30	10YR 6/6 ClLo		CSE		
M-312	Neg	18/Apr/09	0-25	10YR 4/3 SiLo		DSA	Coal	

PSEG-ESP Shovel Test Log

ST	Pos/Neg	Date	Depth (cm)	Munsell Color/Texture	Artifacts	Initials	Comments	Bag No.
M-312	Neg	18/Apr/09	25-33	10YR 5/6 SiCl		DSA		
M-313	Pos	18/Apr/09	0-30	10YR 4/3 SiLo	1 Sherd	BMRS	BOT	48
M-313	Pos	18/Apr/09	30-40	10YR 6/6 ClLo		BMRS		
M-313 A	Neg	23/Apr/09	0-27	10YR 5/2 SiLo		SCC	12.5 ft north of M-313	
M-313 A	Neg	23/Apr/09	27-35	10YR 4/6 ClLo		SCC		
M-313 C	Neg	23/Apr/09	0-21	10YR 3/4 SiLo		BMRS	12 ft. south of ST# M-313	
M-313 C	Neg	23/Apr/09	21-25	10YR 5/4 SiClLo		BMRS		
M-313 D	Neg	23/Apr/09	0-26	10YR 4/4 SiLo		BMRS	12 ft. west of ST# M-313	
M-313 D	Neg	23/Apr/09	26-31	10YR 5/6 SiClLo		BMRS		
M-314	Neg	18/Apr/09	0-21	10YR 5/4 ClLo		CSE		
M-314	Neg	18/Apr/09	21-26	10YR 6/6 ClLo		CSE		
M-315	Neg	18/Apr/09	0-22	7.5YR 4/4 SiLo		KW		
M-315	Neg	18/Apr/09	22-37	7.5YR 5/6 ClLo		KW		
M-316	Neg	18/Apr/09	0-20	10YR 4/3 SiLo		DSA	Coal	
M-316	Neg	18/Apr/09	20-27	10YR 5/6 SiCl		DSA		
M-317	Neg	18/Apr/09	0-23	10YR 4/3 SiLo		DSA	Coal	
M-317	Neg	18/Apr/09	23-33	10YR 5/6 SiCl		DSA		
M-318	Neg	18/Apr/09	0-23	10YR 5/4 ClLo		CSE		
M-318	Neg	18/Apr/09	23-30	10YR 6/6 ClLo		CSE		
M-319	Neg	18/Apr/09	0-25	10YR 4/4 SiLo		BMRS		
M-319	Neg	18/Apr/09	25-40	10YR 6/6 ClLo		BMRS		
M-320	Neg	18/Apr/09	0-23	7.5YR 4/4 SiLo		KW		
M-320	Neg	18/Apr/09	23-38	7.5YR 5/6 ClLo		KW		
M-321	Pos	18/Apr/09	0-24	10YR 4/4 SiLo	1 Metal	BMRS		49
M-321	Pos	18/Apr/09	24-37	10YR 6/6 ClLo		BMRS		
M-322	Neg	18/Apr/09	0-25	10YR 5/4 SaLo		CSE		
M-322	Neg	18/Apr/09	25-30	10YR 6/8 ClLo		CSE		
M-323	Neg	18/Apr/09	0-24	10YR 4/3 SiLo		DSA		
M-323	Neg	18/Apr/09	24-34	10YR 5/6 SiCl		DSA		
M-324	Neg	18/Apr/09	0-22	7.5YR 4/4 SiLo		KW		
M-324	Neg	18/Apr/09	22-41	7.5YR 5/6 ClLo		KW		
M-325	Neg	18/Apr/09	0-27	10YR 5/4 ClLo		CSE		
M-325	Neg	18/Apr/09	27-32	10YR 6/6 ClLo		CSE		
M-326	Neg	18/Apr/09	0-23	10YR 4/4 SiLo		BMRS		
M-326	Neg	18/Apr/09	23-40	10YR 6/6 ClLo		BMRS		
M-327	Neg	18/Apr/09	0-24	10YR 4/3 SiLo		DSA		
M-327	Neg	18/Apr/09	24-35	10YR 5/6 SiCl		DSA		
M-328	Pos	18/Apr/09	0-23	7.5YR 4/4 SiLo	Glazed Brick Frag	KW		50
M-328	Pos	18/Apr/09	23-37	7.5YR 5/6 ClLo		KW		
M-329	Pos	18/Apr/09	0-24	10YR 4/3 SiLo	1 Flake/ 1 Sherd	BMRS	Discarded Brick	51
M-329	Pos	18/Apr/09	24-34	10YR 6/6 ClLo		BMRS		
M-330	Neg	18/Apr/09	0-22	10YR 5/4 SaLo		CSE		
M-330	Neg	18/Apr/09	22-30	10YR 6/6 ClLo		CSE		

ST	Pos/Neg	Date	Depth (cm)	Munsell Color/Texture	Artifacts	Initials	Comments	Bag No.
M-331	Neg	18/Apr/09	0-31	7.5YR 4/4 SiLo		DSA		
M-331	Neg	18/Apr/09	31-37	10YR 4/6 SiCl		DSA		
M-332	Neg	18/Apr/09	0-22	7.5YR 4/4 SiLo		KW		
M-332	Neg	18/Apr/09	22-33	7.5YR 5/6 ClLo		KW		
M-333	Pos	18/Apr/09	0-20	10YR 5/4 ClLo- mottled	1 Quartz Biface	CSE		52
M-333	Pos	18/Apr/09	20-30	10YR 6/6 ClLo		CSE		
M-334	Neg	18/Apr/09	0-24	10YR 4/3 SiLo		BMRS	EOT- next to wetland	
M-334	Neg	18/Apr/09	24-38	10YR 6/6 ClLo		BMRS		
M-335	Neg	18/Apr/09	0-26	10YR 4/3 SiLo		DSA	2 pieces coal, 1 piece brick	
M-335	Neg	18/Apr/09	26-35	10YR 5/6 SiCl		DSA		
M-336	Neg	18/Apr/09	0-25	7.5YR 4/4 SiLo		KW		
M-336	Neg	18/Apr/09	25-38	7.5YR 5/6 ClLo		KW		
M-337	Neg	18/Apr/09	0-25	10YR 5/4 ClLo		CSE		
M-337	Neg	18/Apr/09	25-30	10YR 6/8 ClLo		CSE		
M-338	Neg	18/Apr/09	0-27	10YR 4/3 SiLo		BMRS		
M-338	Neg	18/Apr/09	27-40	10YR 6/6 ClLo		BMRS		
M-339	Neg	18/Apr/09	0-26	10YR 4/3 SiLo		DSA	Coal, Brick w/ small piece of glaze	
M-339	Neg	18/Apr/09	26-34	10YR 4/6 SiCl		DSA		
M-340	Pos	18/Apr/09	0-26	7.5YR 4/4 SiLo	1 Nail	KW		53
M-340	Pos	18/Apr/09	26-38	7.5YR 5/6 ClLo		KW		
M-341	Pos	18/Apr/09	0-30	10YR 4/3 SiLo	3 Prehist Sherds/ Shell or Bone	DSA		54
M-341	Pos	18/Apr/09	30-34	10YR 4/6 SiCl		DSA		
M-342	Neg	18/Apr/09	0-25	10YR 4/4 SiLo		BMRS		
M-342	Neg	18/Apr/09	25-39	10YR 6/6 ClLo		BMRS		
M-343	Neg	18/Apr/09	0-21	10YR 5/4 ClLo		CSE		
M-343	Neg	18/Apr/09	21-31	10YR 6/8 ClLo		CSE		
M-344	Neg	18/Apr/09	0-24	7.5YR 4/4 SiLo		KW		
M-344	Neg	18/Apr/09	24-34	7.5YR 5/6 ClLo		KW		
M-345	Neg	18/Apr/09	0-24	10YR 4/3 SiLo		BMRS	BOT	
M-345	Neg	18/Apr/09	24-37	10YR 6/6 ClLo		BMRS		
M-346	Neg	18/Apr/09	0-26	10YR 4/3 SiLo		DSA		
M-346	Neg	18/Apr/09	26-37	10YR 4/6 SiCl		DSA		
M-347	Neg	18/Apr/09	0-25	10YR 5/4 ClLo		CSE		
M-347	Neg	18/Apr/09	25-33	10YR 6/8 ClLo		CSE		
M-348	Neg	18/Apr/09	0-26	7.5YR 4/4 SiLo		KW		
M-348	Neg	18/Apr/09	26-36	7.5YR 5/6 ClLo		KW		
M-349	Pos	18/Apr/09	0-21	10YR 4/3 SiLo	Sherd	DSA		55
M-349	Pos	18/Apr/09	21-32	10YR 4/6 SiCl		DSA		
M-350	Neg	18/Apr/09	0-21	10YR 4/3 SiLo		BMRS		
M-350	Neg	18/Apr/09	21-40	10YR 6/6 ClLo		BMRS		
M-351	Neg	18/Apr/09	0-20	10YR 5/4 ClLo		CSE		
M-351	Neg	18/Apr/09	20-30	10YR 6/8 ClLo		CSE		

PSEG-ESP Shovel Test Log

ST	Pos/Neg	Date	Depth (cm)	Munsell Color/Texture	Artifacts	Initials	Comments	Bag No.
M-352	Neg	18/Apr/09	0-23	10YR 4/3 SiLo		KW		
M-352	Neg	18/Apr/09	23-37	10YR 5/6 SiCl		KW		
M-353	Neg	18/Apr/09	0-22	10YR 4/4 SiLo		BMRS		
M-353	Neg	18/Apr/09	22-40	10YR 6/6 ClLo		BMRS		
M-354	Neg	18/Apr/09	0-26	10YR 5/4 SaLo		CSE		
M-354	Neg	18/Apr/09	26-33	10YR 6/6 ClLo		CSE		
M-355	Pos	18/Apr/09	0-20	10YR 4/3 SiLo	Sherd	DSA		56
M-355	Pos	18/Apr/09	20-34	10YR 4/6 SiCl		DSA		
M-356	Pos	18/Apr/09	0-26	10YR 4/3 SiLo	1 Prehist Sherd	KW		57
M-356	Pos	18/Apr/09	26-38	10YR 5/6 SiCl		KW		
M-357	Neg	19/Apr/09	0-24	10YR 4/4 SiLo		BMRS		
M-357	Neg	19/Apr/09	24-38	10YR 6/6 SaClLo		BMRS		
M-358	Neg	18/Apr/09	0-25	10YR 5/4 SaLo		CSE		
M-358	Neg	18/Apr/09	25-30	10YR 5/8 ClLo		CSE		
M-359	Neg	19/Apr/09	0-22	7.5YR 4/4 SiLo		KW		
M-359	Neg	19/Apr/09	22-33	7.5YR 5/6 ClLo		KW		
M-360	Neg	19/Apr/09	0-25	10YR 4/3 SiLo		DSA		
M-360	Neg	19/Apr/09	25-33	10YR 4/6 SiCl		DSA		
M-361	Neg	19/Apr/09	0-28	10YR 4/3 SiLo		BMRS		
M-361	Neg	19/Apr/09	28-45	10YR 6/6 SiClLo		BMRS		
M-362	Neg	19/Apr/09	0-22	10YR 4/3 SiLo		DSA	Coal	
M-362	Neg	19/Apr/09	22-29	10YR 4/6 SiCl		DSA		
M-363	Neg	19/Apr/09	0-25	10YR 5/4 SaLo		CSE		
M-363	Neg	19/Apr/09	25-30	10YR 5/8 ClLo		CSE		
M-364	Neg	19/Apr/09	0-23	7.5YR 4/4 SiLo		KW		
M-364	Neg	19/Apr/09	23-38	7.5YR 5/6 ClLo		KW		
M-365	Neg	19/Apr/09	0-25	10YR 4/4 SiLo		BMRS		
M-365	Neg	19/Apr/09	25-38	10YR 6/6 SiClLo		BMRS		
M-365	Neg	19/Apr/09	0-20	10YR 4/3 SiLo		DSA	Coal	
M-365	Neg	19/Apr/09	20-31	10YR 4/6 SiCl		DSA		
M-365 A	Neg	23/Apr/09	0-25	10YR 4/3 SiLo		BMRS	12 ft north of ST# M-365	
M-365 A	Neg	23/Apr/09	25-29	10YR 5/6 SiClLo		BMRS		
M-365 B	Neg	23/Apr/09	0-25	10YR 4/3 SiLo		BMRS	12 ft east of ST# M-365	
M-365 B	Neg	23/Apr/09	25-28	10YR 5/6 SiClLo		BMRS		
M-365 C	Neg	23/Apr/09	0-27	10YR 4/3 SiLo		BMRS	12 ft south of M-365	
M-365 C	Neg	23/Apr/09	27-31	10YR 5/6 SiClLo		BMRS		
M-365 D	Neg	23/Apr/09	0-25	10YR 4/3 SiLo		BMRS	12 ft west of ST# M-365	
M-365 D	Neg	23/Apr/09	25-30	10YR 5/6 SiClLo		BMRS		
M-367	Neg	19/Apr/09	0-25	10YR 5/4 SaLo		CSE		
M-367	Neg	19/Apr/09	25-32	10YR 5/8 ClLo		CSE		
M-368	Neg	19/Apr/09	0-23	7.5YR 4/4 SiLo		KW		
M-368	Neg	19/Apr/09	23-37	7.5YR 5/6 ClLo		KW		

PSEG-ESP Shovel Test Log

ST	Pos/Neg	Date	Depth (cm)	Munsell Color/Texture	Artifacts	Initials	Comments	Bag No.
M-369	Pos	19/Apr/09	0-23	10YR 4/3 SiLo	1 Glass/ 1 Sherd (glazed)	DSA		58
M-369	Pos	19/Apr/09	23-27	10YR 4/6 SiCl		DSA		
M-370	Neg	19/Apr/09	0-31	10YR 3/3 SiLo		BMRS	Discarded Coal	
M-370	Neg	19/Apr/09	31-45	10YR 4/6 SiClLo		BMRS		
M-371	Neg	19/Apr/09	0-25	10YR 5/4 SaLo		CSE		
M-371	Neg	19/Apr/09	25-30	10YR 6/6 ClLo		CSE		
M-372	Neg	19/Apr/09	0-38	10YR 4/4 SiLo		KW	Brick Frag	
M-372	Neg	19/Apr/09	38-48	10YR 5/6 ClLo		KW		
M-373	Neg	19/Apr/09	0-40	10YR 4/3 SiLo		DSA	1 piece coal	
M-373	Neg	19/Apr/09	40-51	10YR 4/6 SiCl		DSA		
M-374	Pos	19/Apr/09	0-25	10YR 5/4 SaLo	1 Prehist Sherd	CSE		59
M-374	Pos	19/Apr/09	25-30	10YR 6/6 ClLo		CSE		
M-375	Neg	19/Apr/09	0-26	10YR 4/3 SiLo		BMRS		
M-375	Neg	19/Apr/09	26-43	2.5YR 4/6 SiClLo		BMRS		
M-376	Neg	19/Apr/09	0-24	10YR 4/4 SiLo		KW		
M-376	Neg	19/Apr/09	24-36	10YR 5/6 ClLo		KW		
M-377	Neg	19/Apr/09	0-29	10YR 4/3 SiLo		DSA	several coal pieces, 1 piece of shell	
M-377	Neg	19/Apr/09	29-36	10YR 4/6 SiCl		DSA		
M-378	Neg	19/Apr/09	0-25	10YR 5/4 SaLo		CSE		
M-378	Neg	19/Apr/09	25-30	10YR 6/6 ClLo		CSE		
M-379	Neg	19/Apr/09	0-28	10YR 4/3 SiLo		BMRS	Discarded Coal	
M-379	Neg	19/Apr/09	28-43	10YR 6/6 ClLo		BMRS		
M-379 A	Neg	23/Apr/09	0-28	10YR 4/3 SiLo		BMRS	12 ft north of ST# M-379	
M-379 A	Neg	23/Apr/09	28-32	10YR 5/6 SiClLo		BMRS		
M-379 C	Pos	23/Apr/09	0-37	10YR 4/2 SiLo	Brick/ Historic Sherd	SCC	Brick at 10 cmbgs/ Sherd at 25 cm/ Located 12.5 ft south of ST# M-379	94
M-379 C	Pos	23/Apr/09	37-41	10YR 4/6 ClLo		SCC		
M-380	Neg	19/Apr/09	0-26	10YR 4/4 SiLo		KW		
M-380	Neg	19/Apr/09	26-47	10YR 5/6 ClLo		KW		
M-381	Neg	19/Apr/09	0-22	10YR 4/3 SiLo		DSA	several pieces of coal	
M-381	Neg	19/Apr/09	22-33	10YR 4/6 SiClLo		DSA		
M-382	Neg	19/Apr/09	0-25	10YR 4/3 SiLo		BMRS	Discarded Coal	
M-382	Neg	19/Apr/09	25-41	10YR 4/6 SiClLo		BMRS		
M-383	Neg	19/Apr/09	0-27	10YR 5/4 SaLo		CSE	1 red brick frag, not collected	
M-383	Neg	19/Apr/09	27-32	10YR 6/6 ClLo		CSE		
M-384	Pos	19/Apr/09	0-30	10YR 4/3 SiLo	1 Sherd Whiteware	DSA	Coal ~8 pieces. Quartz pebbles	60
M-384	Pos	19/Apr/09	30-40	10YR 5/4 SiClLo		DSA		
M-385	Neg	19/Apr/09	0-26	10YR 4/4 SiLo		KW		
M-385	Neg	19/Apr/09	26-43	10YR 5/6 ClLo		KW		
M-386	Neg	19/Apr/09	0-33	10YR 4/3 SiLo	1 Flake (rock, NCM discarded)	BMRS	Discarded Brick and Coal	61
M-386	Neg	19/Apr/09	33-46	2.5Y 6/6 SiClLo		BMRS		

PSEG-ESP Shovel Test Log

ST	Pos/Neg	Date	Depth (cm)	Munsell Color/Texture	Artifacts	Initials	Comments	Bag No.
M-387	Neg	19/Apr/09	0-43	10YR 5/4 SaLo		CSE		
M-387	Neg	19/Apr/09	43-50	10YR 6/6 ClLo		CSE		
M-388	Neg	19/Apr/09	0-29	10YR 4/4 SiLo		KW		
M-388	Neg	19/Apr/09	29-39	10YR 5/6 ClLo		KW		
M-389	Pos	19/Apr/09	0-29	10YR 4/3 SiLo	Sherd	DSA		62
M-389	Pos	19/Apr/09	29-37	10YR 4/6 SiClLo		DSA		
M-389 A	Neg	23/Apr/09	0-28	10YR 4/4 SiLo		BMRS	12 ft north of ST# M-389	
M-389 A	Neg	23/Apr/09	28-31	10YR 5/6 SiClLo		BMRS		
M-389 B	Neg	23/Apr/09	0-28	10YR 4/3 SiLo		SCC		
M-389 B	Neg	23/Apr/09	28-35	10YR 4/6 ClLo		SCC		
M-389 C	Pos	23/Apr/09	0-24	10YR 4/4 SiLo	1 Prehist Sherd	BMRS	12 ft south of ST# M-389	102
M-389 C	Pos	23/Apr/09	24-27	10YR 5/6 SiClLo		BMRS		
M-390	Neg	19/Apr/09	0-28	10YR 4/3 SiLo		BMRS	Discarded Coal	
M-390	Neg	19/Apr/09	28-45	10YR 6/6 ClLo		BMRS		
M-391	Neg	19/Apr/09	0-23	10YR 4/4 SiLo		KW		
M-391	Neg	19/Apr/09	23-39	10YR 5/6 ClLo		KW		
M-392	Neg	19/Apr/09	0-25	10YR 5/4 SaLo		CSE		
M-392	Neg	19/Apr/09	25-30	10YR 6/6 ClLo		CSE		
M-393	Neg	19/Apr/09	0-26	10YR 4/3 SiLo		BMRS	Discarded Coal	
M-393	Neg	19/Apr/09	26-38	10YR 6/6 ClLo		BMRS		
M-394	Neg	19/Apr/09	0-27	10YR 4/3 SiLo	2 Sherds (NCM, discarded)	DSA		63
M-394	Neg	19/Apr/09	27-33	10YR 5/6 SiClLo		DSA		
M-395	Neg	19/Apr/09	0-26	7.5YR 4/4 SiLo		KW		
M-395	Neg	19/Apr/09	26-39	7.5YR 5/6 ClLo		KW		
M-396	Neg	19/Apr/09	0-27	10YR 5/4 SaLo		CSE		
M-396	Neg	19/Apr/09	27-32	10YR 6/6 ClLo		CSE		
M-397	Neg	19/Apr/09	0-36	10YR 4/3 SiLo		BMRS		
M-397	Neg	19/Apr/09	36-50	2.5YR 4/6 SiClLo		BMRS		
M-398	Pos	19/Apr/09	0-49	10YR 4/3 SiLo	3 Sherds	DSA	Coal	64
M-398	Pos	19/Apr/09	49-58	10YR 5/6 SiClLo		DSA		
M-399	Pos	19/Apr/09	0-36	7.5YR 4/4 SiLo	1 Sherd	KW	Artifact ~ 25 cmbs	65
M-399	Pos	19/Apr/09	36-48	7.5YR 5/6 ClLo		KW		
M-400	Neg	19/Apr/09	0-40	10YR 5/4 SaLo		CSE	1 sizeable chunk pf red brick/tile	
M-400	Neg	19/Apr/09	40-45	10YR 6/6 ClLo		CSE		
M-401	Neg	19/Apr/09	0-32	10YR 4/3 SiLo		BMRS		
M-401	Neg	19/Apr/09	32-45	2.5YR 4/6 SiClLo		BMRS		
M-402	Neg	19/Apr/09	0-28	10YR 5/4 SaLo		CSE		
M-402	Neg	19/Apr/09	28-33	10YR 6/6 ClLo		CSE		
M-403	Neg	19/Apr/09	0-32	7.5YR 4/4 SiLo		KW		
M-403	Neg	19/Apr/09	32-43	7.5YR 5/6 ClLo		KW		
M-404	Neg	19/Apr/09	0-27	10YR 4/3 SiLo		DSA	Coal	
M-404	Neg	19/Apr/09	27-37	10YR 5/4 SiClLo		DSA		

ST	Pos/Neg	Date	Depth (cm)	Munsell Color/Texture	Artifacts	Initials	Comments	Bag No.
M-405	Neg	19/Apr/09	0-25	10YR 4/3 SiLo		BMRS		
M-405	Neg	19/Apr/09	25-40	10YR 4/6 SiCLLo		BMRS		
M-406	Neg	19/Apr/09	0-30	10YR 5/4 SaLo		CSE		
M-406	Neg	19/Apr/09	30-33	10YR 6/6 ClLo		CSE		
M-407	Neg	19/Apr/09	0-25	10YR 4/3 SiLo		DSA	2 Bricks/Coal	
M-407	Neg	19/Apr/09	25-34	10YR 6/6 SiClLo		DSA		
M-408	Neg	19/Apr/09	0-30	10YR 4/3 SiLo		KW		
M-408	Neg	19/Apr/09	30-40	10YR 5/6 ClLo		KW		
M-409	Neg	19/Apr/09	0-38	10YR 4/3 SiLo		BMRS		
M-409	Neg	19/Apr/09	38-49	2.5Y 4/6 SiClLo		BMRS		
M-410	Neg	19/Apr/09	0-45	10YR 5/4 SaLo		CSE		
M-410	Neg	19/Apr/09	45-50	10YR 6/6 ClLo		CSE		
M-411	Neg	19/Apr/09	0-48	10YR 4/3 SiLo		DSA	Coal	
M-411	Neg	19/Apr/09	48-57	10YR 6/6 SiClLo		DSA		
M-412	Neg	19/Apr/09	0-38	10YR 4/3 SiLo		KW		
M-412	Neg	19/Apr/09	38-50	10YR 5/6 ClLo		KW		
M-413	Pos	19/Apr/09	0-28	10YR 4/3 SiLo	1 Sherd (Mica Tempered)	BMRS		66
M-413	Pos	19/Apr/09	28-40	10YR 6/6 ClLo		BMRS		
M-413 A	Neg	23/Apr/09	0-31	10YR 4/3 SiLo		BMRS	12 ft north of ST# M-413	
M-413 A	Neg	23/Apr/09	31-34	10YR 4/6 SiClLo		BMRS		
M-413 B	Neg	23/Apr/09	0-33	10YR 4/4 SiLo		BMRS	12 ft east of ST# M-413	
M-413 B	Neg	23/Apr/09	33-48	10YR 5/4 SiLo		BMRS		
M-413 B	Neg	23/Apr/09	48-50	2.5Y 5/6 SiClLo		BMRS		
M-413 C	Neg	23/Apr/09	0-30	10YR 4/3 SiLo		BMRS	12 ft south of ST# M-413	
M-413 C	Neg	23/Apr/09	30-34	10YR 4/6 SiClLo		BMRS		
M-413 D	Neg	23/Apr/09	0-25	10YR 4/3 SiLo		BMRS	12 ft west of ST# M-413	
M-413 D	Neg	23/Apr/09	25-28	10YR 5/6 SiClLo		BMRS		
M-414	Neg	19/Apr/09	0-23	10YR 5/4 SaLo		CSE		
M-414	Neg	19/Apr/09	23-30	10YR 6/6 ClLo		CSE		
M-415	Neg	19/Apr/09	0-25	10YR 4/3 SiLo		KW		
M-415	Neg	19/Apr/09	25-35	10YR 5/6 ClLo		KW		
M-416	Neg	19/Apr/09	0-26	10YR 4/3 SiLo		BMRS		
M-416	Neg	19/Apr/09	26-40	10YR 6/6 ClLo		BMRS		
M-417	Neg	19/Apr/09	0-28	10YR 4/3 SiLo		DSA	Coal	
M-417	Neg	19/Apr/09	28-39	10YR 6/6 SiClLo		DSA		
M-418	Neg	19/Apr/09	0-35	10YR 4/3 SiLo		KW		
M-418	Neg	19/Apr/09	35-45	10YR 5/6 ClLo		KW		
M-419	Neg	19/Apr/09	0-44	10YR 5/4 SaLo		CSE		
M-419	Neg	19/Apr/09	44-54	10YR 6/6 ClLo		CSE		
M-420	Neg	19/Apr/09	0-28	10YR 4/3 SiLo		BMRS		
M-420	Neg	19/Apr/09	28-49	10YR 4/4 SiLo		BMRS		
M-420	Neg	19/Apr/09	49-64	2.5Y 4/6 SiClLo		BMRS		

PSEG-ESP Shovel Test Log

ST	Pos/Neg	Date	Depth (cm)	Munsell Color/Texture	Artifacts	Initials	Comments	Bag No.
M-421	Neg	19/Apr/09	0-29	10YR 4/3 ClSiLo		DSA		
M-421	Neg	19/Apr/09	29-38	10YR 5/4 ClLo		DSA		
M-422	Neg	19/Apr/09	0-31	10YR 4/4 SiLo		KW		
M-422	Neg	19/Apr/09	31-41	10YR 5/4 ClLo		KW		
M-423	Neg	19/Apr/09	0-42	10YR 4/3 SiLo		BMRS		
M-423	Neg	19/Apr/09	42-56	2.5Y 4/6 SiClLo		BMRS		
M-424	Neg	19/Apr/09	0-27	10YR 4/3 ClSiLo		DSA		
M-424	Neg	19/Apr/09	27-32	10YR 5/4 ClLo		DSA		
M-425	Neg	19/Apr/09	0-30	10YR 5/4 SaLo		CSE		
M-425	Neg	19/Apr/09	30-353	10YR 6/6 ClLo		CSE		
M-426	Neg	19/Apr/09	0-30	10YR 4/4 SiLo		KW		
M-426	Neg	19/Apr/09	30-40	10YR 5/6 ClLo		KW		
M-427	Neg	19/Apr/09	0-30	10YR 4/3 SiLo		DSA	1 piece modern clear glass, discarded	
M-427	Neg	19/Apr/09	30-34	10YR 5/4 SiCl		DSA		
M-428	Neg	19/Apr/09	0-28	10YR 5/4 SaLo		CSE		
M-428	Neg	19/Apr/09	28-31	10YR 6/6 ClLo		CSE		
M-429	Neg	19/Apr/09	0-28	10YR 4/3 SiLo		BMRS	Discarded Brick and Coal	
M-429	Neg	19/Apr/09	28-45	10YR 4/6 SiClLo		BMRS		
M-430	Neg	19/Apr/09	0-30	10YR 4/4 SiLo		KW		
M-430	Neg	19/Apr/09	30-40	10YR 5/6 ClLo		KW		
M-431	Neg	19/Apr/09	0-27	10YR 4/3 SiLo		DSA		
M-431	Neg	19/Apr/09	27-33	10YR 5/6 ClLo		DSA		
M-432	Pos	19/Apr/09	0-28	10YR 5/4 SaLo	1 Piece Glass	CSE		67
M-432	Pos	19/Apr/09	28-33	10YR 6/6 ClLo		CSE		
M-432 B	Neg	23/Apr/09	0-23	10YR 4/4 SiLo		BMRS	12 ft east of M-432	
M-432 B	Neg	23/Apr/09	23-28	10YR 5/6 SiClLo		BMRS		
M-432 C	Pos	23/Apr/09	0-24	10YR 4/3 SiLo	2 Brick Frags- One Glazed	SCC		90
M-432 C	Pos	23/Apr/09	24-28	10YR 5/6 SaLo		SCC		
M-433	Neg	19/Apr/09	0-30	10YR 4/3 SiLo		BMRS		
M-433	Neg	19/Apr/09	30-42	2.5Y 4/6 SiClLo		BMRS		
M-434	Neg	19/Apr/09	0-26	10YR 4/4 SiLo		KW		
M-434	Neg	19/Apr/09	26-36	10YR 5/6 ClLo		KW		
M-435	Neg	19/Apr/09	0-22	10YR 4/3 SiLo		DSA		
M-435	Neg	19/Apr/09	22-34	10YR 5/6 ClLo		DSA		
M-436	Neg	19/Apr/09	0-22	10YR 5/4 SaLo		CSE		
M-436	Neg	19/Apr/09	22-30	10YR 6/6 ClLo		CSE		
M-437	Neg	19/Apr/09	0-30	10YR 4/4 SiLo		KW		
M-437	Neg	19/Apr/09	30-40	10YR 5/6 ClLo		KW		
M-438	Pos	19/Apr/09	0-25	10YR 4/3 SiLo	1 Sherd	BMRS		68
M-438	Pos	19/Apr/09	25-40	2.5Y 4/6 SiClLo		BMRS		
M-438 A	Neg	23/Apr/09	0-32	10YR 4/4 SiLo		BMRS	25 ft north of M-438	
M-438 A	Neg	23/Apr/09	32-36	10YR 6/4 SiClLo		BMRS		

ST	Pos/Neg	Date	Depth (cm)	Munsell Color/Texture	Artifacts	Initials	Comments	Bag No.
M-438 B	Neg	23/Apr/09	0-23	10YR 4/3 SiLo		SCC		
M-438 B	Neg	23/Apr/09	23-28	10YR 5/6 SaLo		SCC		
M-438 C	Neg	23/Apr/09	0-25	10YR 4/4 SiLo		BMRS	25 ft south of M-438	
M-438 C	Neg	23/Apr/09	25-27	10YR 6/4 SiClLo		BMRS		
M-439	Neg	19/Apr/09	0-21	10YR 4/3 SiLo		DSA		
M-439	Neg	19/Apr/09	21-30	10YR 5/6 ClLo		DSA		
M-440	Neg	19/Apr/09	0-25	7.5YR 4/4 SiLo		KW		
M-440	Neg	19/Apr/09	25-35	7.5YR 5/6 ClLo		KW		
M-441	Neg	19/Apr/09	0-25	10YR 5/4 SaLo		CSE	1 small red brick frag	
M-441	Neg	19/Apr/09	25-30	10YR 5/8 ClLo		CSE		
M-442	Neg	19/Apr/09	0-23	10YR 4/3 SiLo		BMRS	8 M east of road	
M-442	Neg	19/Apr/09	23-68	10YR 5/6 SiClLo		BMRS	Began auguering at 40 cm	
M-442	Neg	19/Apr/09	68-80	10YR 5/6 mottled w/ 10YR 5/8 SaClLo		BMRS		
M-442	Neg	19/Apr/09	80-100	10YR 5/6 LoSa		BMRS		
M-442	Neg	19/Apr/09	100-130	10YR 5/6 Coarse Sand and Gravel		BMRS	No water encountered, auger got sandy gradually	
M-443	Neg	19/Apr/09	0-24	10YR 4/3 SiLo		DSA		
M-443	Neg	19/Apr/09	24-29	10YR 4/6 SiCL		DSA		
M-444	Neg	19/Apr/09	0-22	7.5YR 4/4 SiLo		KW		
M-444	Neg	19/Apr/09	22-34	7.5YR 5/6 ClLo		KW		
M-445	Neg	19/Apr/09	0-25	10YR 5/4 SaLo		CSE		
M-445	Neg	19/Apr/09	25-30	10YR 6/6 ClLo		CSE		
M-446	Pos	19/Apr/09	0-42	10YR 4/3 SiLo	Iron Object (missing)	DSA	Brick	69
M-446	Pos	19/Apr/09	42-47	10YR 4/6 SiCL		DSA		
M-446 A	Neg	23/Apr/09	0-32	10YR 4/4 SiLo		BMRS	25 ft north of M-446	
M-446 A	Neg	23/Apr/09	32-35	2.5Y 5/6 SiClLo		BMRS		
M-446 C	Neg	23/Apr/09	0-26	10YR 4/4 SiLo		BMRS	25 ft south of M-446	
M-446 C	Pos	23/Apr/09	26-44	10YR 5/4 SiLo	Sherd	BMRS		91
M-446 C	Neg	23/Apr/09	44-48	2.5Y 5/6 SiClLo		BMRS		
M-446 D	Neg	23/Apr/09	0-28	10YR 4/3 SiLo		SCC		
M-446 D	Neg	23/Apr/09	28-35	10YR 5/6 SaLo		SCC	located 25 ft west of ST# M-446 (west radial)	
M-447	Neg	19/Apr/09	0-18	7.5YR 4/4 SiLo		KW		
M-447	Neg	19/Apr/09	18-36	7.5YR 5/6 ClLo		KW		
M-448	Neg	19/Apr/09	0-27	10YR 5/4 SaLo		CSE		
M-448	Neg	19/Apr/09	27-34	10YR 6/6 ClLo		CSE		
M-449	Neg	19/Apr/09	0-30	10YR 4/3 SiLo		BMRS		
M-449	Neg	19/Apr/09	30-45	2.5YR 4/6 SiClLo		BMRS		
M-450	Pos	19/Apr/09	0-40	10YR 4/3 SiLo	Sherd	DSA		70
M-450	Pos	19/Apr/09	40-50	10YR 4/6 SiCL		DSA		
M-450 A	Neg	23/Apr/09	0-25	10YR 4/4 SiLo		BMRS	25 ft north of ST M-450	
M-450 A	Neg	23/Apr/09	25-40	10YR 5/4 SiLo		BMRS		

PSEG-ESP Shovel Test Log

ST	Pos/Neg	Date	Depth (cm)	Munsell Color/Texture	Artifacts	Initials	Comments	Bag No.
M-450 A	Neg	23/Apr/09	40-44	2.5YR 4/6 SiClLo		BMRS		
M-450 B	Neg	23/Apr/09	0-31	10YR 4/3 SiLo		SCC		
M-450 B	Neg	23/Apr/09	31-33	10YR 5/6 SaLo		SCC		
M-450 C	Neg	23/Apr/09	0-28	10YR 4/4 SiLo		BMRS		
M-450 C	Pos	23/Apr/09	28-42	10YR 5/4 SiLo	Sherd	BMRS		92
M-450 C	Neg	23/Apr/09	42-45	2.5Y 5/6 SiClLo		BMRS		
M-450 D	Pos	23/Apr/09	0-39	10YR 4/3 SiLo	White Sherd	SCC		93
M-450 D	Pos	23/Apr/09	39-43	10YR 5/6 SaLo		SCC		
M-451	Neg	19/Apr/09	0-25	7.5YR 4/4 SiLo		KW		
M-451	Neg	19/Apr/09	25-38	7.5YR 5/6 ClLo		KW		
M-452	Pos	19/Apr/09	0-26	10YR 5/4 SaLo	1 Metal Object/ 1 Flake	CSE		71
M-452	Pos	19/Apr/09	26-31	10YR 6/6 ClLo		CSE		
M-453	Neg	19/Apr/09	0-32	10YR 4/3 SiLo		BMRS		
M-453	Neg	19/Apr/09	32-45	2.5YR 4/6 SiClLo		BMRS		
M-454	Pos	19/Apr/09	0-27	10YR 4/3 SiLo	1 Piece Clear Glass	DSA		72
M-454	Pos	19/Apr/09	27-35	10YR 5/6 SiCl		DSA		
M-455	Neg	19/Apr/09	0-31	7.5YR 4/4 SiLo		KW		
M-455	Neg	19/Apr/09	31-41	7.5YR 5/6 ClLo		KW		
M-456	Neg	19/Apr/09	0-28	10YR 4/3 SiLo		BMRS		
M-456	Neg	19/Apr/09	28-45	2.5Y 4/6 SiClLo		BMRS		
M-457	Neg	19/Apr/09	0-25	10YR 5/4 SaLo		CSE		
M-457	Neg	19/Apr/09	25-30	10YR 6/6 ClLo		CSE		
M-458	Pos	19/Apr/09	0-24	10YR 4/3 SiLo	2 Sherds (1 Glazed)	DSA		73
M-458	Pos	19/Apr/09	24-34	10YR 5/6 SiCl		DSA		
M-459	Neg	19/Apr/09	0-28	7.5YR 4/4 SiLo		KW		
M-459	Neg	19/Apr/09	28-44	7.5YR 5/6 ClLo		KW		
M-460	Pos	19/Apr/09	0-25	10YR 4/3 SiLo	1 Prehist Sherd/ 1 Redware	BMRS		74
M-460	Pos	19/Apr/09	25-38	10YR 6/6 ClLo		BMRS		
M-461	Neg	19/Apr/09	0-32	10YR 5/4 SaLo		CSE		
M-461	Neg	19/Apr/09	32-42	10YR 6/6 ClLo		CSE		
M-462	Neg	19/Apr/09	0-25	10YR 4/3 SiLo		DSA	Coal	
M-462	Neg	19/Apr/09	25-34	10YR 5/6 SiCl		DSA		
M-463	Neg	19/Apr/09	0-30	7.5YR 4/4 SiLo		KW		
M-463	Neg	19/Apr/09	30-40	7.5YR 5/6 ClLo		KW		
M-464	Pos	19/Apr/09	0-27	10YR 4/3 SiLo	1 Glass/ 1 Poss Sherd	BMRS		75
M-464	Pos	19/Apr/09	27-43	10YR 4/6 SiClLo		BMRS		
M-465	Neg	19/Apr/09	0-25	10YR 4/3 SiLo		DSA	Coal	
M-465	Neg	19/Apr/09	25-34	10YR 5/6 SiCl		DSA		
M-466	Neg	19/Apr/09	0-23	10YR 5/4 SaLo		CSE		
M-466	Neg	19/Apr/09	23-28	10YR 6/6 ClLo		CSE		

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ST	Pos/Neg	Date	Depth (cm)	Munsell Color/Texture	Artifacts	Initials	Comments	Bag No.
M-467	Neg	19/Apr/09	0-30	7.5YR 4/4 SiLo		KW		
M-467	Neg	19/Apr/09	30-40	7.5YR 5/6 ClLo		KW		
M-468	Pos	19/Apr/09	0-32	10YR 4/3 SiLo	1 FRC (In Sod Cap)	BMRS		76
M-468	Pos	19/Apr/09	32-42	10YR 4/6 SiClLo		BMRS		
M-469	Neg	19/Apr/09	0-23	10YR 4/3 SiLo		DSA	Coal	
M-469	Neg	19/Apr/09	23-33	10YR 5/6 SiCl		DSA		
M-470	Neg	19/Apr/09	0-25	10YR 5/4 SaLo		CSE		
M-470	Neg	19/Apr/09	25-30	10YR 6/6 ClLo		CSE		
M-471	Neg	19/Apr/09	0-22	7.5YR 4/4 SiLo		KW		
M-471	Neg	19/Apr/09	22-41	7.5YR 5/6 ClLo		KW		
M-472	Neg	19/Apr/09	0-24	10YR 4/3 SiLo		DSA	Coal	
M-472	Neg	19/Apr/09	24-33	10YR 5/6 SiCl		DSA		
M-473	Neg	19/Apr/09	0-25	10YR 4/3 SiLo		BMRS		
M-473	Neg	19/Apr/09	25-39	10YR 4/6 SiClLo		BMRS		
M-474	Neg	19/Apr/09	0-40	10YR 5/4 SaLo		CSE		
M-474	Neg	19/Apr/09	40-43	10YR 6/6 ClLo		CSE		
M-475	Neg	19/Apr/09	0-25	7.5YR 4/4 SiLo		KW		
M-475	Neg	19/Apr/09	25-35	7.5YR 5/6 ClLo		KW		
M-476	Neg	21/Apr/09	0-28	10YR 4/3 SiLo		BMRS		
M-476	Neg	21/Apr/09	28-40	10YR 6/4 SiClLo		BMRS		
M-477	Pos	21/Apr/09	0-24	10YR 4/3 SiLo	1 Sherd/ 1 Metal	BMRS		78
M-477	Pos	21/Apr/09	24-36	2.5Y 5/4 SiClLo		BMRS		
M-478	Neg	21/Apr/09	0-27	10YR 5/4 SaLo		CSE		
M-478	Neg	21/Apr/09	27-32	10YR 6/6 ClLo		CSE		
M-479	Neg	21/Apr/09	0-22	10YR 4/3 SiLo		KW		
M-479	Neg	21/Apr/09	22-38	10YR 5/6 SiCl		KW		
M-480	Pos	21/Apr/09	0-26	10YR 4/3 SiLo	1 Flake/ 1 Glass Sherd	DSA		77
M-480	Pos	21/Apr/09	26-31	10YR 5/6 SiCl		DSA		
M-481	Neg	21/Apr/09	0-23	10YR 4/3 SiLo		DSA		
M-481	Neg	21/Apr/09	23-34	10YR 5/4 mottled w/ 10YR 5/6 SiCl		DSA		
M-482	Neg	21/Apr/09	0-29	10YR 4/3 SiLo		KW		
M-482	Neg	21/Apr/09	29-39	10YR 5/6 SiCl		KW		
M-483	Neg	21/Apr/09	0-22	10YR 5/4 SaLo		CSE		
M-483	Neg	21/Apr/09	22-32	10YR 6/6 ClLo		CSE		
M-484	Neg	21/Apr/09	0-24	10YR 4/3 SiLo		KW		
M-484	Neg	21/Apr/09	24-38	10YR 5/6 SiCl		KW		
M-485	Neg	21/Apr/09	0-19	10YR 4/3 SiLo		BMRS		
M-485	Neg	21/Apr/09	19-32	10YR 4/6 ClLo		BMRS		
M-486	Neg	21/Apr/09	0-23	10YR 4/3 SiLo		DSA		
M-486	Neg	21/Apr/09	23-32	10YR 5/4 SiCl		DSA		
M-487	Neg	21/Apr/09	0-28	10YR 5/4 SaLo		CSE		

PSEG-ESP Shovel Test Log

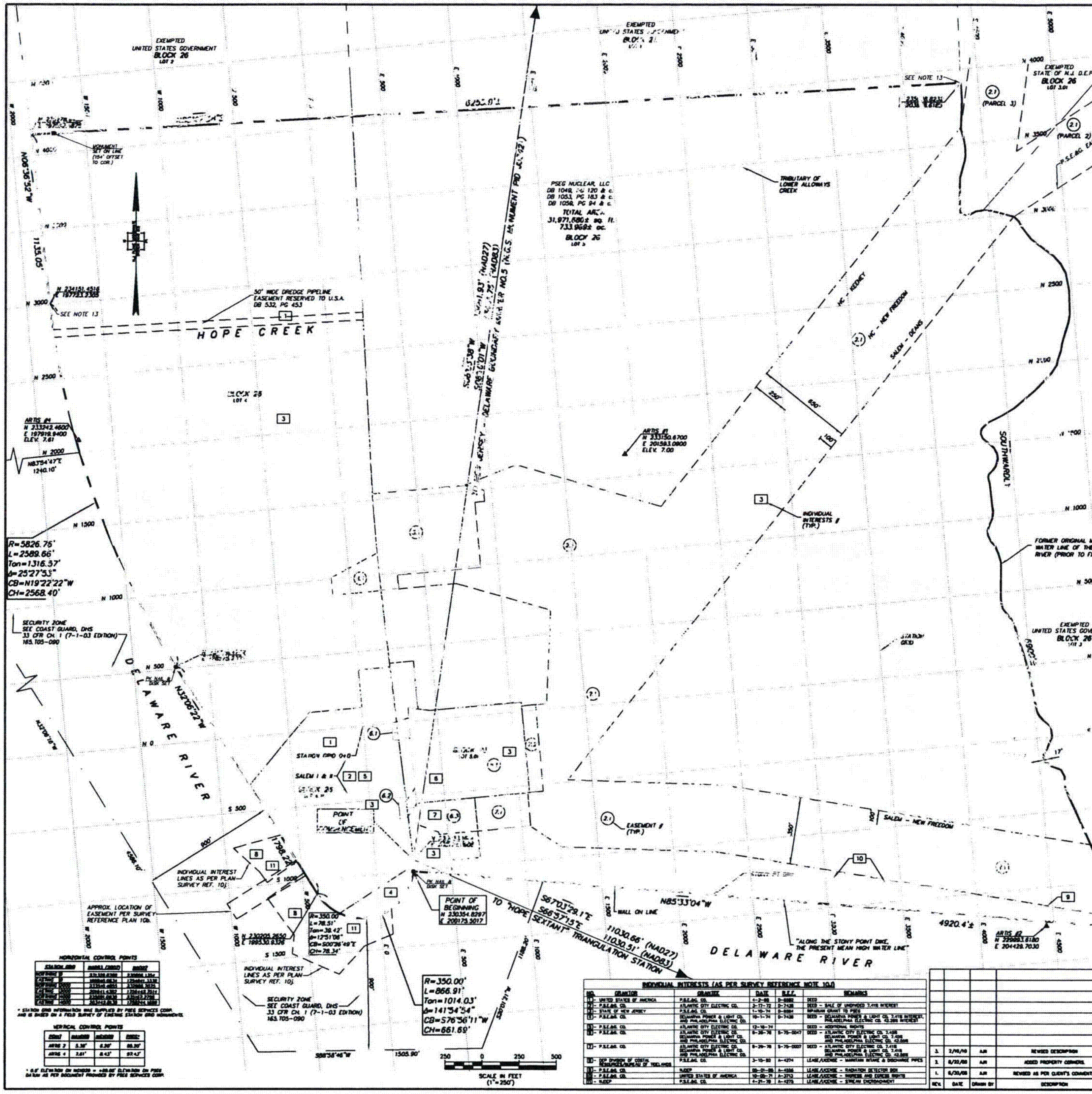
ST	Pos/Neg	Date	Depth (cm)	Munsell Color/Texture	Artifacts	Initials	Comments	Bag No.
M-487	Neg	21/Apr/09	28-35	10YR 6/6 ClLo		CSE		
M-488	Pos	21/Apr/09	0-30	10YR 4/3 SiLo	1 Glass	BMRS		79
M-488	Pos	21/Apr/09	30-40	2.5Y 5/6 ClLo		BMRS		
M-489	Neg	21/Apr/09	0-26	7.5YR 4/4 SiLo		KW		
M-489	Neg	21/Apr/09	26-39	7.5YR 5/6 ClLo		KW		
M-490	Neg	21/Apr/09	0-23	10YR 4/3 SiLo		DSA	Brick	
M-490	Neg	21/Apr/09	23-30	10YR 4/4 SiCl		DSA		
M-491	Neg	21/Apr/09	0-25	10YR 5/4 SaLo		CSE		
M-491	Neg	21/Apr/09	25-35	10YR 6/6 ClLo		CSE		
M-492	Neg	21/Apr/09	0-25	10YR 4/3 SiLo		BMRS		
M-492	Neg	21/Apr/09	25-35	10YR 6/6 ClLo		BMRS		
M-493	Neg	21/Apr/09	0-29	7.5YR 4/4 SiLo		KW		
M-493	Neg	21/Apr/09	29-39	7.5YR 5/6 ClLo		KW		
M-494	Neg	21/Apr/09	0-8	10YR 3/2 SiLo		DSA		
M-494	Neg	21/Apr/09	8-27	10YR 4/3 SiLo		DSA	Treeline	
M-494	Neg	21/Apr/09	27-40	10YR 5/6 SiCl		DSA		
M-495	Neg	21/Apr/09	0-13	10YR 4/2 SiLo- Root Mat		KW	In woodline	
M-495	Neg	21/Apr/09	13-22	10YR 5/4 SiClLo		KW		
M-495	Neg	21/Apr/09	22+	Root Impass- Terminated		KW		
M-496	Neg	21/Apr/09	0-32	10YR 4/3 SiLo		BMRS	Many Roots, in treeline	
M-496	Neg	21/Apr/09	32-40	2.5Y 5/6 SiClLo		BMRS		
M-497	Neg	21/Apr/09	0-22	10YR 5/4 SaLo		CSE		
M-497	Neg	21/Apr/09	22-35	10YR 6/6 ClLo		CSE		
M-498	Neg	21/Apr/09	0-13	10YR 4/2 SiLo		KW	offset due to large tree ~5M	
M-498	Neg	21/Apr/09	13-39	10YR 4/4 SiLo		KW		
M-498	Neg	23/Apr/09	39+	10YR 5/6 ClLo		SCC		
M-499	Neg	21/Apr/09	0-25	10YR 4/3 SiLo		DSA		
M-499	Neg	21/Apr/09	25-30	10YR 5/6 SiCl		DSA		
M-500	Neg	21/Apr/09	0-32	10YR 4/4 SiLo		BMRS		
M-500	Neg	21/Apr/09	32-40	2.5YR 5/4 SiClLo		BMRS		
M-501	Neg	21/Apr/09	0-25	10YR 5/4 SaLo		CSE		
M-501	Neg	21/Apr/09	25-35	10YR 6/6 ClLo		CSE		
M-502	Neg	21/Apr/09	0-34	10YR 4/3 SiLo		DSA		
M-502	Neg	21/Apr/09	34-44	10YR 5/6 SiCl		DSA		
M-510	Neg	23/Apr/09	0-26	10YR 4/3 SiLo		BMRS	Thick Underbrush	
M-510	Neg	23/Apr/09	26-30	2.5YR 4/6 SiClLo		BMRS		
M-511	Neg	23/Apr/09	0-24	10YR 4/3 SiLo		BMRS	Thick Underbrush	
M-511	Neg	23/Apr/09	24-30	2.5YR 4/6 SiClLo		BMRS		
M-512	Neg	23/Apr/09	0-24	10YR 4/3 SiLo		SCC		
M-512	Neg	23/Apr/09	24-30	2.5Y 4/6 ClLo		SCC		

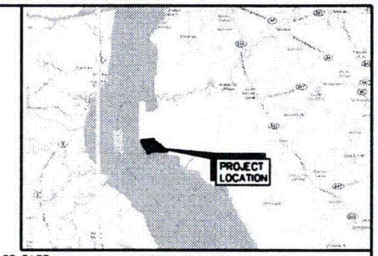
Surface Location	South Group	Artifact	Type	Vessel Type	Sherd Type	Decoration	Count	Incept	Terminal	Notes
IF 107	Kitchen	Ceramic	Refined Redware			Molded W/Brown Glaze On Interior And Exterior	1			
IF 108	Kitchen	Curved Glass	Aqua	Container	Body		1			Burned
IF 109	Kitchen	Ceramic	Hard Paste Chinese Export Porcelain		Body	Plain	1	1660	1800	
IF 110	Kitchen	Ceramic	Ccware		Rim	Molded Flutes	1	1830	1860	
IF 111	Kitchen	Ceramic	Ironstone		Rim	Plain	1	1844	present	
IF 112	Kitchen	Curved Glass	Olive		Base		1			
Cluster 107	Kitchen	Ceramic	Ccware	Plate	Body		2	1830	1860	
Cluster 107	Kitchen	Ceramic	Ccware	Plate	Body	Blue Spatter	1	1830	1860	
Cluster 110	Architecture	Brick	Handmade		Fragment	Ash Glazed	1			
Cluster 110	Architecture	Brick	Indeterminate		Fragment		1			
Cluster 110	Kitchen	Ceramic	Creamware		Body	Plain	1	1775	1820	Lighter Yellow Color
Cluster 110	Kitchen	Ceramic	Indeterminate			Refined; Burned	1			
Cluster 110	Kitchen	Ceramic	Redware		Rim	Brown Glazed	1	late 18th c	19th c	
Cluster 110	Kitchen	Ceramic	Redware		Body	Black Glazed	2	late 18th c	19th c	
Cluster 110	Kitchen	Curved Glass	Colorless	Contaner	Body		1			
Cluster 110	Architecture	Flat Glass	Light Green				1			1.83 mm

Prepared By/Date: JEB 12-08-2009
Checked By/Date: PHG 12-08-2009

APPENDIX G

CD OF REPORT





SITE LOCATION MAP

N.T.S.

INFORMATION OF FACT

PROPERTY DESCRIPTION

TIDAL DATUM CHART (REFERENCE DATUM = NAVD88)

EASEMENT TABLE (ELECTRIC TRANSMISSION)

* EASEMENT & TABLE TAKEN FROM PLAN REFERENCED IN NOTE 10g.

INDIVIDUAL INTERESTS (AS PER SURVEY REFERENCE NOTE 10.j)

HORIZONTAL CONTROL POINTS

VERTICAL CONTROL POINTS

To PSEG Services Corporation
PSEG NUCLEAR LLC

This is to certify that this map or plat and the survey on which it is based were made in accordance with the "Minimum Standard Detail Requirements for ALTA/ACSM Land Title Surveys," jointly established and adopted by ALTA and NSPS in 2005, and include items 1, 2, 3, 4, 5, 8, 9, 10, 11a, 11b, 13, 14, 16, 19, 20, 21 & 22 of Table A thereof. Pursuant to the Accuracy Standards as adopted by ALTA and NSPS and in effect on the date of this certification, undersigned further certifies that in my professional opinion, as a land surveyor registered in the State of New Jersey, the Relative Positional Accuracy of this survey does not exceed that which is specified therein.

Date ______________________

Michael Burns, PLS
New Jersey Licensed Professional Land Surveyor # 34841

REV.	DATE	DRAWN BY	DESCRIPTION
3.	2/16/10	AJH	REVISED DESCRIPTION
2.	8/22/08	AJH	ADDED PROPERTY CORNERS
1.	6/30/08	AJH	REVISED AS PER CLIENT'S COMMENTS

MICHAEL F. BURNS
NEW JERSEY PROFESSIONAL LAND SURVEYOR LIC. NO. 34841

DATE SIGNED: ____________

MASER CONSULTING P.A.
Consulting Municipal & Environmental Engineers
Planners ■ Surveyors ■ Landscape Architects
State of N.J. Certificate of Authorization: 24GA27986500

HAMILTON OFFICE
American Metro Plaza
100 American Metro Blvd., Suite 152
Hamilton, N.J. 08619
Phone (609) 587-8200
Fax (609) 587-8260
E-mail - solutions@maserconsulting.com

Regional Offices: Red Bank, N.J.; Clinton, N.J.; Logan, N.J.; Mt. Arlington, N.J.; Newburgh, N.Y.; West Nyack, N.Y.; Bethlehem, PA

ALTA/ACSM LAND TITLE SURVEY (2005)
FOR
PSEG NUCLEAR LLC
OF
BLOCK 26, LOTS 4, 4.01, 5 & 5.01
TOWNSHIP OF LOWER ALLOWAYS CREEK SALEM COUNTY NEW JERSEY

JOB NUMBER: 05001684D	DATE: JUNE 13, 2008
SCALE: 1" = 250'	LATEST REVISION: FEB. 16, 2010
DRAWING NUMBER: HASU023453	DESIGN BY: RCK
SHEET NUMBER: 1 of 1	

Salem/ Hope Creek Environmental Audit – Post-Audit Information

Question #: PSEG-1D **Category:** PSEG

Statement of Question: Please provide the following documents that were made available during the Salem and HCGS License Renewal Environmental Audit.

Any available information on the "sunken ship cove" (When the ships were placed there, what kind of ships they are, etc...)

Response:
The history and source of the ships in Sunken Ship Cover is explained on pages 18 to 23 in "Submerged Cultural Resources Survey of a Proposed Barge Facility and Water Intake", Panamerican Consultants, Inc, 12/09, which is being provided in response to NRC's Post-Audit Environmental Information Request, item # PSEG-1A.

List Attachments Provided:
NONE.

Salem/ Hope Creek Environmental Audit – Post-Audit Information

Question #: HP-4/ENV-86 **Category:** Health Physics

Statement of Question:

Provide 2009 Radiological Environmental Operating Report and Annual Radiological Effluent Release Report directly to the NRC [License Renewal Environmental (Project Manager)] PM in parallel with submission to the NRC [Document Control Center] through normal channels to avoid time delays in waiting for the document to be posted in ADAMS.

Response: The following documents will be submitted to the NRC License Renewal Environmental Project Manager in parallel with their submission to the NRC Document Control Center after they have been published in April or May 2010.

2009 Radiological Environmental Operating Report, January 1 to December 31, 2009

2009 Annual Radiological Effluent Release Report

List Attachments Provided:

NONE.

Salem/ Hope Creek Environmental Audit – Post-Audit Information

Question #: ENV-84 **Category:** Health Physics

Statement of Question: Please provide the following documents that were made available during the Salem and HCGS License Renewal Environmental Audit.

> Copy of response sheet containing the answer to [Audit Question # ENV-84].

Response:
The response sheet to the following question, which the NRC Staff raised during the Salem and HCGS License Renewal Environmental Audit and which was designated as ENV-84, is being provided.

> What is the impact of the Hope Creek Cobalt Source Project on the REMP?

List Attachments Provided:
PSEG Nuclear, LLC. "Salem/Hope Creek Environmental Audit – Audit Question, Question # – ENV-84." Response Sheet. March 2010.

Salem/ Hope Creek Environmental Audit – Audit Question

Question #: ENV-84 **Category:** Health Physics

Statement of Question: What is the impact of the Hope Creek Cobalt Source Project on the REMP?

Response:
The PSEG License Amendment Request Supporting the Use of Co-60 Isotope Test Assemblies (Isotope Generation Pilot Project) at the HCGS was submitted to the NRC on December 21, 2009. The NRC is currently reviewing the request via audit and requests for additional information. If the NRC approves the Project, it will be implemented through the plant's Design Change Process (DCP). This process would identify any warranted changes to the REMP / RETS. However, specific changes to the REMP, if any, can not be described until the DCP is complete.

List Attachments Provided:
NONE.

Salem/ Hope Creek Environmental Audit – Post-Audit Information

Question #: ENV-88 **Category:** Health Physics

Statement of Question: Have the sites had any noticeable increase of tritium in the overall effluent stream as a result of the groundwater recovery system, and is the tritium measurable within the overall effluent?

Response:
Since 2005, groundwater from the groundwater recovery wells utilized for the Salem tritium remediation program has been transferred to the existing industrial waste treatment system where it mixes with other liquid plant effluents before being discharged into the Salem once-through, condenser cooling water system discharge line and subsequently released into the Delaware River/Estuary. The groundwater containing tritium is pumped from up to six installed remediation wells through a totalizing flow meter and a composite sample is collected for analysis of tritium and gamma-emitting radionuclides. Sampling of this release path is addressed in the Salem Off-site Dose Calculation Manual (ODCM) [see attached excerpt, which includes sections 3/4.11.1 (pages 29 to 34 of 155) and 3/4.11.4 (pages 40 and 41 of 155)], and the discharge is performed under plant procedures and NRC requirements for the effluent release of radioactive liquids.

As the ODCM indicates, a composite sample of effluents released into the Salem once-through, condenser cooling water system discharge line is analyzed monthly for tritium with a lower limit of detection (LLD) of 1×10^{-5} microCuries per milliliter (µCi/mL).The volume and curie discharge is reported in the annual Radiological Effluent Release Report.

Sampling of surface water is also performed in the Delaware River/Estuary (REMP Surface Water Sampling Stations). However, at no sampling location does the tritium testing distinguish between tritium originating from the Salem tritium remediation wells and tritium originating from other liquid effluent sources. Even so, a review of the tritium testing results from the REMP Surface Water Sampling Stations in the Delaware River/Estuary shows that tritium is rarely observable above detection levels (for example, see Figure 5 in the 2008 Annual REMP Report, "Tritium Activity in Surface Water 1988 Through 2008"). Furthermore, instances of observable tritium levels in tritium testing results from the REMP Surface Water Sampling Stations in the Delaware River/Estuary have not increased in frequency since the Salem tritium remediation program began in 2005. This suggests that tritium from the Salem tritium remediation wells is not measurable within the overall effluent stream.

List Attachments Provided:

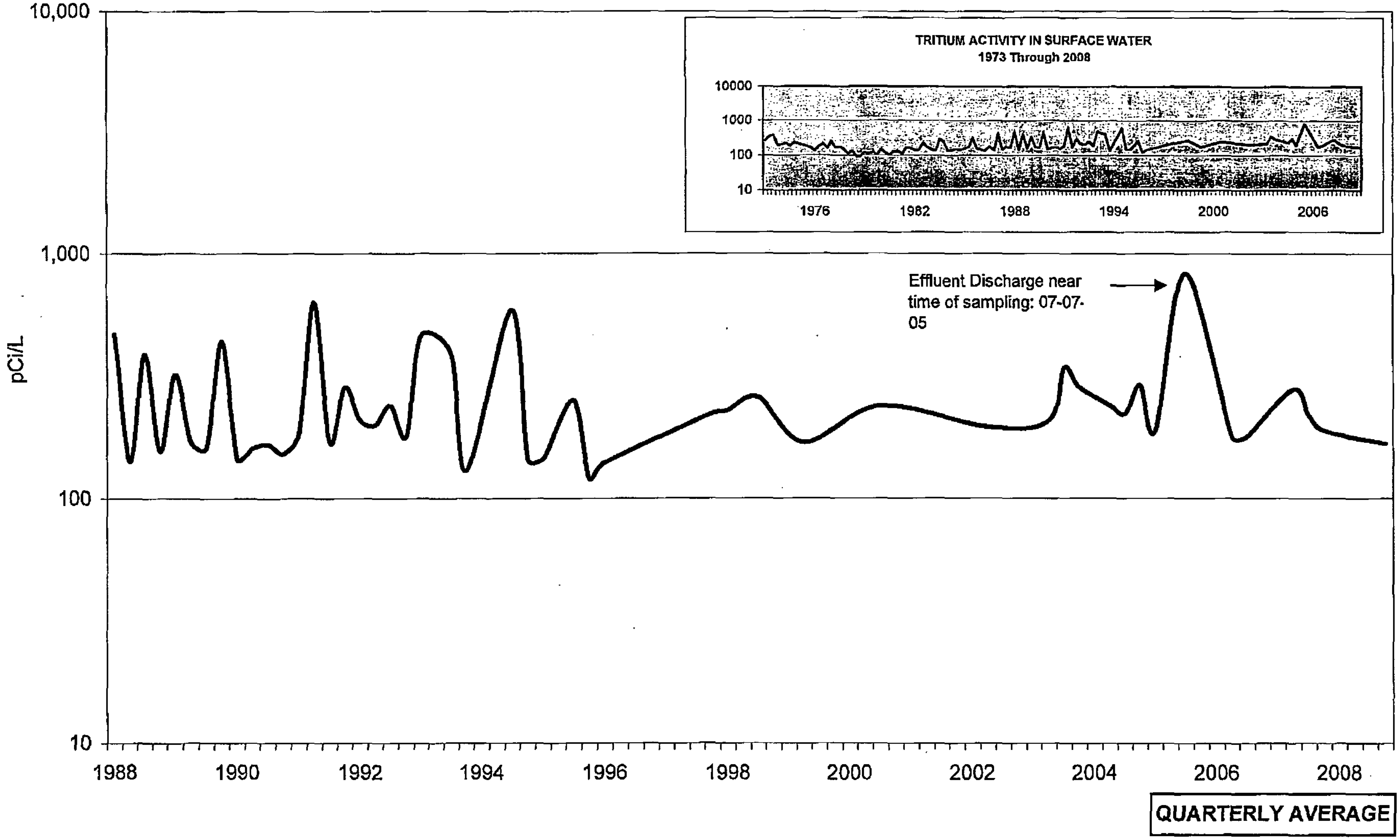
- Figure 5, “Tritium Activity in Surface Water 1988 through 2008,”excerpted from the 2008 Annual REMP Report
- Salem ODCM, Rev. 24, sections 3/4.11.1 (pages 29 to 34 of 155) and 3/4.11.4 (pages 40 and 41 of 155)

2008 Annual REMP Report

Figure 5

Tritium Activity in Surface Water
1988 through 2008

FIGURE 5
TRITIUM ACTIVITY IN SURFACE WATER
1988 THROUGH 2008



Salem Off-Site Dose Calculation Manual, Rev. 24

Sections 3/4.11.1 and 3/4.11.4

3/4.11 RADIOACTIVE EFFLUENTS

3/4.11.1 LIQUID EFFLUENTS

3/4.11.1.1 CONCENTRATION

CONTROLS

3.11.1.1 In accordance with the Salem Units 1 and 2 Technical Specifications 6.8.4.g. 2 and 3, the concentration of radioactive material released in liquid effluents to UNRESTRICTED AREAS (See Figure 5.1-3) shall be limited to the concentrations specified in 10 CFR Part 20, Appendix B, Table II, Column 2 for radionuclides other than dissolved or entrained noble gases. For dissolved or entrained noble gases, the concentration shall be limited to 2 x 10^{-4} microcuries/ml.

APPLICABILITY: At all times.

ACTION:

With the concentration of radioactive material released in liquid effluents to UNRESTRICTED AREAS exceeding the above limits, without delay restore the concentration to within the above limits.

SURVEILLANCE REQUIREMENTS

4.11.1.1.1 Radioactive liquid wastes shall be sampled and analyzed according to the sampling and analyses program in Table 4.11-1.

4.11.1.1.2 The results of the radioactivity analyses shall be used in accordance with the ODCM to assure that the concentrations at the point of release are maintained within the limits of CONTROL 3.11.1.1.

TABLE 4.11-1: RADIOACTIVE LIQUID WASTE SAMPLING AND ANALYSIS PROGRAM

Liquid Release Type	Sampling Frequency	Minimum Analysis Frequency	Type of Activity Analysis	Lower Limit of Detection (LLD)[a] (μCi/ml)
A. Batch Waste Release Tanks[b]	P Each Batch	P Each Batch	Principal Gamma Emitters[c]	$5x10^{-7}$
			I-131	$1x10^{-6}$
	P One Batch/M	M	Dissolve and Entrained Gases (Gamma Emitters)	$1x10^{-5}$
	P Each Batch	M Composite[d]	H-3	$1x10^{-5}$
			Gross Alpha	$1x10^{-7}$
	P Each Batch	Q Composite[d]	Sr-89, Sr-90	$5x10^{-8}$
			Fe-55	$1x10^{-6}$
B. Continuous Releases[e] 1. Steam Generator Blowdown	W Grab Sample	W	Principal Gamma Emitters[c]	$5x10^{-7}$
			I-131	$1x10^{-6}$
	M Grab Sample	M	Dissolved and Entrained Gases	$1x10^{-5}$
	W Grab Sample	M Composite[d]	H-3	$1x10^{-5}$
			Gross Alpha	$1x10^{-7}$
	W Grab Sample	Q Composite[d]	Sr-89, Sr-90	$5x10^{-8}$
			Fe-55	$1x10^{-6}$

TABLE 4.11-1 (Continued)

TABLE NOTATION

a. The LLD is defined, for purposes of these CONTROLS as the smallest concentration of radioactive material in a sample that will yield a net count (above system background) that will be detected with 95% probability with only 5% probability of falsely concluding that a blank observation represents a "real" signal.

For a particular measurement system (which may include radiochemical separation):

$$LLD = \frac{4.66 \bullet S_b}{E \bullet V \bullet 2.22E6 \bullet Y \bullet \exp(-\lambda \Delta t)}$$

Where:

LLD is the "a priori" lower limit of detection as defined above (as microcuries per unit mass or volume),

4.66 is the statistical factor from NUREG 1301

S_b is the standard deviation of the background counting rate or of the counting rate of a blank sample as appropriate (as counts per minute),

E is the counting efficiency (as counts per disintegration),

V is the sample size (in units of mass or volume),

2.22E6 is the number of disintegrations per minute per microcurie,

Y is the fractional radiochemical yield (when applicable),

λ is the radioactive decay constant for the particular radionuclide, and

Δt for environmental samples is the elapsed time between sample collection (or end of the sample collection period) and time of counting.

Typical values of E, V, ξ, and Δt should be used in the calculation.

It should be recognized that the LLD is defined as an a priori (before the fact) limit representing the capability of a measurement system and not as an a posteriori (after the fact) limit for a particular measurement.

TABLE 4.11-1 (Continued)

TABLE NOTATION

b. A batch release is the discharge of liquid wastes of a discrete volume. Prior to sampling for analyses, each batch shall be isolated, and then thoroughly mixed to assure representative sampling.

c. The principal gamma emitters for which the LLD CONTROL applies exclusively are the following radionuclides: Mn-54, Fe-59, Co-58, Co-60, Zn-65, Mo-99, Cs-134, Cs-137, Ce-141, and Ce-144*. This list does not mean that only these nuclides are to be detected and reported. Other peaks that are measurable and identifiable, together with the above nuclides, shall also be identified and reported.

d. A composite sample is one in which the quantity of liquid sampled is proportional to the quantity of liquid waste discharged and in which the method of sampling employed results in a specimen that is representative of the liquids released.

e. A continuous release is the discharge of liquid wastes of a nondiscrete volume, e.g., from a volume of a system that has an input flow during the continuous release.

* The LLD for Ce-144 shall be $2x10^{-6}$ μCi/ml.

3/ 4.11 RADIOACTIVE EFFLUENTS

3/ 4.11.1.2 DOSE

CONTROLS

3.11.1.2 In accordance with Salem Units 1 and 2 Technical Specifications 6.8.4.g.4 and 5, the dose or dose commitment to a MEMBER OF THE PUBLIC from radioactive materials in liquid effluents released, from each reactor unit, to UNRESTRICTED AREAS (see Figure 5.1-3) shall be limited:

a. During any calendar quarter to less than or equal to 1.5 mrem to the total body and to less than or equal to 5 mrem to any organ, and

b. During any calendar year to less than or equal to 3 mrem to the total body and to less than or equal to 10 mrem to any organ.

APPLICABILITY: At all times.

ACTION:

a. With the calculated dose from the release of radioactive materials in liquid effluents exceeding any of the above limits, prepare and submit to the Commission within 30 days, pursuant to Technical Specification 6.9.2, a Special Report that identifies the cause(s) for exceeding the limit(s) and defines the corrective actions that have been taken to reduce the releases and the proposed corrective actions to be taken to assure that subsequent releases will be in compliance with the above limits.

b. The provisions of CONTROL 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.1.2 Cumulative dose contributions from liquid effluents shall be determined in accordance with the ODCM at least once per 31 days.

3/4.11 RADIOACTIVE EFFLUENTS

3/4.11.1.3 LIQUID RADWASTE TREATMENT

CONTROLS

3.11.1.3 In accordance with the Salem Units 1 and 2 Technical Specifications 6.8.4.g.6, the liquid radwaste treatment system shall be used to reduce the radioactive materials liquid wastes prior to their discharge when the projected cumulative doses due to the liquid effluent from each reactor to UNRESTRICTED AREAS (see Figure 5.1-3) exceed 0.375 mrem to the total body or 1.25 mrem to any organ during any calendar quarter.

APPLICABILITY: At all times.

ACTION:

a. With the radioactive liquid waste being discharged without treatment and in excess of the above limits, prepare and submit to the Commission within 30 days, pursuant to Technical Specification 6.9.2, a Special Report that includes the following information:

   1. Explanation of why liquid radwaste was being discharged without treatment, identification of any inoperable equipment or subsystems, and the reason for the inoperability.

   2. Action(s) taken to restore the inoperable equipment to OPERABLE status, and

   3. Summary description of action(s) taken to prevent a recurrence.

b. The provisions of CONTROL 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.1.3 Doses due to liquid releases shall be projected at least once per 31 days in accordance with the ODCM.

3/4.11 RADIOACTIVE EFFLUENTS

3/4.11.2.4 GASEOUS RADWASTE TREATMENT

CONTROLS

3.11.2.4 In accordance with the Salem Units 1 and 2 Technical Specifications 6.8.4.g.6, the GASEOUS RADWASTE TREATMENT SYSTEM and the VENTILATION EXHAUST TREATMENT SYSTEM shall be used to reduce radioactive materials in gaseous waste prior to their discharge when the projected gaseous effluent air doses due to gaseous effluent releases, from the site to areas at and beyond the SITE BOUNDARY (see Figure 5.1-3), exceed 0.625 mrad for gamma radiation and 1.25 mrad for beta radiation in any calendar quarter. The VENTILATION EXHAUST TREATMENT SYSTEM shall be used to reduce radioactive materials in gaseous waste prior to their discharge when the projected doses due to gaseous effluent releases, from each reactor unit, from the site to areas at and beyond the SITE BOUNDARY (see Figure 5.1-3) would exceed 1.875 mrem to any organ in any calendar quarter.

APPLICABILITY: At all times.

ACTION:

a. With gaseous waste being discharged without treatment and in excess of the above limits, prepare and submit to the Commission within 30 days, pursuant to Technical Specification 6.9.2, a Special Report that includes the following information:

    1. Explanation of why gaseous radwaste was being discharged without treatment, identification of any inoperable equipment or subsystems, and the reason for the inoperability.

    2. Action(s) taken to restore the inoperable equipment to OPERABLE status, and

    3. Summary description of action(s) taken to prevent a recurrence.

b. The provisions of CONTROLS 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.2.4 Doses due to gaseous releases from the site shall be projected at least once per 31 days in accordance with the ODCM.

3/4.11 RADIOACTIVE EFFLUENTS

3/4.11.4 TOTAL DOSE

CONTROLS

3.11.4. In accordance with Salem Units 1 and 2 Technical Specification s 6.8.4.g.11, the annual (calendar year) dose or dose commitment to any MEMBER OF THE PUBLIC, due to releases of radioactivity and radiation, from uranium fuel cycle sources shall be limited to less than or equal to 25 mrem to the total body or any organ (except the thyroid, which shall be limited to less than or equal to 75 mrem).

APPLICABILITY: At all times

ACTION:

a. With the calculated doses from the release of radioactive materials in liquid or gaseous effluents exceeding twice the limits of CONTROL 3.11.1.2a, 3.11.1.2b, 3.11.2.2a, 3.11.2.2b, 3.11.2.3a, or 3.11.2.3b, calculations should be made including direct radiation contributions from the reactor units and from outside storage tanks to determine whether the limits of this CONTROL have been exceeded. If such is the case, prepare and submit to the Commission within 30 days, pursuant to Technical Specification 6.9.2, a Special Report that defines the corrective action to be taken to reduce subsequent releases to prevent recurrence of exceeding the above limits and includes the schedule for achieving conformance with the above limits. This Special Report, as defined in 10 CFR Part 20.405c, shall include an analysis that estimates the radiation exposure (dose) to a MEMBER OF THE PUBLIC from uranium fuel cycle sources, including all effluent pathways and direct radiation, for the calendar year that includes the release(s) covered by this report. It shall also describe levels of radiation and concentrations of radioactive material involved, and the cause of the exposure levels or concentrations. If the estimated dose(s) exceeds the above limits, and if the release condition resulting in violation of 40 CFR Part 190 or 10 CFR 72.104 has not already been corrected, the Special Report shall include a request for a variance in accordance with the provisions of 40 CFR Part 190 and 10 CFR 72.104. Submittal of the report is considered a timely request, and a variance is granted until staff action on the request is complete.

b. The provisions of CONTROLS 3.0.3 and 3.0.4 are not applicable.

SURVEILLANCE REQUIREMENTS

4.11.4.1 Cumulative dose contributions from liquid and gaseous effluents shall be determined in accordance with CONTROLS 4.11.1.2, 4.11.2.2, 4.11.2.3, and in accordance with the ODCM.

4.11.4.2 Cumulative dose contributions from direct radiation from the reactor units and from radwaste storage shall be determined in accordance with the ODCM.

Salem/ Hope Creek Environmental Audit – Post-Audit Information

Question #: ENV-98 **Category:** Health Physics

Statement of Question:
Please provide information (referenced sources) on plant-related gamma emitting radionuclides in the subsurface soils associated with the Salem spent fuel pool leak or other systems at Salem and HCGS that are not designed for such releases. Information should include sample locations, depths, and concentrations if known

Response:
Soil samples collected from the borehole cuttings and vacuum excavation materials during installation of the Station monitoring wells were analyzed for gamma-emitting isotopes to determine the appropriate disposal technique based on Station procedures. The soil samples were composite samples (one sample per drum) of cuttings obtained during the monitoring well installation and vacuum excavation activities. Soil samples contained no detectable plant-related gamma-emitting isotopes, with the exception of one of the nine soil samples collected from the cuttings of Well T. Well T is located to the north of the Salem Generating Station, in the area of roof drainage for the Nuclear Operations Support Facility. . The plant-related gamma-emitting isotope identified in the Well T cuttings was Cesium-137, at a concentration of 8.3E-08 µCi/ml. It was determined that this was not related to the tritium investigation based on the distance and orientation from the area of concern. The sample was collected from a shallow depth, based on the amount of gravel in the drum. It is believed this Cesium was residual from the Hope Creek vent release in 1995, which is tracked in the 10 CFR 50.75(g) logs as 5075g19950405. No plant-related gamma-emitting isotopes were detected in any other well installation soil samples.

Soil sampling is discussed in Section 8.1 of the Remedial Investigation Report.

List Attachments Provided:

Arcadis G&M, Inc. *Remedial Investigation Report, PSEG Nuclear LLC Salem Generating Station, Hancock's Bridge, New Jersey*. Prepared for PSEG Services Corporation. March 2004.