



**I-95/Delaware Turnpike Project
New Castle County, Delaware
Phase 1 Archeological Survey**

prepared for
Delaware Department of Transportation
Dover, Delaware

by
John Milner Associates, Inc.
West Chester, Pennsylvania

in association with
Rummel, Klepper & Kahl, LLP
Baltimore, Maryland

October 2004

**I-95/DELAWARE TURNPIKE PROJECT
NEW CASTLE COUNTY, DELAWARE**

PHASE I ARCHEOLOGICAL SURVEY

prepared for

Delaware Department of Transportation
800 Bay Road
Dover, Delaware 19903-0778

by

Robert G. Kingsley, Ph.D.
William J. Chadwick, Ph.D.
Douglas C. McVarish

John Milner Associates, Inc.
535 North Church Street
West Chester, Pennsylvania 19380

in association with

Rummel, Klepper & Kahl, LLP
81 Mosher Street
Baltimore, Maryland 21217

October 2004

ABSTRACT

John Milner Associates, Inc. conducted a Phase I archeological survey as part of an environmental assessment associated with proposed I-95 improvements in New Castle County, Delaware. The work was conducted in association with Rummel, Klepper & Kahl, LLP on behalf of the Delaware Department of Transportation. The purpose of the investigation was to identify archeological sites that might be eligible to the National Register of Historic Places and affected by the proposed highway construction, or to document the absence of such sites. In addition, the project included a geoarcheological assessment of two possible wetland mitigation areas to determine the presence or absence of deeply buried archeological deposits that might be adversely affected by possible wetland construction.

The archeological Area of Potential Effects (APE) extends to either side of I-95 and includes three spatially separate project areas. The first is referred to as the western portion and is associated with proposed replacement of the existing toll plaza, and extends from the Maryland-Delaware border eastward approximately 8,600 feet (1.6 miles). The central portion encompasses the I-95/S.R. 1 interchange. The eastern portion of the APE includes two areas of proposed wetland mitigation, referred to as wetland mitigation Site 1 and Site 7.

In the western portion of the APE, 239 shovel tests were excavated and four prehistoric sites were identified. Site 7NC-D-234 and Site 7NC-D-235 produced minimal artifacts do not appear to represent potentially significant archeological resources that might be eligible for listing in the National Register. Therefore, no further archeological investigation is recommended at these sites. Site 7NC-D-236 and Site 7NC-D-237 produced data suggesting these sites may represent significant archeological resources, eligible for listing in the National Register. If construction is planned for the locations of these sites, Phase II archeological evaluations are recommended prior to construction activities.

In the central portion of the APE, around the I-95/S.R. 1 interchange, three areas considered to have moderate to high archeological sensitivity were identified. Phase I archeological testing at these three areas found no evidence of potentially significant archeological resources. Consequently, no additional archeological investigations are recommended for the I-95/S.R. 1 interchange portion of the project.

In the eastern portion of the APE, shovel and auger tests in proposed mitigation Site 1 and Site 7 showed evidence of filling and marshland environments with no potential for intact archeological deposits. No further archeological investigation is recommended in association with proposed wetland mitigation Site 1 and Site 7.

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1.0 INTRODUCTION

1.1 PURPOSE AND GOALS OF THE INVESTIGATION

John Milner Associates, Inc. (JMA) conducted a Phase I archeological survey as part of an environmental assessment associated with proposed I-95 improvements in New Castle County, Delaware. The work was conducted in association with Rummel, Klepper & Kahl, LLP (RKK) on behalf of the Delaware Department of Transportation (DelDOT) and the Federal Highway Administration (FHWA) (Appendix I). The purpose of the investigation was to identify archeological sites, both historic and prehistoric, that might be eligible to the National Register of Historic Places and affected by the proposed highway construction, or to document the absence of such sites. In addition, the project included a geoarcheological assessment of two possible wetland mitigation areas to determine the presence or absence of deeply buried archeological deposits that might be adversely affected by possible wetland construction.

The proposed I-95 improvements will be funded by the Federal Highway Administration (FHWA). Therefore, the undertaking is subject to review in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended. The investigation was conducted in accordance with the Secretary of the Interior's *Standards and Guidelines for Archeology and Historic Preservation* (National Park Service 1983), as well as guidelines specific to the State of Delaware, including the *Delaware Statewide Comprehensive Historic Preservation Plan* (Ames et al. 1987) and the Delaware State Historic Preservation Office's Guidelines for Archeological and Architectural Surveys in Delaware (1993).

1.2 DESCRIPTION OF THE AREA OF POTENTIAL EFFECTS

The Area of Potential Effects (APE) for archeology reported in this document consists of three spatially separate areas, which may be referred to generally as the western, central, and eastern portions (Figure 1). These three areas correspond to locations of proposed improvements at the existing toll plaza at the Delaware-Maryland state line, improvements at the interchange of I-95 and S.R. 1, and possible wetland replacement areas, respectively.

The western portion extends from the Delaware-Maryland boundary on the west eastward approximately 8,600 feet (1.6 miles) (Figure 2). Because no toll plaza-related highway improvements are expected to incur within the Maryland portion of Interstate 95, the project area terminates at the state line. Within this corridor a new toll plaza will be constructed, and new traffic lanes and shoulders will be introduced. The immediate environs of I-95 in this area include wetlands, open fields, and some residential development.

The central portion encompasses the I-95/S.R. 1 interchange (Figure 3). Within this sizable area existing lanes may be shifted and new ramps, traffic lanes, and shoulders may be introduced. Most of the acreage in this APE has been heavily disturbed by previous construction activities associated with I-95, Route 1, the existing interchange, and the nearby Christiana Mall. Three smaller areas within the APE have been isolated both as possessing moderate to high sensitivity for archeological materials and remaining relatively undisturbed (Figures 3-6).

The eastern portion of the APE includes two areas of proposed wetland mitigation, referred to as wetland mitigation Site 1 and Site 7 (Figure 7). Proposed mitigation Site 1 is located north of I-95 and south and east of the Christiana River. Proposed mitigation Site 7 is located on a point bar

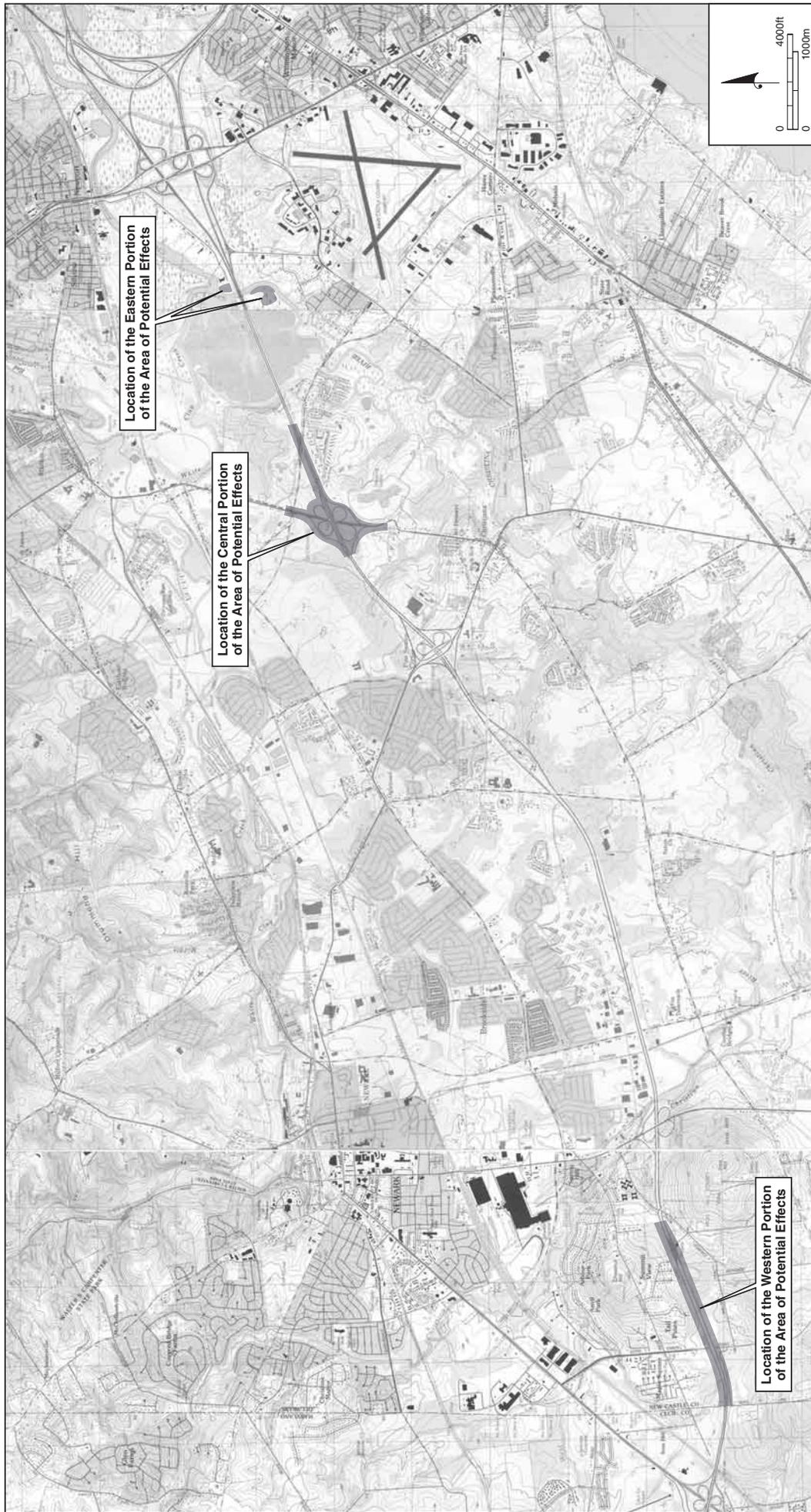


Figure 1. Detail of Newark West, Md.-Del.-Pa. (USGS 1992), Newark East, Del. (USGS 1993), and Wilmington South, Del.-N.J. (USGS 1987) 7.5-minute series quadrangles showing the western, central, and eastern portions of the archeological Area of Potential Effects for the proposed I-95 Delaware Turnpike project.

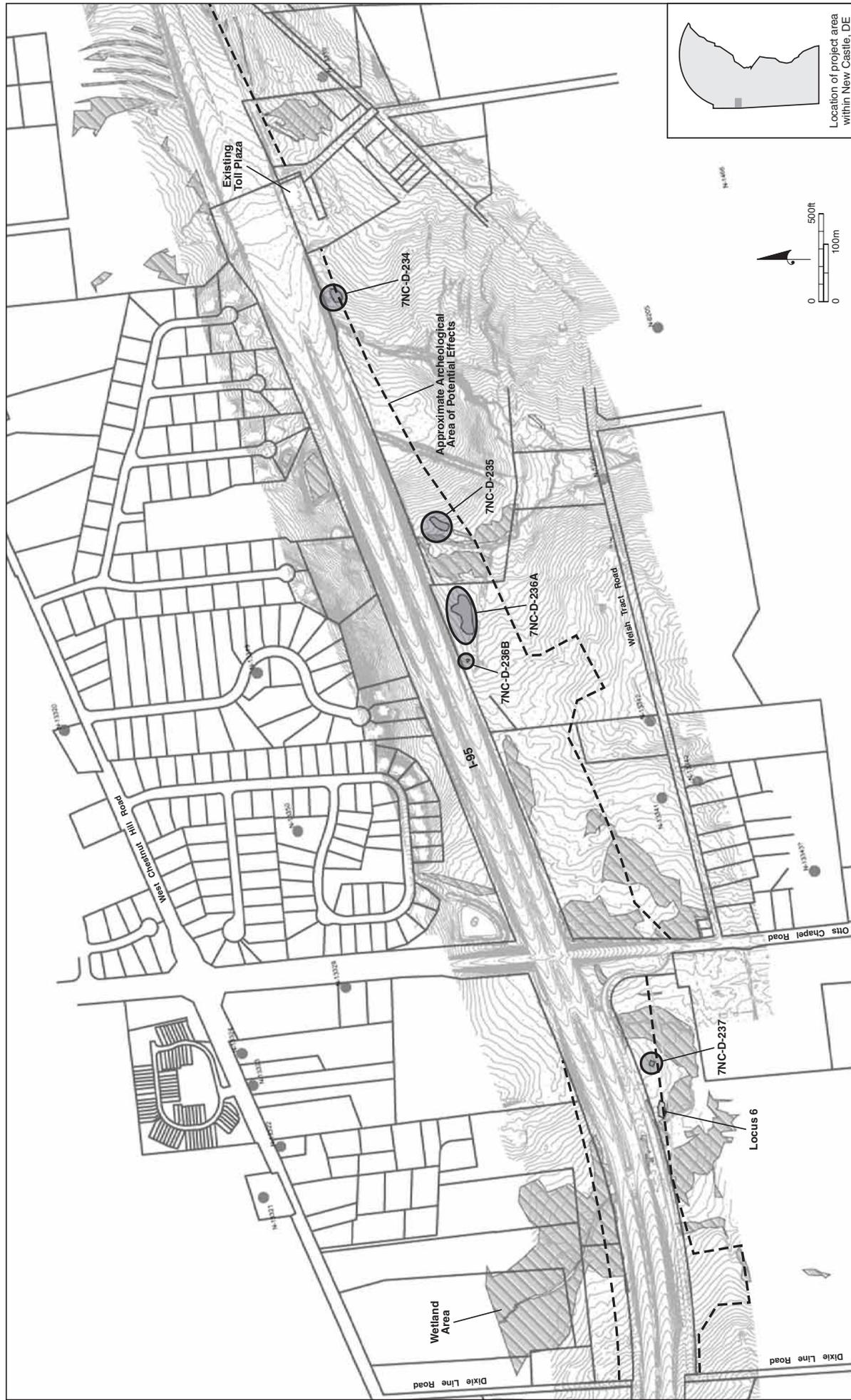


Figure 2. Western portion of archaeological Area of Potential Effects, showing areas of archaeological site locations.

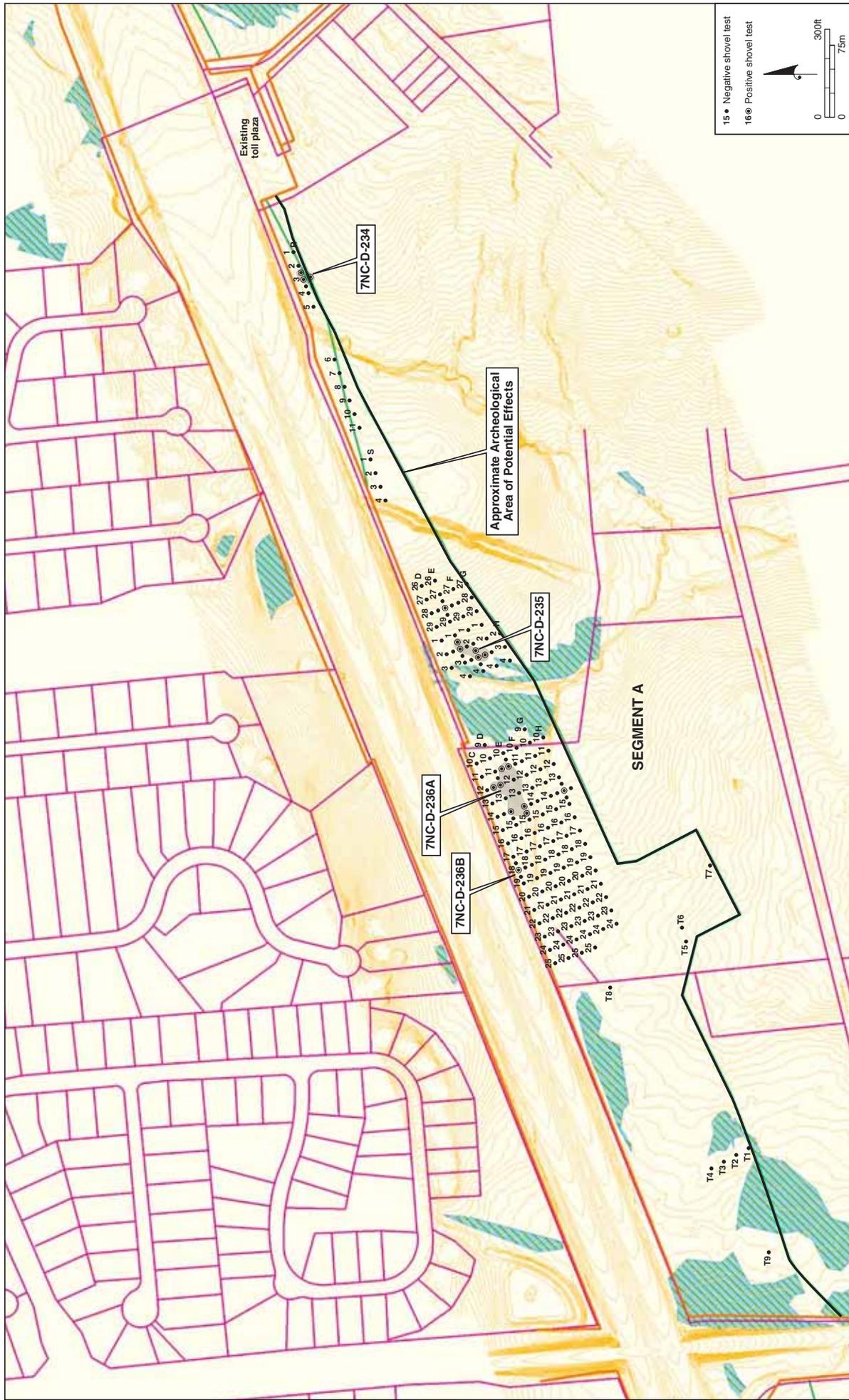


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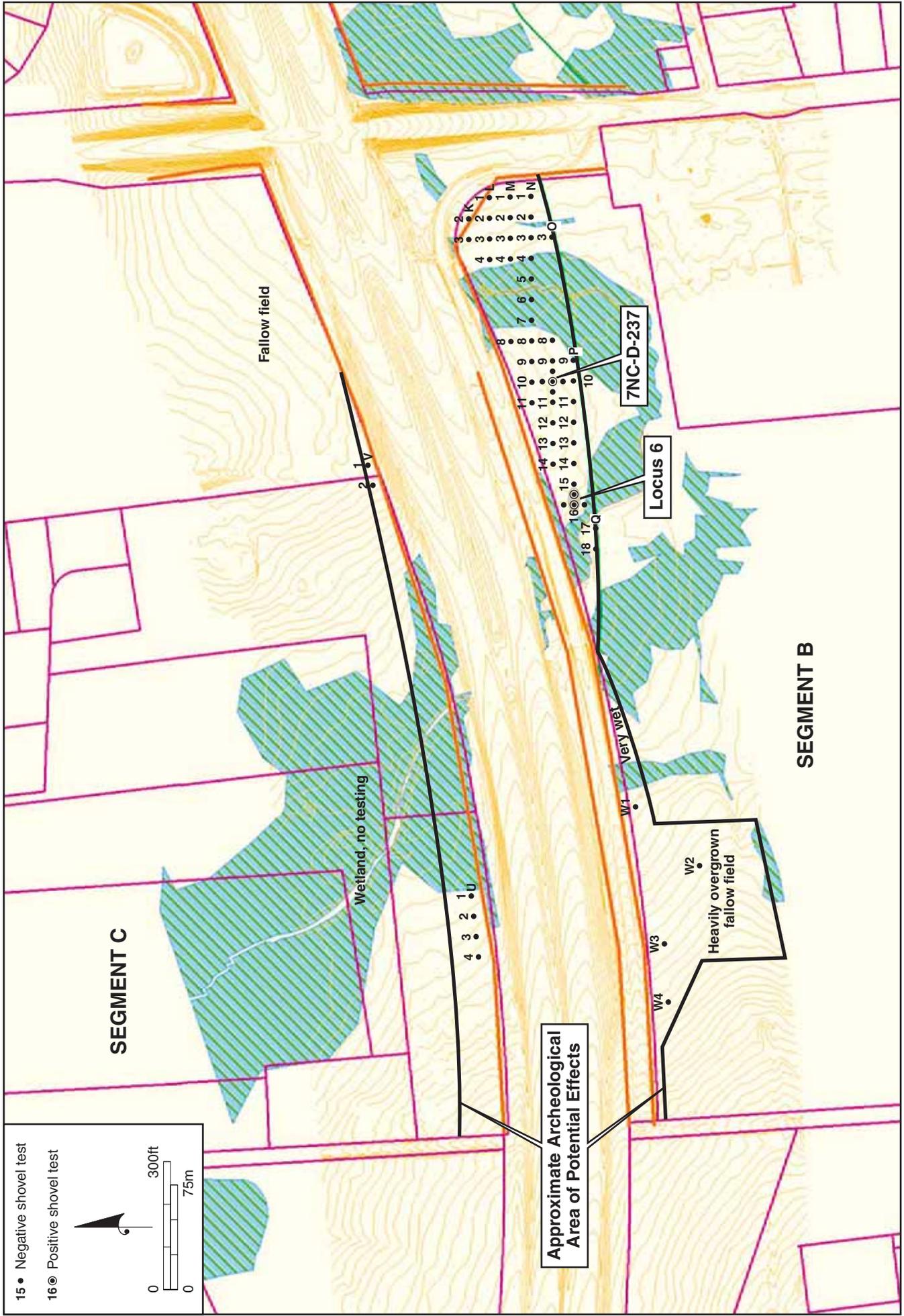


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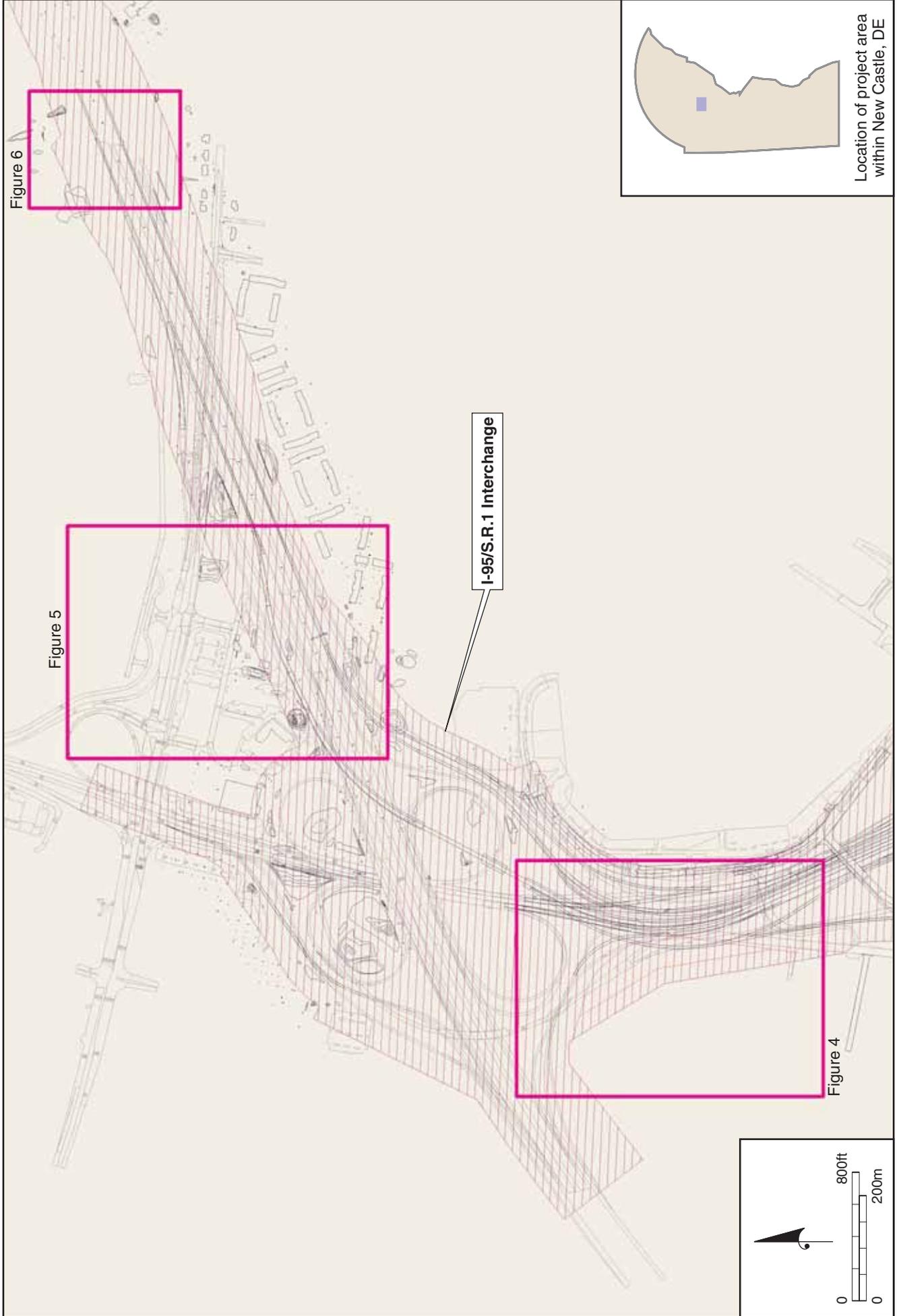


Figure 5. Central portion of archaeological Area of Potential Effects, showing three areas of archeological testing.

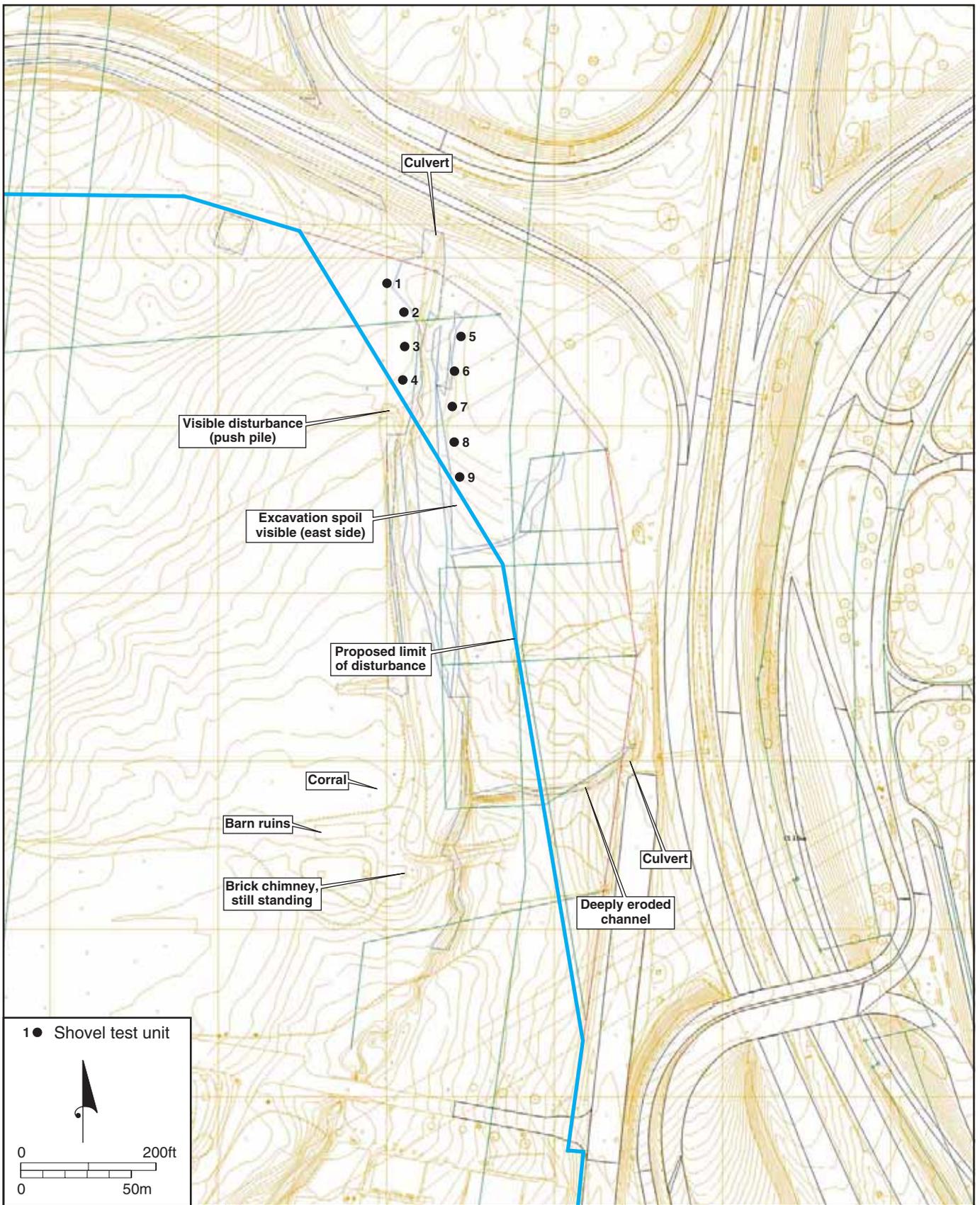


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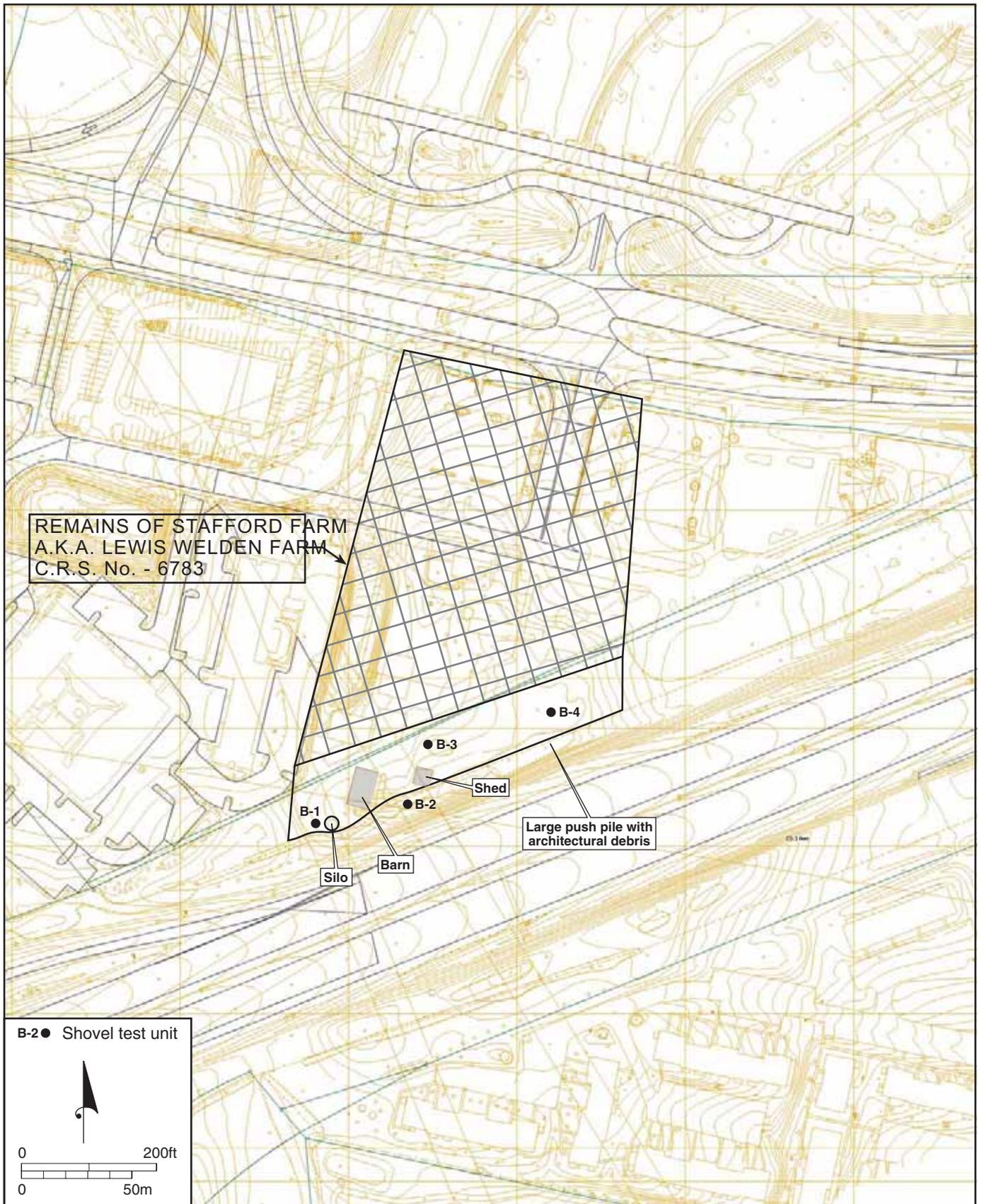


Figure 7. Central portion of archeological Area of Potential Effects, showing archeological testing at the Lewis Welden property.

position of a meander north and west of the Christiana River, on the south side of I-95. Site 1 has undergone extensive disturbance and contains considerable construction debris, while Site 7 is less obviously disturbed and is currently meadowland.

2.0 BACKGROUND RESEARCH

2.1 ENVIRONMENTAL OVERVIEW

The project area lies upon the Delaware Coastal Plain and Piedmont Physiographic Provinces and lies approximately 3.2 km (2 mi) south of the Fall Line. The primary drainages with the project area are the Christina River and White Clay Creek. The area is underlain by the Pleistocene Epoch Columbia Formation, the Lower Cretaceous Potomac Formation, and the Precambrian (?) Iron Hill Gabbro. The Columbia Formation lies within the Coastal Plain Physiographic Province and is composed of a medium to coarse, tan to brown to reddish brown quartz sand with variable gravels and light gray silt components (Groot and Jordan 1999). The paleoenvironmental interpretation of the Columbia Formation is that it was deposited during a transition between a cold climate and a temperate climate by fluvial systems (Groot and Jordan 1999). The Potomac Formation lay unconformably below the Columbia Formation and contains many aquifer-quality sands but is primarily composed of fine-grained silt and clay deposited in the floodplains of the ancient rivers that deposited the sediments (Jordan 1983; McKenna et al. 2004). The Potomac Formation, if exposed, would typically outcrop within the incised valleys of the Christina Creek, Christina River, Muddy Run, Persimmon Run and Creek, and White Clay Creek. The Iron Hill Gabbro is an outlier of the Piedmont Physiographic Province and is surrounded by deposits of the Columbia Formation. The Iron Hill Gabbro is a plutonic rock whose cover is weathered and leached, thus having lost much of its original composition. This weathering has resulted in a layer of iron oxides mixed with ferruginous cryptocrystalline jasper (Plank et al. 2000).

The mapped soil series across the study area consist of the Aldino Series, Elkton Series, Fallsington Series, Keyport Series, Matapeake Series, Mattapex Series, Watchung Series, the Othello-Fallsington-Urban Land Complex, Made Land/Urban Land, and Mixed Alluvial Land (Matthews and Lavoie 1970). Most of these series are found throughout the study areas. The exception is at the proposed wetland mitigation sites. At the proposed mitigation sites, only the Othello-Fallsington-Urban Land Complex and the Made Land/Urban Land are present.

The Aldino Series (AdB₂) soil is moderately well-drained and found on uplands of the Delaware Coastal Plain Physiographic Provinces (Matthews and Lavoie 1970). The typical profile of the Aldino Series begins with a brown (10YR 4/3) silt loam. This is followed by a subsoil with a yellowish brown (10YR 5/4) silty clay loam overlaying a light brownish-gray (10YR 6/2) fragipan of very dense and firm silt loam. Below the fragipan is a saprolite overlying bedrock. Native vegetation on the Aldino Series soils is primarily oaks and hickory (Matthews and Lavoie 1970:11).

The Elkton Series (EmA and EmB) soils are poorly-drained and are found on upland flats in older sediments of the Coastal Plain Physiographic Provinces (Matthews and Lavoie 1970). The typical profile of the Elkton Series begins with a plowzone (Ap) of grayish-brown (10YR 5/2) silt loam overlying a light brownish-gray (10YR 6/2) silt loam A-horizon. The subsoil is a light gray (10YR 6/1) silty clay loam to silty clay to approximately 30 inches with mottles of yellowish brown (10YR 5/8). The underlying material is light gray (10YR 6/1) silt clay marine sediments. Native vegetation on the Elkton Series soils is primarily mixed wetland hardwoods that include oak, gum, swamp maple, and holly (Matthews and Lavoie 1970:20).

The Fallsington Series (Fs) soil is poorly drained and found on upland flats developed on old sandy deposits of the Coastal Plain Physiographic Provinces (Matthews and Lavoie 1970). The

typical profile begins with a plowzone (Ap) of dark grayish-brown (10YR4/2) loam. Below this plowzone is a light brownish-gray (10YR 6/2) sandy clay loam with prominent yellowish brown (10YR 5/8) mottles that transitions to a light gray (10YR 6/1) sandy clay loam with prominent yellowish brown (10YR 5/8) mottles. The underlying material is light gray (10YR 6/1) sandy loam. Native vegetation on the Fallsington Series soil is primarily wetland hardwoods including oak, holly, birch, swamp, and maple (Matthews and Lavoie 1970:22).

The Keyport Series (KeA and KeB₂) are characterized as deep, moderately drained soils that occur on uplands of deposits of clay and silt clay on the Delaware Coastal Plain Physiographic Provinces (Matthews and Lavoie 1970). The typical profile of the Keyport Series begins with a plowzone (Ap) of dark yellowish-brown (10YR 4/4) silt loam. The subsoil is a yellowish brown (10YR 5/6 to 10YR 5/8) silt clay loam. The underlying material is a yellowish brown (10YR 5/6) clay or silt clay variegated with yellowish red (5YR 4/8) that has prominent light gray (10YR 7/1) mottles. Native vegetation on the Keyport Series soils is primarily moisture tolerant mixed hardwoods (Matthews and Lavoie 1970:26).

The Matapeake Series (MeB₂, MeD₃, and MkB₂) are deep, well-drained soils found on uplands of the Coastal Plain Physiographic Provinces (Matthews and Lavoie 1970). A typical profile of the Matapeake Series begins with a plowzone (Ap) of dark brown (10 YR 4/3) silt loam. Underlying the plowzone is an A-horizon of yellowish brown (10YR 5/4) silt loam. The subsoil is a yellowish brown (10YR 5/4) silt loam in the upper portion that transitions to a brown (7.5YR 5/4) silty clay loam in the middle and ends with a yellowish brown (10YR 5/6) very fine sandy loam at the base. The underlying material is a yellowish brown (10YR 5/6) fine sandy loam. Native vegetation on the Matapeake Series soils is primarily oaks and other mixed hardwoods (Matthews and Lavoie 1970:29).

The Mattapex Series (MtB₂) soil is a deep, moderately well drained soil of the Delaware Coastal Plain Physiographic Provinces (Matthews and Lavoie 1970). A typical profile of the Mattapex Series soil starts with a plowzone (Ap) of grayish brown (10RY 4/2) silt loam followed by an A-horizon of yellowish brown (10YR 4/4) silt loam. The subsoil begins with a dark yellowish brown (10YR 4/4) silt loam that transition through a yellowish brown (10YR 5/6) silt loam and a dark brown (7.5YR 4/4) silty clay loam and ends in a dark brown (7.5YR 4/4) silty clay loam with grayish brown (10YR 5/2) mottles. Below the subsoil is a yellowish brown (10YR 5/8) coarse sandy loam. Native vegetation on the Mattapex Series soils is dominantly oaks and other water tolerant hardwoods (Matthews and Lavoie 1970:30).

The Watchung Series (WcB) soil is a poorly-drained soil that occupies depressions and flat areas within the Piedmont Physiographic Provinces of Delaware (Matthews and Lavoie 1970). This soil generally develops within materials derived from weathered Diabase or Gabbro. These soils are found within the study area in close association with Iron Hill. The typical soil of the Watchung Series begins with a dark gray (10YR 4/1) silt loam plowzone (Ap) overlying a subsoil that transitions from a light gray (10YR 6/1) silt clay loam with mottles with that are brown (7.5YR 5/4) to yellowish brown (10YR 5/6) to a gray (5Y 5/1) silty clay with mottles of yellowish brown (10YR 5/6). The underlying the soil is a gray (5Y 5/1) silt loam with mottles that are brown (7.5YR 5/4) and yellowish brown (10YR 5/6). Native vegetation on the Watchung Series soil is primarily oaks and other wetland hardwoods (Matthews and Lavoie 1970:38).

Othello-Fallsington-Urban Land Complex (Ou) is a compilation of soils series used during housing, commercial, and industrial development within the project area (Matthews and Lavoie 1970). These compilations of soils retain their distinct textural and color characteristics even with

their displacement from their original contexts. This soil association is the only soil found related to proposed mitigation Site 7.

The Made Land/Urban Land (Ma) is composed of fill represented by various soil materials, trash, and construction materials and is generally found in areas that have been altered or disturbed by construction or industrial use or where materials have been hydraulically pumped behind bulkheads (Matthews and Lavoie 1970). This soil association is the only soil found related to proposed mitigation Site 1.

The Mixed Alluvial Land (Mv) is composed of materials that occur on floodplains that are flooded at least once a year (Matthews and Lavoie 1970). These are young deposits where soil formation processes have not resulted in distinct characteristics for classification.

2.2 PREHISTORIC AND CONTACT PERIOD OVERVIEW

The following brief, general discussion provides an outline of the prehistoric cultural record of the Delmarva Peninsula as it is currently understood (e.g., Custer 1984a, 1986a, 1987, 1989, 1994; Thomas et al. 1975). The prehistoric archeological record of the Delmarva Peninsula can be divided into five major periods:

- the Paleoindian Period (ca. 14,000–8,500 years [yrs] BP);
- the Archaic Period (ca. 8,500–5,000 yrs BP);
- the Woodland I Period (ca. 5,000–1,000 yrs BP);
- the Woodland II Period (ca. 1,000–350 yrs BP; and
- the Contact Period (ca. A.D. 1650–A.D. 1700).

2.2.1 PALEOINDIAN PERIOD

Native Americans first inhabited Delaware sometime after 14,000 yrs BP, based on dates from Paleoindian-period sites in the eastern United States (Custer 1989:81–86). It is believed that small family groups of Paleoindians lived a wandering existence, hunting in the shifting woodland and grassland mosaic of the time. Game animals may have included musk ox, caribou, moose, and the extinct mastodon; however, modern game animals, such as white-tailed deer, were also present in the region (Custer 1989:95–98). Skeletal evidence of extinct megafauna (mastodon, mammoth) and large northern mammals (e.g., moose, caribou) has been recovered from the drowned continental shelves of the Middle Atlantic region (Emory 1966; Emory and Edwards 1966; Edwards and Merrill 1977). The Paleoindian stone tool kit was designed for hunting and processing animals. Wild plant foods supplemented the diet. Distinctive "fluted" points, characteristic of the early Paleoindian period, show a preference for high-quality stone (Custer 1984b). Use of coastal resources during the Paleoindian period is not known primarily because sea-level rise has drowned the contemporaneous shore (Fletcher 1988; Kellogg 1988; Solecki 1961). Knowledge of the Paleoindian period is, therefore, limited and skewed to the interior of the North American continent.

2.2.2 ARCHAIC PERIOD

The beginning of the Archaic period in Delaware is marked by major changes in human adaptations (Custer 1989:122). By 9,000 yrs BP, northern species of plants and animals had migrated out of the Middle Atlantic region. Temperate plant and animal species were more common, and climate patterns had become more like those of the present. Few Archaic sites have been excavated in Delaware, however, so what is known is largely extrapolated from other areas (Custer 1989:127–129).

The archeological record of the Archaic period includes a wider variety of tools than those of the preceding Paleoindian. From this it has been inferred that human adaptations became more generalized during the Archaic period, and that foraging for plant food resources was an important activity. Archaic period tool kits were also less specialized than the earlier Paleoindian tool kits and included plant-processing tools such as grinding stones, mortars, and pestles. A seasonal, mobile lifestyle exploiting a wide range of resources and settings was probably common. Custer (1986b) found that Archaic sites occur in a wider variety of settings than Paleoindian sites. Archaic sites appear to have been occupied for longer periods of time, perhaps on a seasonal basis by flexible kin-based groups (Custer 1989:129). Exchange of stone for tools tied people together across large areas of the eastern United States, enabling more elaborate exchange networks later in time (Custer 1989:140).

Recent excavations at two sites have added to our knowledge of Archaic-period occupations in Delaware. The Blueberry Hill site, located near Dover, Kent County, was occupied during late Paleoindian/Early Archaic times (Heite and Blume 1995). Evidence of site occupation was sealed and separated by sediments moved by winds during a period of drier climate. The site was situated on a low knoll overlooking a stream confluence and was infrequently occupied for short periods of time, probably as a hunting and gathering camp. The Two Guys site, located in Sussex County, was probably first visited intermittently during Paleoindian times and more intensively during the Early Archaic and Late Archaic periods (LeeDecker et al. 1996). The site is situated on a sandy ridge in an area of extensive, upland wetlands. Evidence for Middle Archaic-period occupation of the Two Guys site is sparse (LeeDecker et al. 1996).

2.2.3 *WOODLAND I PERIOD*

The Woodland period in Delaware has been subdivided into the Woodland I and the Woodland II (Custer 1984a:28, 1989:33–38, 1994:4–6). The Woodland I period, ca. 5,000 to 1,000 yrs BP, is the first period that is well represented on the Delmarva Peninsula. As defined by Custer (1989, 1994), the Woodland I spans three chronological time periods identified for the larger region: the Late Archaic, the Early Woodland, and the Middle Woodland. The Woodland I cultural period is characterized by:

- the use of estuarine and coastal resources and population growth—both resulting in larger and more intensively used sites;
- foraging and collecting adaptations in less-productive areas;
- participation in regional exchange networks; and
- exposure to and participation in complex mortuary rituals (Custer 1994:4).

During the Woodland I period, distinctive cultural complexes have been identified on the basis of artifact styles and regional or local variability (Custer 1994:18–45). Recent work on the Delmarva peninsula has led to revisions of the earlier cultural complexes and their distributions in time and space (Custer 1994:18–22). Woodland I occupation of the Delaware coastal plain, including the project region, is characterized by the Barker's Landing complex, which largely corresponds to the Late Archaic period. After 2,500 yrs BP, the Wolfe Neck complex dominates the low coastal plain, while the Delmarva Adena complex dominates farther north on the high coastal plain, although there is some overlap. The Carey complex, which corresponds to the Middle Woodland of the larger region, dominates the coastal plain. The low coastal plain, including the project area, was dominated chiefly by Late Carey complex cultures during the last 500 years of the Woodland I period. The Barker's Landing complex can be divided into three successive units—I, II, III—characterized by

distinctive types of projectile points and associated ceramics. Exotic lithic materials also distinguish the Barker's Landing complex from the contemporaneous Clyde Farm complex of the northern Delmarva Peninsula (Custer 1984a:134). The Carey and late Carey complexes are distinguished from the earlier Barker's Landing complexes largely by shell-tempered Mockley ceramics.

Prehistoric occupation during the Woodland I period was focused on the major streams draining into the Delaware River and Bay. As sea level continued to rise, the stream basins became drowned and salt water began to intrude upstream with the tides. Site locations apparently shifted upstream as the head of tide migrated (Custer 1994:95–102). Thus, prehistoric archeological sites are spread out along the streams, and occupation appears to have intensified over time. The Woodland I period may have ended with the migration of Algonkian-speaking groups into the eastern United States (Custer 1994:151).

2.2.4 WOODLAND II PERIOD

The Woodland II period, ca. 1,000 yrs BP to A.D. 1600, is characterized by increasing sedentism (Custer and Mellin 1987) and a breakdown in the exchange systems that existed in Woodland I times. The reasons are not well understood, but it has been suggested that population pressure may have played a role (Custer 1989:300). Although sedentism is often associated with the introduction of agriculture, which can provide a steady and reliable subsistence base, there is little evidence for prehistoric agriculture in Delaware. Archeological investigations in the Sussex County coastal region have produced remains of probable cultivated plants (e.g., corn, amaranth seeds), and at the Two Guys site evidence of a cultivated variety of sumpweed (LeeDecker et al. 1996:136–138). Estuarine and marine food resources were probably more important than cultivated foods during the Woodland II period.

2.2.5 CONTACT PERIOD

The archeology of the Contact period, ca. A.D. 1600 to 1700, is very poorly understood because no clear Contact period sites have been reported in Delaware. Although areas in which Native Americans and Europeans interacted are known, sites in Delaware lack artifacts clearly associated with the fur trade that mark contact in other regions. Local peoples were apparently marginalized by other Native American groups that dominated the trade, or local Contact period archeological sites have been covered over or destroyed by historical and modern development. Another possible explanation for the absence of Contact period sites is that contact was short lived and usually ended in violence. A third explanation for the lack of Contact period sites is that archeologists have failed to recognize the subtle combinations of aboriginal and European characteristics and artifacts that would indicate Native American communities or occupations separate from European settlements.

2.3 HISTORIC OVERVIEW

Delaware's historic past, comprising over three and one-half centuries, has been compartmentalized into five temporal study units defined by the *Delaware Comprehensive Historic Preservation Plan* (Ames et al. 1987) which form the basis of a chronological framework for the investigation of the state's historic resources:

- Exploration and Frontier Settlement (1630-1730)
- Intensified and Durable Occupation (1730-1770)
- Early Industrialization (1770-1830)
- Industrialization and Early Urbanization (1830-1880)

- Urbanization and Suburbanization (1880-1940+)
- Suburbanization and Early Ex-urbanization (1940-1960+)

2.3.1 *EXPLORATION AND FRONTIER SETTLEMENT (1630-1730)*

The earliest colonial settlement in Delaware, known as Swanendael ("valley of swans"), was made at present Lewes in 1631. This settlement, sponsored by patroons of the Dutch West India Company and privately financed, was established for the purposes of whaling and raising grain and tobacco. The venture ended in tragedy as the all-male population was wiped out by a massacre in 1632. Further north a group of Swedes in the employ of the New Sweden Company built Fort Christina in 1638 in what is now part of the present city of Wilmington, establishing the first permanent European settlement in Delaware. The Swedish government supported the venture, and Fort Christina became the nucleus of a scattered settlement of Swedish and Finnish farmers known as New Sweden.

The Dutch claimed the identical land—from the Schuylkill River south—by right of prior discovery. In 1651 the West India Company, in an attempt to block Swedish efforts to control commerce on the Delaware River, retaliated by building Fort Casimir at New Castle. The Swedes captured this fort in 1654 and renamed it Fort Trinity. Rivalry between Swedes and Dutch continued, and the Dutch recaptured Fort Trinity in 1655, and also seized Fort Christina. As a result, New Sweden ceased to exist as a political entity due to a lack of support from the homeland. However, Swedish families continued to observe their own customs and religion.

In 1657, as a result of peaceful negotiations, the City of Amsterdam acquired Fort Casimir from the West India Company and founded a town in the environs of the fort called New Amstel. This was a unique situation in American colonial history—a European city became responsible for the governance of an American colony. A small fort was also erected at Lewes in 1659 for the purpose of blocking English intrusion, and a few settlers built homes there, including 41 Dutch Mennonites who established a semi-socialistic community in July of 1663. They too were under the supervision of local officials appointed by the burgomasters of Amsterdam.

English hegemony of the region began in 1664 when Sir Robert Carr attacked the Dutch settlement at New Amstel on behalf of James Stuart, Duke of York and brother of Charles II. This was an important move on England's part to secure her economic position in the New World. New Amstel, renamed New Castle, was besieged and sacked by English soldiers and sailors, resulting in the deaths of three Dutch soldiers and the wounding of 10 others. English troops plundered the town, and English officers confiscated property, livestock, and supplies belonging to the City of Amsterdam, as well as the personal property and real estate owned by the local Dutch officials. The homes of the Mennonites and other settlers at Lewes were also pillaged.

A transfer of political authority from Dutch to English then followed, and the Dutch settlers who swore allegiance to the English were allowed to retain their lands and personal properties with all the rights of Englishmen. Former Dutch magistrates continued in office under English authority, and Swedes, Finns, and Dutch alike peacefully accepted the rule of the Duke of York through his appointed governors.

The settlement pattern for this early period was one of dispersed farmsteads, located along the Delaware and its tributaries, such as the Christina, Appoquinimink, Brandywine, White Clay, and Red Clay. Here the land was well suited for agriculture (Hoffecker 1977). The Swedish and Dutch settlers also pushed their settlement far up the valley of the Christina toward the Elk River.

The town of Christiana Bridge, so named because it was the crossing place of that river, was established by about 1660 at the head of navigation on the Christina.

With the arrival of Penn in the 1680s, an individualistic system of land settlement developed. Grants of tracts of land were made by Penn's proprietors. Penn usually granted land to families, and the standard size tract was about 500 acres (Myers 1912:263). However, a study of the land warrants granted in New Castle County between 1679 and 1700 indicates that about 80 percent of the grants issued were for properties of 300 acres or less, and only 13 percent of the warrants were for properties 500 acres or larger (Eastburn 1891). These larger grants usually went to land speculation companies, such as the London Company, which by 1687 possessed a tract of over 1,300 acres north of White Clay Creek. Land was inexpensive, and in Pennsylvania 100 acres sold for 5 to 15 pounds, or about one to three shillings per acre. Unlike the colonies to the south, such as Maryland, Virginia, and the Carolinas, the quality and low cost of the land in Delaware discouraged the establishment of large estates and land tenancy (Bidwell and Falconer 1941).

By 1683 the cultivated areas of the region consisted of the three lower counties, New Castle, Kent, and Sussex; and three Pennsylvania counties, Philadelphia, Buckingham (Bucks), and Chester. The total population of all six counties in 1683 is estimated to have been about 4,000 (Myers 1912:239). In New Castle County five tax districts, called hundreds, had been established by 1687. With the growth of the population, four more hundreds were created in 1710, including Pencador Hundred, within which a portion of the APE is located.

With the exception of the port towns of Philadelphia and New Castle, there were no major commercial or social centers in the area. The small hamlets that were established were almost always situated on a navigable river or stream, the major transportation routes of the period. Few were located inland because the road network was almost nonexistent. An exception was "Ogle's Town," which was established by 1679 along the road to the Elk River. The villages of Christiana Bridge and Cantwell's Bridge were the only hamlets of any size in the area, and both were located on major navigable rivers and roads. Christiana was located on the road from New Castle to Upland, and Cantwell's Bridge was on the Bohemia Manor cart road to the Chesapeake. The village of Christinahamm, at the mouth of the Christina, was slowly eclipsed by the rise of New Castle, and as early as 1690 was a village of only minor importance (Klein and Garrow 1984).

In the New Castle County region, water transportation was the major mode of travel and commerce in the late seventeenth century. Most of the farmstead tracts and land grants had frontage on a stream or watercourse to ensure that communication and moving of produce to local markets could be accomplished (Hoffecker 1977). In a country that was heavily wooded with a mixture of oaks, walnut, hickory, chestnut, and maple, water travel was the easiest, safest, and most effective means of transport. Overland travel was extremely difficult, because the roads were few and were not easily traversed because of their poor condition. Even the road from New Castle to Christiana Bridge, probably the area's major overland transportation route, was in very poor condition. Generally, the roads in the area were simply intra-regional connectors to the coastal towns.

Swedish settlers grew rye and barley on their farms, but these grains were quickly replaced by wheat when it was found that the latter could be grown more easily. More importantly, wheat became recognized as a marketable commodity, and the farmers and settlers in the area soon shifted from a subsistence-oriented to market-oriented agriculture. Wheat, and to a lesser extent corn, were grown and then shipped by water to local milling sites. The transportation of grains to milling sites supported an extensive coast-wide trade, employing shallops or other similar boats.

These milling sites were among the earliest manufacturing complexes in the region. There was a mill in New Castle by 1658, and one on Red Clay Creek by 1679 (Pursell 1958). Villages such as Christiana Bridge, Newport, and Appoquinimink (Cantwell's Bridge) grew because of this shipping trade, and became market places for the surrounding country. The amount of flour that was exported in the seventeenth century is not known, but it is assumed that much was consumed locally. By the start of the eighteenth century, regional specialization was discernible, and northern Delaware began to be recognized as a wheat- and grain-producing region (Hanna 1917; Loehr 1952; Pursell 1958; Hoffecker 1977).

Another seventeenth century export from the region was lumber. The English settlers, faced with rapidly diminishing timber resources in England, were the primary exploiters of the forests. A sawmill was located on Bread and Cheese Island in New Castle County by 1679. However, unlike Sussex County, lumber from mills in New Castle County was probably used more for building materials locally than as an exported commodity. In order to lessen a chronic shortage of building materials and the necessity of importation from abroad, brickmaking was another seventeenth century industry. The Dutch at New Amstel established the first commercial brickyard in Delaware as early as 1657 (Heite 1976).

Iron mining and smelting may have occurred in Delaware as early as the seventeenth century. In 1673 Augustine Hermann's map was published, identifying a location in west Pencader Hundred as "Yron Hill." While any early mining activities are undocumented, it is evident that there was sufficient trust and interest in the deposits to draw a group of Welsh miner/settlers to the area early in the eighteenth century. From this event a long-standing ironmaking and forging tradition was established in northern New Castle County, specifically in the Iron Hill area.

The present APE was granted in 1701 by William Penn as the 30,000 acre Welsh Tract, located primarily in the northwest corner of New Castle County with part in the northeastern corner of Cecil County. This grant made for William Davies, David Evans, William Willis, and a company of new Welsh purchasers was initially settled by immigrants from southwestern Wales, principally Pembrokeshire and Carmarthenshire. The settlers were predominantly Baptist and Presbyterian, but little is known about their vocations or status before they crossed the Atlantic. About 20 of the families established the Welsh Tract Baptist Church in 1706 in a tiny log building. The present Flemish bond brick building, erected in 1746, is listed in the National Register (Dunlap 1965:259-261; MacDonald 1954).

Northern New Castle County was part of a broader regional economy that was centered in Philadelphia, which in the last quarter of the seventeenth century, quickly began to dominate the economic scene in the lower Delaware Valley. New Castle County was a part of Philadelphia's agricultural and commercial hinterland, along with western New Jersey, northeast Maryland, southeastern and northeastern Pennsylvania, and Kent and Sussex counties in Delaware (Lindstrom 1978; Walzer 1972). Farmers in the region sent their grains to the local milling centers, where the wheat flour and bread were then shipped to Philadelphia for export to the West Indies, other North American colonies, and southern European countries. The farmers in New Castle County quickly adapted to this market system of agriculture. It is estimated that over one-half of the farmsteads in the area were situated within eight miles (or a half-day's journey) of a mill or shipping wharf (Walzer 1972:163).

2.3.2 *INTENSIFIED AND DURABLE OCCUPATION (1730-1770)*

At the beginning of this period, settlement in New Castle County continued in much the same fashion as it had in the previous 100 years. In the Philadelphia region, there was a large influx of immigrants between 1725 and 1755, particularly English and Scotch-Irish, most of whom were indentured servants (Munroe 1978a:160; Galesson 1984; Bailyn 1986). As the transportation network improved, colonists began to move inland away from the navigable rivers and streams. Good, productive land was settled first, but as the population began to grow, marginal property was also occupied. Land was still inexpensive. In 1795, for example, land near Christiana Bridge sold for 3 to 4 pounds (about \$300) per acre (Strickland 1801:19; La Rouchefoucault 1800). A study of the land warrants granted by the Penn government in New Castle County between 1701 and 1725 shows that 85 percent of the farm properties granted to settlers in the area were of 300 acres or less in size, a percentage similar to that in the seventeenth century.

Large grants and tracts of the seventeenth century tended to be divided and subdivided by sale and inheritance (Munroe 1954:19). Farms of 100 acres or less increased in frequency from 10 percent of the total between 1679 and 1700 to 27 percent by the first quarter of the eighteenth century (Eastburn 1891). Using nearby Chester County, Pennsylvania, as a comparison, farm sizes dropped from about 500 acres in 1693 to less than 130 acres by 1791 (Ball and Walton 1976:105). By 1750 it appears that the density of rural settlement in southeast Pennsylvania and New Castle County was approximately five households per square mile (Ball 1976:628; Lemon 1972). At the close of the century, Delaware ranked third in population density behind Rhode Island and Connecticut (Seybert 1818).

Lemon (1967) has divided the eighteenth century in the Philadelphia region into three periods of urban growth. The first period, from 1700 to 1729, was one of urban stagnancy after the initial rapid growth of the seventeenth century. However, hamlets - unplanned towns that sprang up at crossroads and around taverns, ferries and mills - did begin to appear at this time. Ogletown is a prime example of the eighteenth century hamlet in New Castle County. It certainly did not deserve the appellation of town, "...There being but one Brickhouse & a Few Wooden ones all the property of Thomas Ogle, no tavern in the place..." (Paltsits 1935:7). However, Ogletown was located at a crossroads on a major overland transportation route (Coleman et al. 1987).

The second period of urbanization noted by Lemon saw a renewal of town growth based on internal trade between 1730 to 1765. In the Pennsylvania region, Lancaster, York, Carlisle, Reading, and Wilmington are examples of this period of urban growth. On a more local scale, towns such as Christiana Bridge, Newport, Cuckoldstown (modern Stanton), and Newark were chartered and prospered during this period.

Christiana Bridge, located at the head of sloop navigation on the Christina River, had stagnated since the 1680s, but saw growth and prosperity as a major grain transshipment port for produce coming from the upper Chesapeake Bay area. Over the next half-century, but particularly after the American Revolution, Christiana blossomed under the trading and shipping industries into a burgeoning town. By the end of the century, the town could boast a population of 289 inhabitants, ranking fourth in New Castle County in size behind Wilmington, New Castle, and Newport. Located there were several large mills, between 30 and 50 houses, several taverns, and a Presbyterian Church (Rogers and Easter 1960; Acomb 1958:124; Padelford 1939:11; Conrad 1908 2:495).

Christiana Bridge was also an important transshipment town in Philadelphia's economic hinterland. A bridge was reputedly built there by the Swedes by 1660; a second or replacement structure was contracted out in the 1750s, according to the *Pennsylvania Gazette*. Newspaper advertisements for real estate in northern New Castle County in the eighteenth century suggest the importance of the town for economic considerations, often informing potential buyers of a tract as to the distance from the property to Christiana Bridge.

Newport, established about 1735, rivaled Wilmington and Christiana Bridge as a grain-shipping and flour-milling center during the eighteenth century. Because it was less costly to ship flour by water to Philadelphia from Newport than it was to transport the grain overland directly from Lancaster to Philadelphia, grain was transported to Newport overland from the Lancaster and York areas of Pennsylvania. Contemporary maps of Newport show it to have been laid out in a regular town plan, consisting of parallel streets extending from the Christina River and intersected by others at right angles (Colles 1961:170; Moore and Jones 1804:170; Scott 1807:180). Newport was described by travelers as being the size of New Castle, with about 40 well-built houses, three or four stores, and as many taverns (Padelford 1939:11; Scudder 1877:264; Penn 1879:295).

The crossroads town of Newark, chartered in 1758, represented a shift from a water-oriented shipping town to an inland market town. It was located on the two major overland transportation routes, the road from Dover to southeast Pennsylvania and the road from Christiana to Nottingham. Eighteenth century maps show it to have been at the center of no fewer than six roads (Cooch 1946). Newark was established as a market town that supplied the local population with commodities brought from Philadelphia and the surrounding region. While not quite as large as Newport, it was "...the most considerable collection of houses... since Lancaster" (Penn 1879:295). Several mills for local produce were located along White Clay Creek in the town's vicinity, and the Newark Academy was established in the town by the early 1760s.

The town of Stanton, known as Cuckoldstown as early as 1746, became an important milling and grain center in the late eighteenth century. A gristmill was known to be in the vicinity of Stanton as early as 1679, and by 1800 Cuckoldstown rivaled Newport as a local grain processing center. Ships of moderate draft were able to navigate up Red Clay Creek and take on local, as well as southeastern Pennsylvania, farm produce. Located at the confluence of Red Clay Creek with White Clay Creek, Stanton was never a large town. A map of the New Castle County region, drawn in 1777, did not even include the location of Stanton (Cooch 1946), and a traveller's guide, published in 1789 (Colles 1961:170), shows only a mill and 10 dwellings in the vicinity of the town. It was described at the end of the eighteenth century as a "...place of little note...in its vicinity were some good flour mills" (Moore and Jones 1804:6).

Wilmington was by far the largest urban center in New Castle County that developed during this period. Chartered in 1739, the city's location was considered by one visitor to be "one of the pleasantest and most favorable on the whole continent" (Acomb 1958:123). Wilmington soon became a port of entry and a post town, and was an important link in the Philadelphia trading network. Of special significance to the city's location was its proximity to the Brandywine mills. Located one-half mile north of Wilmington, Brandywine village was a small town "...chiefly consisting in mills and taverns, eight or ten being within 100 yards of each other" (Chilton 1931:288). Wilmington thus was a receiving center for local and regional farm produce, brought by water from Christiana, Stanton, and Newport, and shipped up the Delaware to Philadelphia (Lindstrom 1978; Walzer 1972).

Lemon's third period of urban development, from 1766 to 1800, was marked by slower town growth and a more erratic economic pattern. While the towns of New Castle County grew slowly, overall population and land tenancy increased (Lemon 1972:216).

The condition of roads in New Castle County improved considerably during the eighteenth century, but in some locations roads were unsatisfactory even by contemporary standards (Munroe 1954:137; Gray 1961:309). In 1755 the road from Middletown to 'Christeen' was considered good, but from Christiana north "the roads are, in many places, extremely bad and the appearance of the country the same" (Padelford 1939:12). The road from Christiana to Philadelphia, by way of Newport, Wilmington, and Chester, was the post road, but it was described as a "hilly and rocky road; a better and more pleasant [sic] is by New Castle" (Schoepf 1911:376).

The road network in north central New Castle County also improved due to both population growth and interregional trade. A road known as the "New Munster Road" passed through Newark on its way to Lancaster and was laid out in 1765. The "Limekiln Road" (present-day Limestone Road) was evidently established as early as 1726, and extended from the rich grain producing country of southeastern Pennsylvania to the mills in the vicinity of Stanton. A road from Ogletown to the Elk River was resurveyed in 1774 (Conrad 1908:2:490). From Wilmington, a nexus of roads radiated west, south, and north, connecting the Delaware River with the head of the Chesapeake Bay (Head of Elk), Kent and Sussex counties, and southeastern Pennsylvania. Christiana was a major crossroads town on the road to Head of Elk, and also on the route from Red Lion to New Castle. Newport was the terminus of the Lancaster Road, and a route from Newport westward to Newark was laid out in 1750. By mid-century, the roadbeds of many of the area's present-day state roads (Routes 4, 7, and 273; Old Baltimore Pike; portions of Pennsylvania's Route 896), were already established.

Farming in the eighteenth century in New Castle County continued to be a system of mixed husbandry, combining the cultivation of grains with the raising of livestock (Bidwell and Falconer 1941:84). Farming was the most important occupation for between 80 and 90 percent of the area's population (Egnal 1975:201). Wheat remained the primary cash crop, followed by rye, corn, barley, oats, and garden vegetables. In many areas, generations of repeated tillage had begun to exhaust the soil, and in general, even judged by contemporary standards, "...the business of the inland farmers at the end of the eighteenth century was ineffectively and even carelessly managed. Only in a few particulars had any noticeable improvements been made over the primitive methods employed by the earliest settlers" (Bidwell and Falconer 1941:84). A French traveler in Delaware at the end of the eighteenth century, reflecting European views of American agriculture, wrote "the farms are in general small and ill-cultivated; they receive little or no manure and are in every respect badly managed. Some English farmers have recently settled in this neighborhood ... they will doubtless make considerable improvements in agriculture" (La Rouchefoucault 1800:511).

Agricultural practices in New Castle County followed an extensive, rather than an intensive, use of the land (Lemon 1967, 1972:169). Not until the 1750s did three-field or four-field rotational patterns of planting, and only occasionally six-field rotation, become prevalent and widespread. Contemporaries reported that, through the use of these rotational patterns, a yield ranging between six and 20 bushels of wheat per acre could be harvested (Tilton 1946; Strickland 1801). The extensive use of the land was based on this wheat production, the most valuable and important trading commodity that the region could export. It has been suggested that this pattern of land use was the result of a lack of adequate labor supply, the availability of inexpensive land,

household consumption, the market, and the attitudes of the people of the region (Lemon 1972:179). Research in southeast Pennsylvania for this time period indicates that on an average farm of 125 acres, 26 acres would be in grain; 13 in meadow for hay; 20 for pasture; eight or nine in flax or hemp, roots, other vegetables, fruits, and tobacco; three for the farmstead; and the remaining 60 acres would be fallow and woodland (Lemon 1972:167; Ball 1976:628).

Studies of the economic development of the region through the eighteenth century (Sachs 1953; Lemon and Nash 1968; Egnal 1975; Ball 1976; Ball and Walton 1976) have found the period to be one of modest changes in agricultural productivity. These changes, based on population growth and the rise in per capita income, can be seen in two distinct periods: 1720 to 1745 and 1745 to 1760. Minor fluctuations throughout the century were caused by King George's War, the French and Indian War, and the non-importation agreements of 1766 and 1769-1770. In addition, colonists were affected by alternating periods of prosperity and depression. Main (1973) categorizes the New Castle County area as a commercial farm community, or a community that sold a high proportion of its agricultural produce. For this type of community to exist, good farmland and accessibility to markets were necessary. Main's research found that these communities were characterized by high percentages of wealth, rich men, artisans, professionals and merchants, and a high proportion of large versus small farmers.

2.3.3 *EARLY INDUSTRIALIZATION (1770-1830)*

Delaware's manufacturing capacity in the eighteenth century began to be realized during this period. The iron industry, lumber products, and grain milling enterprises continued to grow and prosper. New industries were started that engaged in the preparation of snuff from tobacco, the production of salt from brines in lower Delaware, and the rudimentary beginnings of the textile industry. By the end of the century Delaware was one of the leading manufacturing states and Wilmington was one of America's leading industrial cities. It is evident from research that much of the century was characterized by the stagnated growth of industry due to the effects of first English trade policies, then the Revolutionary War, and finally by the economic uncertainties that followed the War. However, "Locally from 1790 to 1810, commerce prospered as it never had nor would again" (Welsh 1956). This period of increased growth corresponds with the implementation of more sophisticated record-keeping by the federal government and thus, much more substantial research is possible.

A report on the industries of the City of Wilmington in 1791 noted the presence of 12 flour mills, six saw mills, one paper mill, one slitting mill, one barley mill, and one snuff mill. A turn of the century observer commented: "No less than 265,000 barrels of flour, 300,000 barrels of wheat, 170,000 bushels of Indian corn, besides barley, oats, flaxseed, paper, slit iron, snuff, salted provisions and etc. are annually sent from the waters of the Delaware state; of which the Christiana is by far the most productive and probably many times as much so as any other creek or river of like magnitude in the union" (Hancock 1947). Another observer in 1799 recorded the presence of additional mills devoted to the manufacture of linseed oil, a calico printing house, a manufactory of silk bolting-cloth, a hat-making factory, and numerous ship building facilities.

Manufactories that processed iron products also developed. By 1716, iron production was well established in Pennsylvania. In Delaware, Sir William Keith had started a blast furnace on the slopes of Iron Hill by 1725, and a bloomary furnace was known to be in operation by John Ball near St. James Church in Mill Creek Hundred soon after 1706. The construction of a forge by Samuel James within the Welsh Tract in 1723 was the earliest successful forge in the Middle Atlantic. The Abington Iron Works, located on Iron Hill, were in production by the 1730s, as

property advertisements in the *Pennsylvania Gazette* indicate. In Maryland, the Principio Furnace Company, which was to become the largest iron producing company in the Middle Atlantic did not begin production until 1734 (Whitely 1887). In a largely agricultural area such as New Castle County there was a close connection between iron-making and agriculture during the eighteenth and part of the nineteenth centuries. The combination of a readily available raw product and a constant market for their products created the need for a large population of machinists. Thus, northern New Castle County was in the forefront of economic development during the first three quarters of the nineteenth century.

Urbanization in New Castle County during the first quarter of the century was closely tied to transportation routes and agricultural and industrial production. However, most of the towns of importance in the eighteenth century—Christiana Bridge, Newport, Stanton, Cantwell's Bridge, and Newark—that were originally settled because of their location on major transportation arteries, remained major marketing, milling, and shipping centers for only a brief period into the nineteenth century. As early as 1808, it was reported that Christiana Bridge "was formerly the greatest of all the waters across the peninsula," and that its decline was caused by the numerous mills on the Elk River and its tributaries, the rise of Baltimore and the inexpensive cost of shipping produce to that city, and the development of other water and overland transportation routes more convenient than the one through the town (American State Papers 1808, Misc. 1:758). In a more favorable review in 1815, however, it was recorded that Christiana Bridge "is an important place as a depot for goods transporting east or south, as it offers the shortest land carriage between the bays" (Niles Weekly Register IV 1822). Clearly, Christiana remained a major crossroads town (Figure 10), but by the late 1820s was no longer the commercial center it had been in the eighteenth century (Cooch 1946).

2.3.4 INDUSTRIALIZATION AND EARLY URBANIZATION (1830-1880)

In the first half of the nineteenth century, methods and routes of transportation underwent substantial changes in New Castle County, as first turnpikes, then canals, and finally railroads were introduced (Figure 11). Throughout the century, improved transportation was the key to urban, agricultural, and industrial development. The first successful turnpike in Delaware was the Newport and Gap turnpike, which was begun in 1808. It was noted in 1809 that the economic situation of Newport was failing and that "the inhabitants hope something from a turnpike road now progressing" (Scudder 1877:264). The Newport and Gap Turnpike did slow this process of decay, but it could not halt it.

By 1815, eight more turnpikes, all with roads in New Castle County, had been chartered: the Wilmington Turnpike Company, incorporated; the New Castle and Frenchtown Turnpike Company, 1809; the New Castle Turnpike Company, 1811; the Kennett Turnpike Company, 1811; the Wilmington and Great Valley Turnpike Company, 1813; the Wilmington and Philadelphia Turnpike Company, 1813; the Elk and Christiana Turnpike Company, 1813; and the Wilmington and Christiana Turnpike Company, 1815. It should be noted that economic decline like that suffered by Christiana was often an impetus for the construction of a turnpike. For example, the two turnpikes that were built through Christiana in 1813 and 1815 were attempts to get Christiana 'back on the map', and to provide a viable Baltimore-Philadelphia overland connection, and a third turnpike, called the New Castle and White Clay Creek Hundred, was planned to pass through Christiana, was incorporated in 1813, but got little local support and was not constructed (Delaware Laws General Assembly 1813). Despite the improved transportation routes listed above, it was found that water travel was still the cheapest, fastest, safest, and most dependable means of transport available (Gray 1961:311).

The most significant canal built in Delaware was the Chesapeake and Delaware Canal, completed in 1829. Originally planned to connect the Elk and Christina Rivers, it was later constructed across the Delmarva Peninsula below New Castle, just north of Reedy Island. The canal was expected to bring wealth and prosperity to the communities of northern Delaware, and in fact, two new towns were constructed, Delaware City and Chesapeake City, at the termini of the Canal. Instead of widespread prosperity, however, the canal contributed to the economic decline of Christiana, Newport, Stanton, and New Castle, as goods previously shipped overland across the peninsula could now be sent more cheaply by water. Even Chesapeake City and Delaware City were disappointed in their expected economic boom, and growth in these towns was slow. Although not an original purpose of its construction, the Canal also came to serve as a border between two distinct socio-cultural sections of Delaware: the industrial/commercial area of northern New Castle County, and the agrarian communities of southern New Castle, Kent, and Sussex Counties. The Canal would continue to serve in this borderline function throughout the remainder of the century, and does so today.

Railroads came to New Castle County in the 1830s. The first line, the New Castle and Frenchtown Railroad, was constructed in 1832 as a direct result of the opening of the Chesapeake and Delaware Canal, and was an effort to compete with that transportation route (Hoffecker 1977:43). In 1838, the Philadelphia, Wilmington, and Baltimore Railroad was completed, and quickly became the major transportation route across the Delmarva Peninsula (Dare 1856). Throughout the remainder of the century, rail lines continued to be built in northern New Castle County, such as the Baltimore and Ohio, the Wilmington and New Castle, and the Wilmington and Western railroads. As noted previously, the towns of Newark, Stanton, and Newport benefited from their proximity to these railroads, staving off the economic stagnation and decline that were experienced by Christiana, Oglethown, and Glasgow.

New Castle County continued to be predominantly agricultural throughout much of the nineteenth century. In 1815 it was reported that "the greater part of the inhabitants of this state are devoted to agricultural pursuits, and they have rendered it very productive. The principal produce is wheat, rye, Indian corn, barley, oats, and flax. Grasses are abundant, and thrive very luxuriantly, furnishing food for many cattle—and every sort of vegetable ... thrives well here. The staple produce is wheat, of which a great quantity of flour is made for export" (Melish 1815:181). At the start of the nineteenth century, however, agriculture in New Castle County was in a dismal situation. Farming practices continued as much they had during the previous century with the use of the four field system of cropping. Wheat was still the dominant crop, the use of fertilizers was infrequent, and a large number of tenants worked the land. Production was, on the whole, quite low during the first quarter of the century. It was estimated that the average return of crops for all of Delaware was five bushels of wheat per acre, ten of corn, and fifteen of oats, despite the knowledge that the use of fertilizers could increase crop yields to forty bushels of wheat per acre and eighty of corn (Allmond 1958:57).

Demand for American agricultural products was high until about 1815. The out-migration of the population that took place at this time can be seen in the tax assessment data for the nineteenth century for white Clay Creek Hundred (Coleman et al. 1984). A steady rise in the number of taxables was observed from 1800 to 1818, with a sudden drop in 1819. The assessments also list many of the taxables as no longer being in the Hundred, and often there is a notation of "Gone to Ohio" or "Moved to Indiana." Contributing to these difficulties were the problems presented by the Hessian Fly and Black stem-rust, both of which did severe damage to wheat crops. However, it has been suggested that indirectly the Hessian Fly was helpful to wheat cultivation, because it

caused increased attention to be given to fertilization and crop tillage, which increased agricultural productivity (Bidwell and Falconer 1941:96).

The revival of the New Castle County Agricultural Society, one of the first such organizations in the nation, in 1818, encouraged farmers in the use of improved drainage techniques, fertilizers, and machinery. New Castle County was on its way to becoming one of the finest agricultural counties in the United States by 1860. Indeed, between 1830 and 1860, when judged by contemporary agriculturalists, the county was considered to be "far superior to other sections of the state" (Hancock 1947:375), and one newspaper observed that "it will satisfactorily compare, in every respect, with the crack counties in the large neighboring states" (Delaware State Journal 1846). Fertilization, farm machinery, and improved drainage were helpful in the agricultural success, but the county's rich natural resources, its fine transportation network, and the proximity of cities, were advantages with which other areas, particularly Kent and Sussex Counties, found difficult to compete. A traveler through the region summed this up well when he wrote "the northern portion of this little state is generally a fine tract of country, being highly and skillfully cultivated, and well adapted to the growth of wheat and other grains of superior quality. In a word, this portion of the state presents all that is delightful in agriculture" (Myers 1849:39).

Average farm size remained much as it had been during the eighteenth century, about 200 acres. However, farms of 300 to 400 acres were not uncommon (Bausman 1933:64). Prior to 1900, real estate values for agricultural property ranged from \$50 to \$125 an acre in the Christiana-Ogletown-Stanton area (DSPD 1898). The system of farming employed in northern Delaware was similar to that used in neighboring Chester County, and was either a cropping system, a mixed system, or a grazing system (Bidwell and Falconer 1941:261). Documentary evidence for the W.M. Hawthorn farmstead (Coleman et al. 1984) indicates that the mixed system of farming was used by the occupants of the farm. In this method, a well-watered portion of the farm was kept as permanent pasture and was frequently manured, with the remainder of the farm cropped in a rotation of corn, oats, barley, wheat, and clover. The Chester County system of farming was widely held in high esteem, and a typical farm, following this pattern, probably was clean and well arranged, with well-built fences dividing the farmstead into seven to twelve enclosures, and with neatly-constructed farm buildings located near a spring (Bidwell and Falconer 1941:262).

Livestock production in New Castle County continued to be a major farm occupation in the first half of the nineteenth century (Bidwell and Falconer 1941:394). Prior to 1850, the area of eastern Pennsylvania, New Jersey, and northern Delaware had been known for its cattle-feeding industry. However, it was dairy-farming that began to predominate in New Castle County, particularly because of the need for fresh butter and milk in the urban centers of Philadelphia and Wilmington. By 1847, dairies ranging from 15 to 100 cows were common in northern New Castle County (Bidwell and Falconer 1941:427).

Between approximately 1840 and 1860, southern New Castle County and Kent and Sussex counties were large producers of peaches, which were shipped by rail and water to Philadelphia, Wilmington, and Baltimore. This "peach boom" was short-lived, however, when a disease called "the Yellows" devastated the orchards. Some northern New Castle County farmers did grow peaches, but the area did not base its agricultural production on this fruit. Thus, farmers in this area were less affected by the peach blight than areas further south. Other fruits, particularly apples, were grown for profit in the northern New Castle County area (United States Bureau of Census 1850-1880; Myers 1849:39; Hoffecker 1977).

From 1860 until the end of the century, truck or market gardening and the orchard industry began to predominate in much of Delaware. This trend saw its largest percentage increase in the state between 1889 and 1899, with an increase of 457.2 percent (Shannon 1945:260). Northern New Castle County did join this agricultural trend, but still grew a large amount of cereal crops. These grains were no longer for export or widespread consumption, but were for local use in the urban centers, and for cattle-feeding.

Tenant farming, which had been quite common in the eighteenth century, became even more prevalent during the nineteenth century. Large landowners, having acquired much of their holdings during the hard times of the 1820s leased their lands to tenants. One author had likened the farm situation in Delaware in the second half of the nineteenth century to that of the antebellum southern aristocracy: there developed a class of farm owners who not only did little labor themselves, but required that the hired labor render personal services. "They lived on their farms and personally directed their farm businesses. Some of them owned additional farms which they either 'carried on' or rented to tenants" (Bausman 1933:165). By 1900 over 50 percent of all the farmers in Delaware were tenants or share croppers. Over the period between 1880 and 1900 this figure represents almost an eight percent increase in farm tenancy (Shannon 1945:418). Tenancy remained a dominant farming practice into the twentieth century.

The growth of non-agricultural businesses coincided with the decline in agricultural pursuits, which was caused by population expansion and outmigration, poor agricultural production in the early years of the nineteenth century, and urban and industrial expansion (Taylor 1964a; Lindstrom 1978, 1979). Lindstrom (1978:123) found that in 1820 over 76 percent of the population in the Philadelphia hinterland were farmers by occupation, and by 1840 this number had declined to about 70 percent. In addition, the income per agricultural worker fell well below that of the non-agricultural worker. At the same time the income of farmers in the region who were able to remain productive was higher when compared with other areas of the nation. Thus, while many farmers were forced to migrate west or into the cities, or become tenants, many farmers who were successful enjoyed a substantial income and prosperity.

In New Castle County, these changes had brought an end to export crop production, and a real specialization began to occur. New Castle County became an area that specialized in the production of corn, dairy products, fruits and vegetables, and lumber, while producing much less wheat and livestock (Lindstrom 1978:125). By the middle of the century, the county produced goods that were desired by the nearby urban communities supplying perishables such as milk, butter, fruits, and vegetables. This shift from cereal farming to market gardening would continue into the next century.

Regional development during the nineteenth century was much more complex than in the previous decades, primarily due to the great strides in industrialization, urbanization, and transportation that were caused by the Industrial Revolution (Taylor 1964b; Walzer 1972; Lindstrom 1978, 1979). The first half of the century witnessed a noticeable decline in Philadelphia's economic influence over the region, caused by Baltimore's rise, the competition for markets between the two cities, and a drop in the consumption by foreign markets of Philadelphia's agricultural produce. The area responded by diversifying its agricultural production, but primarily it devoted increasingly more of its resources to manufacturing (Lindstrom 1978:122).

While milling continued to be an important occupation in New Castle County, manufacturing of all sorts became common as the century wore on. The variety of manufacturing and milling

establishments in northern New Castle County was astounding. In 1815, *Niles' Weekly Register* observed that the White Clay Creek, Red Clay Creek, and Christiana River drainages within Delaware were the power sources for 46 different mills or manufactories: 24 grist mills, 10 saw mills, 5 cotton mills, 2 woolen manufactories, 1 paper mill, 1 slitting mill, 1 snuff mill, 1 glazing mill, and 1 oil and saw mill (Niles Weekly Register 1822). Less than 35 years later, the number of woolen and cotton manufactories had doubled to 14, all steam or water powered, and it was recorded that "the manufactories of Delaware are more extensive than its commerce" (Myers 1849:40). Although Beers' *Atlas of the State of Delaware* (1868) shows only a slight increase since 1815 in the total number of mills and factories in the hundreds of White Clay Creek, Mill Creek, Christiana, and Pencader, the diversification of mill types in 1868 reveals a decline in the number of agriculturally-oriented establishments and a rise in the number of manufactories based on an industrially-oriented economy. As noted above, in 1815 there were 24 grist mills and, excluding saw mills, only half as many mills of other types. By 1868, there were 19 grist mills and, again excluding saw mills, 15 mills of all other types—iron, cotton, woolen, paper, snuff, spice, bark, and phosphate.

The first official report on the state of manufacturing in the United States was compiled by Tench Coxe for the Year 1810 (Coxe 1814). The report not only provides the first statewide census for manufacturers, but also a breakdown by county for these data. New Castle County was dominant in most aspects of manufacturing and of the 27 categories of manufacturers, 16 were unique to New Castle County. Manufacturers present statewide included woolen and flaxen goods made at home, fulling mills and looms, tanneries, and distilleries. At this time grist mills produced the greatest value of goods with iron manufacturers second in rank.

The War of 1812 and the Embargo Acts that preceded it proved a great stimulus to manufacturing in Delaware, especially in textiles (Munroe 1979). Much of the reemergence and success of both industry and agriculture in Delaware can be attributed to improved transportation facilities beginning in the 1830s. The linking of Wilmington by railroad with Baltimore and Philadelphia in 1837 provided not only Wilmington, but also its hinterland, with excellent markets both for the purchase of raw materials and the sale of finished products. Contained within this hinterland was also a sizable population of skilled mechanics and machinists who were able to perform the skilled technologies. This combination of good transportation, a large labor pool, and a ready supply of raw materials allowed industry in northern New Castle County to grow and diversify very rapidly. It has been pointed out that "a notable aspect of the industrial pattern in Wilmington was the interrelationship among the local industries" (Hoffecker 1977:27). This pattern benefited greatly not only manufacturers in Wilmington, but also the small businesses that were established surrounding the city. With good railroad facilities, requested goods could be delivered within the same day, even from Philadelphia. The carriage manufacturing business represents the process well with leather tanners, foundries, and wheel shops providing the necessary parts that then only needed assembly. Subsequent sale was usually via railroad to Southern markets or to the government during the Civil War when lucrative contracts for wagons and gun carriages were received (Hoffecker 1977). Other successful businesses also followed this pattern of the shipping of their products for out of state sale. Favorable conditions allowed Wilmington to become a leading manufacturer of transportation related equipment such as carriages, railroad cars, and iron ships. In 1853 the majority of workers in Wilmington were employed in cotton manufacturing, iron-casting, wheel making, railroad car manufacturing, shipbuilding, carriage making, leather tanning, and cooperage.

At the turn of the twentieth century, America's industrial economy had become truly national in scope; however, Delaware was falling behind the rest of the nation (Hoffecker 1977). Many of

the successful firms in Wilmington were bought by large, national companies and the others went bankrupt due to competition from the Midwest. Nonetheless, in 1907, Wilmington stood seventh in manufacturing in the United States according to population, and had a greater diversity of industries than any other city in the United States.

The Beers *Atlas of the State of Delaware* depicts the project vicinity as it appeared in the immediate post-Civil War years (Figures 13-14). In the western portion of the project area, Chestnut Hill Road is shown as is a road approximating present Otts Chapel Road. Iron Hill is shown and ore pits are indicated. Much of the project vicinity consists of scattered farmsteads. Further east in the project area, a road is shown in the vicinity of Stanton Christiana Road. Much of the APE consisted of large farmsteads, including H.L. Churchman's estate on a portion of the former Muscle Cripple tract (Figures 13-14).

2.3.5 URBANIZATION AND SUBURBANIZATION (1880-1940+)

As shown on Hopkins's 1881 map (Figures 14-15), at the beginning of this period, the western portion of the project area vicinity consisted primarily of scattered farmsteads located to either side of present Welsh Tract Road and present Chestnut Hill Road. Iron Hill is shown with ore pits indicated south of the project area near present Whitaker Road.

In the 1880s, development in the easterly portions of the APE was concentrated along the Philadelphia-Wilmington-Baltimore Turnpike (Old Baltimore Pike). Development consisted almost entirely of farms ranging in size from 30 acres to well over 100 acres. Because of the location of marshland, the eastern portion of the APE was less intensively developed. Land use was primarily agricultural, most notably the large farm tracts owned by Henry L. Churchman in the vicinity of present Churchmans Road (Figure 15). Little change in development pattern is shown on Baist's 1893 map (Figure 16).

By the 1880s, industrial activity in the project area vicinity came to an end. George P. Whitaker, owner of Principio furnace, employed twenty men to mine ore from Iron Hill. This enterprise shut down in 1884 when the ore was exhausted. An ore pit on Chestnut Hill operated by William McConaughy failed at about the same time (Conrad 1908:527).

The first northern Delaware suburb was Elsmere, begun in 1886 by real estate promoter Joshua T. Heald, designed for working class families and located near the junction of the Baltimore and Ohio Railroad and the Wilmington and Reading Railroad. This community was within walking distance of rail yards and some factories and was a five cent train ride to downtown Wilmington (Hoffecker 1983:57).

In the early twentieth century, trolley suburbs were still rare in the Wilmington area. In 1912, 84 percent of the land area of New Castle County remained farmland linked to the city by a web of unpaved roads. The 1910 census listed over 2,000 farms in the county, half farmed by their owners. The chief products of these farms were livestock and grain to feed them. Seventy percent of the county's population resided in Wilmington, a total of 123,188 inhabitants (Hoffecker 1983:58).

Beginning in the 1920s, the newly created State Highway Department undertook some limited road projects, such as paving and bridge replacement, in the project area. More specifically, these road projects included roadway improvements from Bear to Christiana (Route 7) in 1924, Christiana to Newark (Route 4) in 1925, Newark to Maryland Line in 1930, Cooch's Bridge to

Maryland Line in 1931, and Welsh Tract Road and Chestnut Hill Road, both in 1934. These projects indicate the continuing importance of the Christiana-Elkton Road. In 1925, Route 40, Route 113, and Route 13 were assigned their National Route numbers. County road improvements were also undertaken in tandem with suburban development. The Elkton Road to Pleasant Valley Road project was undertaken in 1926. With the construction of U.S. Route 40 during the 1920s, 30s and 40s, the project area road eventually became known as Old Baltimore Pike. Work from the Maryland Line to Glasgow was started in 1923. Completion of the last link of the dual roadway was in 1936 (Delaware State Highway Department Annual Reports 1923-1938).

The economy of the Wilmington area boomed with World War II defense needs. The Dravo Corporation, headquartered outside of Pittsburgh, established a Wilmington shipyard to meet defense contracts. Employing 11,000 at its peak, Dravo was the Wilmington area's largest wartime employer. Chemical and munitions companies including duPont and Hercules Powder also prospered with defense contracts (Munroe 1993:219-220). Growing defense industries increased the need for housing in the Wilmington area.

2.3.6 SUBURBANIZATION AND EARLY EX-URBANIZATION (1940-1960+)

Beginning in the immediate post-World War II period, the population of New Castle County increased rapidly, growing over 21 percent between 1940 and 1950. The rapid increase continued until 1970 with a population growth of 40.4 percent between 1950 and 1960 and 25.5 percent between 1960 and 1970 (NCCDP 1986:14). Since Wilmington and its suburbs, the industrial center of Delaware, lay close to rural areas of Maryland, Pennsylvania, and New Jersey, they drew population from these neighboring states, as well as from rural Delaware (Munroe 1993:217). During the first five postwar years, about 8,500 homes were built in the Wilmington region. Of these, fewer than 700 were in the city. Not only residents but jobs moved to the Wilmington suburbs.

Near the end of the war, General Motors announced plans to build an automobile assembly plant on a 125-acre tract adjacent to Elsmere, Newport, and Richardson Park. When its first car came off the assembly line in 1947, the plant employed 1,067 hourly workers. Three years later the Chrysler Corporation Parts Division opened a storage center in Newark expected to employ 500 workers. The facility was later expanded with construction of an assembly plant (Hoffecker 1983:118-119; Munroe 1993:231).

Retailers also followed their customers to the suburbs. During the trolley car era, the best store location was in the heart of the center city. In the automotive era before limited access highways, the best location was a large plot of open land along an arterial highway. Sears, Wanamaker and Strawbridge and Clothier each built stores at the edge of Wilmington in the immediate postwar era (Hoffecker 1983:124).

In 1953 the project area still retained much of its rural character; however, in the last several decades, residential, industrial, and commercial development have been rapidly encroaching. During this period of suburban growth (1940s to present) the project area has seen the construction of single-family homes and residential developments in areas that were previously agricultural fields.

By the 1970s most Delaware residents lived in the developed areas within 15 miles of Wilmington but outside the Wilmington city limits. This population was divided among old

suburbs like Claymont, newer suburbs like Klair Estates, and incorporated communities including New Castle, Newport, and Newark (Munroe 1993:244).

Suburban expansion continued during the 1960s and 1970s with the construction of major retail and employment centers. Among these was the Christiana Mall, located at I-95 and Delaware Route 7. Initial planning began in 1973 by John Wanamaker and New Castle and Associates. Five years later, the \$50 million, 850,000 square foot mall opened with 92 stores including anchors Strawbridge & Clothier, Bambergers and J.C. Penney. Mall expansions occurred in 1990 and 1991. In recent years, the agricultural land near the mall has developed into one of the largest concentrations of retail businesses in the state (Goldblatt 2003).

2.3.7 HISTORIC CONTEXT: AGRICULTURE OF NORTHERN DELAWARE

Initial colonial settlement in northern Delaware consisted primarily of scattered farmsteads located on the Delaware River and its tributaries, including the Cristina, Appoquinimink, Brandywine, White Clay, and Red Clay. The relatively flat, well-drained land was well-suited for agricultural use (Hoffecker 1977).

Early Swedish settlers in Delaware grew rye and barley, but cultivation of these grains was soon replaced by wheat cultivation as the latter could be grown more easily. Wheat became recognized as a marketable commodity, and the farm economy began to change from subsistence-oriented to market-oriented agriculture. Wheat and corn were often shipped by water to local milling sites. Wheat flour and bread were often then shipped to Philadelphia for export to the West Indies and other North American colonies and southern European countries (Walzer 1972:163).

Eighteenth century farming in New Castle County was a system of mixed husbandry, combining grain cultivation with raising of livestock (Bidwell and Falconer 1941:84). Between 80 and 90 percent of the population depended on agriculture for their livelihood (Egnal 1975:201). Wheat remained the primary cash crop with lesser amounts of rye, corn, barley, oats, and garden vegetables raised. A French traveler in Delaware in the late eighteenth century wrote that “the farms are in general small and ill-cultivated; they receive little or no manure and are in every respect badly managed” (La Rouchefoucault 1800:511).

Beginning in about 1830, an agricultural reform movement swept rural Delaware. This movement encouraged experiments in drainage, fertilizers, and machinery. Use of manure, guano, or lime substantially increased wheat or corn production, and harvesting of crops was aided by the use of horse-powered grinders, thresher, corn shellers, hay balers, gins, mowers, hay rakes, and reapers (DeCunzo and Garcia 1992:33). Crop and livestock diversification also occurred.

New Castle farms were the most intensively cultivated in the state. More than three-quarters of the farmland in the region was improved. The average farmer owned more than \$150 in tools and machinery. Northern New Castle County was characterized by capital-intensive dairying and feeder cattle production, while the southern portion of the county was typified by wheat cultivation and dairying (DeCunzo and Garcia 1992:34-35).

In much of the state, Indian corn was the basic animal food in the mid-nineteenth century. Farmers in most hundreds produced between 40 and 55 bushels of corn per animal unit, while in the northern tier, hay and oats formed the primary animal diet (DeCunzo and Garcia 1992:35). Nearly every Delaware farmer raised some swine. In the eight northernmost hundreds, pigs were kept almost exclusively for home use.

By 1850, the total value of New Castle County farms was \$11,459,451. Chief livestock included milch cows, sheep, and swine. Major crops included winter wheat, Indian corn, oats, and Irish potatoes. Principal farm products included butter and wool (DeCunzo and Garcia 1992:41). Corn, oats, wheat and Irish potatoes remained the state's prominent field crops between 1840 and 1870.

In 1884, a total of 2,061 county farms encompassed 253,939 acres. The average farm size was slightly less than 130 acres. An 1887 Census Bureau publication tabulated agricultural production in Delaware toward the end of the nineteenth century. Delaware farmers planted the greatest acreage in corn. Other major field crops included wheat, oats, and market garden products. Fruit cultivation, including apples and peaches, grew in importance in the late nineteenth and early twentieth centuries (DeCunzo and Garcia 1992:43-48).

Between 1880 and 1920, the percentage of improved farm land in New Castle County had decreased by almost 10 percent to 75.2 percent of the total land. By 1930, thirty percent of the farms were categorized as general farms, almost one-quarter as dairy farms, 10 percent as cash farms-grains, and eight percent as self-sufficient farms (DeCunzo and Garcia 1992:102). By 1930, approximately 22,000 acres were planted in corn, about 36,000 in wheat, about 3,000 in truck crops, 3,000 acres in alfalfa hay, and about 800 acres in legumes for hay (DeCunzo and Garcia 1992:110-113). The predominant livestock raised were ducks, turkeys, milch cows and other cows, geese, and sheep (DeCunzo and Garcia 1992:155). The county's farms had approximately 12,000 milk cows in 1930 (DeCunzo and Garcia 1992:157).

Property Types

In the historic context for the archeology of agriculture, 1830-1940, DeCunzo and Garcia list the following associative property types:

Agricultural Complex. An agricultural complex consists of a dwelling or dwellings and domestic and agricultural outbuildings. Kitchens, smokehouses, milk houses, spring houses, wood sheds, ice houses, and other food supply and storage buildings are among expected domestic outbuildings. Agricultural outbuildings would include barns, stables, cart sheds, granaries, hay barracks, hog houses, sheep houses, and potato/root houses. The complex also includes associated utilitarian and nonutilitarian spaces including landscaped lawns, yards, and garden; kitchen gardens; work yards; animal pens; drives, lanes and paths; and agricultural fields, fencelines, and hedgerows (DeCunzo and Garcia 1992:234-235).

Agricultural Dwelling. An agricultural dwelling consists of the residence of a farm owner-operator, tenant farmer, farm manager, or other free agricultural laborer and his or her family household. It consists of at least one dwelling, as well as domestic outbuildings and associated yards, gardens, and activity areas (DeCunzo and Garcia 1992:236).

Agricultural Outbuilding. An agricultural outbuilding consists of one or more outbuildings with the same or different agricultural functions located on farms but isolated from the farmstead. Also included are associated work and storage yards (DeCunzo and Garcia 1992:237).

Agricultural Quarter. An agricultural quarter consists of a residence or residential complex housing numbers of agricultural laborers. It includes at least one dwelling, as well as domestic outbuildings and, in some cases, yards, gardens and activity areas (DeCunzo and Garcia 1992:239).

Agricultural Structure. An agricultural structure consists of one or more structures not designed to shelter humans or human activities along with associated outdoor work spaces. Isolated from the farmstead but located on a farm, the property type includes structures such as stone water towers (DeCunzo and Garcia 1992:243).

3.0 METHODS AND RESEARCH DESIGN

3.1 METHODS OF DATA COLLECTION

The investigation began with an analysis of archeological sensitivity based on mapping supplied by RKK detailing the areas of maximum physical disturbance of all of the proposed alternatives involving construction. This area was designated the overall Area of Potential Effect (APE) for archeology (Figure 1). This construction mapping was compared with a series of historic maps covering the region dating from 1820, 1849, 1868, 1881, and 1893 (Figures 10-16). The map data was then combined with knowledge of previously reported cultural resources in and near the APE, an understanding of the history of the general region, and known settlement and subsistence behaviors of past populations to develop a preliminary evaluation of historic archeological sensitivity.

Sensitivity or potential for prehistoric archeological remains was also assessed principally through map analysis. Factors including proximity to water sources (generally within 100 meters), well-drained soils, knowledge of prehistoric settlement patterns, and proximity to known prehistoric sites were assessed in determining the relative sensitivity of a particular location. The single most telling factor affecting prehistoric sensitivity was the extensive degree of previous construction disturbance throughout the area. Many more locations within the APE might have been judged sensitive for prehistoric sites but for the presence of previous earthmoving disturbance.

These sensitivity evaluations ultimately formed the basis for guiding the Phase I archeological testing. Test excavation units were focused on those areas deemed highly or moderately sensitive for archeological materials, while disturbed or otherwise low sensitivity areas were not tested. All evaluations of archeological sensitivity were presented to and agreed upon by representatives of the SHPO, DelDOT, RKK, and JMA at numerous meetings held prior to archeological field survey.

Field investigations commenced with a pedestrian reconnaissance of the entire APE for archeology. The locations of wetland areas, areas of previous disturbance, and the nature of landforms in the APE were confirmed and noted on a set of base maps.

The presence or absence of archeological resources in areas of high archeological sensitivity was documented through the manual excavation of shovel test units (STUs) placed at 15-m intervals. Additional units, termed radial tests, were placed at 7.5-m intervals around positive finds. No testing took place within identified wetlands, on steep slopes, or areas of obvious previous disturbance. The locations of all STUs were recorded on plans of the project area, and the soil profiles were recorded on standardized forms. Excavated soils were passed through one-quarter-inch hardware cloth to ensure uniform recovery of cultural material. Cultural material was retained in bags marked with standard provenience information. However, recent artifacts, roadside debris, and other similar classes of artifacts were noted on field forms but were not generally saved. Following excavation and recordation, the locations of shovel tests were restored to as close as original condition as possible by backfilling with the screened soil. Narrative field notes and black-and-white and color photographs were produced to document the setting and results of the field investigations.

The geoarcheological assessment at the eastern portion of the APE also included the use auger test units (ATs) at Site 1 and a bucket auger at Site 7 and. STUs at Site 7 were augmented using an 8.9 cm (3.5 inch) bucket auger until refusal. A gouge auger and piston sampler were employed in the testing of AT locations within Site 1. The gouge auger used for this survey is 100 centimeters long and 60 millimeters in diameter, and recovers an undisturbed sample of cohesive

soil/sediment without compaction or mixing of stratigraphic layers. The piston sampler is 75 centimeters long and 40 millimeters in diameter. The piston sampler also takes undisturbed samples of less cohesive soil/sediment (such as unconsolidated sand) without compaction or mixing of stratigraphic layers.

The soils recovered from the ATs were documented based on depth below ground surface, textures, colors, degree of mottling, consistence, and other notable features. The supratidal deposits recovered from the tests were screen through one-quarter-inch mesh to identify any archeological materials associated with the deposits. The position of each test location was plotted on a base map.

All artifacts were transported to JMA's laboratory in West Chester, Pennsylvania, for processing, analysis, and temporary storage. Delaware State Museum Accession numbers were obtained for the collections generated by the project. All cultural material and associated documentation resulting from the project will be submitted to the Delaware State Museum for curation at an approved facility.

3.2 RESEARCH DESIGN

The overall objective of the Phase I archeological survey is to identify historic and prehistoric sites that might be adversely affected by the turnpike improvements project. Beyond this general goal, archeological data obtained during the course of the survey might be amenable to addressing various standing research questions in Delaware archeology.

Regarding prehistoric archeology, prehistoric artifact assemblages might address questions about the use of Iron Hill jasper in the area. Iron Hill is located near the central portion of the current APE and is a known source of jasper utilized by prehistoric peoples. Identification of an assemblage of this material in the APE might lead to an increased understanding of the lithic technology involved in the utilization of this local raw material. Minimally, the recovery of Iron Hill jasper from a site(s) in the APE would enhance the extant data base regarding the distribution and use of this material.

Another possible area of inquiry for prehistoric sites is the relationship between sites and wetlands. Considerable survey efforts have been focused on the Churchmans Marsh locality, partly with an interest in studying prehistoric use of marsh and wetland environments. Recovery of floral and/or faunal remains from a site within the APE might assist in the understanding of seasonality and settlement in such environments, and how such adaptations changed through time.

Historic archeological questions that might be addressed principally turn on an interest in historic farmsteads in the area. As discussed above, farmsteads are the most likely type of historic site to be found within the APE. The excavation and analysis of such a site would address questions regarding farming in northern Delaware and its development over time. A farmstead site might reveal how local farmsteads fit into the various developmental stages and processes of development, as outlined previously.

4.0 RESULTS

4.1 WESTERN PORTION

The western portion of the archeological APE contains no extant or former historic structures that are likely to have associated archeological remains. Historic maps of the APE dating from 1820, 1849, 1868, 1881, and 1893 (Figures 10-16) were examined along with aerial photographs that support this conclusion. Likewise, examination of the site files at the Delaware SHPO revealed that no previously-recorded prehistoric sites are located within or near the western portion project area.

Two areas within the APE, however, possess high prehistoric archeological sensitivity. They are the headwaters of Muddy Run and headwaters of Persimmon Run that include extant waterways, possible former waterways indicated by topography, and associated wetlands, some of which have probably been altered from their original configuration as a result of the construction of I-95. The areas adjacent to these waterways and wetlands, herein arbitrarily demarcated as 100 meters, would have been attractive to native people seeking to harvest plant and animal resources associated with these environments.

The remainder of the APE, most of which had been disturbed by previous construction activities, possesses low prehistoric archeological sensitivity. The area north of I-95 and east of Otts Chapel Road is not included in the APE (Figure 2). In the area north of I-95 and west of Otts Chapel Road was a proposed wetland mitigation area (Figure 4). Soil boring data provided by RKK confirmed extensive previous disturbance in this portion of the APE, related to the initial construction of I-95. Consequently, no excavations took place at that location. At the extreme east end of the area, around the existing toll plaza, extensive land alterations precluded the necessity of archeological excavations (Plates 1-2).

Field conditions during the survey were often less than ideal due to cold weather. Nevertheless, 239 shovel tests were excavated during the Phase I fieldwork, and four prehistoric sites were identified (Figures 2-4). For heuristic purposes, the APE was divided into three segments that correspond to locations along the I-95 corridor. The largest of the tested sections, Segment A, corresponds to the area located between Otts Chapel Road and the existing toll plaza on the south side of I-95 (Figure 3). A total of 186 shovel tests were excavated within this section. The second area, designated as Segment B, corresponds to the portion of the project area located south of I-95, extending from Otts Chapel Road toward the Maryland border (Figure 4). A total of 47 shovel tests were excavated within this portion. The third section, Segment C, corresponds to the area north of I-95, between the Maryland border and Otts Chapel Road; the aforementioned possible wetland mitigation area at this location was excluded from testing (Figure 4). Six shovel tests were excavated within this segment.

Segment A

Segment A (Figure 3) consisted almost entirely of immature woodland with tracts of mature woodlands associated with historic field lines and areas surrounding wetlands and drainages; the woodlands represent areas that would not have been suitable to historic agricultural activities. In addition to these woods, a large fallow field with dense understory was located adjacent to the western edge of this young forest. The 1970 New Castle Soil Survey, using 1962 aerial photographs, shows this section of the project area as primarily agricultural fields with wooded sections corresponding to areas currently demarcated as wetlands and along field lines. Shovel



Plate 1. Existing toll plaza, view to east, showing disturbed landscape.



Plate 2. Existing toll plaza, view to west, showing disturbed landscape.

test profiles corroborated and verified the historic agricultural development of the land as seen in these aerial images.

Two portions within Segment A were tested on a 15-meter grid due to their proximity to extant drainages. The first area corresponds to Transect R, which sampled the area adjacent to an unnamed drainage located immediately west of the existing toll plaza. The APE within this area ranged from approximately 20 to 35 meters in width, of which the northernmost 10 meters had been disturbed by an access road and associated fiber optic line. These conditions allowed for the placement of only 13 shovel tests within 100 meters of the drainage. A plowzone (Ap), identified based on the presence of an abrupt lower boundary of the surface horizon, was identified in all of the excavated units. This Ap-horizon typically consisted of olive brown (2.5Y 4/4) to light olive brown (2.5Y 5/3, 5/4) silt loam. The underlying B-horizon consisted of light brownish gray (2.5Y 6/2), light yellowish brown (2.5Y 6/3) to a yellowish brown (10YR 5/6, 5/8) silt loam.

STU R3, located on the east side of the drainage, produced a single low-quality jasper flake from the A-horizon. Two radial shovel tests were excavated, and both units produced additional prehistoric material. The recovery of a flake and blocky fragment, also comprised of low-quality jasper, from the surface horizon brought the total number of artifacts from this location to three. Site Number 7NC-D-234 (CRS# N-14190) was assigned (Figures 2-3, 17). The exact dimensions of this locus cannot fully be determined, due to its location on the southern edge of the project area, but it appears to measure less than 15 meters in diameter. It is unclear if this area represents a discrete location, as currently identified, or the northern edge of a larger site.

The second section of Segment A that was tested on a 15-meter grid was the area adjacent to the headwaters of Muddy Run, corresponding to Transects C through H (Figure 3). This area was largely undisturbed, with documented areas of disturbance limited to the northern portion of the tested area, adjacent to the access road and a fiber optic line, in the vicinity of Transect C. A secondary disturbance was identified that may correspond to small, discrete historic filling activities located near the drainages. Associated with this drainage system were substantial amounts of recent debris. Drainages such as these are typical repositories for such recent trash deposits.

A plowzone (Ap-horizon) was identified in the majority of the undisturbed, upland sections within this area. The typical soil profile contained a plowzone largely devoid of organics capped by a humic layer. It is unclear what factors resulted in the presence of this pale colored Ap-horizon that is universally present within these immature woods. Perhaps excessive erosion, a result of historic agricultural activities, limited the amount of organics that could accumulate within this surface layer. The only unplowed areas corresponded to those sections immediately adjacent to wetlands. The unit stratigraphy of the plowed sections normally contained an accumulated organic horizon at the surface. The O-horizon ranged in thickness from 4 to 10 centimeters and consisted largely of very dark grayish brown (10 YR 3/2), dark brown (10YR 3/3), to dark grayish brown (10YR 4/2) silt loam to loam. Underlying this organic horizon was the plowzone that ranged substantially in depth and in color designation across the tested area. In some areas, the Ap-horizon was fully eroded while in other areas the plowzone extended to a depth of 39 centimeters below surface. The Ap-horizon usually ranged from dark grayish brown (10YR 4/2, 2.5Y 4/2), grayish brown (10YR 5/2, 2.5Y 5/2), dark yellowish brown (10YR 4/4), olive brown (2.5Y 4/3, 4/4), to light olive brown (2.5Y 5/3, 5/4, 5/6) silt loam to silty clay loam. The subsoil underlying this surface horizon also displayed substantial variation. This lower horizon normally consisted of yellowish red (5YR 5/8), strong brown (7.5YR 5/6, 5/8), reddish yellow (7.5YR 6/8), light olive brown (2.5Y 5/3, 5/4, 5/6), light yellowish brown (2.5Y 6/3, 6/4),

light brownish gray (10YR 6/2, 2.5Y 6/2), and yellowish brown (10YR 5/4, 5/6) silt loam to silty clay loam with iron staining and increased mottling within the lower landscape units.

Two prehistoric sites, designated as 7NC-D-235 (CRS# N-14191) and 7NC-D-236 (CRS# N-14192), were identified in close proximity to the headwaters of Muddy Run (Figures 2-3, 17). Site 7NC-D-235, located near the eastern flank of Muddy Run, was identified by the positive test results of STUs E2 and F3 (Figure 17). Within these units, three low-quality jasper flakes were recovered from the A-horizon. One of the four radial shovel tests excavated around STU E2 produced an additional jasper flake, while two of the four radials excavated around STU F3 yielded an additional two flakes (1 jasper, 1 chert), bringing the aggregate total number of recovered artifacts within the site boundary to six. Approximate site dimensions measure approximately 35 meters north-south by 12 meters east-west.

Site 7NC-D-236 is situated parallel to a small tributary stream that leads into the headwaters of Muddy Run on a west to east trending slope (Figures 2-3; Plate 3). The site as currently defined contains two associated loci separated by approximately 39 meters. Locus A, the easternmost locus, was identified on the northern interior side of the drainage divide on the basis of five positive primary shovel test units (STUs D12, D14, E11, E12, and E14; Figure 17). These units produced prehistoric material predominately composed of low-quality jasper. All told, 29 artifacts were recovered, including one core, 16 flakes, and 12 blocky fragments. An additional 10 radial shovel tests were excavated to further define the locus boundary, and four of these yielded additional prehistoric material. The radial test units produced 10 flakes and 1 blocky fragment, for a total of 40 prehistoric artifacts from this location. Approximate dimensions of Locus A measure 35 meters north-south by 60 meters east-west. Locus B was identified from a single positive grid result (STU C18; Figure 17), which was located on the southern edge of the access road and fiber optic line within the sampled area (Plate 4). Three jasper flakes were recovered from this primary shovel test. All three excavated radial units were culturally sterile. Maximum site size of 7NC-D-236 is approximately 122 meters east-west by 35 meters north-south.

In addition to these two prehistoric sites, prehistoric material was recovered from two other primary shovel tests. STU E28, located approximately 35 meters upslope from 7NC-D-235, yielded a single chalcedony flake, while STU H14, located approximately 40 meters south of 7NC-D-236, yielded one jasper flake (Figure 3). Radial units excavated around these locations did not contain additional prehistoric material and as such, these artifacts are designated as isolated occurrences.

The remaining area that fell outside of the 100-meter drainage zone was sampled with 13 judgmentally placed shovel tests (Plate 5). These units sampled subtle topographic features such as ridge lines and terraces within the surrounding landscape. Profiles were similar to those previously discussed. No prehistoric artifacts were recovered from any of these units and only one historic artifact was recovered. A single lead glazed redware sherd was recovered from the plowzone of STU T7.

As noted previously, the area around the existing toll plaza was not tested because of extensive disturbance related to grading activities and the location of a sewer line/fiber optic line (Plates 1-2). These disturbances were plainly visible and no subsurface testing was required.



Plate 3. Area of Site 7NC-D-236, view to west, showing site conditions.



Plate 4. Area of Site 7NC-D-236, view to west, showing access road and fiber optic line north of site area.



Plate 5. Excavations in overgrown field in Segment A, view to east-northeast.



Plate 6. View to east from Dixie Line road, showing excavation of shovel tests (in rear background) in mowed field.

Segment B

Segment B refers to the section of the project area located south of I-95, currently bounded on the north and west by Dixie Line Road and on the east by Otts Chapel Road (Figure 4). Current field conditions of the eastern seventy percent of this area correspond to mature woods with little understory, while the western 30 percent was comprised of an impenetrable thicket within a large fallow field. The APE within Segment B ranged from approximately 10 to 70 meters in width, of which the northernmost 10 meters had been clear-cut in association with a fiber optic line. A total of 43 shovel tests were excavated on Transects K through Q within 100 meters of the drainages.

The shovel tests within the wooded section in Segment B did not appear to contain a plowzone beneath the decomposing organic cap. Most of the shovel tests contained a humic layer at the surface that was typically less than 10 centimeters thick and consisted of very dark brown (10YR 2/2) to very dark grayish brown (10YR 3/2) silt loam to loam. The underlying topsoil usually was 10 cm thick and was identified as a dark grayish brown (10YR 4/2, 2.5Y 4/2), brown (10YR 4/4), dark yellowish brown (10YR 4/4), to light olive brown (2.5Y 5/3) silt loam. The B horizon ranged considerably and was described as pale brown (10YR 6/3), grayish brown (2.5Y 5/2), yellowish brown (10YR 5/4, 5/6), light yellowish brown (2.5Y 6/3, 6/4), to light olive brown (2.5Y 5/3, 5/4, 5/6) silt loam to heavy silt loam with mottling and iron staining present in many of the units.

One prehistoric site, 7NC-D-237 (CRS# N-14193), was identified within Segment B (Figures 2, 4). STU O10, located between two unnamed drainages, contained a total of 31 pieces of jasper debitage. Eleven flakes/blocky fragments were recovered from the A-horizon and 20 flakes/blocky fragments were collected from intact B-horizon soils (Figure 17). Four radial shovel tests were excavated around STU O10, and none yielded additional material. The site appears to represent a very discrete prehistoric lithic reduction area with overall site dimensions measuring less than 15 meters in diameter.

A second location within Segment B yielded prehistoric material and was termed Locus 6 (Figures 2, 4). A single quartzite flake was recovered from STU P16, which is situated along the eastern edge of existing wetlands and immediately adjacent to the western-most drainage in this area. Three radials were excavated, one of which yielded an additional jasper flake. These artifacts are considered isolated finds.

The large overgrown field was outside of the 100-meter drainage zone, and four STUs were placed where gaps in the vegetation allowed for archeological testing. This field strategy permitted sampling across the east-west breadth of this area along the south side of Dixie Line Road (Figure 4). The plowzone within this section consisted of dark yellowish brown (10YR 4/4), olive brown (2.5Y 4/4), to light olive brown (2.5Y 5/3, 5/4) silt loam. While the underlying B-horizon consisted of light yellowish brown (2.5Y 6/3), yellowish brown (10YR 5/6) to light olive brown (2.5Y 5/6) silt loam. No artifacts were identified in any of the judgmentally placed shovel test units.

Segment C

The APE within this section consists mostly of woods with a small mowed field at the extreme western section north of I-95 and east of Dixie Line Road (Figure 4). The widest section of this expanded area is approximately 20 meters north of the existing I-95 fence line. Six shovel tests were excavated within this portion of the project area and no artifacts were recovered. Four STUs

were placed within 100 meters of an unnamed drainage within a mowed field near Dixie Line Road (Plate 6). The Ap-horizon within this area consisted of dark gray (10YR 4/1) to dark grayish brown (10YR 4/2) silt loam. The B-horizon was comprised of yellowish brown (10YR 5/6) to light olive brown (2.5Y 5/4) silt loam. Two additional units were placed on the eastern side of the drainage near the southwestern corner of a large fallow field located adjacent to Otts Chapel Road and I-95. Within this section of woods, the profile contained an organic layer directly overlying the intact subsoil. The O-horizon consisted of a very dark brown (10YR 2/2) silt loam to loam. The underlying B-horizon consisted of light olive brown (2.5Y 5/4) silt loam with less than 5 percent gravel.

4.2 CENTRAL PORTION

Historic maps of the APE dating between 1820-1893 (Figures 10-16) reveal various historic buildings or farmsteads formerly located within the archeological APE. Of these, all but one appear to have been eradicated, principally as a result of the construction of I-95 and other associated roadways. The exception is the Lewis Welden Farm, a portion of which has survived highway construction; the remnant area of this location was subjected to archeological testing (see below). The site files at the Delaware SHPO revealed that no previously-recorded prehistoric sites are located within the central portion project area, though one site, 7NC-E-58, is located near the north edge of I-95; this area was archeologically tested (see below). Several additional prehistoric sites are known to the north, south, and east, but none lie in close proximity to the APE.

As with the western area, the bulk of the central portion of the APE has been disturbed by previous construction, and only three relatively undisturbed locations were identified as having moderate to high archeological sensitivity (Figure 5). The first is a wooded area with a small stream located at the southwest quadrant of the I-95/S.R. 1 Interchange (Figure 6). This area was judged to possess moderate to high sensitivity for prehistoric sites. The second consists of an area containing the remains of outbuildings associated with a historic property dating from ca. 1868, known variously as the Stafford Farm, Maple Springs Farm, or the Lewis Welden Farm. This area is located at the northeast quadrant of the I-95/S.R. 1 Interchange (Figure 7). With the exception of this single location, little to no potential exists for intact historic archeological resources within the central portion of the APE. The third and final area of archeological sensitivity is located adjacent to a previously reported prehistoric archeological site, located north of I-95 on a bluff west of and overlooking Churchman's Marsh (Figure 8). Phase I testing was deemed necessary at each of these locations to fully document the presence or absence of potentially significant archeological resources.

Wooded Area, Southwest Quadrant of the I-95/S.R. 1 Interchange

A first order stream runs north to south through the wooded area in the southwest quadrant of the I-95/S.R. 1 interchange (Figure 6). The area adjacent to the stream was considered to have high sensitivity for prehistoric archeological resources. A total of nine STUs was excavated in two 15-meter interval transects, one to the west of the stream and one to the east (Figure 6). Most of the area exhibited intact silt loam soils with 4 to 6 centimeters of recently developed loam above a plowzone reaching to a depth of approximately 24 centimeters. No prehistoric artifacts were recovered. Upon closer examination, it was evident that the stream runs almost exactly north to south in a straight line, suggesting the possibility that the stream is in fact a man-made drainage feature. Most of the remainder of the wooded area appeared disturbed, and no further subsurface testing was conducted.

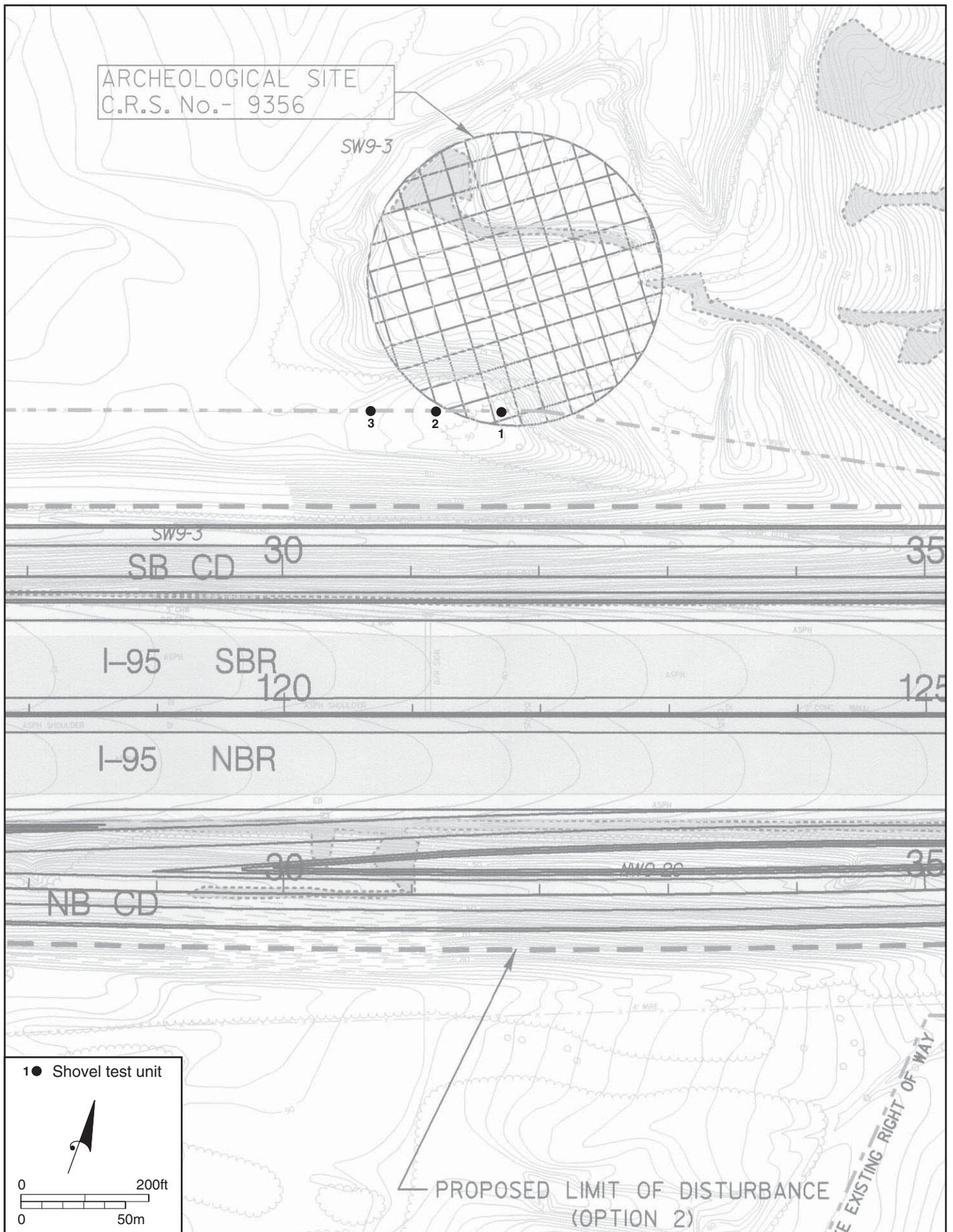


Figure 8. Central portion of archaeological Area of Potential Effects, showing archeological testing at Site N-9356.

Area of Lewis Welden Farm 7NC-E-172 (CRS N-6783) Outbuildings, Northeast Quadrant of the I-95/SR 1 Interchange

The Lewis Welden Farm (Figure 7) was once located along the south side of Churchman's Road, where I-95 now lies. Also known as the Stafford Farm or Maple Springs Farm, the property was documented in a draft National Register form, prepared in 1992 by Kise Franks & Straw. At that time, the property, measured 7.40 acres, included one contributing and one noncontributing building, five contributing sites, and five contributing and two noncontributing objects.

Over the years the farmstead and the majority of its associated outbuildings have been demolished for commercial and retail development, including shops, hotels, and a bookstore. The area of the farm buildings between the bookstore and I-95 has been graded and a lawn established there. However, the approximate location of a barn was still visible. In addition, a silo still stood within the existing I-95 right-of-way (Plate 7) and the remains of a small concrete block foundation were also visible. Several "push-piles" of soil and stone were noted within the I-95 right-of-way as well (Figure 7). This area was considered to have moderate sensitivity for historical archeological deposits associated with the farm.

Three STUs were excavated at this location (Figure 7; Plate 7). Two of these were located in the lawn area and exhibited extensive disturbance. Fragments of plastic, aluminum, and mortar were recovered from both STUs. The third STU was located between the concrete block foundation and the silo. Intact soils, consisting of 29 centimeters of silt loam over undisturbed silty clay loam subsoil, were encountered (Figure 17). One modern nail and one screw were recovered, and fragments of mortar and concrete were also present.

Area of Previously Reported Prehistoric Site 7NC-E-58 (CRS N-9356), West of Churchman's Marsh

Just west of Churchman's Marsh, three STUs were excavated at 15-meter intervals across a relatively flat remnant terrace landform, north of and parallel to the existing cut for I-95 (Figure 8; Plate 8). This area lay immediately adjacent to a previously reported prehistoric site (7NC-E-58) and was regarded as having high prehistoric archeological sensitivity. The easternmost STU exhibited disturbed soils, but the remaining two STUs had up to 9 centimeters of recent humus over an old plowzone extending to a depth of approximately 30 centimeters (Figure 17). Fragments of clay pigeons and lead shot were recovered from intact soils, and these comprise the bulk of the cultural material found. A single small possible quartzite fire-cracked rock fragment was recovered from STU Z2 (Figure 17). No radials were excavated around this location. In addition to the shovel test excavation, the landform cut was visually inspected for any prehistoric features or artifacts that may have been eroding out of the intact landform; none were present. It would appear that previously recorded Site 7NC-E-58 does not extend into this portion of the APE.

4.3 EASTERN PORTION

Wetland Mitigation Site 1

Proposed mitigation Site 1 is located on a point bar of a meander north and west of the Christiana River; its northern margin is approximately 100 meters (328 feet) south of I-95 (Figures 9, 18). Historic maps reproduced herein (Figures 10-16) show no historic buildings or structures in the



Plate 7. Shovel test excavation at Welden Farm location, view to southwest; note extant silo.



Plate 8. Shovel test excavation at Site 7NC-E-58 location, view to east.

area. A search of the site files at the SHPO revealed a plethora of prehistoric sites in the greater vicinity of Churchmans Marsh, White Clay Creek, and the Christina River. However, no previously recorded sites lie within the Site 1 area; one prehistoric site (7NC-E-79) is reportedly located immediately to the west and near the Christina River. The Latrobe 1803 map of this location places the site within a tidal marsh (Figure 19). The later Smith 1894-95 map again shows the area of Site 1 within a tidal marsh that appears to have been removed from tidal influences by a dike (Figure 20). The aerial photograph of 1945 shows the area lying within approximately 30-50 meters of the Christiana River as vegetated, with the remainder covered at high tide (Figure 21). The 1956 aerial photograph again shows fringing vegetation along the Christiana River and associated dike, with the remainder of the area still being influenced by tidal fluctuations (Figure 22). The aerial photograph taken in 1997 shows I-95 to the north of the study area and the environs of Site 1 as no longer influenced by tidal forces, having become vegetated with grass and deciduous trees (Figure 18; Plate 9).

Five auger test units were excavated at Site 1. Test A-1 was located near the northern most extent of Site 1 and within 10 meters west of the Christiana River (Figures 9, 18). This test was excavated to a depth of 473 cmbgs (Appendix III). The upper 50 centimeters of this test consisted of a series of seven deposits between 2-10 centimeters thick that appear to be overwash deposits related to flooding events. Two of the seven deposits (between 31 cmbgs and 58 cmbgs) were finely stratified. The color range of the upper 50 centimeters was from very dark grayish brown (10YR 3/2) to reddish gray (2.5YR 5/1) to brown (7.5YR 5/4). From 50 cmbgs to the terminus of the excavation (473 cmbgs), the deposits transitioned from dark gray (2.5Y 4/1) silt loam to dark bluish gray (Gley2 4/10B) clay. The test was terminated at 473 cmbgs (15.5 feet). No cultural materials were recovered from this test.

Test A-2 was located approximately 100 meters southeast of A-1 (Figures 9, 18; Plate 9). This test was excavated to a depth of 500 cmbgs (Appendix III). Here, the upper 71 centimeters of the test exhibited four deposits that appear to be related to overwash deposits probably related to flooding of the Christiana River. The second of these deposits ranged in depth from 2-54 cmbgs and was finely stratified with coarser materials towards the base; the strata contained several wood fragments. From 71-122 cmbgs there occurred a series of four deposits that transition from a very dark gray (5Y 3/2) silt loam to a very dark greenish gray (Gley1 3/10Y) silt clay. These deposits appear to be intertidal lagoon deposits. These lagoonal deposits lie abruptly upon a compact and dewatered 11-centimeter-thick peat unit that contained a fragment of glass. Directly below this peat unit, dark gray (Gley1 4/N) firm lagoonal mud continues to a depth of at least 500 cmbgs.

Test A-3 was located approximately 76 meters southwest of A-2 (Figure 18). This test was in more open vegetation than the first two and within close proximity to a stand of Phragmites, which indicates brackish water conditions. (Phragmites is an invasive perennial grass, 2-4 meters tall, occasionally up to 6 meters, with stout creeping rhizomes; a fresh to brackish water plant of North America). This test was excavated to a depth of 400 cmbgs (Appendix III). The upper 122 centimeters of this test contains six horizons of deposits that appear to be related to overwash deposits related to flooding events. The two units ranging in depth between 82-122 cmbgs were both stratified. At 122 cmbgs, there is a sharp boundary with the underlying horizon. From 122-173 cmbgs there are two horizons of firm very dark gray (5Y 3/1) to dark gray (5Y 4/1) silt clay that lay directly upon a horizon of peat. This peat occurs between 173-176 cmbgs and is very firm and dewatered. The deposits below the peat then transitioned from a friable dark gray (5Y 4/1) silt clay to a firm bluish gray (Gley2 5/10B) lagoonal mud to a depth of at least 400 cmbgs.

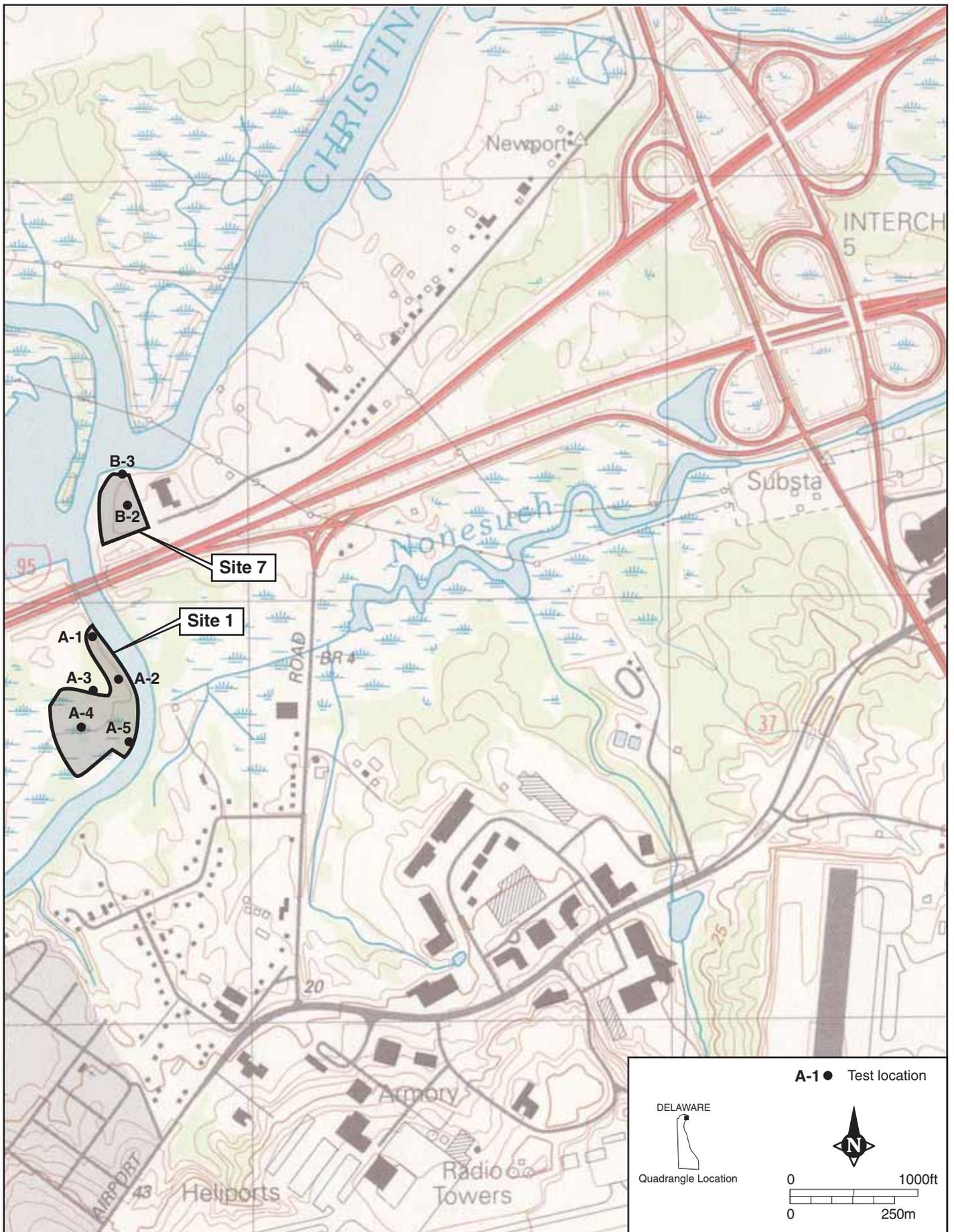


Figure 9. Eastern portion of archeological Area of Potential Effects, showing locations of proposed wetland mitigation Site 1 and Site 7.

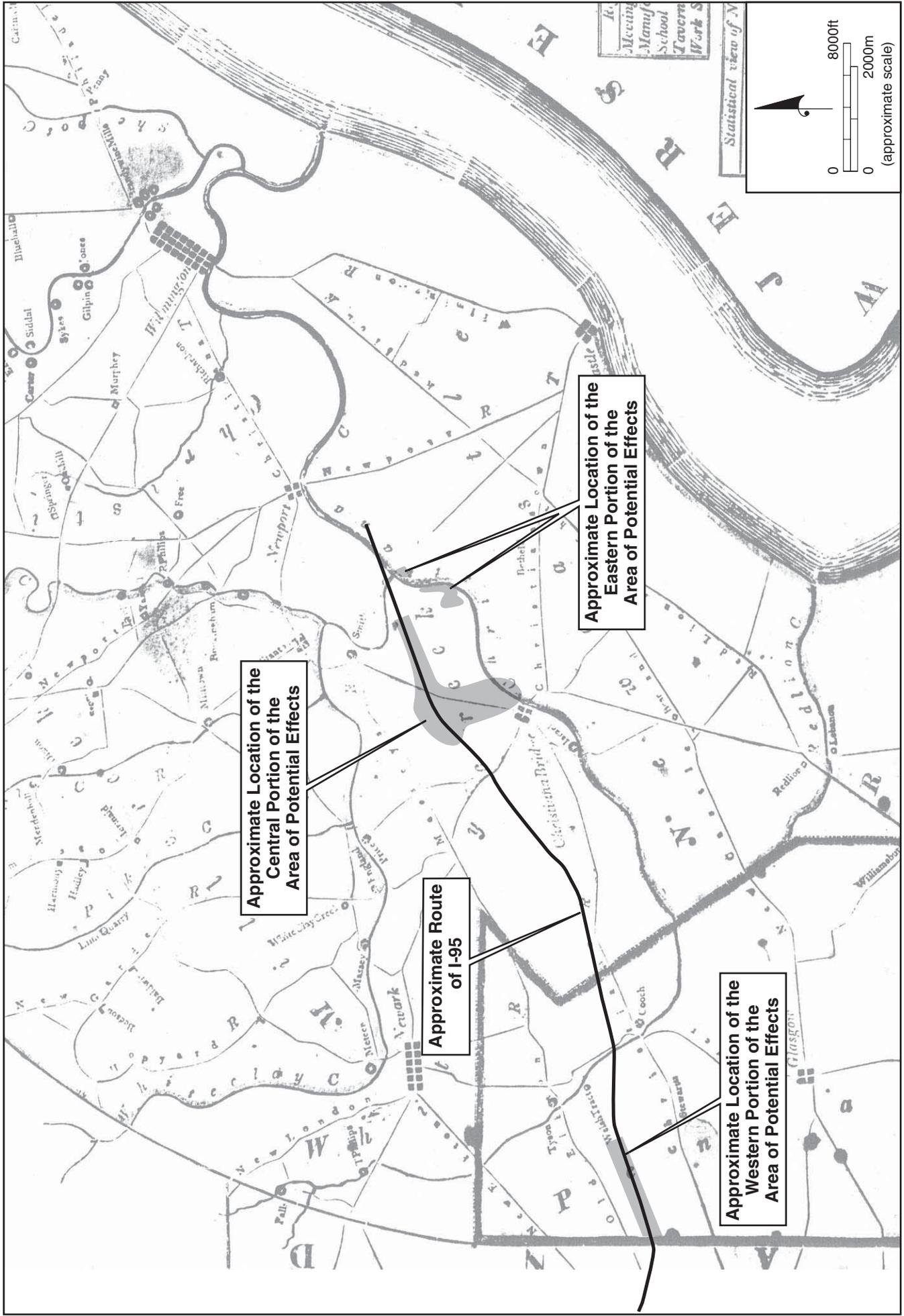


Figure 10. Detail of the *Roads of New Castle County* (Heald 1820), showing the approximate location of the archaeological Area of Potential Effects for the proposed I-95/Delaware Turnpike project.

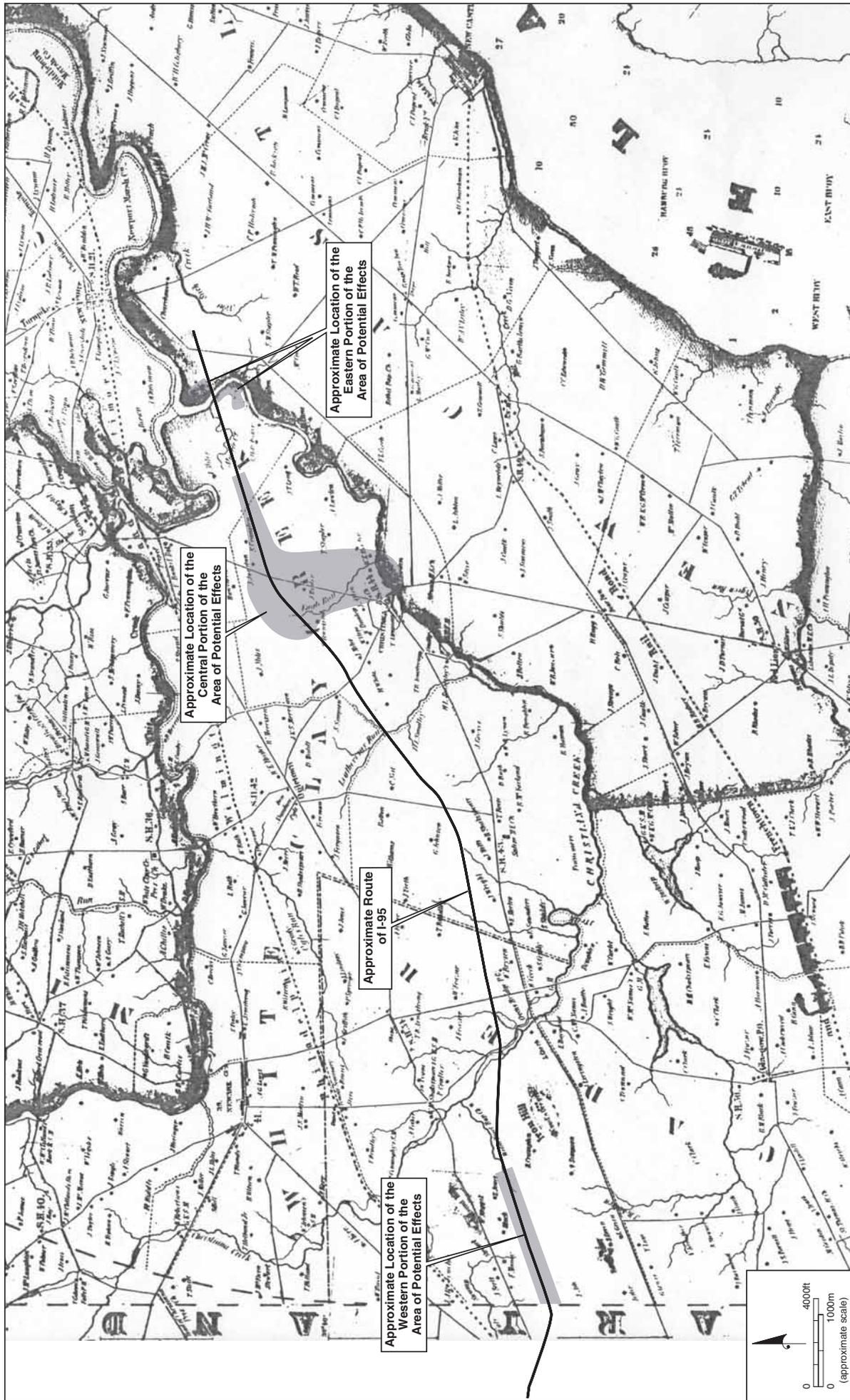


Figure 11. Detail of the *Map of New Castle County, Delaware* (Rea and Price 1849), showing the approximate location of the archeological Area of Potential Effects for the proposed I-95/Delaware Turnpike project.

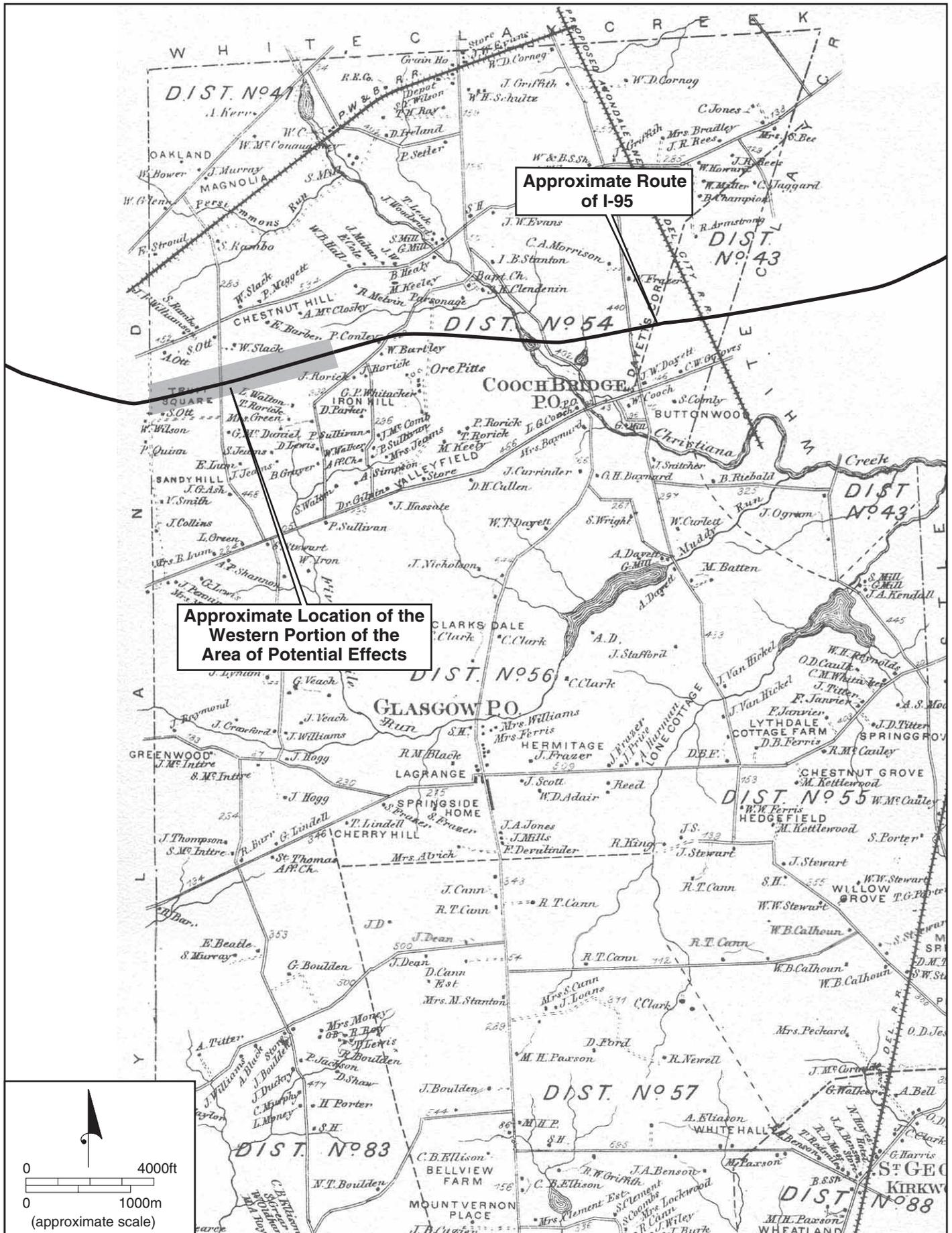


Figure 12. Detail of the *Atlas of the State of Delaware* (Beers 1868), showing the approximate location of the western portion of the archeological Area of Potential Effects for the proposed I-95/Delaware Turnpike project.

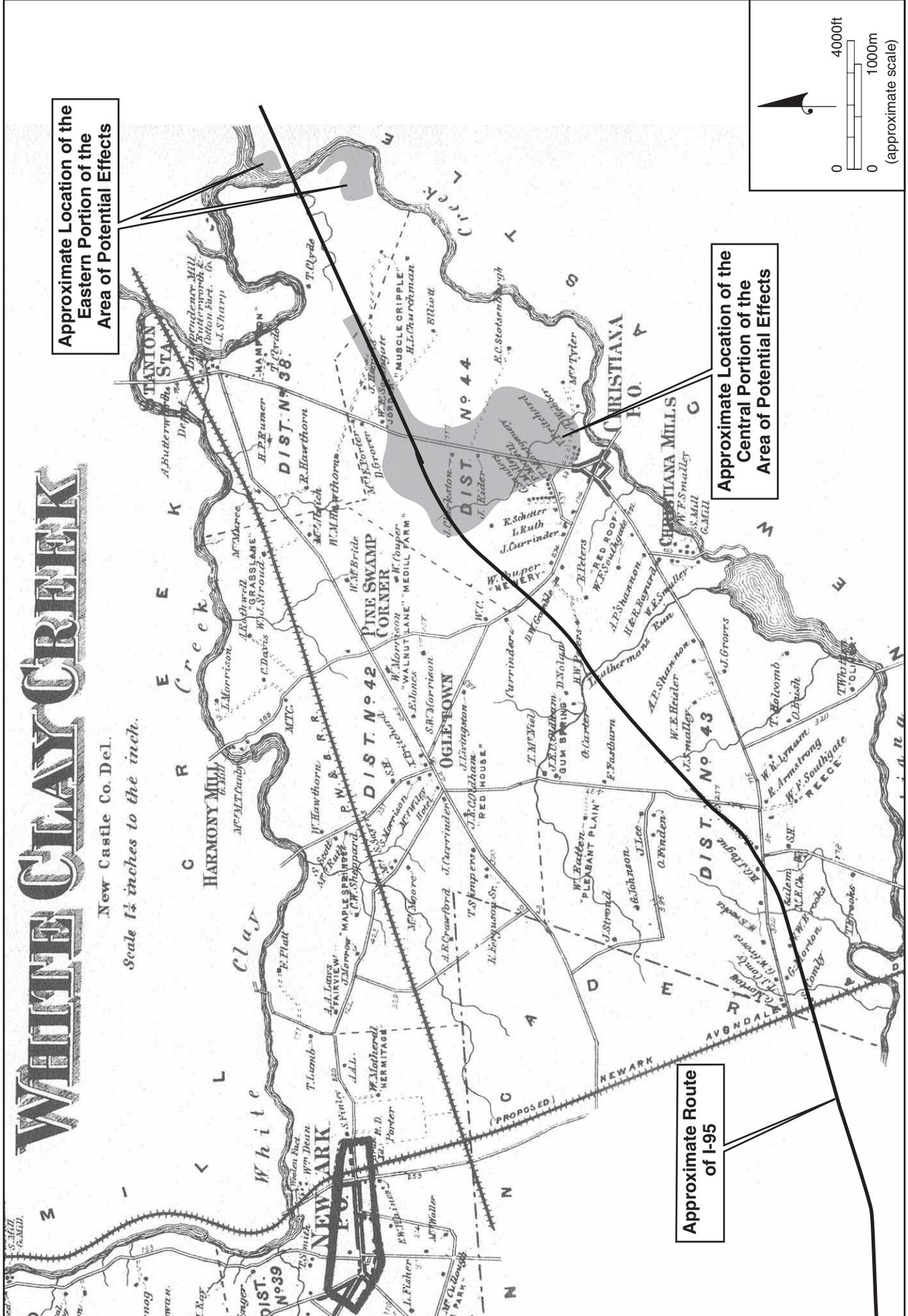


Figure 13. Detail of the *Atlas of the State of Delaware* (Beers 1868), showing the approximate location of the central and eastern portions of the archaeological Area of Potential Effects for the proposed I-95/Delaware Turnpike project.

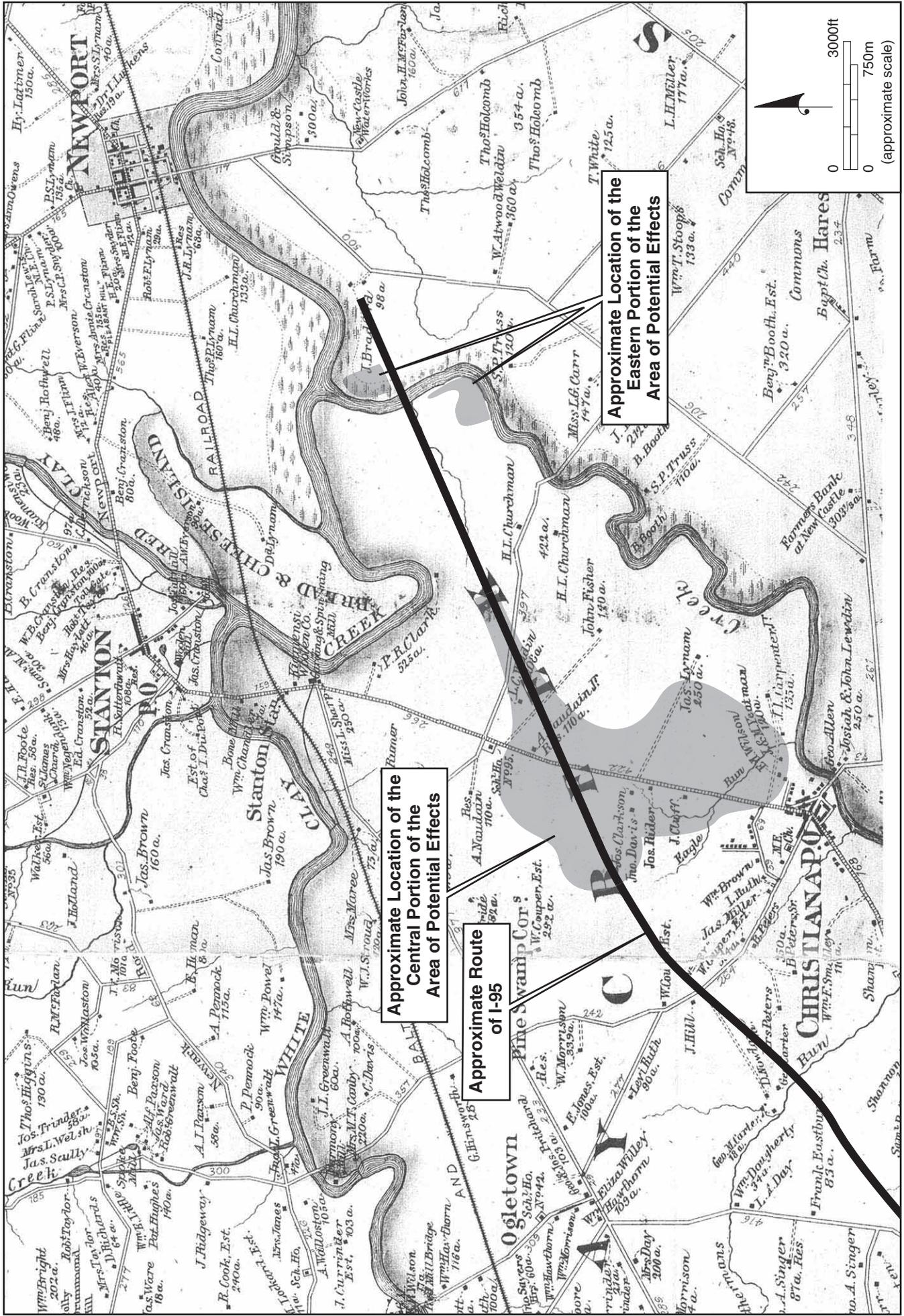


Figure 15. Detail of the Map of New Castle County, Delaware (Hopkins 1881), showing the approximate location of the central and eastern portions of the archeological Area of Potential Effects for the proposed I-95/Delaware Turnpike project.

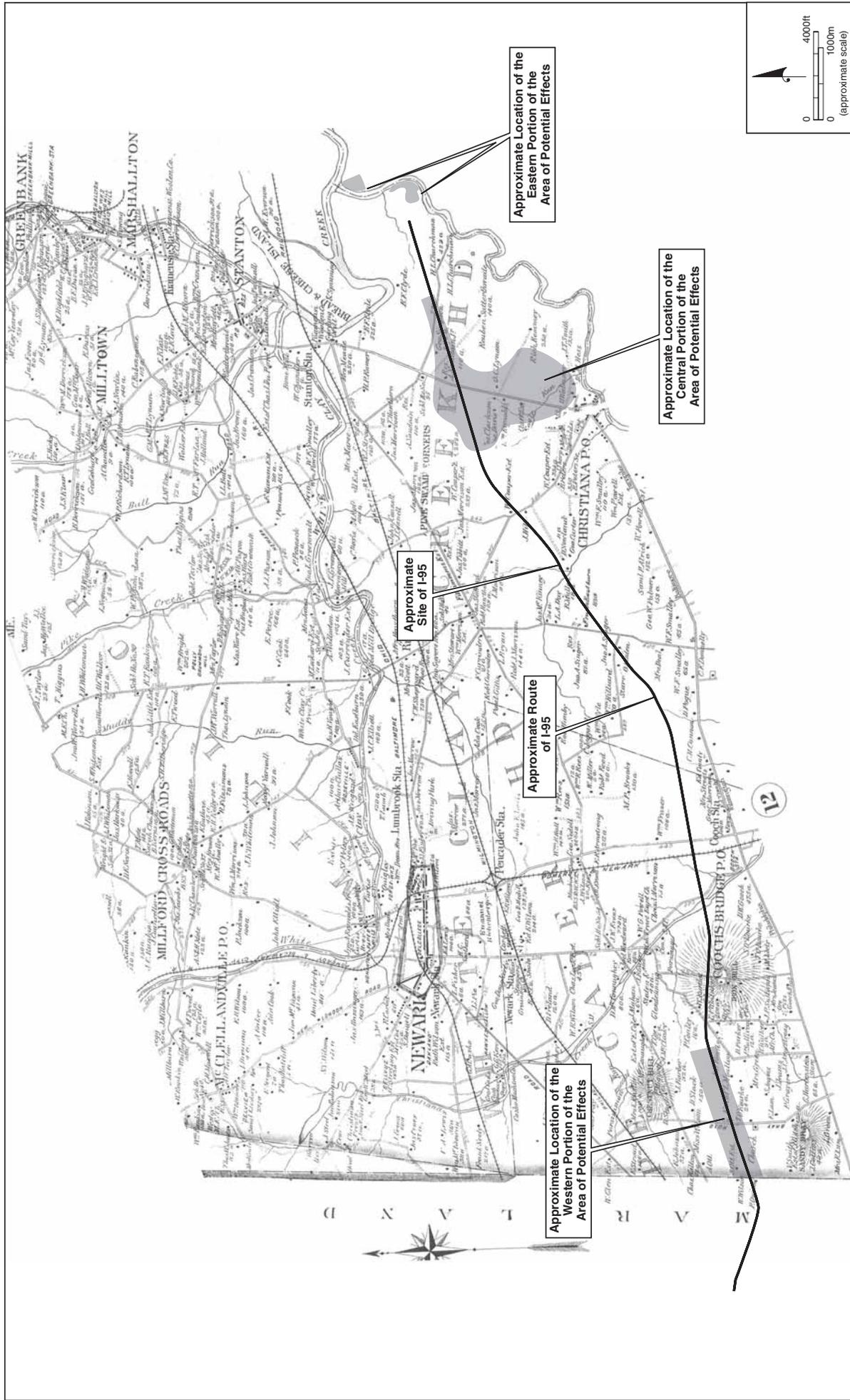
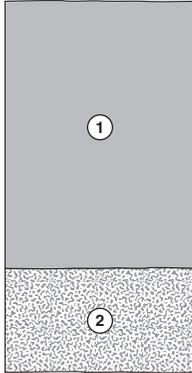


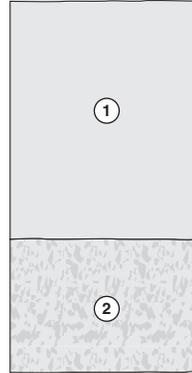
Figure 16. Detail of the *Atlas of New Castle County, Delaware* (Baist 1893), showing the approximate location of the archeological Area of Potential Effects for the proposed I-95/Delaware Turnpike project.

**7NC-D-234
STU R3 East**



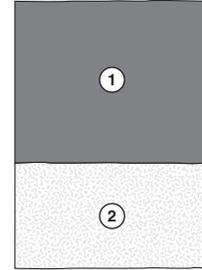
- 1 10YR 4/3 brown silt loam; Ap-horizon
- 2 Banded 10YR 5/8 yellowish brown silt loam; B-horizon

**7NC-D-235
STU F3**



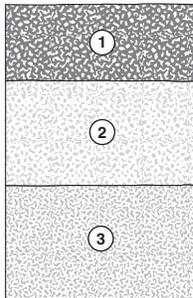
- 1 2.5Y 5/6 light olive brown silt loam; Ap-horizon
- 2 2.5Y 6/2 light brownish gray with 50% mottle of 2.5Y 7/1 light gray silt loam; B-horizon

**7NC-D-236.001
STU D12**



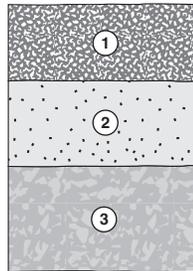
- 1 2.5Y 4/2 dark grayish brown silt loam; Ap-horizon
- 2 2.5Y 5/4 light olive brown silt loam; B-horizon

**7NC-D-236.002
STU C18**



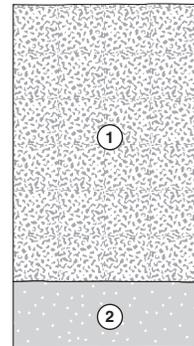
- 1 10YR 3/2 very dark grayish brown silt loam; Ap1-horizon
- 2 2.5Y 5/3 light olive brown silt loam; Ap2-horizon
- 3 2.5Y 6/6 olive yellow silt loam; B-horizon

**7NC-D-237
STU O10**



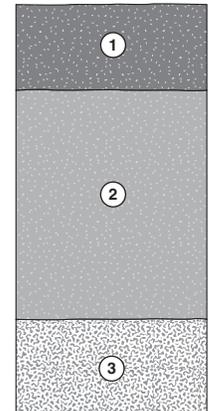
- 1 10YR 3/2 very dark grayish brown silt loam; Ap1-horizon
- 2 2.5Y 6/2 light brownish gray silt clay loam; Ap2-horizon
- 3 2.5Y 6/2 light brownish gray with 20% mottle of 2.5Y 6/4 light yellowish brown silt clay loam; B-horizon

**7NC-E-172
STU B2**



- 1 10YR 4/4 dark yellowish brown silt loam; Ap-horizon
- 2 10YR 5/8 yellowish brown silty clay loam; B-horizon

**7NC-E-58
STU Z2**



- 1 10YR 2/2 very dark brown sandy loam; O-horizon
- 2 10YR 4/3 brown sandy loam; Ap-horizon
- 3 10YR 5/6 yellowish brown silt loam; B-horizon

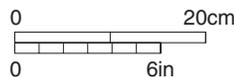


Figure 17. Representative shovel test unit profiles.



Figure 18. Detail, 1997 aerial photograph of eastern portion of Area of Potential Effects, showing location of proposed mitigation Site 1 and Site 7 and geoarcheological assessment test locations.

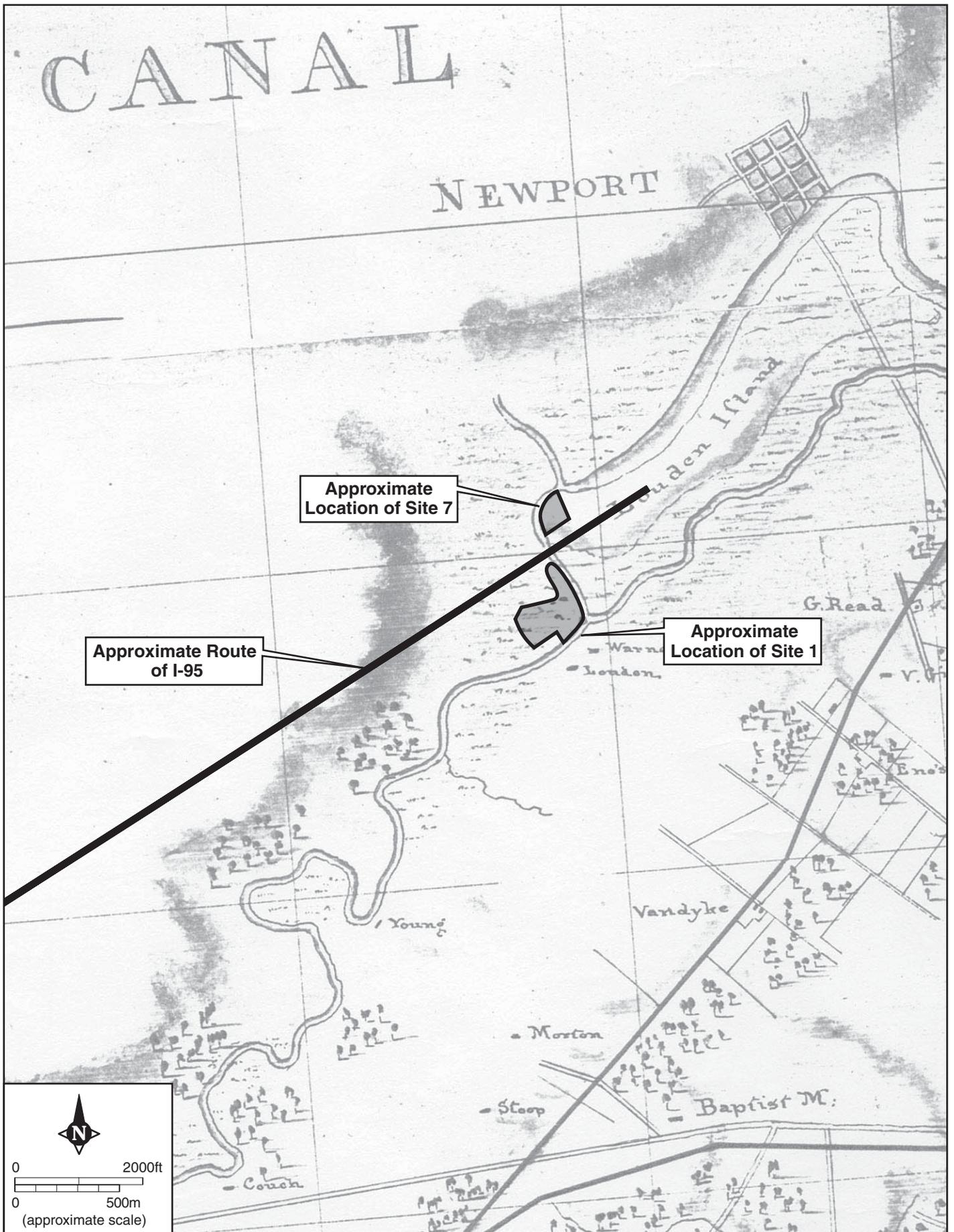


Figure 19. Detail, *General Map of the County over which the Chesapeake & Delaware Canal is proposed to be carried* (Latrobe 1803), showing approximate locations of proposed mitigation Site 1 and Site 7.



Plate 9. General view west from auger test A-2, showing present environs of proposed wetland mitigation Site 1.



Plate 10. View northwest toward rusting tanks located near the northern extent of proposed wetland mitigation Site 7.

Test A-4 was located approximately 80 meters southwest of A-3 (Figure 18). This test was in open vegetation with standing water and within 5 meters of a stand of Phragmites. This test was excavated to a depth of 400 cmbgs (Appendix III). The upper 150 centimeters of this test contains six horizons of deposits that appear to be related to flood overwash deposits. The unit was stratified with sand between 17-36 cmbgs. At 150 cmbgs, there occurred a subtle transition with the underlying horizon from a dark gray (5YR 4/1) to a dark reddish gray (5YR 4/2) with no textural change. The dark reddish gray (5YR 4/2) horizon is 5 centimeters thick and abruptly lay upon (Gley1 3/N) silt clay to (Gley2 3/5B) clay to 234 cmbgs. At 234 cmbgs, the greenish black (Gley2 2.5/5BG) clay abruptly changes into a 54-centimeter-thick very dark gray (5Y 3/1) silt clay loam. At 288 cmbgs, the deposits then transition back to a bluish gray (Gley2 4/10B) clay lagoonal mud to a depth of at least 400 cmbgs.

Test A-5 was located approximately 120 meters southwest of A-4 and 150 meters south of A-2 (Figure 18). This test was located in dense vegetation and approximately 15 meters north of the Christiana River. This test was excavated to a depth of 400 cmbgs (Appendix III). The upper 59 centimeters of this test contains four horizons of overwash flood deposits that sharply overlay a compacted and dewatered peat horizon. This peat horizon ranges from 59-63 cmbgs. Directly below the peat horizon is a 10-centimeter-thick dark gray (5Y 4/1) clay loam. This clay loam is sharply bounded with a black (5Y 2.5/2) silt clay loam that contains approximately 30 percent organic matter. The silt clay loam transitioned through three horizons that progressed from a dark gray (5Y 4/1) clay loam to dark bluish gray (Gley2 4/5B) clay at the terminus of the excavation at 400 cmbgs.

To summarize the above findings, the five ATs excavated at Site 1 revealed a general stratigraphy that began at the surface with stratified deposits of probable overwash flooding events atop tidal marsh deposits, which were then bounded sharply below by lagoonal mud deposits. Auger tests were excavated to depths of 4-5 meters and all terminated in lagoonal mud deposits. Historic glass was noted associated with a peat horizon in A-2 between 122-133 cmbgs. No prehistoric artifacts were recovered from the five tests. There is very low potential for intact deposits and landscapes within the proposed wetland mitigation Site 1 that could have supported prehistoric occupation. In addition, the series of maps and aerial photography (Figures 18-22) clearly depict the environs of Site 1 to be historically associated with a tidally influenced landscape that would not support continued human occupation.

Wetland Mitigation Site 7

Proposed mitigation Site 7 is located north of I-95, south and east of the Christiana River and directly south of the river's confluence with White Clay Creek (Figures 9, 18). Historic maps (Figures 10-16) show no historic period structures within the area. As noted above, examination of the Delaware SHPO site files revealed numerous recorded sites in the greater Churchmans Marsh vicinity; however, no sites occur within the Site 7 area or immediately nearby. Based on a map produced in 1803 (Figure 19), the approximate location of Site 7 is on the western terminus of Loudon Island. On Smith's 1894-95 map (Figure 20), the location of Site 7 appears to straddle portions of the Christiana River, intertidal marsh, and pastureland. Later aerial photography in 1945 shows a very similar location of the site as that depicted on the 1894-95 map, with the former pasture now under agriculture (Figure 21). A 1956 aerial photograph shows the field as fallow and the majority of the area as wetland to the west, north, and within the proposed site (Figure 22). Finally, the 1997 aerial photograph shows the majority of the area as open land with small fringing wetlands to the west and north (Figure 18). Overall, mitigation Site 7 shows a high

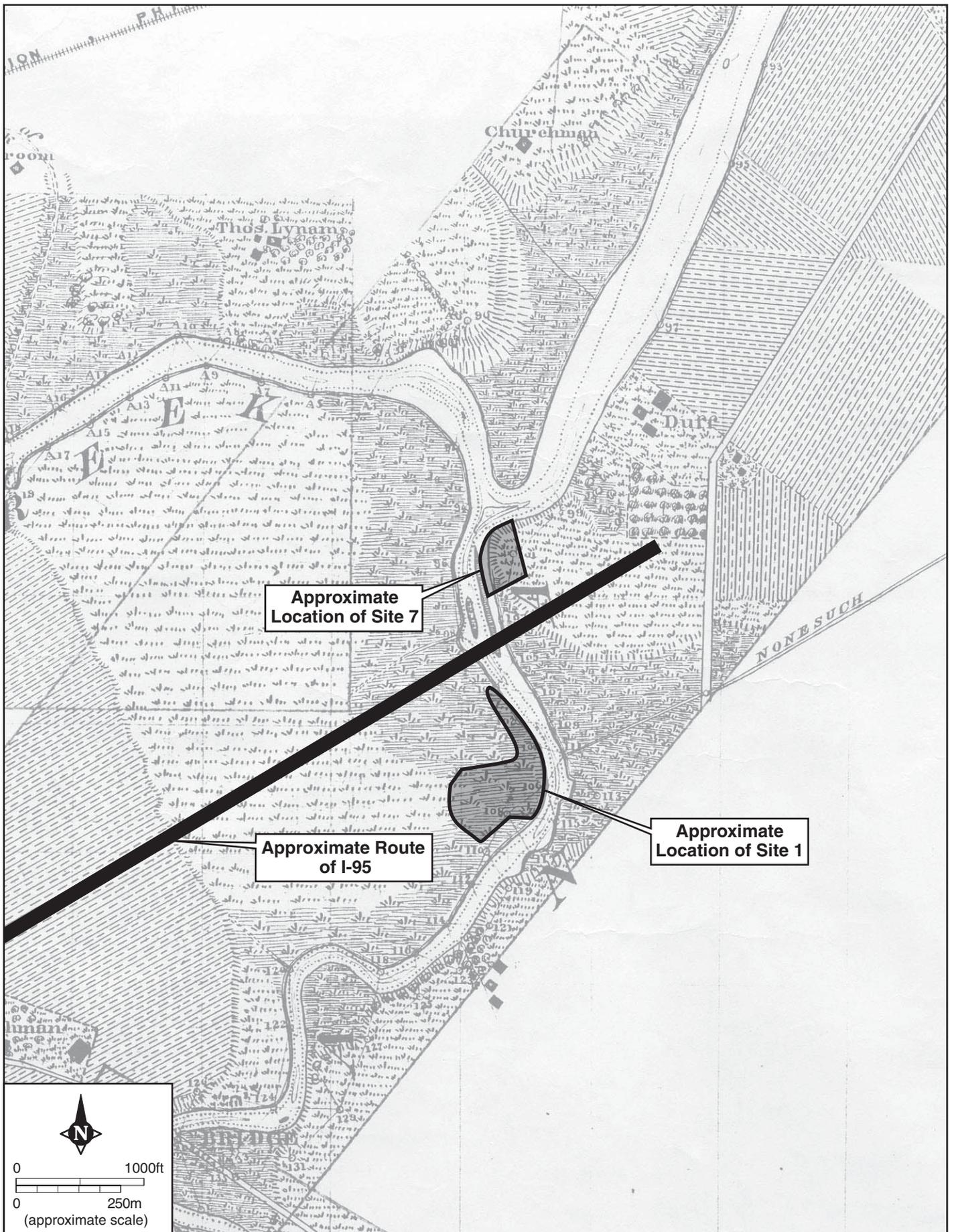


Figure 20. Detail, *Survey of Christiana River, Del. and its Tributaries White Clay Creek and Red Clay Creek* (Smith 1894-95), showing approximate locations of proposed mitigation Site 1 and Site 7.

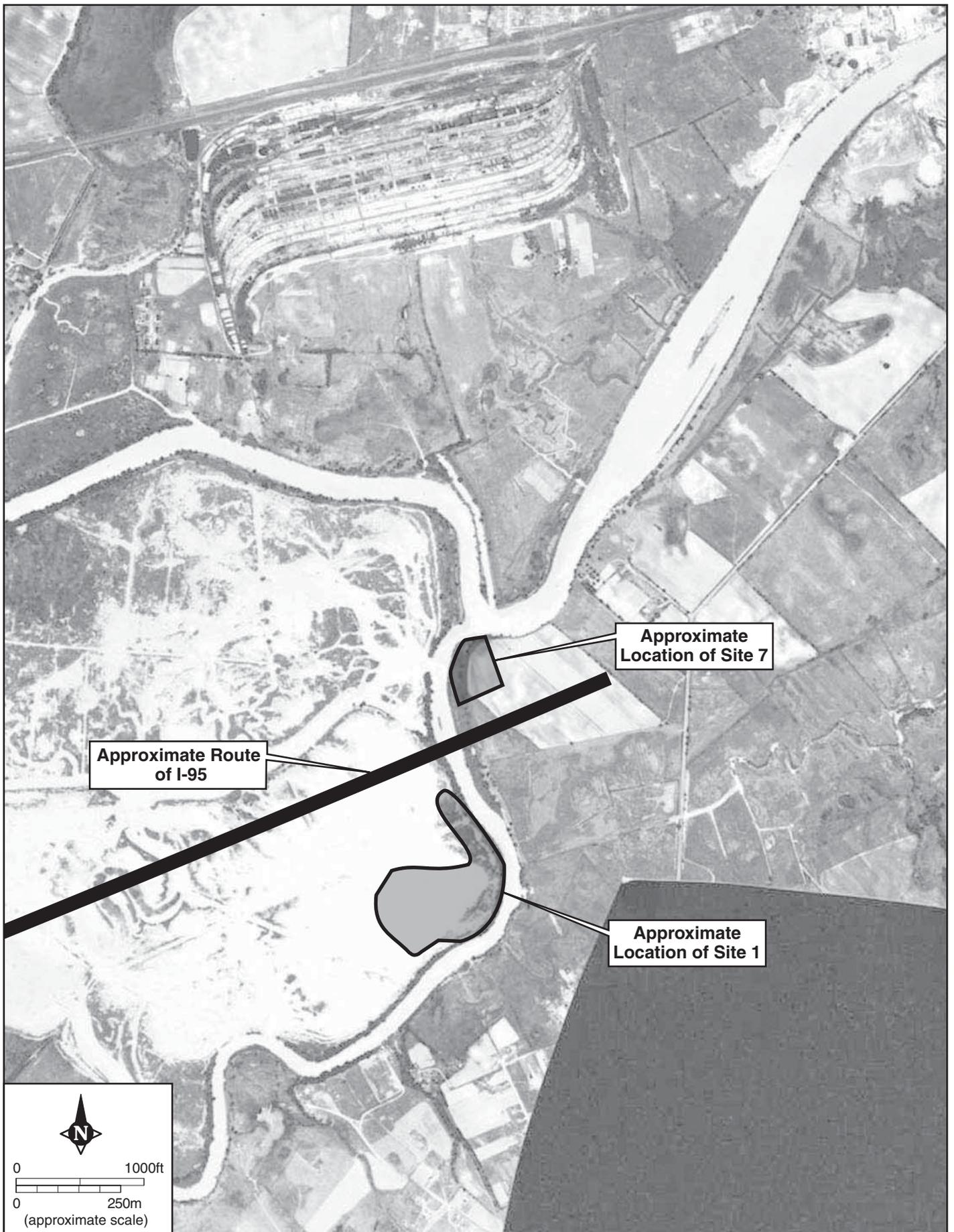


Figure 21. 1945 aerial photograph showing approximate locations of proposed mitigation Site 1 and Site 7.

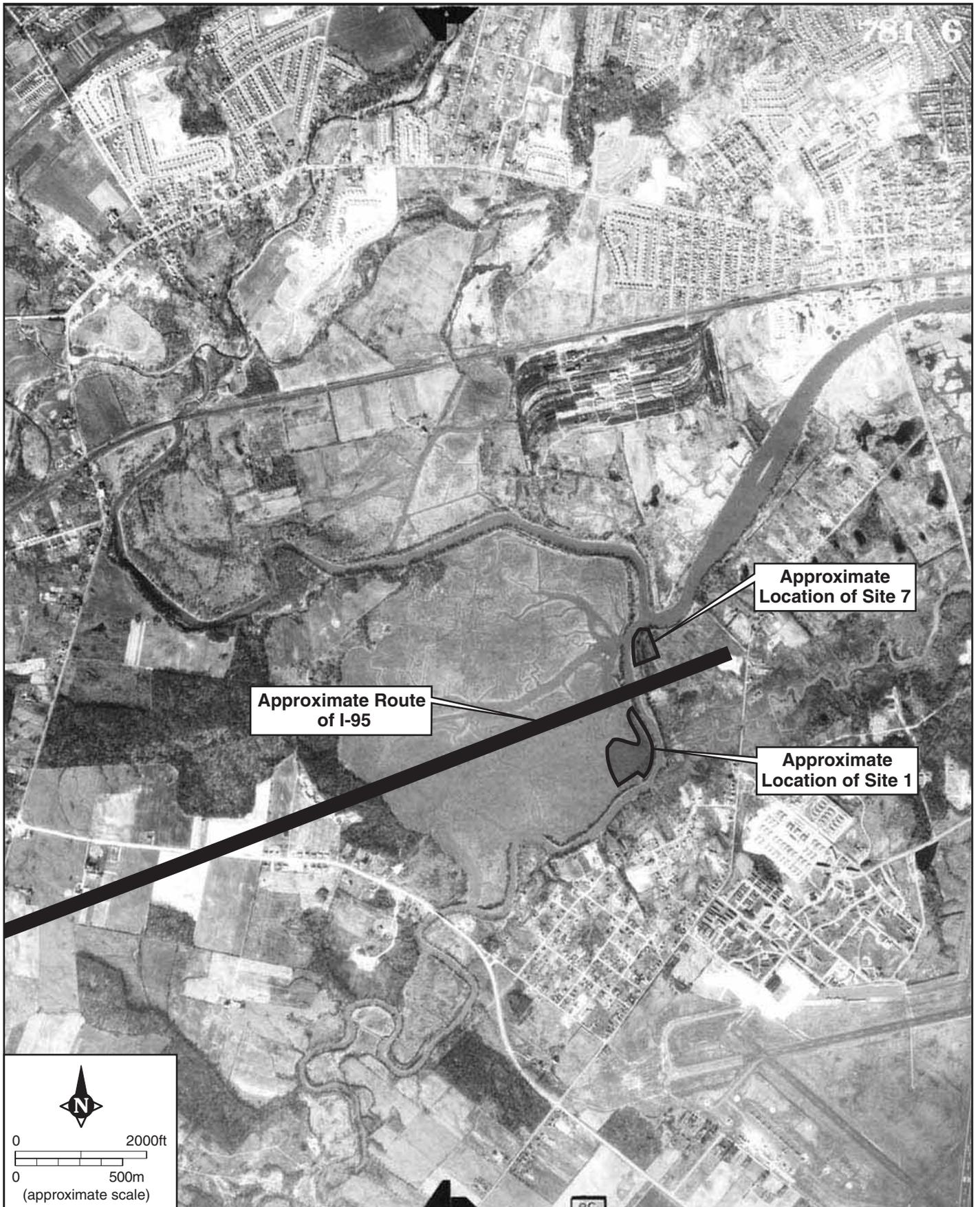


Figure 22. 1956 aerial photograph showing approximate locations of proposed mitigation Site 1 and Site 7.

degree of previous disturbance, most evidently resulting from the construction of nearby I-95. Concrete, macadam, and general debris are strewn across the area (e.g. Plates 10-11).

Two shovel test units, with bucket auger probes into the bases, were excavated within the footprint of proposed mitigation Site 7. The first, B-2, was located centrally within the proposed site (Figure 18). This location had several large blocks of macadam and concrete about, and several large blocks had to be removed during excavation of B-2. The upper 45 centimeters was excavated with a shovel while the remaining 20 centimeters was excavated with a bucket auger (Appendix III). The excavation was terminated at 65 centimeters below ground surface (cmbgs) due to impenetrable gravel and blocks of macadam and concrete. The entire excavation consisted of fill.

Test B-3 was located on the northern boundary of Site 7 (Figure 18). It lay approximately 1 meter lower in elevation than B-2 and was placed in an open space within the tree line. This open space appears to be a high pedestrian traffic area for access to the Christiana River and was close to a small fire ring that has been utilized in the recent past. The upper 75 centimeters of this test was excavated using a shovel while the remaining 105 centimeters was excavated with a bucket auger (Appendix III). The test was terminated at 180 cmbgs due to an impenetrable layer of rounded tabular gravel. The unit began with 32 centimeters of very dark grayish brown (10YR 3/2) sand loam Ap-horizon that contained fragments and blocks of macadam and concrete. From 32-70 cmbgs was a dark yellowish brown sand loam Apb-horizon that contained fragments of concrete and plastic. This Apb-horizon was sharply bounded with an Apb2-horizon of dark grayish brown clay loam that contained fragments of macadam. The Apb2-horizon was mottled with dark gray (5Y 4/1) clay loam near the base of the horizon. The Apb2-horizon transitioned into a 13-centimeter thick yellowish brown (10YR 5/4) sandy clay loam Apb3-horizon that is mottled at the top with dark gray (5Y 4/1) clay loam. This Apb3-horizon is followed by a dark yellowish brown (10YR 4/6) Apb4-horizon of sandy clay loam from 113-180 cmbgs. The Apb4-horizon is mottled with red (2.5YR 4/6) and brown (10YR 5/3) clay loam. The excavation was terminated at 180 cmbgs due to an impenetrable layer of rounded tabular gravel.

In sum, Site 7 occupies what has been identified historically as the terminus and fringing intertidal zone of an island. The two tests were excavated into stratified fill deposits. The fill deposits appear to be episodic with the primary components being macadam, concrete, and various plastics pieces. Evidence for filling and grading includes push piles of macadam and concrete along the edges of the area and chunks of macadam and concrete throughout the central area of the site. Based on the results of the subsurface testing, there appears to be at least two meters of fill within the proposed mitigation site. No evidence of intact buried deposits was observed from either test and no prehistoric artifacts were recovered. In addition, the series of maps and aerial photography (Figures 18-22) depict the environs of Site 7 to be potentially historically associated with a fringing tidally-influenced landscape next to a supratidal landscape (upland). The supratidal landscape could have supported prehistoric occupation based upon the historic record, but it is highly unlikely that any such landscape could have survived undisturbed.



Plate 11. General view southwest along western edge of proposed wetland mitigation Site 7; note blocks of concrete at center of photograph.

5.0 SUMMARY AND RECOMMENDATIONS

John Milner Associates, Inc. conducted a Phase I archeological survey in conjunction with improvements to I-95 in New Castle County, Delaware. The Area of Potential Effects for archeology consisted of three spatially separated locations, within which archeological testing was conducted. The results of the investigation and recommendations generated there from are presented below.

5.1 WESTERN PORTION

In total, 239 shovel tests were excavated in the western portion and four prehistoric sites were identified. In addition, three primary shovel tests produced a single flake each. Radials were excavated and in only one instance was additional material recovered. Due to the low density of artifacts, all three locations were deemed to represent isolated finds. As such, these finds do not warrant further evaluation.

Site 7NC-D-234 produced three artifacts from an area measuring less than 15 meters in diameter. This does not appear to represent a potentially significant archeological resource that might be eligible for listing in the National Register of Historic Places and, accordingly, no further archeological investigation is recommended at this location.

Site 7NC-D-235 produced six artifacts from an area measuring approximately 35-12 meters. This does not appear to represent a potentially significant archeological resource that might be eligible for listing in the National Register and, therefore, no further archeological investigation is recommended at this location.

Site 7NC-D-236 recovered 43 artifacts from an area measuring approximately 35-122 meters. This site seems more substantial than most of the others identified during the Phase I survey. Accordingly, it may be a significant archeological resource, eligible for listing in the National Register. If construction is planned for this location, a Phase II archeological evaluation is recommended for the site.

Site 7NC-D-237 produced 31 artifacts from a single STU, 20 of which were recovered from intact B-horizon soil. No additional material was recovered from surrounding STUs. Given that a significant number of artifacts were recovered from intact B-horizon soil at this location, this site may be a significant archeological resource, eligible for listing in the National Register. If construction is planned for this location, a Phase II archeological evaluation is recommended for the site.

In sum, should design plans ultimately include Sites 7NC-D-236 and 7NC-D-237, JMA recommends Phase II archeological evaluation for these sites. Overall, it is clear that jasper from the Iron Hill formation was an important resource to prehistoric people over a long period of time. They made extensive use of this material and it constitutes the bulk of the artifacts recovered. The nearby presence of this lithic raw material source may also have contributed to the number and distribution of the sites identified in the APE. Previous archeological testing in the vicinity of Iron Hill has identified other sites with artifact assemblages similar to that recovered from sites 7NC-D-236 and 7NC-D-237. The lithic material recovered from these two sites is remarkably similar to the assemblage recovered from the Iron Hill East site (7NC-D-108). At that site the artifacts included large amounts of amorphous, decomposed, low-grade lithic debris, and much smaller quantities of better quality jasper artifacts. While neither location yielded

diagnostic artifacts, previous work on the Iron Hill jasper quarries and the Delaware Chalcedony Complex have indicated a time period of exploitation ranging from Paleo-Indian to Woodland.

5.2 CENTRAL PORTION

While the bulk of the APE for the I-95/S.R. 1 interchange portion of the project was previously disturbed, three areas considered to have moderate to high archeological sensitivity were identified. The Phase I archeological testing at these three areas found no evidence of potentially significant archeological resources. An area of intact soil containing historic artifacts was identified at the Lewis Welden Farm location in this part of the APE. However, given the extensive disturbance across most of the site and limited extent of intact soils, it is unlikely that this find represents an historical archeological resource significant in its own right, or as a resource contributing to the criteria under which the property was previously evaluated as being eligible for the National Register. Consequently, no additional archeological investigations are recommended for the I-95/S.R. 1 interchange portion of the project.

5.3 EASTERN PORTION

Proposed mitigation Site 1 and Site 7 are regarded as having very low to no potential for intact, deeply buried archeological deposits dating to either the historic or the prehistoric periods. The shovel and auger tests showed evidence of filling and marshland environments with no potential for intact archeological deposits. No further archeological investigation is recommended in association with proposed wetland mitigation Site 1 and Site 7.

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APPENDIX I:
SCOPES OF WORK

Via JMA Courier

October 13, 2003

Rummel, Klepper & Kahl, LLP
81 Mosher Street
Baltimore, MD 21217

Attn: William Hellmann

Re: I-95/SR 1 Interchange/Mainline Project
New Castle County, Delaware
Phase IB Cultural Resources Investigations
Supplemental Professional Services Proposal

Dear Mr. Hellmann:

John Milner Associates, Inc. (JMA) is pleased to submit this Supplemental Professional Services Proposal for the referenced project. Presently JMA is conducting Phase IA cultural resources investigations for I-95 improvements in accordance with three professional services proposals: the first for the SR 1 to SR 141 segment, dated October 4, 2001; the second for the SR 1/I-95 interchange segment, dated October 26, 2001; and the third for the I-95 toll plaza segment, dated October 26, 2001. Since these proposals were submitted, the project was restructured. The SR 1 to SR 141 and SR 1/I-95 interchange segments were combined, while the I-95 toll plaza segment remains independent.

The present proposal addresses the SR 1 to SR 141 and SR1/I-95 interchange segments. The tasks proposed herein are intended to supplement on-going investigations and further assist the Federal Highway Administration (FHWA) and the Delaware Department of Transportation (DelDOT) in meeting their Section 106 compliance responsibilities. The Scope of Services was developed in consultation with Rummel Klepper & Kahl (RKK), DelDOT, and the State Historic Preservation Office (SHPO).

JMA proposes to provide the professional services necessary to carry out the investigations outlined above, in accordance with current (April 1997) guidelines for archeological surveys issued by the Delaware State Historic Preservation Office (SHPO). This Proposal defines the proposed scope of services, including a research design for the survey, identifies a schedule for the project, specifies compensation and terms for the proposed services.

The objective of the Phase I archeological investigation is to document the presence or absence of archeological resources within the area of potential effects (APE). The objective of the historic architectural survey is to evaluate historic properties within the APE and determine if these properties are eligible for listing in the National Register of Historic Places (NRHP).

I. SCOPE OF SERVICES

The proposed project will entail five tasks, as follows: 1) Phase IB archeological investigation, 2) historic architectural evaluations, 3) artifact processing and data analysis, 4) preparation of a report, and 5) project coordination and meetings. Each task is described briefly below.

PHASE IB ARCHEOLOGICAL INVESTIGATION

Phase IB archeological investigation will be conducted within the APE defined for the I-95/SR 1 Interchange/Mainline project area. JMA will archeologically survey the maximum proposed extent of construction disturbance, as currently illustrated on the alternatives maps supplied by RKK. Background research, such as examination of the SHPO site files, review of previous studies, and information on the prehistory and history of the area have already been completed as part of the Phase IA report. JMA's proposed field investigations will take into soils, hydrography, and topography, and will be focused on areas that are sensitive for prehistoric and historic archeological remains. Based on the results of the Phase IA documentation, there are few areas within the APE for the I-95/SR 1 interchange that retain the potential for intact archeological deposits. Notable areas include the wooded area west of the southbound exit ramp from I-95 to SR 1, the remnant area of the Stafford farm (a former National Register-listed site), and the slopes immediately north of I-95 bordering Churchman's Marsh.

Field investigations will commence with a pedestrian reconnaissance, provided that surface visibility is adequate. If surface visibility is not adequate, subsurface testing in the form of shovel tests is proposed. JMA proposes to excavate shovel test units (STUs) placed at 15 meter intervals in transects spaced 30 meters apart. The testing interval may be further tightened to 7.5 meters in those loci with high artifact densities and/or identified features are encountered. The number of shovel tests excavated will depend on several factors, including local conditions, topography, and background research. JMA anticipates that the number of shovel tests excavated will approximate 250 to 300. JMA anticipates that the field crew will consist of a project archeologist (field supervisor) and a team of five (5) archeologists.

The locations of STUs will be recorded on plans of the project area, and the soil profiles will be recorded on standardized forms. Excavated soils will be passed through one-quarter-inch hardware cloth to ensure uniform recovery of cultural material. Cultural material will be retained in bags marked with standard provenience information. Narrative field notes and black-and-white and color photographs will be taken to document the setting and results of

the field investigations. Following excavation and recordation, the locations of shovel tests will be restored to as close as original condition as possible by backfilling with the screened soil.

HISTORIC ARCHITECTURAL EVALUATIONS

In accordance with SHPO guidelines, JMA will prepare National Register of Historic Places (NRHP) evaluations for historic architectural properties within the preliminary area of potential effects (APE) that meet the NRHP 50-year age consideration. The Phase IA field examination indicated that the following properties meet these requirements:

424 Old Airport Road
??? Old Airport Road (south side)
433 Old Airport Road
467 Old Airport Road
491 Old Airport Road
495 Old Airport Road

JMA will conduct background research in local historical collections to establish relevant historic contexts within which to evaluate each historic architectural property. Following DelDOT's notification of all property owners, JMA will conduct a field survey to confirm the results of background research and photograph each property, as appropriate.

ARTIFACT PROCESSING AND DATA ANALYSIS

Artifacts recovered in the course of the field investigations will undergo laboratory processing and analysis. Materials will be cleaned and inventoried following guidelines established by the SHPO. The recovered artifacts will be identified as to material, temporal or cultural/chronological association, style, and function. Preliminary analysis will seek patterns in the relative composition of the recovered artifact assemblage, particularly to the extent that such patterns may indicate the functional nature of the assemblages and/or the site formation processes associated with their deposition. These attributes are particularly relevant to the evaluation of potential archeological significance. Field data will be evaluated, synthesized, and placed in a broader regional perspective based on JMA's knowledge of regional archeological resources and previous background research, the *Management Plan for the Prehistoric Archeological Resources of Northern Delaware* and the *Management Plan for Delaware's Historical Archaeological Resources*. For purposes of this proposal, JMA estimates that the number of artifacts recovered from the Phase I survey will not exceed 500.

REPORT PREPARATION

The results of the Phase IB investigations will be presented in a combined report with the results of on-going Phase IA investigations for the SR 1 to SR 141 and SR 1/I-95

interchange segments. The report will include the following elements:

- a. Statement of purpose and goals of the investigation
- b. Description of the project and preliminary APE
- c. Description of the environmental setting as it pertains to cultural resources
- d. Synthesis of cultural development and land use patterns within the preliminary APE
- e. Description of the research and field methods that were employed
- f. Description of Phase IA results and recommendations
- g. Description of Phase IB archeological testing and results
- h. Description and evaluation of historic architectural properties with reference to appropriate historic contexts and NRHP criteria (36 CFR Part 60.4)
- i. Delaware cultural resource survey (CRS) form for each property/site, as appropriate
- j. GIS data for each CRS form (to be submitted on CD)
- k. Supporting illustrations

Under the terms of this proposal three (3) review copies of the draft report will be delivered to RKK. After review of the draft report by RKK, DelDOT and the SHPO, the report will be revised accordingly and produced in a final version. Upon approval of the final report, JMA will provide six (6) bound copies, and one (1) unbound copy, all with original photographs, to RKK and DelDOT, and one (1) bound copy each to the DE and MD SHPOs.

PROJECT COORDINATION AND MEETINGS

JMA will participate in on-going project coordination and meetings as directed by RKK. It is anticipated that these activities will involve preparation of letters, memoranda, and presentation copy for project team and agency review; participation in meetings and telephone conferences with RKK, DelDOT, and SHPO, and other parties, as appropriate; and preparation for and participation in public workshops.

II. SCHEDULE

Project initiation will commence within one week of receipt of Notice to Proceed, barring the occurrence of adverse weather conditions or other delaying factors beyond the control of JMA. We anticipate that architectural and archeological field investigations can be completed within approximately 3 weeks (fifteen working days), weather permitting. The draft of the full report will be submitted for review within six (6) weeks of the completion of fieldwork. The final report will be delivered on a mutually agreed upon schedule, following receipt of review comments on the draft report.

We have prepared this proposal based upon available information and our understanding of the required additional services. We appreciate the opportunity to continue our association on this significant and challenging assignment, and look forward to the

Rummel, Klepper & Kahl, LLP
October 13, 2003
Page 5

successful completion of the project.

Sincerely,

JOHN MILNER ASSOCIATES, INC.

Richard Meyer
Senior Project Manager

enc.

cc: Wade P. Catts
Daniel G. Roberts
Douglas C. McVarish
John P. McCarthy

Via JMA Courier

October 13, 2003

Rummel, Klepper & Kahl, LLP
81 Mosher Street
Baltimore, MD 21217

Attn: William Hellmann

Re: I-95/Newark Toll Plaza Project
New Castle County, Delaware and Cecil County, Maryland
Phase IB Cultural Resources Investigations
Supplemental Professional Services Proposal

Dear Mr. Hellmann:

John Milner Associates, Inc. (JMA) is pleased to submit this Supplemental Professional Services Proposal for the referenced project. Presently JMA is conducting Phase IA cultural resources investigations for I-95 improvements in accordance with three professional services proposals: the first for the SR 1 to SR 141 segment, dated October 4, 2001; the second for the SR 1/I-95 interchange segment, dated October 26, 2001; and the third for the I-95 toll plaza segment, dated October 26, 2001. Since these proposals were submitted, the project was restructured. The SR 1 to SR 141 and SR 1/I-95 interchange segments were combined, while the I-95 toll plaza segment remains independent.

The present proposal addresses the I-95 toll plaza segment. The tasks proposed herein are intended to supplement on-going investigations and further assist the Federal Highway Administration (FHWA) and the Delaware Department of Transportation (DelDOT) in meeting their Section 106 compliance responsibilities. The Scope of Services was developed in consultation with Rummel, Klepper & Kahl (RKK), DelDOT, and the State Historic Preservation Office (SHPO).

JMA proposes to provide the professional services necessary to carry out the investigations outlined above, in accordance with current (April 1997) guidelines for archeological surveys issued by the Delaware State Historic Preservation Office (SHPO). This Proposal defines the proposed scope of services, identifies a schedule for the project, and specifies compensation and terms for the proposed services.

The objective of the Phase I archeological survey is to document the presence or absence of archeological resources within the area of potential effects (APE). The objective of the historic architectural survey is to evaluate historic properties within the APE and determine if these properties are eligible for listing in the National Register of Historic Places (NRHP).

I. SCOPE OF SERVICES

The proposed project will entail five tasks, as follows: 1) Phase IB archeological investigation, 2) historic architectural evaluations, 3) artifact processing and analysis, 4) preparation of a report, and 5) project coordination and meetings. Each task is described briefly below.

PHASE IB ARCHEOLOGICAL INVESTIGATION

Phase IB archeological survey will be conducted within the APE defined for the toll plaza project areas. JMA will archeologically survey the maximum proposed extent of construction disturbance, as currently illustrated on the alternatives maps supplied by RKK. Background research, such as examination of the SHPO site files, review of previous studies, and information on the prehistory and history of the area have already been completed as part of the Phase IA report. JMA's proposed field investigations will take into account soils, hydrography, and topography, and will be focused on areas that are sensitive for prehistoric and historic archeological remains.

JMA proposes to focus survey efforts on the portions of the project area in the field area north of I-95 and west of Ott's Chapel Road, and in the wooded area south of the toll plaza, particularly focused in the vicinity of streams and drainages. Field investigations will commence with a pedestrian reconnaissance, provided that surface visibility is adequate. If surface visibility is not adequate, subsurface testing in the form of shovel tests is proposed. JMA proposes to excavate shovel test units (STUs) placed at 15 meter intervals in transects spaced 30 meters apart. The testing interval may be further tightened to 7.5 meters in those loci with high artifact densities and/or identified features are encountered. In those areas where testing will be centered on stream drainages, the survey area will extend approximately 100 meters to the east and west away from the drainages. The number of shovel tests excavated will depend on several factors, including local conditions, topography, and background research. JMA anticipates that the number of shovel tests excavated will approximate 600. JMA anticipates that the field crew will consist of a project archeologist (field supervisor) and a team of five (5) archeologists.

The locations of STUs will be recorded on plans of the project area, and the soil profiles will be recorded on standardized forms. Excavated soils will be passed through one-quarter-inch hardware cloth to ensure uniform recovery of cultural material. Cultural material will be retained in bags marked with standard provenience information. Narrative field notes and black-and-white and color photographs will be taken to document the setting and results of the field investigations. Following excavation and recordation, the locations of shovel tests will be restored to as close as original condition as possible by backfilling with the screened soil.

HISTORIC ARCHITECTURAL EVALUATIONS

In accordance with SHPO guidelines, JMA will prepare National Register of Historic Places (NRHP) evaluations for historic architectural properties within the preliminary area of potential effects (APE) that meet the NRHP 50-year age consideration. The Phase IA field examination indicated that the following properties meet these requirements:

771 Chestnut Hill Road
779 Chestnut Hill Road
803 Chestnut Hill Road
844 Chestnut Hill Road
879 Chestnut Hill Road
648 Churchmans Road (CRS# N-1603)
1653 Dixie Line Road
1463 Otts Chapel Road
104 Stanton Christiana Road
120 Stanton Christiana Road
128 Stanton Christiana Road
92 Welsh Tract Road
159 Welsh Tract Road (CRS# N-13339)
180 Welsh Tract Road
188 Welsh Tract Road

In addition, JMA will prepare a NRHP evaluation of the existing toll plaza. While this property does not yet meet the 50-year age consideration, it will be addressed under Criteria Consideration G.

JMA will conduct background research in local historical collections to establish relevant historic contexts within which to evaluate each historic architectural property. Following DelDOT's notification of all property owners, JMA will conduct a field survey to confirm the results of background research and photograph each property, as appropriate.

ARTIFACT PROCESSING AND DATA ANALYSIS

Artifacts recovered in the course of the field investigations will undergo laboratory processing and analysis. Materials will be cleaned and inventoried following guidelines established by the SHPO. The recovered artifacts will be identified as to material, temporal or cultural/chronological association, style, and function. Preliminary analysis will seek patterns in the relative composition of the recovered artifact assemblage, particularly to the extent that such patterns may indicate the functional nature of the assemblages and/or the site formation processes associated with their deposition. These attributes are particularly relevant to the evaluation of potential archeological significance. Field data will be evaluated, synthesized, and placed in a broader regional perspective based on JMA's knowledge of regional archeological resources and previous background research, the *Management Plan for the Prehistoric Archeological Resources of Northern Delaware*

and the *Management Plan for Delaware's Historical Archaeological Resources*. For purposes of this proposal, JMA estimates that the number of artifacts recovered from the Phase I survey will not exceed 1,000.

REPORT PREPARATION

The results of the Phase IB investigations will be presented in a combined report with the results of on-going Phase IA investigations for the I-95 toll plaza segment. The report will include the following elements:

- a. Statement of purpose and goals of the investigation
- b. Description of the project and preliminary APE
- c. Description of the environmental setting as it pertains to cultural resources
- d. Synthesis of cultural development and land use patterns within the preliminary APE
- e. Description of the research and field methods that were employed
- f. Description of Phase IA results and recommendations
- g. Description of Phase IB archeological testing and results
- h. Description and evaluation of historic architectural properties with reference to appropriate historic contexts and NRHP criteria (36 CFR Part 60.4)
- i. Maryland historic sites survey (HSS) and Delaware cultural resource survey (CRS) form for each property/site, as appropriate
- j. GIS data for each CRS form (to be submitted on CD)
- k. Supporting illustrations

Under the terms of this proposal three (3) review copies of the draft report will be delivered to RKK. After review of the draft report by RKK, DelDOT and the DE and MD SHPOs, the report will be revised accordingly and produced in a final version. Upon approval of the final report, JMA will provide six (6) bound copies, and one (1) unbound copy, all with original photographs, to RKK and DelDOT, and one (1) bound copy each to the DE and MD SHPOs.

PROJECT COORDINATION AND MEETINGS

JMA will participate in on-going project coordination and meetings as directed by RKK. It is anticipated that these activities will involve preparation of letters, memoranda, and presentation copy for project team and agency review; participation in meetings and telephone conferences with RKK, DelDOT, DE and MD SHPOs, and other parties, as appropriate; and preparation for and participation in public workshops.

II. SCHEDULE

Project initiation will commence within one week of receipt of Notice to Proceed, barring the occurrence of adverse weather conditions or other delaying factors beyond the control of JMA. We anticipate that field investigations can be completed within approximately two to three weeks (10 to 15 days), weather permitting. The draft of the full report will be

Rummel, Klepper & Kahl, LLP
October 13, 2003
Page 5

submitted for review within six (6) weeks of the completion of fieldwork. The final report will be delivered on a mutually agreed upon schedule, following receipt of review comments on the draft report.

We have prepared this proposal based upon available information and our understanding of the required additional services. We appreciate the opportunity to continue our association on this significant and challenging assignment, and look forward to the successful completion of the project.

Sincerely,

JOHN MILNER ASSOCIATES, INC.

Richard Meyer
Senior Project Manager

enc.

cc: Wade P. Catts
Daniel G. Roberts
Douglas C. McVarish
John P. McCarthy

Draft Memorandum of Field Meeting

Date: July 29, 2004
To: Attendees
From: Kirk Mantay/Michele Floam
Subject: Wetland Mitigation Sites Review
Reference: Improvements to I-95 from SR-1 to SR 141
Delaware Department of Transportation

A field review for five (5) potential sites for compensatory wetland mitigation was conducted for the above referenced project on July 22, 2004 at 9:30 AM in New Castle County, Delaware. Those in attendance included:

Terry Fulmer	DeIDOT
Bob Kleinburd	FHWA
Tim Goodger	NMFS
Jackie Winkler and Dick Hassel	USACOE
Joanne Haughey	DNREC
Kirk Mantay and Michele Floam	RK&K

Action Items

- ▶ Begin more detailed studies (cultural resource investigation, hazmat, surveys, and field assessments) of mitigation sites 1 and 7 (**RK&K**)
- ▶ Obtain background information on sites 1 and 7 through 1995 draft EIS and Churchmans Reservoir EIS (**RK&K**)
- ▶ Schedule and conduct a coordination meeting to present detailed study information to regulatory agencies in September 2004 (**RK&K**)

Introduction

On July 8, 2004, at the Joint Permit Review (JPR), RK&K submitted a copy of the *Draft Nontidal/Tidal Wetland Mitigation Site Search Report* to the regulatory agencies. The mitigation sites were selected to compensate for the unavoidable impacts to federally jurisdictional waters of the US, including wetlands associated with the I-95/SR 1 Interchange and I-95 mainline widening between SR1 and SR 141.

During the mitigation site search eleven (11) potential tidal and nine (9) potential nontidal sites were investigated. Seven (7) of the tidal sites and eight (8) nontidal sites were dropped from consideration due to land use and land cover conflicts or cultural resource issues. Therefore, four (4) tidal sites (1, 7, 17 and 18) and one (1) nontidal site (16) were carried forward for review at this meeting.



Rummel, Klepper & Kahl, LLP
Consulting Engineers

Mitigation Requirements

Based on estimated acreage of impacts from the preferred alternative, 1.70 acres of nontidal/tidal wetland mitigation is required for this project (see table below for breakdown).

DELDOT I-95 SR1 to SR141 and I-95 SR1 INTERCHANGE						
NONTIDAL MITIGATION REQUIREMENTS						
	Nontidal PFO/PEM SF	Nontidal PEM/PSS SF	Nontidal PEM SF	Nontidal PEM/POW SF	Tidal Waters of the US	Totals
	4,448	3,623	28,043	18,552	11,326	66,032 SF/ 1.52 AC
Mitigation Ratios	2:1	2:1	1:1	1:1	1:1	
Mitigation Required	8,976	7,246	28,043	18,552	11,326	74,143 SF/ 1.70 AC

Field Reviews

Site 1

Site 1 is located on the western bank of the Christina River, approximately 100 feet south of the I-95 crossing over the river. The site was once a tidal portion of Churchmans Marsh, and was filled to its current elevation (approximately 5' above mean high tide) with dredge spoils from the river. Currently, the area is an open grass meadow with a sparse amount of saplings and shrubs adjacent to wooded areas. This is a good site to create both tidal and nontidal wetlands.

- No hazmat has been conducted on the site
- The mitigation site will be located far enough off the roadway to accommodate potential future expansions of the I-95.
- Map needs to be revised to reflect the open area better
- Jackie indicated that a lot of background information could be obtained from the Churchman Reservoir study.
- The design should minimize the impacts to existing trees
- Geotechnical boring should be conducted to determine if excavated material could be used for roadway fill

Site 17

This property is currently operated as the Continental Auto and Scrap/Salvage Junkyard, east of Airport Road. This property is composed of upland fill from many sources. Several dozen roadway sections previously removed from Delaware Turnpike underlie the property. The site is cover is mostly gravel, exposed soil and grass. One building exists on the site along with junked cars and construction equipment.

The shop building and main work area is located on approximately 10-12' fill (approximately 14' above MHT, 10-12' above existing wetland boundary), while much of the surrounding yard area



is approximately 4-8' above the existing wetland boundary and 6-10' above MHT. The eastern most part of this area is currently being used for scrap vehicle storage. This portion of the site would require only a moderate amount (2-6') of excavation, but nearly the entire area is under high-tension wires. Expansive phragmites tidal wetlands exist along and north of Nonesuch Creek. Both nontidal and tidal wetlands could be created at this site.

- The tidal influence is thought to be a result of the tide gate that is frequently opened by hunters. DelDOT cannot control this sporadic opening of the gate, although they have tried in the past. Therefore, the tidal influence to this site would be unpredictable
- There was a lot of concern from Dick, Jackie and Tim, that it would be very difficult to prevent invasive species from occurring at the site due to its proximity to such an extensive phragmites marsh.
- Only way to prevent invasive species would be to enhance the entire area
- Dick informed the group that a pre-application meeting was conducted with the Radisson hotel a few weeks ago and that this site was identified as a floodplain mitigation site for the hotel
- Bob noted that the restoration of this site would provide the most bang for the buck from an aesthetic standpoint not from an biological diversity focus

Site 18

This property, east of site 17, is an open field that was once a gas station. This site is built upon approximately 14' of upland fill, and is surrounded by the same extensive phragmites marsh as site 17. Both nontidal and tidal wetlands could be created at this site.

- The tidal influence is also thought to be a result of the tide gate openings and is unpredictable (see note, site 17 above)
- There was also a lot of concern that it would be very difficult to prevent invasive species from occurring at the site
- The site is small and would not accommodate the entire mitigation required for the project

Site 7

Site 7 is located on the eastern bank of the Christina River, approximately 100 feet northeast of the I-95 crossing over the river. A portion of the site has recently been cleared. Currently, the area is a mixed upland/wetland meadow with sparse woody vegetation and a nontidal drainage channel. The site is adjacent to a tidal portion of the Christina River, and a vertical bank (approx. 5-6') prevents tidal influence. This site is also good to create both tidal and nontidal wetlands

- Forested areas should be avoided
- The mitigation site will be located far enough off the road to accommodate potential future expansions of the I-95.
- During the wetland delineation conducted for the Turnpike, wetlands were identified at this site. Therefore, this site will consist of both creation and enhancement of existing wetlands



- Jackie noted that prevention of invasive species at this site may also be difficult as well as goose herbivory
- Geotechnical boring should be conducted to determine if excavated material could be used for roadway fill
- Property may be for sale

Site 16

Site 16 is located in the northwest quadrant of the Delaware Turnpike and Otts Chapel Road intersection. The potential nontidal mitigation site is an abandoned agricultural field that consists of herbaceous material. A woodland edge surrounds the outer portion of the property. This site will be excavated for roadway fill material.

- It was the opinion of the COE that this site would be potentially considered if the adjacent property, which contains a perennial stream and forested wetlands, could be purchased and preserved
- Otherwise the site is isolated
- Jackie recommending using this site as a disposal site for excavated materials from site 1 or 7 if that material is not determined to be suitable for roadway fill

Conclusion/Discussion

To conclude the meeting, the group reviewed the day's notes and decided which sites to retain and which to eliminate from further study. The recommendations at this meeting were consistent with comments made by EPA at the previous field review in May 2004. The results are listed in the table below:

Site	Status	Mitigation Opportunities
Site 1	Retained	Tidal and Nontidal
Site 7	Retained	Tidal and Nontidal
Site 16	Eliminated	Nontidal
Site 17	Eliminated	Tidal and Nontidal
Site 18	Eliminated	Tidal and Nontidal

- Surveys, cultural resources investigations, tide data and hazmat investigations will be conducted at sites 1 and 7. The group will meet in September to discuss the finding
- Jackie will consider accepting tidal mitigation for nontidal wetland impacts in order to maximize the potential for success and quality of the site, but this will need to be discussed with and approved by all the resource agencies



Delaware Turnpike
Wetland Mitigation Site Search
Agency Field Investigation
July 29, 2004
Page 5

Should anyone have any concerns or corrections to these minutes, please contact Michele Floam at (410) 728-2900, as soon as possible. These minutes represent the general context of items and issues discussed during the July 22, 2004 site visit.

Cc: Attendees
Darren O'Neill, Joy Ford, Kevin Cunningham and Ken Dunne -DeIDOT
Rick Meyers – Milner & Associates
Bill Moyer and Susan Love - DNREC
Bob Zepp – USFWS
Jim Butch – EPA
Bill Hellmann -RK&K

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Rummel, Klepper & Kahl, LLP
Consulting Engineers

Subject: Re: Delaware Turnpike - Wetland Replacement Area Candidates

Date: Mon, 26 Jul 2004 09:26:17 -0400

From: "Rick Meyer" <rmeyer@johnmilnerassociates.com>

To: <mfloam@rkkengineers.com>

CC: <wcatts@johnmilnerassociates.com>

Michele - We are available for a field view any day this week. Would you like us to contact Kevin directly about a date and time? Who all would be involved? Thanks. - Rick

----- Original Message -----

From: Michele J. Floam

To: Rick Meyer

Sent: Friday, July 23, 2004 3:59 PM

Subject: FW: Delaware Turnpike - Wetland Replacement Area Candidates

Rick,

See email below. How quickly can you begin this work?

Michele

Michele J. Floam, RLA
Project Manager

Rummel Klepper & Kahl, L.L.P.

Consulting Engineers

81 Mosher Street * Baltimore, MD 21217

Voice: 410-728-2900 Ext. 1310

Fax: 410-728-3160

Email: mfloam@rkkengineers.com

-----Original Message-----

From: Fulmer, Terry (DelDOT) [mailto:TFulmer@mail.dot.state.de.us]

Sent: Friday, July 23, 2004 8:38 AM

To: 'mfloam@rkkengineers.com'; Cunningham, Kevin (DelDOT)

Cc: O'Neill, Darren M. (DelDOT); 'whellmann@rkkengineers.com'

Subject: RE: Delaware Turnpike - Wetland Replacement Area Candidates

since we seem to be focusing on sites 1 and 7, maybe now is the time for a little field recon. would you please have milner get up with kevin to set a field review and decide what level of effort we'll need. thanks terry

-----Original Message-----

From: Michele J. Floam [mailto:mfloam@rkkengineers.com]

Sent: Friday, July 23, 2004 8:28 AM

To: Terry Fulmer

Subject: FW: Delaware Turnpike - Wetland Replacement Area Candidates

See below email

Michele

Michele J. Floam, RLA
Project Manager

Rummel Klepper & Kahl, L.L.P.
Consulting Engineers
81 Mosher Street * Baltimore, MD 21217
Voice: 410-728-2900 Ext. 1310
Fax: 410-728-3160
Email: mfloam@rkkengineers.com

-----Original Message-----

From: Rick Meyer [mailto:rmeyer@johnmilnerassociates.com]
Sent: Tuesday, July 20, 2004 3:54 PM
To: mfloam@rkkengineers.com
Subject: Delaware Turnpike - Wetland Replacement Area Candidates

Michele - We have checked the SHPO files for archeological sites. Here are the results:

Area 1:
no recorded sites within area. one prehistoric site (7NC-E-79) immediately west near creek.

Area 7:
no recorded sites within or in immediate vicinity.

Area 12:
two prehistoric sites within southeastern bulge near Sunset Lake (7NC-D-229, 7NC-D-230).
one prehistoric site between areas 12 and 14 (7NC-D-25).
one prehistoric site within area 14 (7NC-D-4).

Areas 16, 17, and 18:
no recorded sites within or in immediate vicinity.

Please call with any questions. - Rick

Scope Of Work For The Proposed Wetland Mitigation Areas Along I-95

All:

Kevin [Cunningham] and I [Wade Catts] met today and did a field view of Areas 1 and 7. Following our field walk, Kevin and I came to the following conclusions:

- Area 1 is somewhat problematic. Unlike Area 7, this area exhibits no evidence of modern disturbance. Historical maps again show no historic occupation of the property, however, a prehistoric site is already recorded a short distance to the west of the area, near the limits of the larger property. Kevin and I decided that this area should have some bucket augers and shovel testing done to determine the nature of the soils.
- Area 7 appears from the field view and from our review of some historic maps (1803, 1849, 1868, and 1895) to have little to no potential for archeological deposits. Maps do not depict any historic occupation of the property, and surface indications are that considerable dumping of debris (macadam, concrete, gravel, oil tanks) has occurred at some time in the past. However, Kevin suggested that JMA do some bucket augering and shovel testing within the footprint of the area to confirm this.

For both areas JMA will prepare a brief letter report detailing the historic images that were reviewed, our review of the archeological literature and I-95 soil core information pertaining to the Churchman's Marsh area, and the results of the boring and field view.

Schedule:

Bucket augering will be undertaken next week (first week in August), and should take one day (Bill Chadwick and one assistant). We'll get the other information pulled together quickly, and should have a letter summary of our work by the end of the second week in August. Kevin and I are both of the opinion that these areas are low potential for archeological resources.

Wade

Subject: Re: Delaware Turnpike - Field View of Wetland Replacement Area Candidates

Date: Thu, 29 Jul 2004 14:56:38 -0400

From: Wade Catts <wcatts@johnmilnerassociates.com>

To: "Fulmer, Terry (DelDOT)" <TFulmer@mail.dot.state.de.us>, wchadwic <wchadwic@johnmilnerassociates.com>

CC: 'Rick Meyer' <rmeyer@johnmilnerassociates.com>, "Cunningham, Kevin (DelDOT)" <KCunningham@mail.dot.state.de.us>, mfloam@rkkengineers.com, "O'Neill, Darren M. (DelDOT)" <DONeill@mail.dot.state.de.us>, whellmann@rkkengineers.com, wcatts <wcatts@johnmilnerassociates.com>

APPENDIX II:
SITE FORMS
DELAWARE STATE HISTORIC PRESERVATION
OFFICE
CULTURAL RESOURCE SURVEY FORMS:
ARCHEOLOGY



DELAWARE STATE HISTORIC PRESERVATION OFFICE
15 THE GREEN, DOVER, DE 19901

CULTURAL RESOURCE SURVEY
PROPERTY IDENTIFICATION FORM

CRS # N-6783
SPO Map 08-09-34
Hundred Pencader
Quad Newark East
Other _____

- 1. HISTORIC NAME/FUNCTION: Stafford Farm, Maple Springs Farm, Lewis Weldin Farm
- 2. ADDRESS/LOCATION: N Of I-95, E Of Sr 1/7, S Of Churchman's Rd.
- 3. TOWN/NEAREST TOWN: Stanton vicinity?
- 4. MAIN TYPE OF RESOURCE: building structure site object
landscape district
- 5. MAIN FUNCTION OF PROPERTY: Farm
- 6. PROJECT TITLE/ REASON FOR SURVEY (if applicable):
I-95/SR 1 Interchange/Mainline Project (Section 106)

7. ADDITIONAL FORMS USED:

#:	Form:	List property types:
	CRS 2 Main Building Form	
	CRS 3 Secondary Building Form	
x	CRS 4 Archaeological Site Form	Farm
	CRS 5 Structure (Building-Like) Form	
	CRS 6 Structure (Land Feature) Form	
	CRS 7 Object Form	
	CRS 8 Landscape Elements Form	
x	CRS 9 Map Form	N/A
	CRS 14 Potential District Form	

8. SURVEYOR INFORMATION:

Surveyor name: Mark A. Tobias

Principal Investigator name: Wade P. Catts

Principal Investigator signature: _____

Organization: John Milner Associates, Inc. Date: 8/1/2004

9. OTHER NOTES OR OBSERVATIONS:

CRS# N-6783

The majority of the farm was razed, including the dwelling and other domestic related outbuildings, for the construction of a shopping center. Southernmost section of the farm, adjacent to the northern edge of I-95 was not impacted by this recent construction. Within this area, the silo remains intact with traces of two additional agricultural outbuildings (barn/shed).

10. STATE HISTORIC CONTEXT FRAMEWORK (check all appropriate boxes; refer to state management plan(s)):

a) Time period(s)

- Pre-European Contact
- Paleo-Indian
- Archaic
- Woodland I
- Woodland II

- 1600-1750∨ Contact Period (Native American)
- 1630-1730∨ Exploration and Frontier Settlement
- 1730-1770∨ Intensified and Durable Occupation
- 1770-1830∨ Early Industrialization
- 1830-1880∨ Industrialization and Early Urbanization
- 1880-1940∨ Urbanization and Early Suburbanization
- 1940-1960∨ Suburbanization and Early Ex-urbanization

b) Geographical zone

- Piedmont
- Upper Peninsula
- Lower Peninsula/Cypress Swamp
- Coastal
- Urban (City of Wilmington)

c) Historic period theme(s)

- | | |
|---|---|
| <input checked="" type="checkbox"/> Agriculture | <input type="checkbox"/> Transportation and Communication |
| <input type="checkbox"/> Forestry | <input checked="" type="checkbox"/> Settlement Patterns and Demographic Changes |
| <input type="checkbox"/> Trapping/Hunting | <input type="checkbox"/> Architecture, Engineering and Decorative Arts |
| <input type="checkbox"/> Mining/Quarrying | <input type="checkbox"/> Government |
| <input type="checkbox"/> Fishing/Oystering | <input type="checkbox"/> Religion |
| <input type="checkbox"/> Manufacturing | <input type="checkbox"/> Education |
| <input type="checkbox"/> Retailing/Wholesaling | <input type="checkbox"/> Community Organizations |
| <input type="checkbox"/> Finance | <input type="checkbox"/> Occupational Organizations |
| <input type="checkbox"/> Professional Services | <input type="checkbox"/> Major Families, Individuals and Events |

USE BLACK INK ONLY

CRS-1



DELAWARE STATE HISTORIC PRESERVATION OFFICE
15 THE GREEN, DOVER, DE 19901

CULTURAL RESOURCE SURVEY
ARCHAEOLOGICAL SITE FORM

CRS # N-6783
Site # 7NC-E-172
Soil Map # NC19

1. INFORMANT: _____

2. SURFACE CONDITION: submerged cultivated wooded fallow
marsh beach/shoreline urban

other: lawn

integrity: good

3. SOIL TYPE: Matapeake silt loam (MeB2), 2 to 5 percent slopes

4. DESCRIPTION OF FIELD WORK (check all that apply): surface collection visibility _____ %

shovel test measured unit mechanical stripping

remote sensing walkover informant collection

5. COLLECTIONS:

a) Repository _____ Accession # 2004.27

Collector/consultant John Milner Associates, Inc.

Date 2/13/2004 Surface Excavation

b) Repository _____ Accession # _____

Collector/consultant _____

Date _____ Surface Excavation

c) Repository _____ Accession # _____

Collector/consultant _____

Date _____ Surface Excavation

d) Repository _____ Accession # _____

Collector/consultant _____

Date _____ Surface Excavation

6. ARTIFACTS: List material and types

CRS # N-6783

Site # 7NC-E-172

Only four architecturally related artifacts were recovered during the Phase IB archeological survey of the intact lawn behind the Border's bookstore and the I-95 cut. Recovered materials include a mortar sample, a cinder block fragment, an unidentified nail, and a metal screw.

7. FEATURES:

Remnant outbuildings associated with the L. Weldin/Stafford Farm Site include an intact silo, a square cinder block foundation, and an "L" shaped berm which appears to coincide with the exterior of third rectangular shaped outbuilding. Other intact features may be present in the narrow intact lawn between the Borders Bookstore and the I-95 cut.

8. DOCUMENTATION:

Publication/report title	Year
Management Summary "Phase IB Archeological Testing, I-95/SR 1 Interchange/Mainline Project New Castle County, Delaware"	2004

Supporting documentation on file: (Mark the appropriate boxes)

Field notes yes no
Maps yes no
Drawings yes no
Photographs yes no
Lab Analysis yes no

Other:



DELAWARE STATE HISTORIC PRESERVATION OFFICE
15 THE GREEN, DOVER, DE 19901

CULTURAL RESOURCE SURVEY
MAP FORM

CRS # N-6783

1. ADDRESS/LOCATION: _____

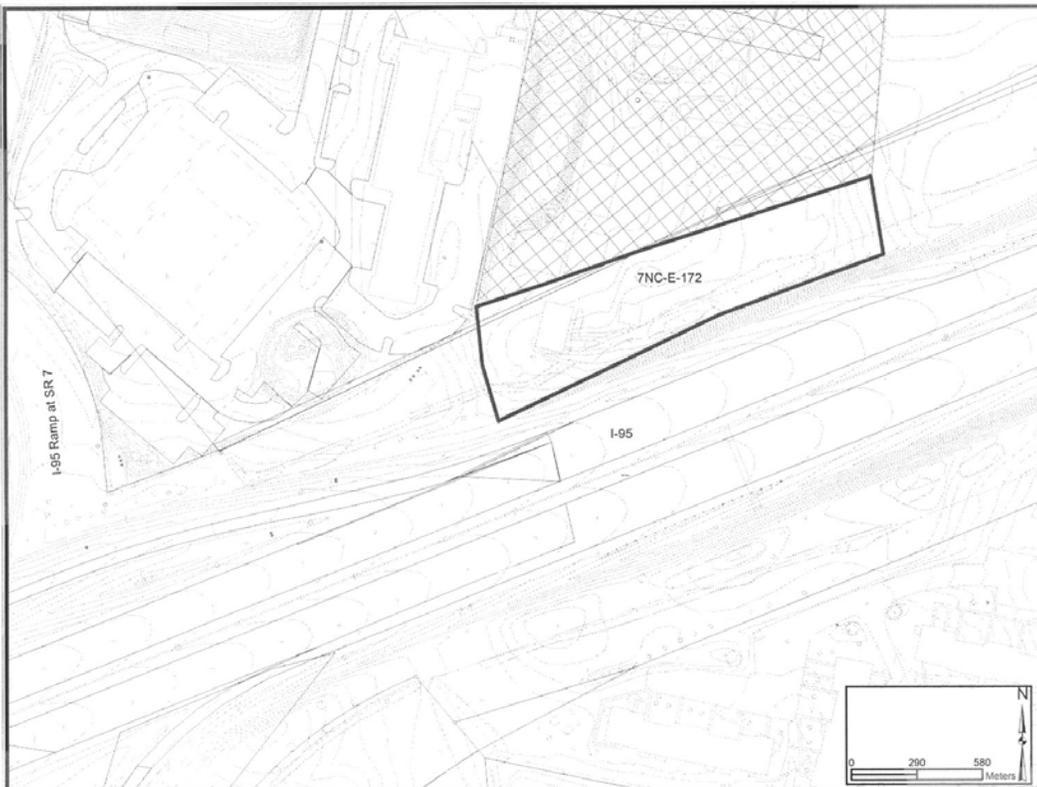
2. NOT FOR PUBLICATION reason: Archeological Site

3. LOCATION MAP:

Indicate position of resource in relation to geographical landmarks such as streams and crossroads.

(attach section of USGS quad map with location marked or draw location map)

INDICATE NORTH ON SKETCH





DELAWARE STATE HISTORIC PRESERVATION OFFICE
15 THE GREEN, DOVER, DE 19901

CULTURAL RESOURCE SURVEY
PROPERTY IDENTIFICATION FORM

CRS # N-9356
SPO Map 08-09-34
Hundred Pencader
Quad Newark East
Other _____

1. HISTORIC NAME/FUNCTION: _____
2. ADDRESS/LOCATION: N Of I-95, W Of Churchman's Marsh, S Of Quarry.
3. TOWN/NEAREST TOWN: Stanton vicinity?
4. MAIN TYPE OF RESOURCE: building structure site object
 landscape district
5. MAIN FUNCTION OF PROPERTY: Previously Identified Prehistoric Archeological Site
6. PROJECT TITLE/ REASON FOR SURVEY (if applicable):
I-95/SR 1 Interchange/Mainline Project (Section 106)

7. ADDITIONAL FORMS USED:

#:	Form:	List property types:
	CRS 2 Main Building Form	
	CRS 3 Secondary Building Form	
x	CRS 4 Archaeological Site Form	
	CRS 5 Structure (Building-Like) Form	
	CRS 6 Structure (Land Feature) Form	
	CRS 7 Object Form	
	CRS 8 Landscape Elements Form	
x	CRS 9 Map Form	N/A
	CRS 14 Potential District Form	

8. SURVEYOR INFORMATION:

Surveyor name: Mark A. Tobias

Principal Investigator name: Wade P. Catts

Principal Investigator signature: _____

Organization: John Milner Associates, Inc. Date: 8/1/2004

9. OTHER NOTES OR OBSERVATIONS:

CRS# N-9356

The majority of the site had been previously quarried leaving only a small section of the bluff intact overlooking Churchman's Marsh on the north side of I-95.

10. STATE HISTORIC CONTEXT FRAMEWORK (check all appropriate boxes; refer to state management plan(s)):

- a) Time period(s)
- Pre-European Contact
 - Paleo-Indian
 - Archaic
 - Woodland I
 - Woodland II
- 1600-1750∨ Contact Period (Native American)
 - 1630-1730∨ Exploration and Frontier Settlement
 - 1730-1770∨ Intensified and Durable Occupation
 - 1770-1830∨ Early Industrialization
 - 1830-1880∨ Industrialization and Early Urbanization
 - 1880-1940∨ Urbanization and Early Suburbanization
 - 1940-1960∨ Suburbanization and Early Ex-urbanization

- b) Geographical zone
- Piedmont
 - Upper Peninsula
 - Lower Peninsula/Cypress Swamp
 - Coastal
 - Urban (City of Wilmington)

c) Historic period theme(s)

- | | |
|--|--|
| <input type="checkbox"/> Agriculture | <input type="checkbox"/> Transportation and Communication |
| <input type="checkbox"/> Forestry | <input type="checkbox"/> Settlement Patterns and Demographic Changes |
| <input type="checkbox"/> Trapping/Hunting | <input type="checkbox"/> Architecture, Engineering and Decorative Arts |
| <input type="checkbox"/> Mining/Quarrying | <input type="checkbox"/> Government |
| <input type="checkbox"/> Fishing/Oystering | <input type="checkbox"/> Religion |
| <input type="checkbox"/> Manufacturing | <input type="checkbox"/> Education |
| <input type="checkbox"/> Retailing/Wholesaling | <input type="checkbox"/> Community Organizations |
| <input type="checkbox"/> Finance | <input type="checkbox"/> Occupational Organizations |
| <input type="checkbox"/> Professional Services | <input type="checkbox"/> Major Families, Individuals and Events |

USE BLACK INK ONLY

CRS-1



DELAWARE STATE HISTORIC PRESERVATION OFFICE
15 THE GREEN, DOVER, DE 19901

CULTURAL RESOURCE SURVEY
ARCHAEOLOGICAL SITE FORM

CRS # N-9356
Site # 7NC-E-58
Soil Map # NC20

1. INFORMANT: _____

2. SURFACE CONDITION: cultivated wooded fallow
 submerged marsh beach/shoreline urban

other: _____

integrity: good

3. SOIL TYPE: Sassafras and matapeake soils (SmE), 15 to 30 percent slopes

4. DESCRIPTION OF FIELD WORK (check all that apply): surface collection visibility _____ %
shovel test measured unit mechanical stripping
remote sensing walkover informant collection

5. COLLECTIONS:

a) Repository _____ Accession # 2004.28

Collector/consultant John Milner Associates, Inc.

Date 2/13/2004 Surface Excavation

b) Repository _____ Accession # _____

Collector/consultant _____

Date _____ Surface Excavation

c) Repository _____ Accession # _____

Collector/consultant _____

Date _____ Surface Excavation

d) Repository _____ Accession # _____

Collector/consultant _____

Date _____ Surface Excavation

6. ARTIFACTS: List material and types

CRS # N-9356
Site # 7NC-E-58

Only one possible quartzite fire-cracked rock fragment was recovered during the Phase IB survey.

7. FEATURES:

Unknown

8. DOCUMENTATION:

Publication/report title	Year
Management Summary "Phase IB Archeological Testing, I-95/SR 1 Interchange/Mainline Project New Castle County, Delaware"	2004

Supporting documentation on file: (Mark the appropriate boxes)

- Field notes yes no
- Maps yes no
- Drawings yes no
- Photographs yes no
- Lab Analysis yes no

Other:



CULTURAL RESOURCE SURVEY
MAP FORM

CRS # N-9356

1. ADDRESS/LOCATION: _____

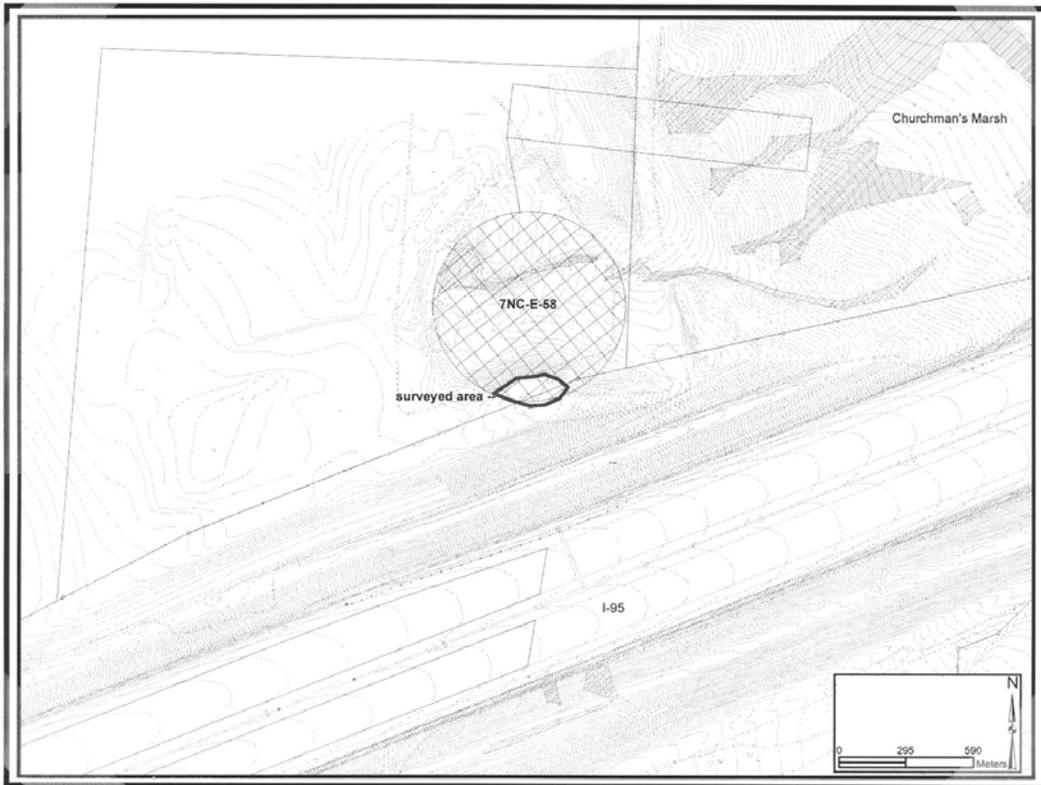
2. NOT FOR PUBLICATION reason: Archeological Site

3. LOCATION MAP:

Indicate position of resource in relation to geographical landmarks such as streams and crossroads.

(attach section of USGS quad map with location marked or draw location map)

INDICATE NORTH ON SKETCH





DELAWARE STATE HISTORIC PRESERVATION OFFICE
15 THE GREEN, DOVER, DE 19901

CULTURAL RESOURCE SURVEY
PROPERTY IDENTIFICATION FORM

CRS # N-14190
SPO Map 04-05-33
Hundred Pencader
Quad Newark West
Other _____

- 1. HISTORIC NAME/FUNCTION: _____
- 2. ADDRESS/LOCATION: S Of I-95, W Of I-95 Toll Plaza
- 3. TOWN/NEAREST TOWN: Newark vicinity?
- 4. MAIN TYPE OF RESOURCE: building structure site object
 landscape district
- 5. MAIN FUNCTION OF PROPERTY: Lithic Scatter
- 6. PROJECT TITLE/ REASON FOR SURVEY (if applicable):
I-95 Toll Plaza Project (Section 106)

7. ADDITIONAL FORMS USED:

#:	Form:	List property types:
	CRS 2 Main Building Form	
	CRS 3 Secondary Building Form	
x	CRS 4 Archaeological Site Form	
	CRS 5 Structure (Building-Like) Form	
	CRS 6 Structure (Land Feature) Form	
	CRS 7 Object Form	
	CRS 8 Landscape Elements Form	
x	CRS 9 Map Form	N/A
	CRS 14 Potential District Form	

8. SURVEYOR INFORMATION:

Surveyor name: Mark A. Tobias

Principal Investigator name: Wade P. Catts

Principal Investigator signature: _____

Organization: John Milner Associates, Inc. Date: 8/1/2004

9. OTHER NOTES OR OBSERVATIONS:

CRS# N-14190

N/A

10. STATE HISTORIC CONTEXT FRAMEWORK (check all appropriate boxes; refer to state management plan(s)):

- a) Time period(s)
- Pre-European Contact
 - Paleo-Indian
 - Archaic
 - Woodland I
 - Woodland II
 - 1600-1750∇ Contact Period (Native American)
 - 1630-1730∇ Exploration and Frontier Settlement
 - 1730-1770∇ Intensified and Durable Occupation
 - 1770-1830∇ Early Industrialization
 - 1830-1880∇ Industrialization and Early Urbanization
 - 1880-1940∇ Urbanization and Early Suburbanization
 - 1940-1960∇ Suburbanization and Early Ex-urbanization
- b) Geographical zone
- Piedmont
 - Upper Peninsula
 - Lower Peninsula/Cypress Swamp
 - Coastal
 - Urban (City of Wilmington)
- c) Historic period theme(s)
- | | |
|--|--|
| <input type="checkbox"/> Agriculture | <input type="checkbox"/> Transportation and Communication |
| <input type="checkbox"/> Forestry | <input type="checkbox"/> Settlement Patterns and Demographic Changes |
| <input type="checkbox"/> Trapping/Hunting | <input type="checkbox"/> Architecture, Engineering and Decorative Arts |
| <input type="checkbox"/> Mining/Quarrying | <input type="checkbox"/> Government |
| <input type="checkbox"/> Fishing/Oystering | <input type="checkbox"/> Religion |
| <input type="checkbox"/> Manufacturing | <input type="checkbox"/> Education |
| <input type="checkbox"/> Retailing/Wholesaling | <input type="checkbox"/> Community Organizations |
| <input type="checkbox"/> Finance | <input type="checkbox"/> Occupational Organizations |
| <input type="checkbox"/> Professional Services | <input type="checkbox"/> Major Families, Individuals and Events |

USE BLACK INK ONLY

CRS-1



DELAWARE STATE HISTORIC PRESERVATION OFFICE
15 THE GREEN, DOVER, DE 19901

CULTURAL RESOURCE SURVEY
ARCHAEOLOGICAL SITE FORM

CRS # N-14190
Site # 7NC-D-234
Soil Map # NC22

1. INFORMANT: N/A

2. SURFACE CONDITION: submerged cultivated wooded fallow
marsh beach/shoreline urban

other: _____

integrity: good

3. SOIL TYPE: Elkton silt loam (EmB), 2 to 5 percent slopes

4. DESCRIPTION OF FIELD WORK (check all that apply): surface collection visibility _____ %

shovel test measured unit mechanical stripping

remote sensing walkover informant collection

5. COLLECTIONS:

a) Repository _____ Accession # 2004.29

Collector/consultant John Milner Associates, Inc.

Date 2/27/2004 Surface Excavation

b) Repository _____ Accession # _____

Collector/consultant _____

Date _____ Surface Excavation

c) Repository _____ Accession # _____

Collector/consultant _____

Date _____ Surface Excavation

d) Repository _____ Accession # _____

Collector/consultant _____

Date _____ Surface Excavation

6. ARTIFACTS: List material and types

CRS # N-14190
Site # 7NC-D-234

The recovered assemblage consists of two flakes and one blocky fragment (low-grade jasper). The site abutts the edge of the project area and may continue to the south. The site dimensions, within the surveyed area, was less than 15 m across.

7. FEATURES:

Unknown

8. DOCUMENTATION:

Publication/report title	Year
Management Summary "Phase IB Archeological Testing, I-95 Toll Plaza Project, New Castle County, Delaware"	2004

Supporting documentation on file: (Mark the appropriate boxes)

Field notes yes no
Maps yes no
Drawings yes no
Photographs yes no
Lab Analysis yes no

Other:



DELAWARE STATE HISTORIC PRESERVATION OFFICE
15 THE GREEN, DOVER, DE 19901

CULTURAL RESOURCE SURVEY
MAP FORM

CRS # N-14190

1. ADDRESS/LOCATION: _____

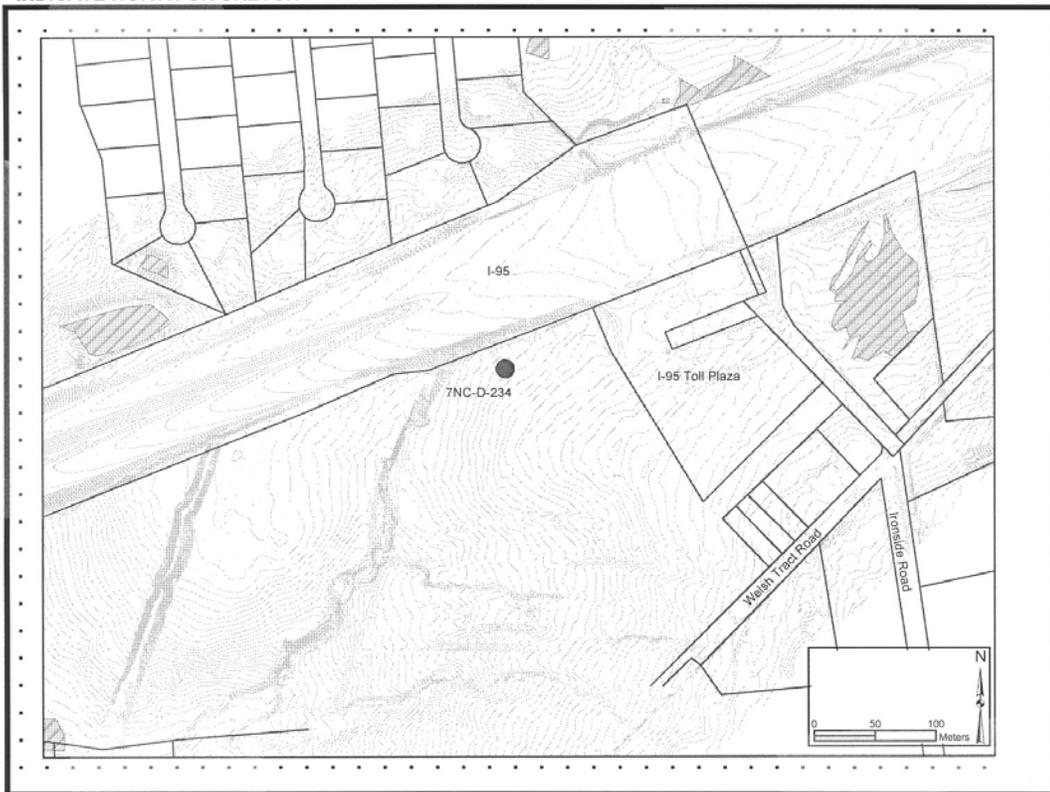
2. NOT FOR PUBLICATION reason: Archeological Site

3. LOCATION MAP:

Indicate position of resource in relation to geographical landmarks such as streams and crossroads.

(attach section of USGS quad map with location marked or draw location map)

INDICATE NORTH ON SKETCH





DELAWARE STATE HISTORIC PRESERVATION OFFICE
15 THE GREEN, DOVER, DE 19901

CULTURAL RESOURCE SURVEY
PROPERTY IDENTIFICATION FORM

CRS # N-14191
SPO Map 04-05-33
Hundred Pencader
Quad Newark West
Other _____

1. HISTORIC NAME/FUNCTION: _____
2. ADDRESS/LOCATION: S Of I-95, E Of Muddy Run
3. TOWN/NEAREST TOWN: Newark vicinity?
4. MAIN TYPE OF RESOURCE:

building <input type="checkbox"/>	structure <input type="checkbox"/>	site <input checked="" type="checkbox"/>	object <input type="checkbox"/>
landscape <input type="checkbox"/>	district <input type="checkbox"/>		
5. MAIN FUNCTION OF PROPERTY: Lithic Scatter
6. PROJECT TITLE/ REASON FOR SURVEY (if applicable):
I-95 Toll Plaza Project (Section 106)

7. ADDITIONAL FORMS USED:

#:	Form:	List property types:
	CRS 2 Main Building Form	_____
	CRS 3 Secondary Building Form	_____
x	CRS 4 Archaeological Site Form	_____
	CRS 5 Structure (Building-Like) Form	_____
	CRS 6 Structure (Land Feature) Form	_____
	CRS 7 Object Form	_____
	CRS 8 Landscape Elements Form	_____
x	CRS 9 Map Form	N/A
	CRS 14 Potential District Form	_____

8. SURVEYOR INFORMATION:

Surveyor name: Mark A. Tobias

Principal Investigator name: Wade P. Catts

Principal Investigator signature: _____

Organization: John Milner Associates, Inc. Date: 8/1/2004

9. OTHER NOTES OR OBSERVATIONS:

CRS# N-14191

N/A

10. STATE HISTORIC CONTEXT FRAMEWORK (check all appropriate boxes; refer to state management plan(s)):

a) Time period(s)

- Pre-European Contact
- Paleo-Indian
- Archaic
- Woodland I
- Woodland II

- 1600-1750∨ Contact Period (Native American)
- 1630-1730∨ Exploration and Frontier Settlement
- 1730-1770∨ Intensified and Durable Occupation
- 1770-1830∨ Early Industrialization
- 1830-1880∨ Industrialization and Early Urbanization
- 1880-1940∨ Urbanization and Early Suburbanization
- 1940-1960∨ Suburbanization and Early Ex-urbanization

b) Geographical zone

- Piedmont
- Upper Peninsula
- Lower Peninsula/Cypress Swamp
- Coastal
- Urban (City of Wilmington)

c) Historic period theme(s)

- | | |
|--|--|
| <input type="checkbox"/> Agriculture | <input type="checkbox"/> Transportation and Communication |
| <input type="checkbox"/> Forestry | <input type="checkbox"/> Settlement Patterns and Demographic Changes |
| <input type="checkbox"/> Trapping/Hunting | <input type="checkbox"/> Architecture, Engineering and Decorative Arts |
| <input type="checkbox"/> Mining/Quarrying | <input type="checkbox"/> Government |
| <input type="checkbox"/> Fishing/Oystering | <input type="checkbox"/> Religion |
| <input type="checkbox"/> Manufacturing | <input type="checkbox"/> Education |
| <input type="checkbox"/> Retailing/Wholesaling | <input type="checkbox"/> Community Organizations |
| <input type="checkbox"/> Finance | <input type="checkbox"/> Occupational Organizations |
| <input type="checkbox"/> Professional Services | <input type="checkbox"/> Major Families, Individuals and Events |

USE BLACK INK ONLY

CRS-1



DELAWARE STATE HISTORIC PRESERVATION OFFICE
15 THE GREEN, DOVER, DE 19901

CULTURAL RESOURCE SURVEY
ARCHAEOLOGICAL SITE FORM

CRS # N-14191
Site # 7NC-D-235
Soil Map # NC22

1. INFORMANT: N/A
2. SURFACE CONDITION: submerged cultivated wooded fallow
marsh beach/shoreline urban
other: _____
integrity: good
3. SOIL TYPE: Elkton silt loam (EmB), 2 to 5 percent slopes
4. DESCRIPTION OF FIELD WORK (check all that apply): surface collection visibility _____ %
shovel test measured unit mechanical stripping
remote sensing walkover informant collection
5. COLLECTIONS:
- a) Repository _____ Accession # 2004.30
Collector/consultant John Milner Associates, Inc.
Date 2/27/2004 Surface Excavation
- b) Repository _____ Accession # _____
Collector/consultant _____
Date _____ Surface Excavation
- c) Repository _____ Accession # _____
Collector/consultant _____
Date _____ Surface Excavation
- d) Repository _____ Accession # _____
Collector/consultant _____
Date _____ Surface Excavation

6. ARTIFACTS: List material and types

CRS # N-14191
Site # 7NC-D-235

A total of six prehistoric artifacts were recovered from an area measuring approximately 35 m north-south by 12 m east-west. The recovered assemblage consists of one chert and five low-grade jasper flakes. The site is located east of Muddy Run and south of I-95.

7. FEATURES:

Unknown

8. DOCUMENTATION:

Publication/report title	Year
Management Summary "Phase IB Archeological Testing, I-95 Toll Plaza Project, New Castle County, Delaware"	2004

Supporting documentation on file: (Mark the appropriate boxes)

- Field notes yes no
- Maps yes no
- Drawings yes no
- Photographs yes no
- Lab Analysis yes no

Other:



CULTURAL RESOURCE SURVEY
MAP FORM

CRS # N-14191

1. ADDRESS/LOCATION: _____

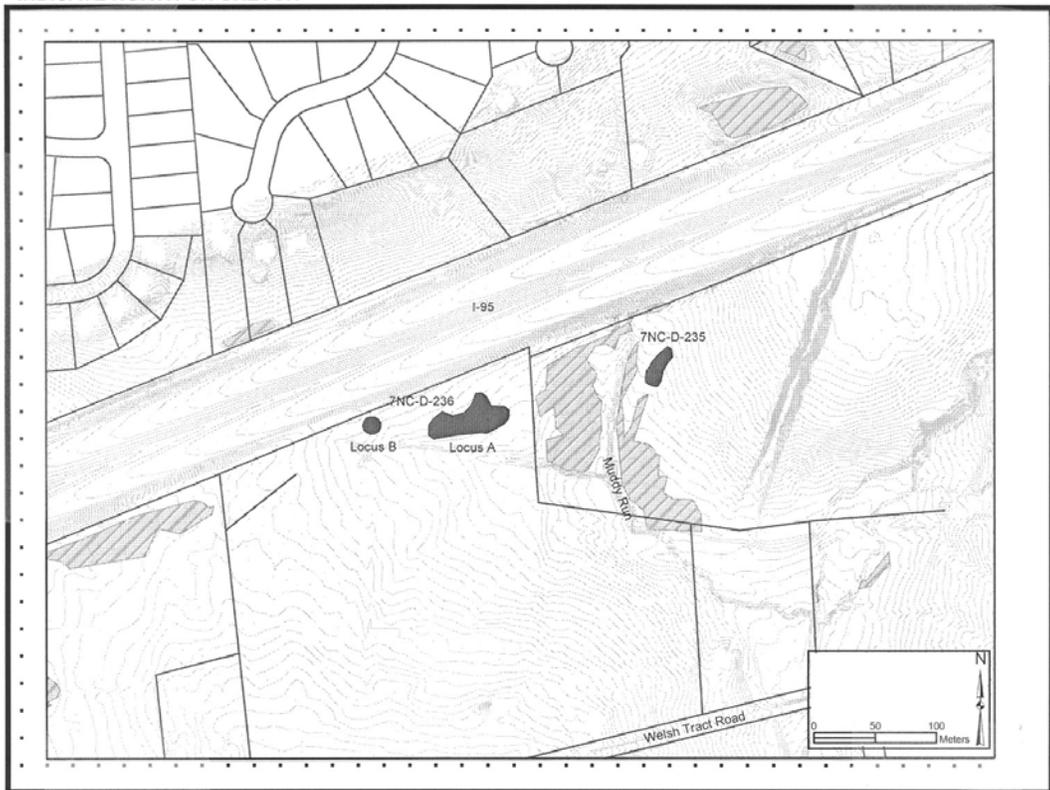
2. NOT FOR PUBLICATION reason: Archeological Site

3. LOCATION MAP:

Indicate position of resource in relation to geographical landmarks such as streams and crossroads.

(attach section of USGS quad map with location marked or draw location map)

INDICATE NORTH ON SKETCH





DELAWARE STATE HISTORIC PRESERVATION OFFICE
15 THE GREEN, DOVER, DE 19901

CULTURAL RESOURCE SURVEY
PROPERTY IDENTIFICATION FORM

CRS # N-14192
SPO Map 04-05-33
Hundred Pencader
Quad Newark West
Other _____

1. HISTORIC NAME/FUNCTION: _____
2. ADDRESS/LOCATION: S Of I-95, W Of Muddy Run
3. TOWN/NEAREST TOWN: Newark vicinity?
4. MAIN TYPE OF RESOURCE:

building	<input type="checkbox"/>	structure	<input type="checkbox"/>	site	<input checked="" type="checkbox"/>	object	<input type="checkbox"/>
landscape	<input type="checkbox"/>	district	<input type="checkbox"/>				
5. MAIN FUNCTION OF PROPERTY: Lithic Scatter
6. PROJECT TITLE/ REASON FOR SURVEY (if applicable):
I-95 Toll Plaza Project (Section 106)

7. ADDITIONAL FORMS USED:

#:	Form:	List property types:
	CRS 2 Main Building Form	
	CRS 3 Secondary Building Form	
x	CRS 4 Archaeological Site Form	
	CRS 5 Structure (Building-Like) Form	
	CRS 6 Structure (Land Feature) Form	
	CRS 7 Object Form	
	CRS 8 Landscape Elements Form	
x	CRS 9 Map Form	N/A
	CRS 14 Potential District Form	

8. SURVEYOR INFORMATION:

Surveyor name: Mark A. Tobias

Principal Investigator name: Wade P. Catts

Principal Investigator signature: _____

Organization: John Milner Associates, Inc. Date: 8/1/2004

9. OTHER NOTES OR OBSERVATIONS:

CRS# N-14192

N/A

10. STATE HISTORIC CONTEXT FRAMEWORK (check all appropriate boxes; refer to state management plan(s)):

- a) Time period(s)
- Pre-European Contact
 - Paleo-Indian
 - Archaic
 - Woodland I
 - Woodland II
 - 1600-1750∨ Contact Period (Native American)
 - 1630-1730∨ Exploration and Frontier Settlement
 - 1730-1770∨ Intensified and Durable Occupation
 - 1770-1830∨ Early Industrialization
 - 1830-1880∨ Industrialization and Early Urbanization
 - 1880-1940∨ Urbanization and Early Suburbanization
 - 1940-1960∨ Suburbanization and Early Ex-urbanization
- b) Geographical zone
- Piedmont
 - Upper Peninsula
 - Lower Peninsula/Cypress Swamp
 - Coastal
 - Urban (City of Wilmington)
- c) Historic period theme(s)
- | | |
|--|--|
| <input type="checkbox"/> Agriculture | <input type="checkbox"/> Transportation and Communication |
| <input type="checkbox"/> Forestry | <input type="checkbox"/> Settlement Patterns and Demographic Changes |
| <input type="checkbox"/> Trapping/Hunting | <input type="checkbox"/> Architecture, Engineering and Decorative Arts |
| <input type="checkbox"/> Mining/Quarrying | <input type="checkbox"/> Government |
| <input type="checkbox"/> Fishing/Oystering | <input type="checkbox"/> Religion |
| <input type="checkbox"/> Manufacturing | <input type="checkbox"/> Education |
| <input type="checkbox"/> Retailing/Wholesaling | <input type="checkbox"/> Community Organizations |
| <input type="checkbox"/> Finance | <input type="checkbox"/> Occupational Organizations |
| <input type="checkbox"/> Professional Services | <input type="checkbox"/> Major Families, Individuals and Events |

USE BLACK INK ONLY

CRS-1



DELAWARE STATE HISTORIC PRESERVATION OFFICE
15 THE GREEN, DOVER, DE 19901

CULTURAL RESOURCE SURVEY
ARCHAEOLOGICAL SITE FORM

CRS # N-14192
Site # 7NC-D-236
Soil Map # NC22

1. INFORMANT: N/A
2. SURFACE CONDITION: submerged cultivated wooded fallow
marsh beach/shoreline urban
other: _____
integrity: good
3. SOIL TYPE: Elkton silt loam (EmB), 2 to 5 percent slopes and Watchung and Calvert silt loams (WcB) 3 to 8 percent slopes
4. DESCRIPTION OF FIELD WORK (check all that apply): surface collection visibility _____ %
shovel test measured unit mechanical stripping
remote sensing walkover informant collection
5. COLLECTIONS:
- a) Repository _____ Accession # 2004.31
Collector/consultant John Milner Associates, Inc.
Date 2/27/2004 Surface Excavation
- b) Repository _____ Accession # _____
Collector/consultant _____
Date _____ Surface Excavation
- c) Repository _____ Accession # _____
Collector/consultant _____
Date _____ Surface Excavation
- d) Repository _____ Accession # _____
Collector/consultant _____
Date _____ Surface Excavation

6. ARTIFACTS: List material and types

CRS # N-14192
Site # 7NC-D-236

Locus A: A total of forty prehistoric artifacts were recovered from an area measuring approximately 35 m north-south by 60 m east-west. The site is situated south of I-95 and immediately west of wetlands associated with Muddy Run. The recovered assemblage consists almost entirely of low-grade jasper including one core, 26 flakes, and 13 blocky fragments.

Locus B: Three low-grade jasper flakes comprise the prehistoric artifact assemblage recovered from this area located approximately 40 m W of Locus 1. All of the material was recovered from a single shovel test unit. Surrounding grid units and radials, placed at 7.5 m intervals, were culturally sterile. Therefore, the approximate diameter is less than 15 m. This area abuts the southern edge of a fiber optic ROW that runs parallel to the southern edge of I-95.

7. FEATURES:

Unknown

8. DOCUMENTATION:

Publication/report title	Year
Management Summary "Phase IB Archeological Testing, I-95 Toll Plaza Project, New Castle County, Delaware"	2004

Supporting documentation on file: (Mark the appropriate boxes)

- Field notes yes no
- Maps yes no
- Drawings yes no
- Photographs yes no
- Lab Analysis yes no

Other:



CULTURAL RESOURCE SURVEY
MAP FORM

CRS # N-14192

1. ADDRESS/LOCATION: _____

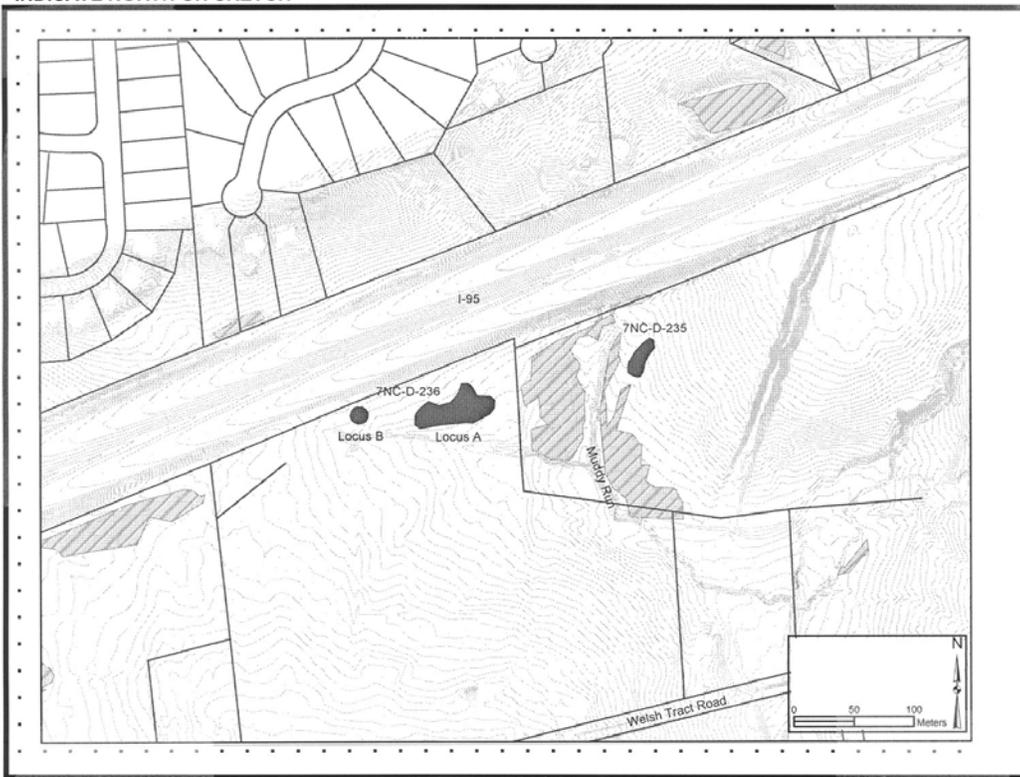
2. NOT FOR PUBLICATION reason: Archeological Site

3. LOCATION MAP:

Indicate position of resource in relation to geographical landmarks such as streams and crossroads.

(attach section of USGS quad map with location marked or draw location map)

INDICATE NORTH ON SKETCH





DELAWARE STATE HISTORIC PRESERVATION OFFICE
15 THE GREEN, DOVER, DE 19901

CULTURAL RESOURCE SURVEY
PROPERTY IDENTIFICATION FORM

CRS # N-14193
SPO Map 04-05-33
Hundred Pencader
Quad Newark West
Other _____

1. HISTORIC NAME/FUNCTION: _____
2. ADDRESS/LOCATION: S Of I-95 And Dixie Line Rd., W Of Ott's Chapel Rd.
3. TOWN/NEAREST TOWN: Newark vicinity?
4. MAIN TYPE OF RESOURCE: building structure
 landscape district site object
5. MAIN FUNCTION OF PROPERTY: Lithic Scatter
6. PROJECT TITLE/ REASON FOR SURVEY (if applicable):
I-95 Toll Plaza Project (Section 106)

7. ADDITIONAL FORMS USED:

#:	Form:	List property types:
	CRS 2 Main Building Form	
	CRS 3 Secondary Building Form	
x	CRS 4 Archaeological Site Form	
	CRS 5 Structure (Building-Like) Form	
	CRS 6 Structure (Land Feature) Form	
	CRS 7 Object Form	
	CRS 8 Landscape Elements Form	
x	CRS 9 Map Form	N/A
	CRS 14 Potential District Form	

8. SURVEYOR INFORMATION:

Surveyor name: Mark A. Tobias

Principal Investigator name: Wade P. Catts

Principal Investigator signature: _____

Organization: John Milner Associates, Inc. Date: 8/1/2004

9. OTHER NOTES OR OBSERVATIONS:

CRS# N-14193

N/A

10. STATE HISTORIC CONTEXT FRAMEWORK (check all appropriate boxes; refer to state management plan(s)):

a) Time period(s)

- Pre-European Contact
- Paleo-Indian
- Archaic
- Woodland I
- Woodland II

- 1600-1750∨ Contact Period (Native American)
- 1630-1730∨ Exploration and Frontier Settlement
- 1730-1770∨ Intensified and Durable Occupation
- 1770-1830∨ Early Industrialization
- 1830-1880∨ Industrialization and Early Urbanization
- 1880-1940∨ Urbanization and Early Suburbanization
- 1940-1960∨ Suburbanization and Early Ex-urbanization

b) Geographical zone

- Piedmont
- Upper Peninsula
- Lower Peninsula/Cypress Swamp
- Coastal
- Urban (City of Wilmington)

c) Historic period theme(s)

- | | |
|--|--|
| <input type="checkbox"/> Agriculture | <input type="checkbox"/> Transportation and Communication |
| <input type="checkbox"/> Forestry | <input type="checkbox"/> Settlement Patterns and Demographic Changes |
| <input type="checkbox"/> Trapping/Hunting | <input type="checkbox"/> Architecture, Engineering and Decorative Arts |
| <input type="checkbox"/> Mining/Quarrying | <input type="checkbox"/> Government |
| <input type="checkbox"/> Fishing/Oystering | <input type="checkbox"/> Religion |
| <input type="checkbox"/> Manufacturing | <input type="checkbox"/> Education |
| <input type="checkbox"/> Retailing/Wholesaling | <input type="checkbox"/> Community Organizations |
| <input type="checkbox"/> Finance | <input type="checkbox"/> Occupational Organizations |
| <input type="checkbox"/> Professional Services | <input type="checkbox"/> Major Families, Individuals and Events |

USE BLACK INK ONLY

CRS-1



DELAWARE STATE HISTORIC PRESERVATION OFFICE
15 THE GREEN, DOVER, DE 19901

CULTURAL RESOURCE SURVEY
ARCHAEOLOGICAL SITE FORM

CRS # N-14193
Site # 7NC-D-237
Soil Map # NC22

1. INFORMANT: N/A
2. SURFACE CONDITION: submerged cultivated wooded fallow
marsh beach/shoreline urban
other: _____
integrity: good
3. SOIL TYPE: Keypoint silt loam (KeB2), 2 to 5 percent slopes
4. DESCRIPTION OF FIELD WORK (check all that apply): surface collection visibility _____ %
shovel test measured unit mechanical stripping
remote sensing walkover informant collection
5. COLLECTIONS:
- a) Repository _____ Accession # 2004.32
Collector/consultant John Milner Associates, Inc.
Date 2/27/2004 Surface Excavation
- b) Repository _____ Accession # _____
Collector/consultant _____
Date _____ Surface Excavation
- c) Repository _____ Accession # _____
Collector/consultant _____
Date _____ Surface Excavation
- d) Repository _____ Accession # _____
Collector/consultant _____
Date _____ Surface Excavation

6. ARTIFACTS: List material and types

CRS # N-14193
Site # 7NC-D-237

A total of thirty-one prehistoric artifacts were recovered from a single shovel test unit. Surrounding grid units and radials, placed at 7.5 m intervals, were culturally sterile. The recovered assemblage consists entirely of low-grade jasper and includes 20 flakes and 11 blocky fragments.

7. FEATURES:

Unknown

8. DOCUMENTATION:

Publication/report title	Year
Management Summary "Phase IB Archeological Testing, I-95 Toll Plaza Project, New Castle County, Delaware"	2004

Supporting documentation on file: (Mark the appropriate boxes)

Field notes yes no
Maps yes no
Drawings yes no
Photographs yes no
Lab Analysis yes no

Other:



DELAWARE STATE HISTORIC PRESERVATION OFFICE
15 THE GREEN, DOVER, DE 19901

CULTURAL RESOURCE SURVEY
MAP FORM

CRS # N-14193

1. ADDRESS/LOCATION: _____

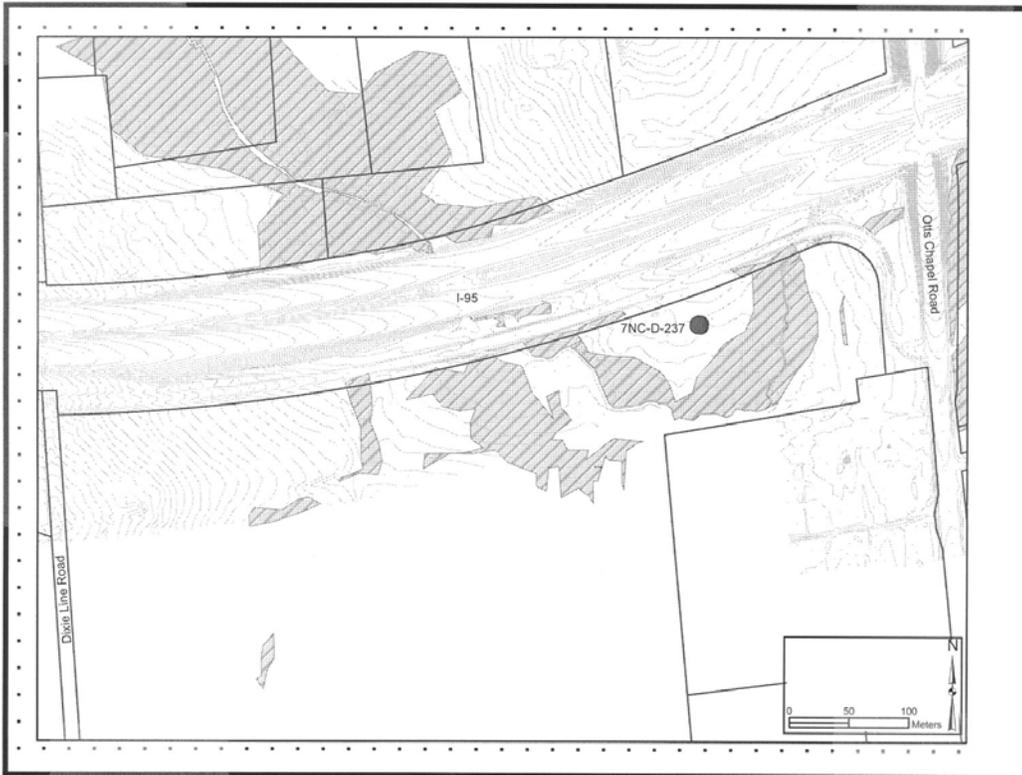
2. NOT FOR PUBLICATION reason: Archeological Site

3. LOCATION MAP:

Indicate position of resource in relation to geographical landmarks such as streams and crossroads.

(attach section of USGS quad map with location marked or draw location map)

INDICATE NORTH ON SKETCH



APPENDIX III:

SOIL DESCRIPTIONS,
WETLAND MITIGATION SITES 1 AND 7

GOUGE AUGER/ PISTON SAMPLER LOG

John Milner Associates, Inc.

CLIENT WRA/DeIDOT PROJECT DETERN2 Described By MT/WC Date 08/04/04

Unit No. A-1	Unit Type: Auger	Location: W of Christina River near base of dike slope
Vegetation: Grass / open forest		
Drainage: poor		

Depth (cm)	Color	Texture	Consistence	Roots	Shells	Artifacts	Comments
0-9	10YR 3/2	SiLo					
9-12	10YR 5/3	SiLo					
12-21	2.5YR 5/1	SiCiLo					iron staining
21-31	10YR 4/1	SiCiLo					
31-40	7.5YR 5/4	CiSa					w/ finely stratified SiSa layers at top – small pea gravel in Sa – flood/tide deposits?
40-48	7.5YR 5/4 2.5YR 5/4	SiLo Si					thinly layered - flood/tide deposits?
48-50	10YR 4/2	LoSa					
50-58	2.5Y 4/1	SiLo					mottled with 10YR 4/4 SiLo w/ iron staining measured 70 cmbgs
70-76	10YR 4/2	LoSa					
76-110	2.5YR 5/2	SiCiLo					iron staining - wet measured 130 cmbgs
Additional Notes:							

GOUGE AUGER/ PISTON SAMPLER LOG

John Milner Associates, Inc.

CLIENT WRA/DeIDOT PROJECT DETERN2 Described By MT/WC Date 08/04/04

Unit No. A-1	Unit Type: Auger	Location: W of Christina River near base of dike slope
Vegetation: Grass / open forest		
Drainage: poor		

Depth (cm)	Color	Texture	Consistence	Roots	Shells	Artifacts	Comments
130-165	5Y 5/1	SiCl	firm				iron staining measured 180cmbgs
180-205	Gley2 4/10B	SiCl	firm				iron staining
205-473	Gley2 4/10B	Cl	firm				
Additional Notes:							

GOUGE AUGER/ PISTON SAMPLER LOG

John Milner Associates, Inc.

CLIENT WRA/DeIDOT PROJECT DETERN2 Described By MT/WC Date 08/04/04

Unit No. A-2	Unit Type: Auger	Location: W of Christina River - S of I95
Vegetation: Grass / open forest (poplar)		
Drainage: poor		

Depth (cm)	Color	Texture	Consistence	Roots	Shells	Artifacts	Comments
0-2	10YR 4/2	SiLo					
2-54	10YR 5/3 -2.5YR 5/1	SiLo w/Sa	firm				finely stratified w/small wood fragments – coarsening downward – flood deposits?
54-68	10YR 5/3 -2.5YR 5/1	SiLo					
68-71	10YR 5/3 -2.5YR 5/1	SaLo					iron staining
71-76	5Y 3/1	SiLo					
76-89	5Y 5/1 – 2.5Y 5/2	SiLo					banded
89-114	Gley1 3N	ClLo	firm				banded
114-122	Gley1 3/10Y	SiCl	firm				SHARP CONTACT
122-133	7.5YR 2.5/1	Peat	firm	X		X	organic rich – dewatered – wood fragments – petroleum smell – glass fragment
133-188	Gley1 4/N	SiCl	firm				200 cmbgs
Additional Notes:							

GOUGE AUGER/ PISTON SAMPLER LOG

John Milner Associates, Inc.

CLIENT WRA/DeIDOT PROJECT DETERN2 Described By MT/WC Date 08/04/04

Unit No. A-2	Unit Type: Auger	Location: W of Christina River - S of I95
Vegetation: Grass / open forest (poplar)		
Drainage: poor		

Depth (cm)	Color	Texture	Consistence	Roots	Shells	Artifacts	Comments
200-500	Gley1 4N	Cl	firm				
Additional Notes:							

GOUGE AUGER/ PISTON SAMPLER LOG

John Milner Associates, Inc.

CLIENT WRA/DeIDOT PROJECT DETERN2 Described By MT/WC Date 08/04/04

Unit No. A-3	Unit Type: Auger	Location: W of Christina River - S of I95
Vegetation: Grass / open forest (poplar)		
Drainage: poor		

Depth (cm)	Color	Texture	Consistence	Roots	Shells	Artifacts	Comments
0-2	2.5Y 4/1	LoSa	friable				
2-37	2.5Y 5/3	fSaLo	loose				
37-45	5Y 5/2	SiCl	firm				
45-67	5Y 4/1	SiCl	firm				organics/rootlets measured to 82 cmbgs
82-112	5Y 5/1	SiClLo	firm				banded (laminated) w/ layers of 5Y 6/1 and 5Y 5/6
112-122	5Y 3/1	SiClLo	firm				banded (laminated) w/ layers of 5Y 5/1 SHARP BOUNDARY
122-152	5Y 3/1	SiCl	very firm				massive
152-173	5Y 4/1	SiCl	firm				banded (laminated) w/ layers of 5Y 5/1 SHARP BOUNDARY
173-176	7.5YR 2.5/1	Peat	firm				organic/roots - dewatered
176-191	5Y 4/1	SiClLo	friable				
Additional Notes:							

GOUGE AUGER/ PISTON SAMPLER LOG

John Milner Associates, Inc.

CLIENT WRA/DeIDOT PROJECT DETERN2 Described By MT/WC Date 08/04/04

Unit No. A-3	Unit Type: Auger	Location: W of Christina River - S of I95
Vegetation: Grass / open forest (poplar)		
Drainage: poor		

Depth (cm)	Color	Texture	Consistence	Roots	Shells	Artifacts	Comments
191-201	5Y 4/1	SiCl	firm				mottled w/ (Gley1) 4/N
201-300	Gley2 5/10B	SiCl	firm				
300-400	Gley2 5/10B	Cl	firm				
Additional Notes:							

GOUGE AUGER/ PISTON SAMPLER LOG

John Milner Associates, Inc.

CLIENT WRA/DeIDOT PROJECT DETERN2 Described By MT/KJ Date 08/05/04

Unit No. A-4	Unit Type: Auger	Location: W of Christina River - S of I95 / 5 m W of phragmite
Vegetation: Grass / open forest		
Drainage: poor / standing water		

Depth (cm)	Color	Texture	Consistence	Roots	Shells	Artifacts	Comments
0-5	10YR 3/2	SiLo	loose	X			standing water at the surface
5-17	10YR 4/2	SiLo	firm	X			
17-36	5Y 5/2	SaLo	firm	X			banded (laminated) w/ 5Y 5/4 – flood/tidal?
36-62	5Y 4/2	SiCilO	firm	X			iron staining
62-70	2.5Y 4/1	SiCl	firm	X			
70-150	5Y 4/1	SiCilO	firm				
150-155	5Y 4/2	SiCilO	firm				
155-196	Gley1 4/10Y	SiCl	firm				
196-200	Gley1 3/N	SiCL	firm				
200-221	Gley2 3/5B	SiCl	firm				
Additional Notes:							

GOUGE AUGER/ PISTON SAMPLER LOG

John Milner Associates, Inc.

CLIENT WRA/DeIDOT PROJECT DETERN2 Described By MT/KJ Date 08/05/04

Unit No. A-4	Unit Type: Auger	Location: W of Christina River - S of I95 / 5 m W of phragmites
Vegetation: Grass / open forest		
Drainage: poor / standing water		

Depth (cm)	Color	Texture	Consistence	Roots	Shells	Artifacts	Comments
221-234	Gley2 2.5Y/5BG	Cl	firm				
234-288	5Y 3/1	SiClLo	firm				
288-400	Gley2 4/10B	Cl	firm				
Additional Notes:							

GOUGE AUGER/ PISTON SAMPLER LOG

John Milner Associates, Inc.

CLIENT WRA/DeIDOT PROJECT DETERN2 Described By MT/KJ Date 08/05/04

Unit No. A-5	Unit Type: Auger	Location: 15m N of Christina River - S of I95
Vegetation: Grass / open forest		
Drainage: poor / standing water		

Depth (cm)	Color	Texture	Consistence	Roots	Shells	Artifacts	Comments
0-10	5Y 4/1	SiLo	friable	X			
10-15	5Y 4/1	SiCilO		X			banded (laminated) w/ 5Y 6/1
15-52	5Y 5/1	CilO	firm	X			iron staining
52-59	5Y 4/1	CilO	firm	X			
59-63		peat	firm	X			organics – compacted and dewatered
63-73	5Y 4/1	CilO	firm				
73-91	5Y 2.5/2	SiCilO		X			organics (30%)
91-113	5Y 4/1	CilO	firm				
113-153	Gley2 4/5B	SiCl	firm				
153-400	Gley2 4/5B	Cl	firm				
Additional Notes:							

GOUGE AUGER/ PISTON SAMPLER LOG

John Milner Associates, Inc.

CLIENT WRA/DeIDOT PROJECT DETERN2 Described By MT/WC Date 08/04/04

Unit No. B-2	Unit Type: STU/Bucket Auger	Location: E of Christina River - N of I95 - center of area
Vegetation: grass and weeds / open		
Drainage: poor / standing water		

Depth (cm)	Color	Texture	Consistence	Roots	Shells	Artifacts	Comments
0-45							STU - fill with aggregate, macadam, and concrete and plastic trash
45-65							Bucket Auger - continued aggregate, macadam and concrete
Additional Notes: refusal due to large blocks of concrete							

GOUGE AUGER/ PISTON SAMPLER LOG

John Milner Associates, Inc.

CLIENT WRA/DeIDOT **PROJECT** DETERN2

Described By MT/KJ **Date** 08/05/04

Unit No. B-3	Unit Type: STU/Bucket Auger	Location: S of Christina River - N of I95 – across from White Clay Creek
Vegetation: waist high grass and brush – N edge of landform		
Drainage: poor / standing water		

Depth (cm)	Color	Texture	Consistence	Roots	Shells	Artifacts	Comments
0-32	10YR 3/2	SaLo	friable				macadam and concrete blocks
32-70	10YR 3/4	SaLo	friable				concrete and plastic
70-88	10YR 4/2	CiLo					macadam mottled w/ 5Y 4/1 at base
88-101	10YR 5/4	SaCiLo	firm				mottled w/ 5Y 4/1
101-113	10YR 4/6	SaCiLo	firm				
113-180	10YR 5/6	SaCiLo	firm				mottled w/ 2.5YR 4/6 and 10YR 5/3
180+		gravel					tabular and rounded
Additional Notes: shovel test 0-75 cm and bucket auger to 180 cm – terminated due to gravel causing refusal of auger							

APPENDIX IV:
VITAE OF PRINCIPAL PREPARERS



ROBERT G. KINGSLEY

Senior Project Manager
John Milner Associates, Inc.
The Barclay
535 North Church Street
West Chester, PA 19380
(610) 436-9000
(610) 436-8468 (fax)
rkingsle@johnmilnerassociates.com (e-mail)

EDUCATION

Ph.D.	Michigan State University	Anthropology	1985
M.A.	Western Michigan University	Anthropology	1977
B.A.	Grand Valley State University	Anthropology	1973

EXPERIENCE PROFILE

Robert Kingsley's principal area of concentration is the prehistoric archeology of the Eastern United States. His early experience involved excavations at Woodland and Historic Period sites in southern Michigan, and he went on to supervise or direct numerous survey and excavation projects for universities and consulting firms. His field experience ranges from the Plains and Midwest to the Northeast, and includes sites or materials from nearly all cultural/temporal periods. Examples include the supervision of intensive survey and excavation projects in Michigan and Iowa, and the direction of data recovery excavations at significant Archaic and Woodland Period sites in Pennsylvania, New Jersey, Rhode Island, and Massachusetts. Theoretical/analytical emphases include ceramic and lithic analysis, settlement system analysis, the analysis of social and political implications of mortuary practices, and an overall orientation toward the study of socio-political structures of prehistoric societies. He has authored numerous publications in scholarly journals, including several on the poorly-documented Hopewell societies of southern Michigan. As Project Manager/Senior Project Manager, Dr. Kingsley has held key administrative and management roles in both large- and small-scale archeological projects throughout the Mid-Atlantic and New England regions.

KEY PROJECTS

- 2002- Phase IA and IB Archeological and Historic Architectural Investigations for the Penns Neck EIS Project, Middlesex and Mercer Counties, New Jersey. DMJM+Harris, Inc. and the New Jersey Department of Transportation.
- 2000- Professional Services for Curation and Collections Management (Indefinite Quantity). Department of the Army, St. Louis District, Corps of Engineers.
- 2000-2004 Phase IA and IB Archeological Investigations in conjunction with the Route 23 Relocation and Henderson Road/I-76 Ramps Project, Upper Merion Township, Montgomery County, Pennsylvania. Boles, Smyth Associates, Inc., the Upper Merion Transportation Authority, and the Pennsylvania Department of Transportation.

- 1999-2000 Cultural Resources and Marine Geophysical Survey, New Bedford Harbor Superfund Site, New Bedford, Massachusetts. Foster Wheeler Environmental Corporation.
- 1997-2000 Archeological Monitoring and Data Recovery at Independence National Historical Park, Philadelphia, Pennsylvania. National Park Service, Denver Service Center.
- 1993, 96-00 Phase IA, IB, II, and III archeological and historic architectural investigations, Portland Natural Gas Transmission System pipeline, pipeline laterals, and access roads, Vermont, Maine, and New Hampshire. El Paso Energy.
- 1999 Phase I Archeological Survey of the Proposed Haaf-Tercha/Crossings One Industrial Park, Lehigh County, Pennsylvania. Opus East, L.L.C.
- 1995-1999 Phase III data recovery, New Jersey Route 19 improvements, Paterson, New Jersey. New Jersey Department of Transportation.
- 1995-1999 Phase III data recoveries in conjunction with the construction of Route 33, Northampton County, Pennsylvania. Pennsylvania Department of Transportation.
- 1997-1998 Phase I Archeological Survey of the proposed Hustead Pipeline Project and access roads, Greene and Fayette Counties, Pennsylvania. Foster Wheeler Environmental Corporation and Carnegie Natural Gas Company.
- 1994-1998 Phase I, II, and III archeological investigations for the Mayview State Hospital Wetland Replacement Project, Allegheny County, Pennsylvania. Pennsylvania Department of Transportation.
- 1987-1998 Phase I, II, and III investigations of bridge replacement and highway improvement projects in Allegheny, Bedford, Bucks, Centre, Chester, Lancaster, Lehigh, Lycoming, Mercer, Montgomery, Northampton, Perry, Snyder, Somerset, Wyoming, and York Counties, Pennsylvania. Pennsylvania Department of Transportation.
- 1993-1994 Phase IA, Phase I, and Phase II Archeological Investigations for the Boston Energy Supply Project, Tennessee Gas Pipeline, Crawford and Mercer Counties, Pennsylvania. Stone & Webster Engineering Corporation.
- 1992-1994 Phase III data recovery in Conjunction with the Proposed Central Artery/Tunnel Project, Boston, Massachusetts. Bechtel/Parsons Brinckerhoff, Inc. and the Massachusetts Highway Department.
- 1992 Phase III data recovery analysis and report preparation, Iroquois Gas Transmission Pipeline Project, Fairfield County, Connecticut. Iroquois Gas Transmission System, L.P.
- 1989-1992 Phase III data recoveries in conjunction with the Route 41/42 Improvements, Gloucester County, New Jersey. New Jersey Department of Transportation.
- 1987-1991 Phase I, II, and III archeological investigations in conjunction with the Route 4, Route 1, and Route 138 improvements, Jamestown and North and South Kingstown, Rhode Island. Rhode Island Department of Transportation.
- 1987-1990 Lower Schuylkill Valley Archeological Synthesis Project, Chester and Montgomery Counties, Pennsylvania. Peco Energy, Inc.
- 1985 Red Rock Reservoir Project, site survey and analysis in Marion County, Iowa. Gilbert/Commonwealth, Inc.

1976-1978 Research Associate, Department of Anthropology; Director of Public Archeology Program. Administered contracts, proposals, fieldwork, reports. Western Michigan University.

SELECTED PUBLICATIONS

- 2003 Oberly Island: Trend and Tradition in the Lower Lehigh Valley. *Pennsylvania Archaeologist* 71(2):16-59. (with Peter E. Siegel and Tod L. Benedict).
- 1999 The Tasha-Bodwell Swamp Site (27-RK-202), Rockingham County, New Hampshire. *New Hampshire Archaeological Society Bulletin* 39(1):34-69. (with Douglas C. Kellogg).
- 1999 The Middle Woodland Period in Southern Michigan. In *Retrieving Michigan's Buried Past: The Archeology of the Great Lakes State*, edited by J.R. Halsey. Cranbrook Institute of Science.
- 1996 Territoriality and Societal Interaction During the Early Late Woodland Period in Southern Michigan. In *Investigating the Archaeological Record of the Great Lakes State: Essays in Honor of Elizabeth Baldwin Garland*, edited by M.B. Holman, J.G. Brashler, and K.E. Parker. New Issues Press. Kalamazoo, MI (with Margaret B. Holman).
- 1994 The Lower Blacks Eddy Site and Prehistoric Settlement Systems in the Middle Delaware Valley. *Journal of Middle Atlantic Archaeology*, No. 10 (with James A. Robertson).
- 1991 Archaeology of the Lower Black's Eddy Site, Bucks County Pennsylvania: A Preliminary Report. *Pennsylvania Archaeologist*, 61(1):19-75 (with Joseph Schuldenrein, James A. Robertson, Linda Scott-Cummings, and Daniel R. Hayes).
- 1990 Rethinking Hopewell Ceramic Typology in Michigan. In *Pilot of the Grand: Papers in Tribute to Richard E. Flanders, Part I*, edited by T.J. Martin and C.E. Cleland. *The Michigan Archaeologist*, 36(3-4):211-232.
- 1989 On the Occurrence of Hacklander Ware in Michigan. *The Michigan Archaeologist*, 35(2):61-88.
- 1985 20 IS 46: A Late Archaic Cemetery in Iosco County, Michigan. *The Michigan Archaeologist*, 31(3):67-81. Ann Arbor (with Barbara J. Mead).
- 1985 *Kin Groups and Mortuary Practices: Ethnographic Implications for Archaeology*. Ph.D. dissertation, Michigan State University, University Microfilms, Ann Arbor.
- 1984 An Analysis of the Mortuary Practices at the Norton Mounds Site. *The Wisconsin Archaeologist* 65(2):99-115.
- 1981 Hopewell Middle Woodland Settlement Systems and Cultural Dynamics in Southern Michigan. *Midcontinental Journal of Archaeology* 6(2). Kent, Ohio.

SUMMARY OF PROFESSIONAL ACTIVITIES

Dr. Kingsley is author, co-author, or editor of over one hundred sixty (160) cultural resources reports, nineteen (19) professional publications, one (1) book review, and ten (10) papers presented at professional meetings.



WILLIAM J. CHADWICK

Principal Geoaarcheologist/Project Manager
John Milner Associates, Inc.
The Barclay
535 North Church Street
West Chester, PA 19380
(610) 436-9000 (phone)
(610) 436-8468 (fax)
wchadwic@johnmilnerassociates.com

EDUCATION

Ph.D.	University of Delaware	Geology	2000
M.A.	Temple University	Geology	1994
B.A.	University of Maine at Farmington	Geology/Geography	1990

LICENSES/CERTIFICATIONS/TRAINING

- Registered Professional Archeologist
- Licensed Professional Geologist (Utah, # 5556501-2250)
- OSHA 40 Hour HAZWOPER (2001)
- OSHA 8 Hour HAZWOPER Refresher (current)
- OSHA 8 Hour Training for Supervisors (2001)
- OSHA Hazard Communication (2002)
- OSHA Excavation Safety Training for Competent Persons (2002)
- OSHA Permit-required Confined Spaces (2002)
- OSHA Bloodborne Pathogen (2003)
- Heartsaver CPR (2004 – Adult CPR and AED)
- U.S. Coast Guard Boating Skills and Seamanship (1995)
- Recent Archeological Prospection Advances for Non-Destructive Investigations in the 21st Century (2002 - Fort Vancouver National Historic Site, Vancouver, WA)
- Trimble GeoExplorer 3c and Pathfinder Office Training (2001)

EXPERIENCE PROFILE

Dr. William J. Chadwick serves as a Principal Geoaarcheologist and Project Manager at JMA. He is a Registered Professional Archeologist and Licensed Professional Geologist who has broad experience in both geoaarcheology and archeology. Dr. Chadwick holds a Ph.D. in Geology from the University of Delaware where he gained extensive training in archeological geology, ground-penetrating radar (GPR), quaternary geology, sedimentology, stratigraphy, and geomorphology. He has conducted numerous geoaarcheological examinations of paleogeographies and paleoenvironments and several geophysical surveys related to archeological sites, and their environs, throughout the Mid-Atlantic and New England regions. He also utilizes GPS and GIS to map and conduct analysis of spatial attributes related to cultural resources. His experience in archeology includes all phases of excavation related to Prehistoric and Historic Period sites throughout the Mid-Atlantic and New England regions. Dr. Chadwick is author or co-author of numerous cultural resource and geoaarcheological reports, as well as several professional publications and presentations at professional meetings.

KEY PROJECTS

- 2004 GIS-based Existing Conditions and Sensitivity Analysis of Cultural Resources, Route 1 Beach Area Improvements, Sussex County, Delaware. Whitman, Requardt & Associates and Delaware State Department of Transportation
- 2004 Ground-Penetrating Radar Survey of Target Areas within US 422 / SR 23 Interchange Project Area, Valley Forge National Historical Park, Montgomery County, Pennsylvania. Pennsylvania Department of Transportation.
- 2004 Geomorphic Assessment of a Proposed Wastewater Treatment Plant Expansion and Improvements, Caernarvon Township Municipal Sewer Authority, Caernarvon Township, Berks County, Pennsylvania. Great Valley Consultants
- 2004 GIS-based Existing Conditions and Sensitivity Analysis of Cultural Resources, Rehoboth Beach Entrance Improvements, Sussex County, Delaware. Whitman, Requardt & Associates and Delaware State Department of Transportation
- 2004 Geoarcheological Evaluation, Flat Rock Wind Power, 230 kV Transmission Line, Towns of Martinsburg and Watson, Lewis County, New York. Flat Rock Wind Power, LLC
- 2003-2004 GIS-based Existing Conditions and Cultural Resources Survey, S.R. 1/Indian River Inlet Bridge Project, Sussex County, Delaware. Rummel, Klepper, & Kahl and Delaware State Department of Transportation.
- 2003-2004 GIS-based Existing Conditions of Cultural Resources Survey, U.S. Highway 113, North-South Study Area, Sussex and Kent County, Delaware. Rummel, Klepper, & Kahl and Delaware State Department of Transportation.
- 2003 Archeological Phase I Survey for the Columbia Falls and Moscow OTHB-E Radar stations, Washington and Somerset Counties, Maine. United States Air Force Air Education and Training Command.
- 2003 Geoarcheological Evaluation of Proposed Middlesex Water Company Raw-Water-Supply Pipeline, in Johnson Park, Edison Township, Middlesex County, New Jersey.
- 2003 Supplementary Phase I Archeological Investigations along MD 237, Phase II Evaluation of 18ST608, and Geophysical Survey: Ebenezer Cemetery (18ST618), MD237: MD235 to Pegg Road, St. Mary's County, Maryland. Maryland State Highway Administration.
- 2001-2003 Stage IB Archeological Survey of the Intertidal Zone, New Bedford Harbor Superfund Site, Bristol County, Massachusetts. Foster Wheeler Environmental Corporation and the U.S. Army Corps of Engineers, New England District.
- 2002 Geoarcheological Evaluation, Proposed 8-inch Sewer Main Project, Whitmarsh Township, Montgomery County, Pennsylvania. URS Corporation.
- 2002 Ground-Penetrating Radar Pilot Study of Independence Square, Independence National Historical Park, Philadelphia, PA. National Park Service, Northeast District.
- 2002 Geoarcheological Evaluation, Keystone Boulevard Project, Pottstown, Montgomery County Pennsylvania. URS Corporation.
- 2002 A Ground-Penetrating Radar Survey of Probable Tannery Site, Harrogate at Landenberg, New Garden Township, Pennsylvania. Wilkinson Builders.

- 2001 Geoarcheological Evaluation, Cross Harbor Freight Movement Project: Phase 1A Archeological Assessment, 65TH Street Rail Yard, Bay Tunnel Alignment, First Avenue Tunnel Alignment, Brooklyn, Kings County, New York. AKRF, Inc.

SELECTED PUBLICATIONS AND PAPERS

- 2004 Rivers, Roads, Dirt and Documents: A GIS-based Cultural Resource Project Management Tool for Delaware Department of Transportation. Paper presented at Byways to the Past V: The Fifth Annual Conference on Historic Preservation and Transportation Projects, Indiana, PA. (with Wade Catts)
- 2003 “Come and Get Me Copper!” or “This is a Real Pane in the Glass!”: Archeological Evidence of Industrial Practices at Raritan Landing. Paper presented at Annual Meeting of the Council of Northeast Historical Archaeology, Lowell, MA. (with Wade Catts, Edward Morin, and Meta Janowitz)
- 2003 “Location! Location! Location! Interplay of Topography and Material Life at the Landing at the Landing, 1720-1777.” Paper presented at the 2003 Annual Meeting of the Society of Historical Archeology, Providence, RI. (with Edward Morin and Wade Catts)
- 2001 “Predicting the Spatial Distribution of Prehistoric Archaeological Sites as Related to Water Resources using GIS Analysis in the Lehigh Valley, Pennsylvania.” Paper presented at the Geological Society of America Northeastern Section 2001 Meeting, Burlington, Vermont and at The Society for Pennsylvania Archaeology Seventy-Second Annual Meeting. (with Matthew Harris)
- 2001 “Ground Penetrating Radar, Stratigraphic Methods, and Geoarchaeology the Paleogeography of Ancestral Cape Henlopen, Delaware.” Paper presented at the Geological Society of America Northeastern Section 2001 Meeting, Burlington, Vermont.
- 2000 The Application of Ground Penetrating Radar to a Coastal Prehistoric Archaeological Site, Cape Henlopen, Delaware, USA. *Geoarchaeology, An International Journal*, 15(8):765-781. (with John A. Madsen).
- 2000 *Paleogeographic and Paleoenvironmental Reconstruction of Terrain Associated with Coastal Prehistoric Archaeological Sites, Cape Henlopen, Delaware*. Thesis (Ph.D.) - University of Delaware
- 2000 “Evidence for Multiple Sea-level Still Stands during the Evolution of Cape Henlopen, Delaware, USA.” Paper presented at the Geological Society of America Northeastern Section 2000 Meeting, Connecticut.
- 1998 “Ground Penetrating Radar Reveals the Relationship Between Sea-Level Rise and the Prehistoric Occupation of Relict Recurved Spits, Cape Henlopen, Delaware.” Paper presented at the Geological Society of America 1998 Annual Meeting, Toronto, Canada.
- 1998 “Ground Penetrating Radar, Its Use in Understanding the Geologic Context of a Prehistoric Archaeological Site, Cape Henlopen, Delaware. Paper presented at the Geological Society of America Northeastern Section 1998 Meeting, Portland, Maine.
- 1995 “Paleogeographies of Historic and Prehistoric Archaeological Sites in the Coastal Zone.” Eastern States Archaeological Federation, 62nd Annual Meeting, Wilmington, Delaware. (with John C. Kraft)

SUMMARY OF PROFESSIONAL ACTIVITIES

Dr. Chadwick is author or co-author of sixteen (16) cultural resources reports, nine (9) geoarcheological reports, two (2) professional publications, and thirteen (13) papers presented at professional meetings.



DOUGLAS C. McVARISH

Principal Architectural Historian/Project Manager
 John Milner Associates, Inc.
 1216 Arch Street, 5th Floor
 Philadelphia, PA 19107
 (215) 561-7637 (phone)
 (215) 977-7360 (fax)
 dmcvarish@johnmilnerassociates.com

EDUCATION

M.S.	University of Vermont	Historic Preservation	1991
M.P.	University of Virginia	Urban Planning	1987
	University of Virginia	History of Architecture	1988-1989
B.A.	Hampshire College	American Studies	1978

PROFESSIONAL CERTIFICATION

- 2005 OSHA-certified 8-hour HAZWOPER refresher course
- 2004 OSHA-certified 8-hour HAZWOPER refresher course
- 2001 OSHA-certified 8-hour HAZWOPER refresher course
- 1999 OSHA-certified 40-hour Hazardous-Waste Operations Training (HAZWOPER)

EXPERIENCE PROFILE

Douglas C. McVarish has over 15 years experience in the field of historic preservation. He has collaborated on, directed, or conducted, historical and architectural projects in 16 eastern and midwestern states. These projects have been documented in historic resource survey reports, National Register nominations, and HABS/HAER recordations. Mr. McVarish has developed special expertise in the areas of American industrial history and industrial architecture, military architecture, bridge building technology, and vernacular architecture. In addition, he has become familiar with many collections of historical and architectural records in the United States and with local, state and federal regulations pertaining to historic preservation.

KEY PROJECTS

- 2005 Context research for historic architectural investigation. Rehoboth Beach Improvements Project, Rehoboth Beach, Delaware. Whitman Requardt & Associates, LLP, and Delaware Department of Transportation.
- 2005 New Hampshire Division of Historic Resources survey form for Pierce Shops, Chesterfield, New Hampshire. Shaw Environmental and the U.S. Environmental Protection Agency.
- 2005 Historic documentation of the Sanford Spinning Company, Fall River, Massachusetts. Moriece and Gary.
- 2005 Historical research concerning the evolution of Franklin Square, Philadelphia. Once Upon a Nation.

- 2005 Documentary research concerning purported unmarked cemetery, Upper Dublin Township, Pennsylvania. Upper Dublin Township.
- 2005 Intensive level survey and historic district assessment, East Orange School #4, East Orange, New Jersey. Langan Engineering and Environmental Services.
- 2004 Context development for I-95, U.S. Route 113, Delaware Route 1 and New Road highway improvement projects, Delaware. Rummel Klepper and Kahl; Whitman, Requardt and Associates; and the Delaware Department of Transportation.
- 2004 Historic architectural evaluation of the main post office complex, Philadelphia, Pennsylvania. Weston Solutions.
- 2003-2004 Context development for I-95 and U.S. Route 113 highway improvement projects, Delaware. Rummel Klepper and Kahl and the Delaware Department of Transportation.
- 2003 Architectural Inventory of Pre-1950 New Jersey Army National Guard Facilities. U.S. Army Corps of Engineers, St. Louis District, and the New Jersey Department of Military and Veterans Affairs.
- 2003 BHP survey form preparation, Crawford Electrical Generating Station, Middletown, Pennsylvania. The Smart Associates.
- 2003 Historic architectural investigation, Reading Regional Airport, Berks County, Pennsylvania. DMJM Aviation, Inc.
- 2002-2003 Historic architectural and effects investigations for Penns Neck EIS, Mercer and Middlesex Counties, New Jersey. DMJM+Harris and New Jersey Department of Transportation.
- 2002 Architectural resources reconnaissance survey, CR 143, Town of Huron, Wayne County, New York. New York State Education Department.
- 2002 Historic documentation of proposed school construction sites, Chester County, Pennsylvania. West Chester Area School District.
- 2002 Survey form, West Chester Historic District Expansion, Pennsylvania. Borough of West Chester.
- 2002 HAER-level documentation, Middletown Air Depot, Pennsylvania. Susquehanna Area Regional Airport Authority.
- 2001-2002 Historic resource screening studies, Pennsylvania, New Jersey and Delaware. Commerce Bank.
- 2000-2002 Historic buildings surveys, Fort Dix, New Jersey. Foster Wheeler Environmental Corporation and Fort Dix.
- 2001 Historic documentation of the New York, Susquehanna and Western Palisades train tunnel, Bergen County, New York. Environmental Science Services, Inc. and the PSEG Power Cross Hudson Corporation.
- 2001-2002 Historic Architectural Investigations. Roadway Improvement Projects, Upper Merion Township, Pennsylvania. Boles, Smyth Associates, Inc.

- 2001 Historic documentation of the Hiteman Leather Tannery, West Winfield, New York. CDM Federal Programs Corporation.
- 2001-2002 Historic architectural survey. Proposed Limerick Energy Center vicinity, Montgomery and Chester Counties, Pennsylvania. Foster Wheeler Environmental Corporation.
- 2001-2002 National Register nomination and multiple property documentation form. Ste. Genevieve, Missouri. City of Ste. Genevieve and Missouri State Historic Preservation Office.
- 2000-2001 Historical and photographic documentation of railroad bridges in the proposed Southern New Jersey Light Rail Transit System corridor, Camden, Burlington and Mercer Counties, New Jersey. Bechtel Infrastructure and New Jersey Transit.
- 2000-2001 Historic resources surveys of airports in Philadelphia, York County, and Dauphin County, Pennsylvania. DMJM Aviation and BAA Harrisburg.
- 1999-2002 National Historic Landmark nomination. Ste. Genevieve National Historic Landmark District. Ste. Genevieve, Missouri. National Park Service.
- 1999-2001 Historic engineering evaluation. Ohio River Navigation System. Greenhorne & O'Mara, Inc. and the U.S. Army Corps of Engineers.
- 2000 Historic American Buildings Survey documentation. Special Antenna Cover Building 9023, Camp Evans, Monmouth County, New Jersey. Geo-Marine, Inc. and the U.S. Army Corps of Engineers, Fort Worth District.
- 1999 Historic, architectural and landscape documentation. Ruth E. Nissen property, Cheltenham Township, Pennsylvania. National Trust for Historic Preservation.
- 1999 Historic resources recommendation of eligibility report. Piney Hydroelectric Plant, Clarion County, Pennsylvania. Foster Wheeler Environmental Corporation.
- 1999 Section 106 report. Pownal Tannery, North Pownal, Vermont. Stone & Webster Engineering Corporation
- 1999 Popular history of the Philadelphia Naval Shipyard, Philadelphia, Pennsylvania. Kvaerner Philadelphia Shipyard, Inc.
- 1999 Historic American Engineering Record documentation for two buildings and two structures. Philadelphia Naval Shipyard, Philadelphia, Pennsylvania. Kvaerner Philadelphia Shipyard, Inc.
- 1998-1999 Historic engineering evaluation. Monongahela River Navigation System. Pennsylvania and West Virginia. Pittsburgh District, U.S. Army Corps of Engineers.
- 1998 Historic American Engineering Record documentation for the Victory Bridge, Perth Amboy-Sayreville, New Jersey. Goodkind & O'Dea.
- 1998 Calvert County Historic Schools Survey. Calvert County Planning Department.
- 1998 National Register assessment of eligibility, TWA Maintenance Hanger, Philadelphia International Airport, Philadelphia. D & Z Infrastructure and the Philadelphia Division of Aviation.

- 1998 Reconnaissance level survey for the Portland Natural Gas Transmission System pipeline, Oxford and Franklin Counties, Maine. El Paso Energy and the Portland Natural Gas Transmission System.
- 1998 National Register assessment of eligibility for the March Estate, Greenland, New Hampshire. El Paso Energy and the Portland Natural Gas Transmission System.
- 1994-1998 Historic resources investigations for highway improvement projects. New Jersey Department of Transportation.
- 1992-1998 Historic resources investigation for bridge replacement and highway improvement projects. Pennsylvania Department of Transportation.
- 1997 Architectural investigation of 23 Bergen Street. Bridgeton, New Jersey. New Jersey Rural Housing Action Corporation.
- 1997 Historic documentation concerning the Douglass House, Trenton, New Jersey. City of Trenton, Department of Housing and Community Development.
- 1997 Reconnaissance level architectural survey and historic context development for the Long Island Beach Reformulation Study. Suffolk County, New York. Greeley-Polhemus Group, Inc. and the New York District, U.S. Army Corps of Engineers.
- 1996-1997 Determinations of Eligibility and National Register nominations for selected properties in the Delaware Water Gap National Recreation Area. Monroe and Pike Counties, Pennsylvania and Sussex County, New Jersey. National Park Service.
- 1996-1997 Phase II architectural investigation and historic resources effect evaluation for proposed Portland Natural Gas Pipeline, New Hampshire and Maine. El Paso Energy.
- 1996 Phase II architectural investigation for proposed Route 58A improvements, Lee County, Virginia. Patton Harris Rust and Associates, P.C.
- 1996 Historic survey report for Warner Theater, Atlantic City, New Jersey. Caesars Atlantic City.
- 1995-1996 Historical research on the Rev. John Witherspoon Estate (Tusculum), Princeton Township, New Jersey. Princeton Township Historic Preservation Commission.
- 1995 Historic context report for pre-military occupancy of the Seneca Army Depot, Romulus, New York. Greeley-Polhemus Group, Inc. and the New York District, U.S. Army Corps of Engineers.
- 1995 Historic American Engineering Record recordation of Enterprise Pottery, Trenton, New Jersey. New Jersey Department of Transportation.
- 1995 Reconnaissance level architectural survey for proposed high-voltage power line. Montgomery and Giles County, Virginia and Mercer and Summers County, West Virginia. Appalachian Power Company.
- 1994-1995 Historic context for Consolidated Edison Astoria Generating Station, Queens, New York. Roy F. Weston, Inc.
- 1995-1995 National Register Nomination for the Court Street School, Freehold, New Jersey. Court Street School Education Community Center, Inc.

- 1994 Historic resource survey of Black Rock Lock and Canal, and Buffalo District Reservation, Buffalo, New York.
- 1993-1994 Historic resources components of cultural resources surveys of the Naval Complex Philadelphia, the Naval Hospital Philadelphia, the Naval Security Station (Washington, DC), Marine Corps Air Station Cherry Point (North Carolina), and Ships Parts Control Center (Mechanicsburg, PA). U.S. Navy. Naval Facilities Engineering Command.
- 1993 Historic resources survey of aluminum industry related resources in Westmoreland and Allegheny Counties, Pennsylvania. National Park Service, Western Pennsylvania Partnership Branch.
- 1993 Historic American Engineering recordation of the Penns Creek Bridge. Selingsgrove vicinity, Pennsylvania. Pennsylvania Department of Transportation.
- 1993 Historic American Engineering Record recordation of the New Shaft Mine Complex. Allegany County, Maryland. Soil Conservation Service.
- 1992 Historic resources survey of Rosebank Family Housing complex. Staten Island, New York. U.S. Coast Guard.
- 1992 Historic American Engineering Record recordation of Simpsonville Mill, Simpsonville, Maryland. Maryland Department of Transportation.

SUMMARY OF PROFESSIONAL ACTIVITIES:

Mr. McVarish is author or co-author of over one hundred and ten (110) cultural resources reports, two (2) scholarly articles and one (1) paper presented at a professional meeting.

APPENDIX V:
ARTIFACT INVENTORY

ARTIFACT INVENTORY
DELAWARE TURNPIKE, PHASE I: 7NC-E-172
DSM PROVENIENCE AND CATALOG CONTROL NO. 2004.27
PENCADER HUNDRED, NEW CASTLE COUNTY, DELAWARE
JOHN MILNER ASSOCIATES, INC. FEBRUARY 2004

LOT	STU	LEVEL	CT	ARTIFACT DESCRIPTION	WEIGHT (g)
1	B2	1	1	Mortar: Sand	10.0
1	B2	1	1	Stone: Cinderblock Fragment	
1	B2	1	1	Fastener, Metal: Screw	
1	B2	1	1	Nail: Unidentified	
			Total	4	

ARTIFACT INVENTORY
 DELAWARE TURNPIKE, PHASE I: 7NC-E-58
 DSM PROVENIENCE AND CATALOG CONTROL NO. 2004.28
 PENCADER HUNDRED, NEW CASTLE COUNTY, DELAWARE
 JOHN MILNER ASSOCIATES, INC. FEBRUARY 2004

LOT	STU	LEVEL	CT	ARTIFACT DESCRIPTION	DATE RANGE	WEIGHT (g)	COMMENTS
1	Z1	1	6	Miscellaneous, Ceramic: Clay Pigeon	1880-2000		
2	Z2	1	1	Projectile: Projectile Fragment			Lead Fragment
2	Z2	1	1	Fire-Cracked Rock: Quartzite		1.4	Possible
			Total	8			

ARTIFACT INVENTORY
DELAWARE TURNPIKE, PHASE I: 7NC-D-234
DSM PROVENIENCE AND CATALOG CONTROL NO. 2004.29
PENCADER HUNDRED, NEW CASTLE COUNTY, DELAWARE
JOHN MILNER ASSOCIATES, INC. FEBRUARY 2004

LOT	STU	LEVEL	CT	ARTIFACT DESCRIPTION
1	R3	1	1	Flake 21-25mm: Coarse Jasper
2	R3 E	1	1	Flake 16-20mm: Coarse Jasper
3	R3 S	1	1	Blocky Fragment 21-25mm: Coarse Jasper
			Total	3

ARTIFACT INVENTORY
 DELAWARE TURNPIKE, PHASE I: 7NC-D-235
 DSM PROVENIENCE AND CATALOG CONTROL NO. 2004.30
 PENCADER HUNDRED, NEW CASTLE COUNTY, DELAWARE
 JOHN MILNER ASSOCIATES, INC. FEBRUARY 2004

LOT	STU	LEVEL	CT	ARTIFACT DESCRIPTION
1	E2	1	1	Flake 6-10mm: Coarse Jasper
2	E2 E	1	1	Flake 6-10mm: Coarse Jasper
3	F3	1	1	Flake 16-20mm: Coarse Jasper
3	F3	1	1	Flake 11-15mm: Coarse Jasper
4	F3 E	1	1	Flake 21-25mm: Coarse Jasper
5	F3 S	1	1	Flake 6-10mm: Chert
Total			6	

ARTIFACT INVENTORY
 DELAWARE TURNPIKE, PHASE I: 7NC-D-236
 DSM PROVENIENCE AND CATALOG CONTROL NO. 2004.31
 PENCADER HUNDRED, NEW CASTLE COUNTY, DELAWARE
 JOHN MILNER ASSOCIATES, INC. FEBRUARY 2004

LOT	STU	LOCUS	LEVEL	CT	ARTIFACT DESCRIPTION
1	D12	A	1	1	Core: Jasper
1	D12	A	1	1	Flake 6-10mm: Coarse Jasper
1	D12	A	1	1	Flake 11-15mm: Coarse Jasper
1	D12	A	1	1	Flake 21-25mm: Coarse Jasper
1	D12	A	1	1	Blocky Fragment 11-15mm: Coarse Jasper
1	D12	A	1	1	Blocky Fragment w/Cortex 26-30mm: Coarse Jasper
1	D12	A	1	1	Blocky Fragment >45mm: Coarse Jasper
1	D12	A	1	2	Blocky Fragment 31-35mm: Coarse Jasper
2	D12 N	A	1	1	Flake 21-25mm: Coarse Jasper
2	D12 N	A	1	1	Flake 11-15mm: Coarse Jasper
2	D12 N	A	1	1	Flake 6-10mm: Jasper
3	D14	A	1	1	Flake 6-10mm: Coarse Jasper
3	D14	A	1	1	Blocky Fragment w/Cortex 31-35mm: Coarse Jasper
3	D14	A	1	1	Flake 16-20mm: Coarse Jasper
3	D14	A	1	2	Flake 31-35mm: Coarse Jasper
3	D14	A	1	2	Blocky Fragment 16-20mm: Coarse Jasper
3	D14	A	1	2	Blocky Fragment 21-25mm: Coarse Jasper
3	D14	A	1	1	Blocky Fragment 26-30mm: Coarse Jasper
3	D14	A	1	1	Flake 11-15mm: Coarse Jasper
4	E11	A	1	2	Flake >45mm: Coarse Jasper
4	E11	A	1	1	Flake 26-30mm: Coarse Jasper
4	E11	A	1	1	Flake 41-45mm: Coarse Jasper
4	E11	A	1	1	Blocky Fragment 31-35mm: Coarse Jasper
4	E11	A	1	2	Nail: Unidentified
5	E11 N	A	1	1	Flake 16-20mm: Coarse Jasper
5	E11 N	A	1	1	Flake w/Cortex 21-25mm: Coarse Jasper
6	E12	A	1	3	Nail: Unidentified
6	E12	A	1	1	Flake >45mm: Coarse Jasper
7	E12 S	A	1	1	Flake 16-20mm: Coarse Jasper
7	E12 S	A	1	2	Flake 21-25mm: Coarse Jasper
8	E14	A	1	1	Flake 11-15mm: Coarse Jasper
8	E14	A	1	1	Flake 36-40mm: Coarse Jasper
8	E14	A	1	1	Flake 21-25mm: Coarse Jasper
9	E14 W	A	1	1	Flake 16-20mm: Coarse Jasper
9	E14 W	A	1	1	Flake 21-25mm: Coarse Jasper
9	E14 W	A	1	1	Blocky Fragment 26-30mm: Coarse Jasper
10	C18	B	2	1	Flake 11-15mm: Coarse Jasper
10	C18	B	2	2	Flake 6-10mm: Coarse Jasper
Total				48	

ARTIFACT INVENTORY
 DELAWARE TURNPIKE, PHASE I: 7NC-D-237
 DSM PROVENIENCE AND CATALOG NO. 2004.32
 PENCADER HUNDRED, NEW CASTLE COUNTY, DELAWARE
 JOHN MILNER ASSOCIATES, INC. FEBRUARY 2004

LOT	STU	LEVEL	CT	ARTIFACT DESCRIPTION
1	O10	1	2	Flake 6-10mm: Coarse Jasper
1	O10	1	3	Flake 11-15mm: Coarse Jasper
1	O10	1	1	Flake 16-20mm: Coarse Jasper
1	O10	1	1	Flake 21-25mm: Coarse Jasper
1	O10	1	3	Blocky Fragment 16-20mm: Coarse Jasper
1	O10	1	1	Blocky Fragment >45mm: Coarse Jasper
2	O10	2	3	Flake 6-10mm: Coarse Jasper
2	O10	2	4	Flake 11-15mm: Coarse Jasper
2	O10	2	3	Flake 16-20mm: Coarse Jasper
2	O10	2	3	Flake 21-25mm: Coarse Jasper
2	O10	2	2	Blocky Fragment 11-15mm: Coarse Jasper
2	O10	2	2	Blocky Fragment 16-20mm: Coarse Jasper
2	O10	2	1	Blocky Fragment 21-25mm: Coarse Jasper
2	O10	2	1	Blocky Fragment 31-35mm: Coarse Jasper
2	O10	2	1	Blocky Fragment >45mm: Coarse Jasper
Total			31	

ARTIFACT INVENTORY
DELAWARE TURNPIKE, PHASE I: NONSITE
DSM PROVENIENCE AND CATALOG CONTROL NO. 2004.33
PENCADER HUNDRED, NEW CASTLE COUNTY, DELAWARE
JOHN MILNER ASSOCIATES, INC. FEBRUARY 2004

LOT	STU	LEVEL	CT	ARTIFACT DESCRIPTION
1	E28	1	1	Flake 6-10mm: Chalcedony
2	H14	1	1	Flake 16-20mm: Jasper
3	H21	1	1	Nail: Unidentified
4	T7	1	1	Redware: Fine Black Glaze
5	P16	1	1	Flake 21-25mm: Quartzite
6	P16 E	1	1	Flake 11-15mm: Jasper
			Total	6