RESEARCH DESIGNS AND METHODS

Background research for the Route 896 Transmission Pipeline project area revealed that although no archaeological investigations have been conducted within the project area, there are several previous archaeological surveys in the nearby area. A number of cultural resource management studies (Custer and Bachman 1986; Custer, Bachman, and Grettler 1986; Custer and Cunningham 1986; Custer and De Santis 1986; Custer 1986), and other archaeological projects (Lothrop, Custer, and De Santis 1987; Wise 1983; Custer et al. 1984, and Gardner and Stewart 1978) have provided excavation and survey data on sites in the nearby region. The entire Route 896 Pipeline project area was included in a recently published cultural resource planning study of the Route 301 corridor (Kellogg 1993a). The Delaware Cultural Resources Survey site files, which are maintained by the Delaware State Historic Preservation Office (DESHPO), the repository for records of all known prehistoric and historic sites in Delaware, also contain information about sites in the vicinity of the Route 896 Pipeline Transmission project area. Figure 6 shows the location of archaeological surveys in the nearby area. It must be noted that many of the prehistoric and historical sites within the DESHPO inventory are reviewed in direct response to transportation and development. Thus, the locations of known sites tend to be clustered in areas of intense development activities and represents a distinct bias in survey and recording (De Cunzo and Catts 1990:118).

In developing predictive models for the project area, it was assumed that archaeological site distributions could be modeled primarily on the basis of environmental factors during the prehistoric period, although social factors could play a role. Several studies have illustrated the use of environmental factors in predictive models for prehistoric sites in both the High and Low Coastal Plain (e.g., Custer et al. 1986; Eveleigh 1984; Galasso 1983; Custer and Galasso 1983; Custer et al. 1984; Gardner 1982, 1987) and these models have been shown to be both accurate and precise (Custer and Bachman 1986; Custer, Bachman, and Grettler 1986). For the most part, these models focus on the availability of surface water and productive swamp, marsh, and bog settings. In fact, a predictive model based solely on surface water availability was successfully applied to the Route 896 Corridor, which is located just north of the current project area along the same roadway (Lothrop, Custer, and De Santis 1987). Social factors in prehistoric site location have also been considered (Custer et al. 1984), but their applicability is limited to Woodland I specialized base camps and their accuracy and precision have not been evaluated.

Historical archaeological investigations within the Route 896 Transmission Pipeline project area followed the guidelines for research suggested by the **Management Plan for Delaware's Historical Archaeological Resources** (De Cunzo and Catts 1990). Three research domains landscape, domestic economy, social group identity and interaction could guide historical archaeological research in the Route 896 Transmission Pipeline project area, provided sites with the appropriate data are identified. Specifically, cultural material remains of sites' occupants, such as ceramics, glass, architectural debris, and faunal remains, along with large archaeological features, can be analyzed to observe domestic and subsistence strategies as they change over time. In contrast to prehistoric sites, explicit predictive models have not been regularly applied to historical archaeological sites due to the general effectiveness of archival research and documentation as a predictive tool, particularly after the mid-nineteenth century. However, recent analyses show that historical site factors such as topography, surface water, soil quality and productivity, and access to transportation facilities and markets had significant influences on historical site locations (Custer, Bachman, and Grettler 1986; Catts, Custer and Hoseth 1991; Custer and Grettler 1991; Kellogg 1993a, 1993b; Lukezic 1990; McGregor 1991; Sprinkle 1991).

FIGURE 6

Previous Archaeological Surveys in Nearby Area

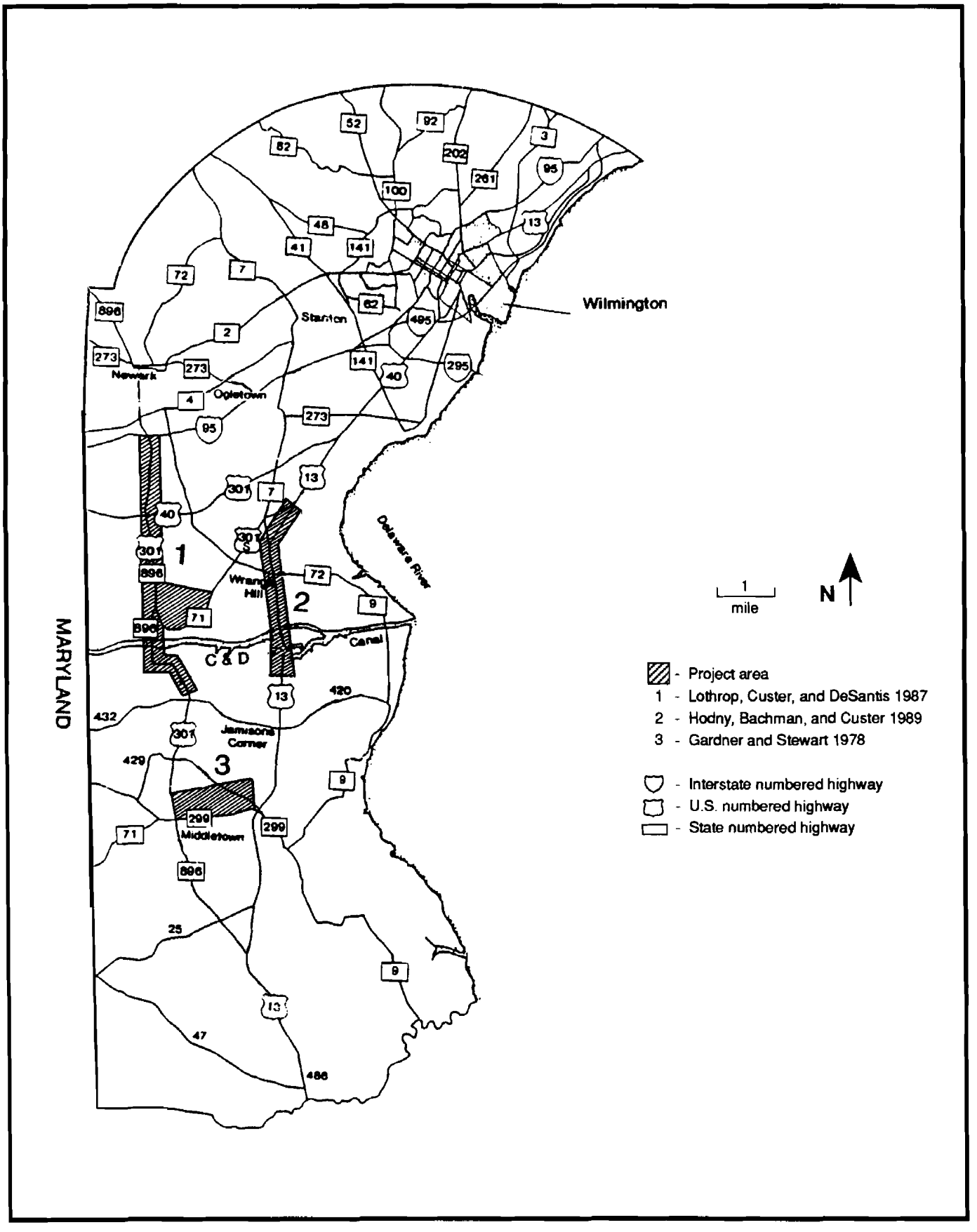


FIGURE 7

Cultural Resources and Potential Cultural Resources Identified Within the Project Area

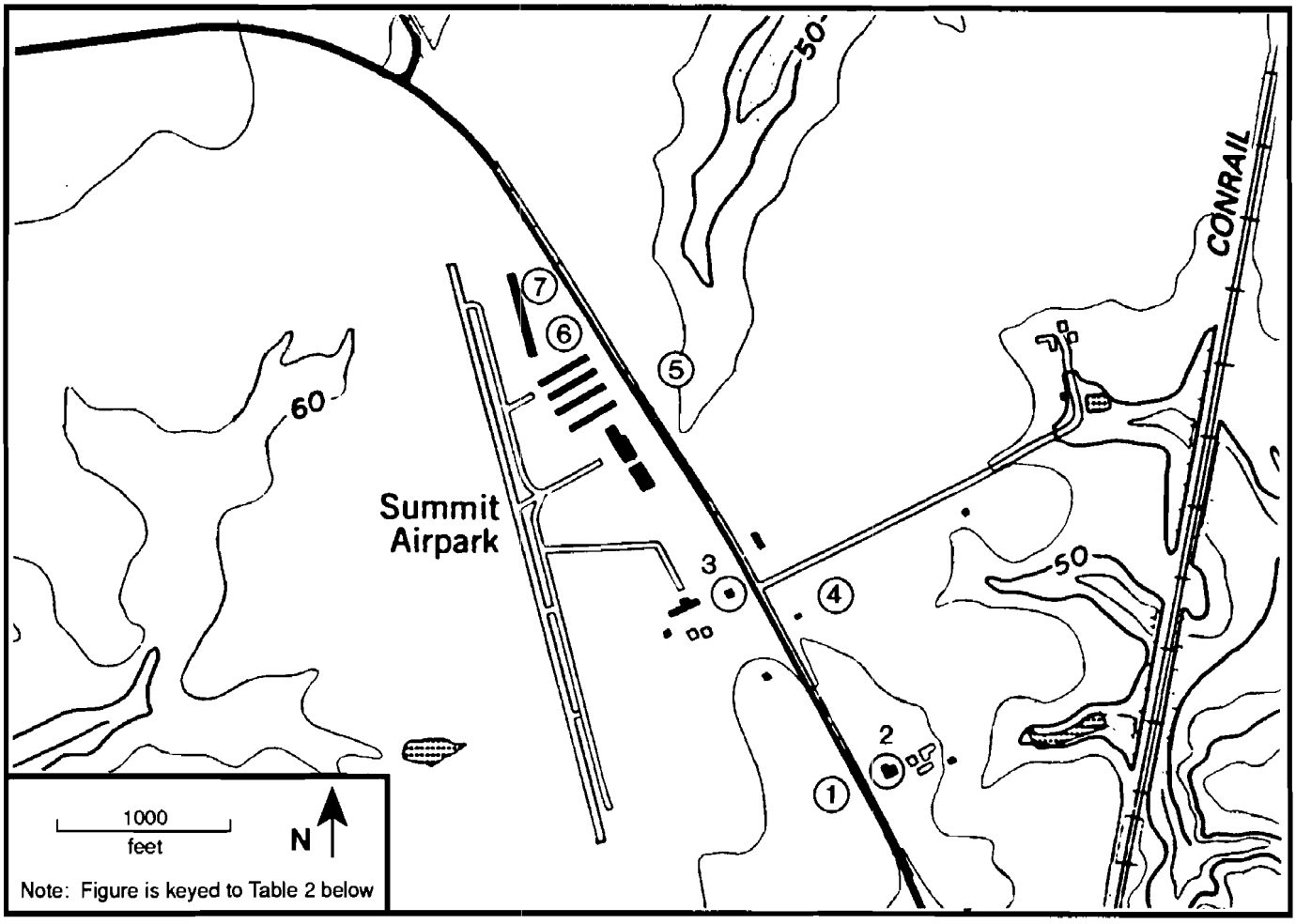


TABLE 2

Route 896 Transmission Pipeline Site Inventory and Current Status of Cultural Resources in Project Vicinity

	Standing structure	Potential standing structure	Potential archaeological site	Listed in SHPO files	Out of row	Identified during the Route 896 Pipeline survey
1. Andrew Eliason, 7NC-F-69, N-12812			X	X		X
2. Eliason, N-413 (Hermetage)	X			X	X	
3. Appleton, 7NC-F-70, N-12813		X		X	X	X
4. Bines			X		X	
5. Richard Griffith Area A, 7NC-F-71A			X			X
Area B, 7NC-F-71B, N-12814					X	X
6. Appleton			X		X	
7. Porter			X		X	

Note: All sites and potential sites are historical

A new study by Kellogg (1993a) has established predictive models for prehistoric and historical site locations based on those models mentioned above and include data on soils and surface water for prehistoric sites, and early roadways and navigable watercourses for historical sites. Archaeological sites located by the Route 896 Transmission Pipeline survey may be used to evaluate these factors as predictors of site location. For the Route 896 Transmission Pipeline project area these latest models (Kellogg 1993a) will be applied, where appropriate, to generate testable predictive models.

The site records of the Delaware State Historic Preservation Office (DESHPO) and the cultural resource planning study of the proposed Route 301 corridor (Kellogg 1993a) indicate that seven historical sites, including two standing structures, are located within or immediately adjacent to the current project area (Figure 7, Table 2). The next two sections of this report will describe the testing method designs for prehistoric and historical site survey.

Prehistoric Research Design

Analysis of prehistoric site locations in Delaware has shown that surface water and soil moisture conditions are the most important variables to prehistoric sites outside of the coastal zone (Custer and Bachman 1986:126-131; Custer et al. 1984:172-177). Custer and Bachman (1986:126-131), for example, note that locations adjacent to streams characterize 71 percent of all sites in all time periods, and Lothrop, Custer, and De Santis (1987:28-31) found that 31 of 34 sites were within 200 meters of water and 18 of the 31 sites were within 100 meters of water. Soil moisture is another important correlate to prehistoric settlement, especially the presence of "bay/basin" features where poorly drained soils occur and standing water may be found seasonally (Custer and Bachman 1986:129, 145-149; Lothrop, Custer, and De Santis 1987:33).

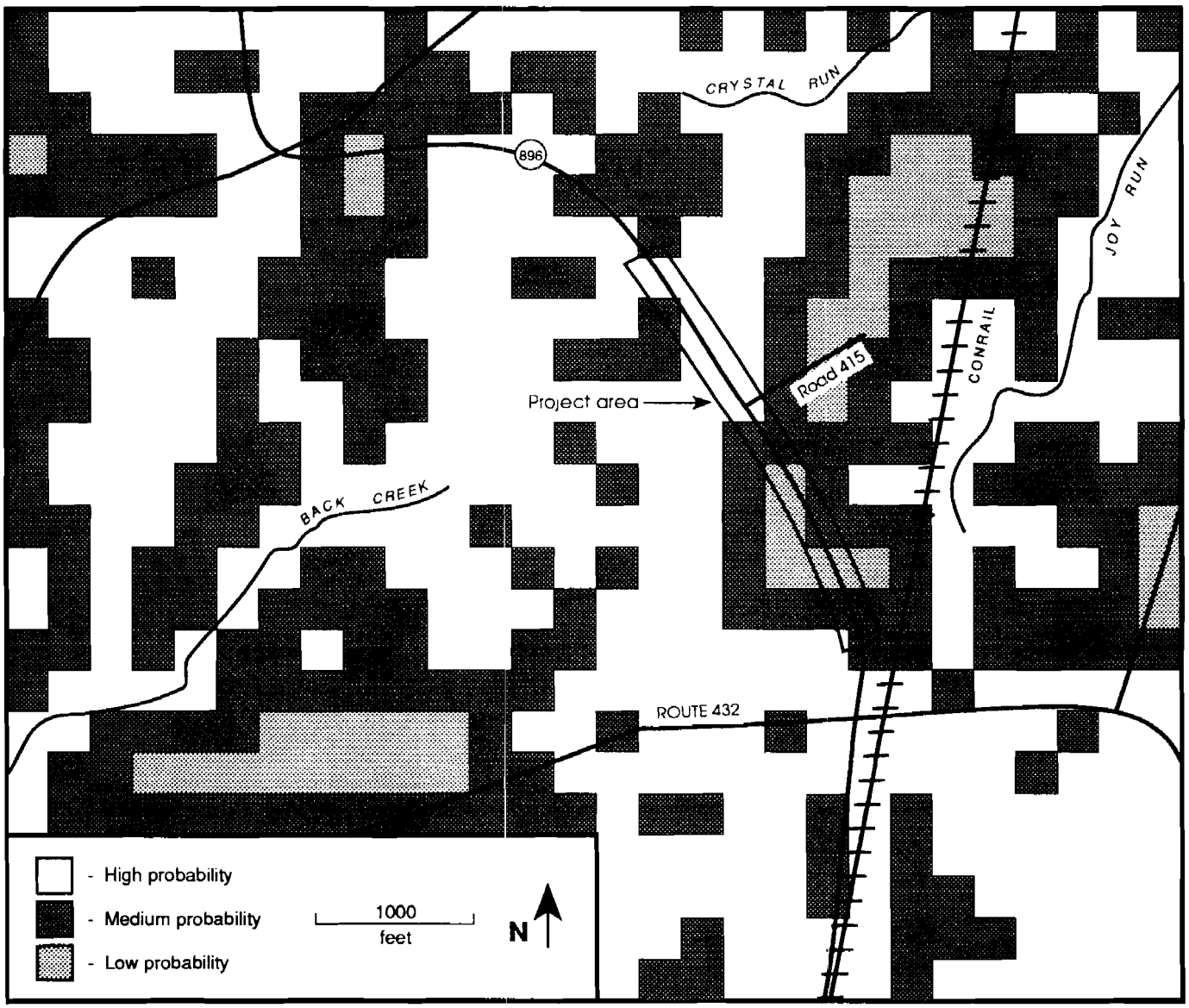
Based on the Route 301 survey, Kellogg (1993a:66) concluded that of five locational variables of known prehistoric archaeological sites: 1) drainage presence/absence; 2) distance to drainage; 3) poorly-drained soil presence/absence; 4) wet/dry soil ecotone presence/absence, and; 5) distance to wet/dry soil ecotone, only the distance variables were significant. The predictive model for prehistoric sites was therefore generated by taking the minimum distance to a drainage of any type or to the wet/dry soil ecotone. Based on the statistical analysis of known site location and previous study results High, Low, and Medium probability zones were established (Kellogg 1993a:66). Figure 8 shows the location of the Route 896 Transmission Pipeline project area within the prehistoric probability zones defined by Kellogg.

The Route 896 Transmission Pipeline project area crosses only one low-order intermittent stream that drains into Crystal Run. Any other stream channels, such as Joy Run and other unnamed tributaries of the Chesapeake and Delaware Canal, are located approximately 600 meters from the project area (Figure 3). There are no identified bay/basin features in the area, and soils are generally well drained.

Prehistoric site location predictions are most accurate when they are made for specific time periods because human adaptations and settlement patterns changed through time in Delaware. Management plans for prehistoric cultural resources in Delaware indicate the potential for specific archaeological resources for each time period (Custer 1986; Custer and De Santis 1986). During the Paleo-Indian Period (ca. 12,000 B.C. - 6,500 B.C.), settlement patterns were focused upon areas with either readily available cryptocrystalline outcrops or poorly-drained swamps (Custer, Cavallo, and Stewart 1983). Focus on resource-rich settings such as bay/basin features and poorly-drained swamp settings are expected during the Archaic Period (Custer 1986:65). Given the environmental setting of the project area, well-drained soils, no bay/basin features, proximity to cobble bed lithic sources, it is unlikely that this area may contain Paleo-Indian and Archaic sites. No known Paleo-Indian or Archaic period sites are located near the project area (Kellogg 1993a:42).

FIGURE 8

Location of Project Area Within Prehistoric Predictive Zones



Management plans for prehistoric cultural resources in Delaware (Custer 1986) indicate that the project area has a moderate potential for containing Woodland I and Woodland II archaeological sites. Major terraces of drainages or well-drained headlands adjacent to swamps/marshes would be the expected locations of base camps are predicted to occur near low order tributaries or at confluences of tributaries. During the Woodland I and II periods, procurement site locations are expected to be in swampy floodplains of major and minor drainages and on alluvial fans associated with swamps, bogs and lithic sources (Custer 1986). The Route 896 Transmission Pipeline project area is one mile long and extends just 70 feet on either side of Route 896, which is located in a well-drained area between drainages that flow into the Chesapeake Bay (Back Creek) and drainages that flow into the Delaware Bay (Joy Run and Crystal Run - Figure 3). Two known sites with Woodland I and II components are located near Joy Run (Kellogg 1993a:42), approximately 2000 feet (600 meters) from the southern portion of the project area (Figure 3).

The project area is located in the Lewes/Henlopen European Settlement Area study unit (Custer 1986). Site type and site locations expectancies for the Contact Period would be very much like the Woodland I and Woodland II Period predictions; however site expectancies decrease through time after

the first contacts until the mid-eighteenth century (Custer 1986). The moderate probability of Woodland I and II occupations within the site area also allows a slight possibility for a Contact Period occupation within the project area, although no known Contact Period sites are located in the area (Kellogg 1993a:44).

Historic Research Design

An evaluation of all historical resources in the Route 896 Pipeline project area was conducted as part of the Route 301 Corridor planning study (Kellogg 1993a). In this survey, predictive models based on comparison of known site locations and data on navigable drainages, roadways, and soils were developed for identifying potential sites for the earliest periods of historical occupation in the study area (1630-1730, 1730-1770) (Kellogg 1993a:71-75). Use of predictive models were rendered unnecessary for identifying later occupations of New Castle County (1770-1830, 1830-1880, 1880-1940) due to extensive documentation (i.e. maps, surveys, and legal documents) of settlement in the area after 1770 (Kellogg 1993a:75).

In addition to already recorded historical resources, Kellogg (1993a:37-39) complied a database of potential archaeological sites as well as potential historical resources. These potential resources located in the vicinity of the Route 896 Transmission Pipeline survey area as documented with the DESHPO are shown in Figure 7, and Table 2 lists their descriptions. Sources of data for potential standing structures and archaeological sites included historic maps such as Latrobe's 1803 map, Heald's Map of 1820, Rea and Price's maps of 1849 and 1850, Beers' 1868 Atlas, Hopkins' 1881 maps, and Baist's 1893 Atlas. These maps document roads, drainages, public buildings, individual farms, businesses, churches, and also individual dwellings. Locations identified on these maps were compared to modern USGS quadrangle maps. Extant structures on recent USGS maps were defined as potential standing structures. Structures not found on the USGS maps were called potential archaeological sites. Archaeological survey of the Route 896 project area was able to identify these potential historical resources.

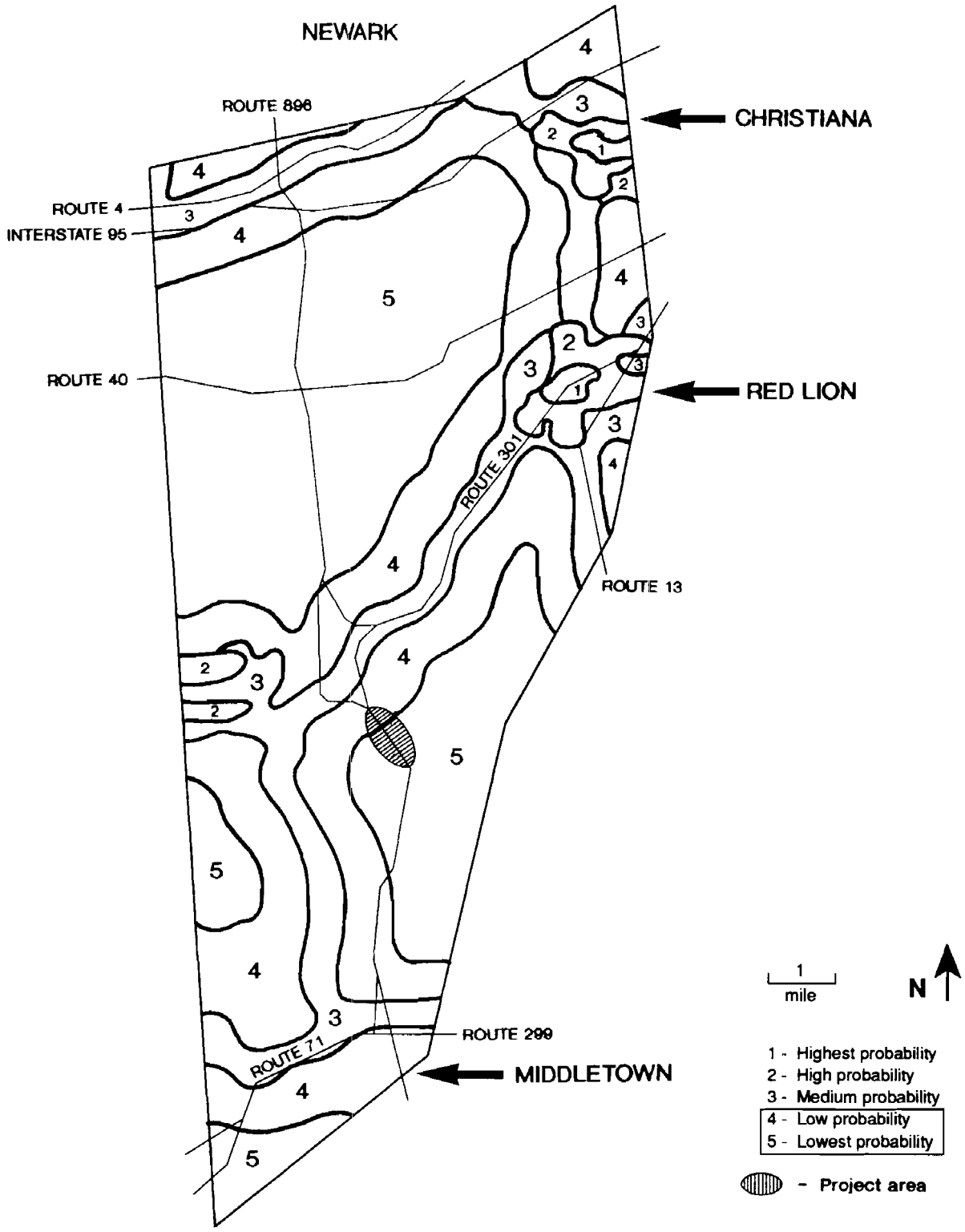
Because of the absence of navigable drainages in close proximity to the project area, the Route 896 project area falls within low probability zones for historical sites dating prior to 1730 (Figure 9, Kellogg 1993a). Although site expectancy in this area is quite low, types of sites which may be present may include, scattered farmsteads (possibly with associated slave sites) and small domestic sites along inland transportation routes such as; brickyards and service businesses (taverns, inns, grist and saw mills) (De Cunzo and Catts 1990).

During the second half of the eighteenth century, 1730-1770, settlement patterns shifted from water-oriented locations to more inland areas (Wise 1983). Navigable drainages still linked the sites of the area with the economy of the larger region; however, expansion away from these drainages increased the development of overland transportation routes. Subsequently, increased commercial and economic development began in the more interior areas of Delaware (Wise 1983, De Cunzo and Catts 1990).

A British Army map from 1777 depicts a road running from Middletown to Carson's Tavern (present day Summit Bridge) (Figure 10) and this road is probably the same route that Route 896 follows today. Although the Route 896 ESNG Transmission Pipeline project area falls within low to medium probability zones for historical sites dating to 1730-1770 (Figure 11, Kellogg 1993a), the presence of this roadway increases site expectancies for this area as compared to expectancies projected for sites dated prior to 1730. Historical site types in the area may include farmsteads, possibly with associated slave and indentured servant sites; small domestic sites along overland routes to service

FIGURE 9

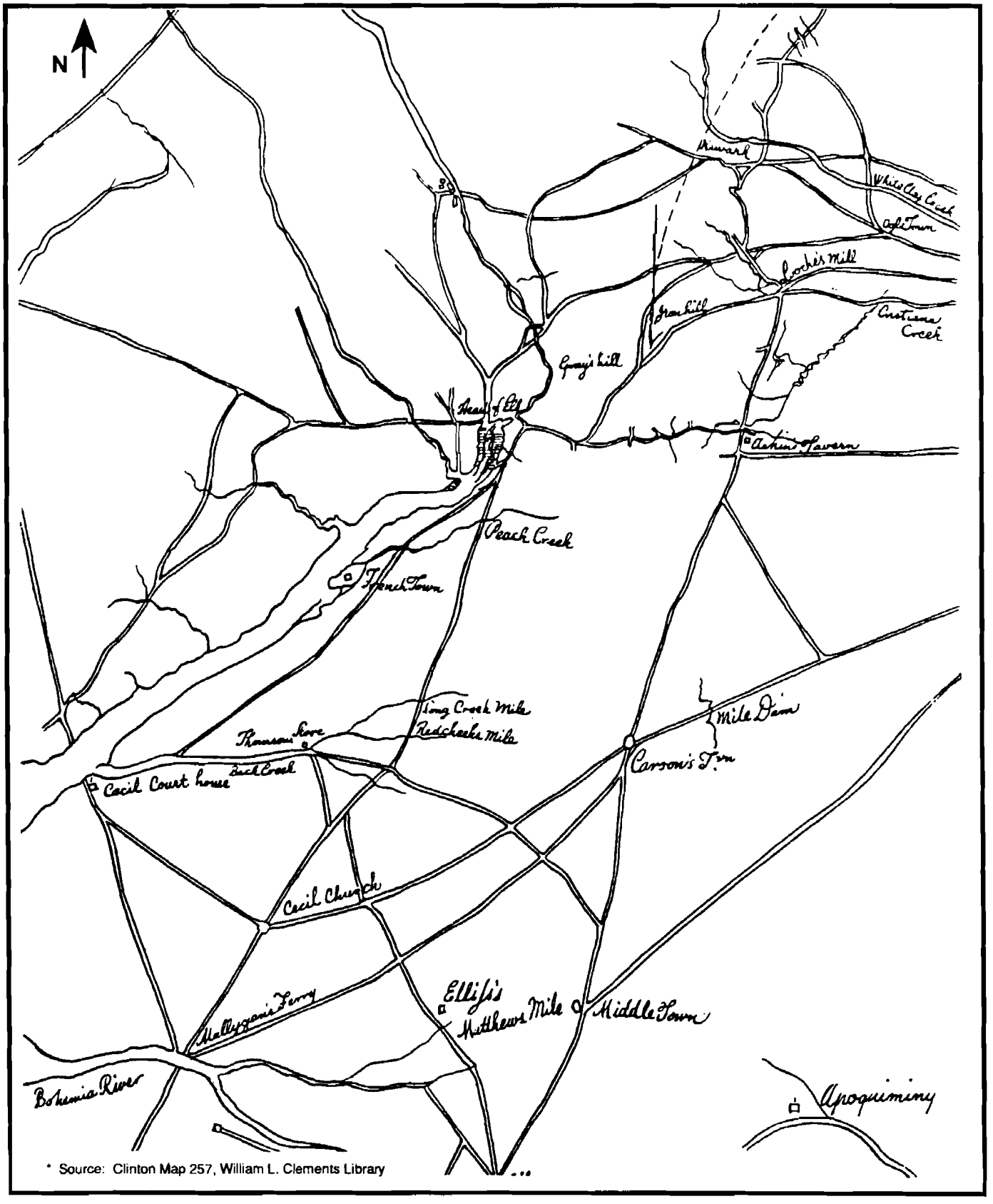
Location of Project Area Within Pre-1730 Predictive Zones



Predictive model for pre-1730 historic sites in the Route 301 study area, based on the distance to navigable drainages and the distance to the contemporaneous road network. Some modern roads are shown to orient the reader. The report text gives a full description of how the map was generated. (Source: Kellogg 1993a)

FIGURE 10

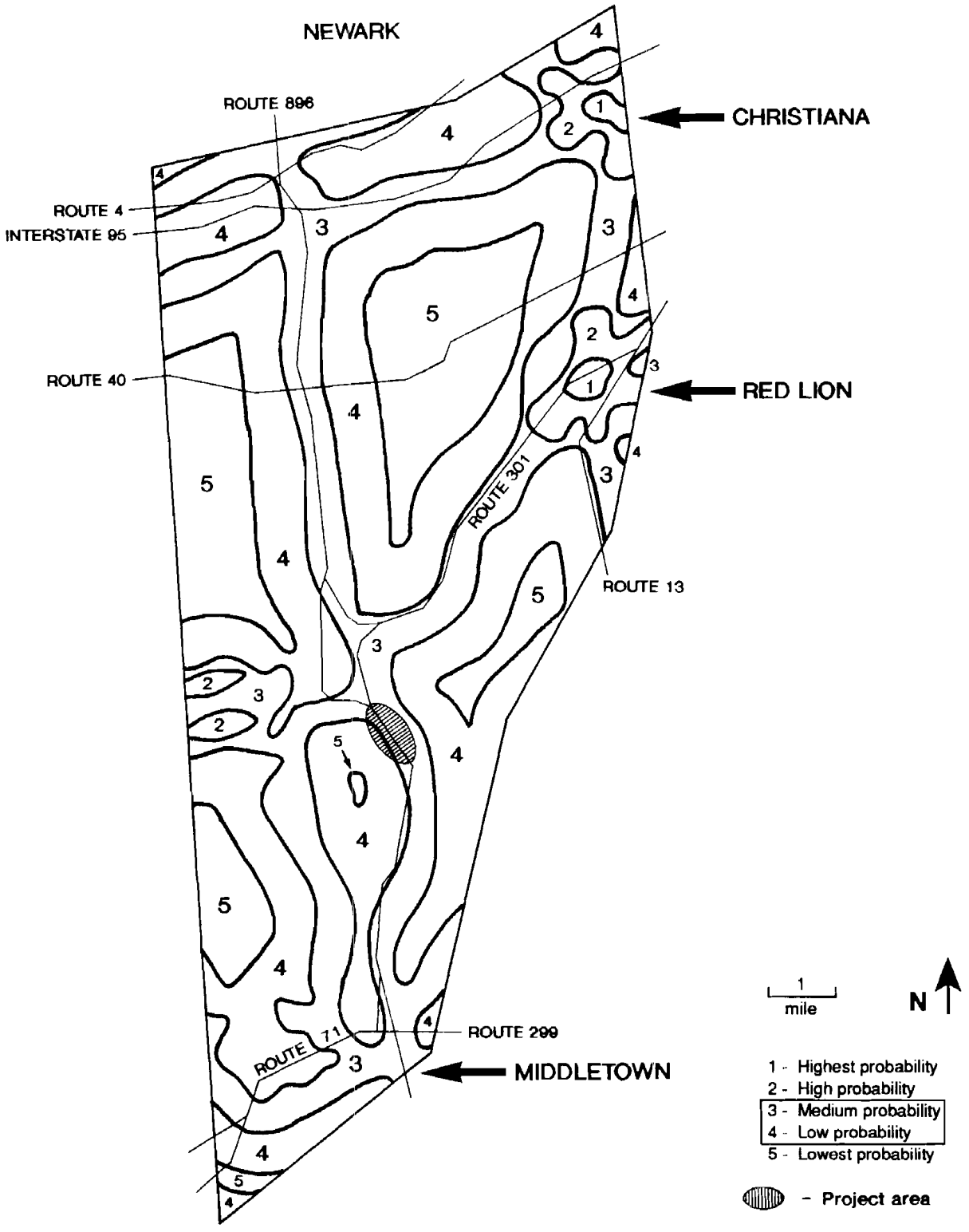
Detail from "Progress of the British Army from the Landing in Elk River to the Taking Possession of Philadelphia anno 1777"



* Source: Clinton Map 257, William L. Clements Library

FIGURE 11

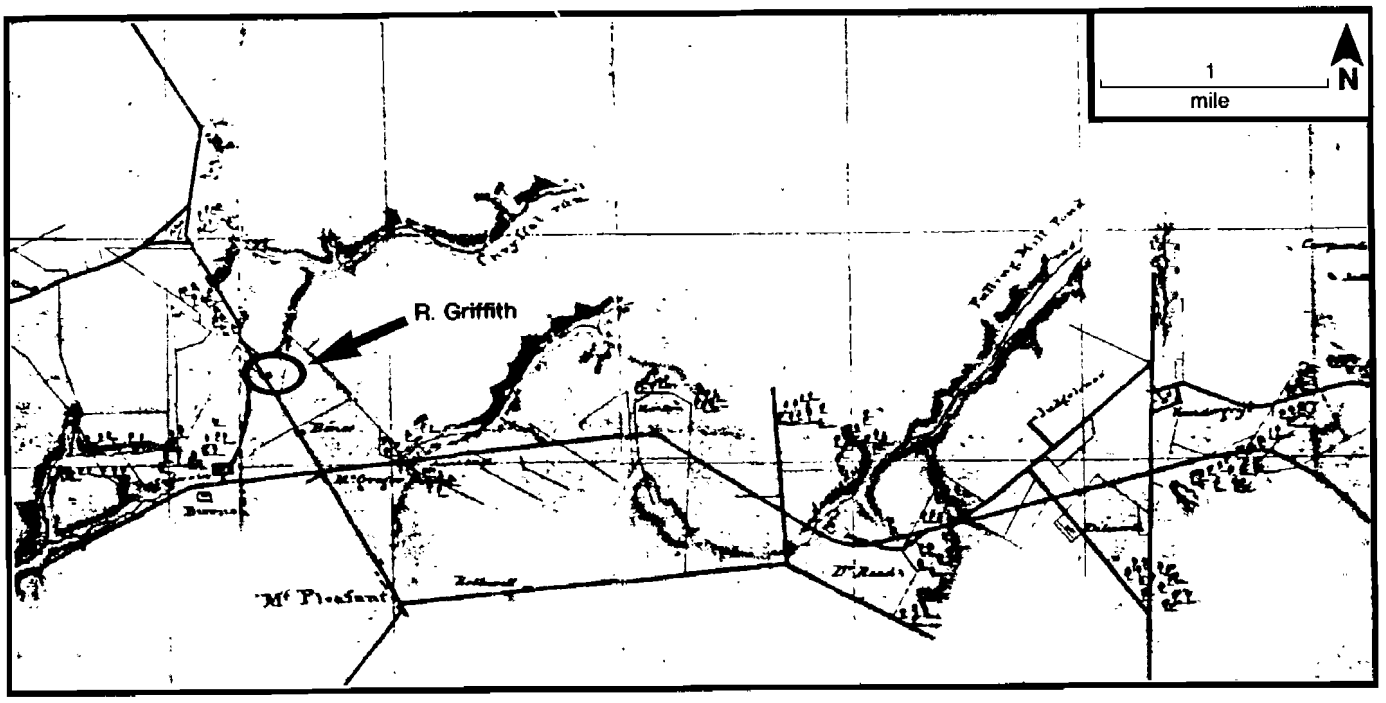
Location of Project Area Within 1730-1770 Predictive Zones



Predictive model for pre-1770 historic sites in the Route 301 study area, based on the distance to navigable drainages and the distance to the contemporaneous road network. The difference between this map and the pre-1730 map is the addition of several roads. Navigable drainages remain the same. Some modern roads are shown to orient the reader. (Source: Kellogg 1993a)

FIGURE 12

Detail of Project Area from Latrobe's Map, 1803



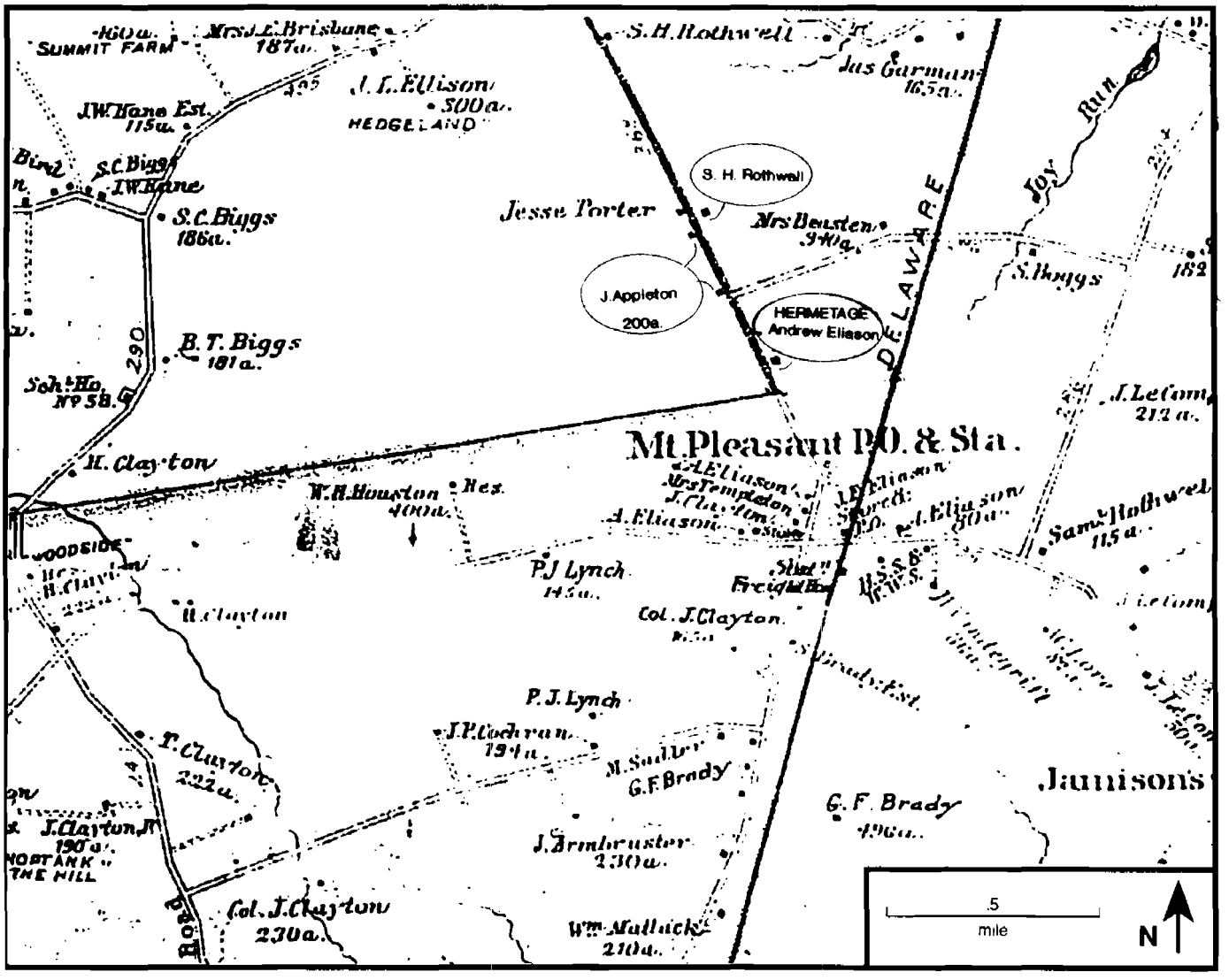
emerging communities (such as churches, and public buildings); and sites associated with nascent industries (such as retail shops, saw and grist mills, craft-production, shipping, storage, and distribution-related activities) (De Cunzo and Catts 1990).

After 1770, rapid socio-economic changes associated with industrialization, urbanization, and suburbanization occurred in Delaware (De Cunzo and Catts 1990). The time span between 1770 and 1940 has been divided into three time periods; 1770-1830, 1830-1880, and 1880-1940 (De Cunzo and Catts 1990). Large-scale construction of transportation routes, such as the Chesapeake and Delaware Canal in 1829 and the New Castle and Frenchtown Railroad in 1831, are reflections of emerging economic growth in the Upper Peninsula of Delaware. As apparent from various map sources (Latrobe 1803 - Figure 12, Beers 1868 - Figure 5, Hopkins 1881 - Figure 13, 1927 Aerial Photograph - Plate 1) consistent settlement occurred in the Route 896 Transmission Pipeline project area throughout this time.

A wide diversity of historic sites which date between 1770 and 1880 are expected in the project area. Farmlands found in the area could include large estates, owner- and tenant-occupied, or free African American agricultural complexes and dwellings (De Cunzo and Catts 1990). Industrial sites may include textile, snuff or grist mills, tanneries, distilleries, or other craft-production sites. Sites related to transportation routes and their construction, such as distribution/storage sites or housing for workers of these routes, may also be present (De Cunzo and Catts 1990). In addition, various mercantile and other domestic sites (e.g., shops, churches, taverns, schools, and public buildings) which once serviced growing communities of the area are also expected. Aside from some temporal and spatial differences, similar site types dating between 1880 and 1940 can be expected in the project area.

FIGURE 13

Detail of Project Area from Hopkins' Map of New Castle County, 1881



Field, Laboratory, and Archival Methods

Phase I and II research conducted for the proposed Route 896 Transmission Pipeline project included a review of the site files and records maintained by the DESHPO pertaining to known prehistoric and historic cultural resources within the vicinity of the project area, a review of historic atlases and maps, and interviews with local landowners and informed persons about the project area.

Research designs governing the testing plan were created for both the prehistoric and historical cultural resources based on previous archaeological investigations in the immediate vicinity of the project area. Archival research was designed to determine the nature and extent of the information contained within extant historical documents. Archival sources included deed records, tax assessments, road papers, other court records and published sources, and the review of relevant prehistoric archaeological literature (Custer 1984, 1986). Archival research can serve to establish a base history of the construction and demolition of the structures and other landscape features of a site, land use and alteration at a site, and information about site occupants, their activities and their role in the community in which they lived.

Researchers must be aware of biases that exist in historical records and literature. For example, Catts and Custer (1990) suggest that a focus on urban and political events as well as a lack of documentary information, has resulted in virtually no studies of Delaware's rural African American population. In addition to certain ethnic biases that may be present, biases also exist regarding social class and wealth. Extensive records and maps are often provided in genealogies, tax assessments, probate records, wills, deeds, and personal diaries often associated with wealthier, well-established landholders. Comparative studies and oral histories can be used to fill in gaps in the historical record.

Pedestrian surveys and surface collection were conducted wherever surface visibility was adequate within the project area. Shovel test pits were employed as the standard Phase I test unit because of their demonstrated effectiveness in detecting buried cultural materials, their aid in the creation of artifact distribution patterns, their ability to establish site limits, and the low intensity of effort required for their excavation when compared to larger, measured test squares (McManamon 1981; Nance and Ball 1986; Lothrop, Custer, and De Santis 1987). Shovel tests were excavated generally at intervals of 40 feet, with smaller interval testing of 20 feet employed on known or potential site locations. Soil was passed through a 1/4-inch screen of hardware mesh, and all cultural materials were bagged and labeled according to individual shovel test pits. Field notes for each shovel test pit included the recording of thickness, color and textural characteristics of all soil horizons encountered, shovel test pit depths and dimensions, and what cultural materials were recovered.

For management and reference purposes, the project area was divided into segments, and within these segments shovel tests were named by the associated property tract. Most shovel test pits were numbered continuously through the entire project area, however, some received number designations within each property tract. All segments with their shovel test pit locations were mapped along with topographical information such as distance to Route 896, private drives, and tree lines.

Phase II investigations, where undertaken, were conducted to define limits, integrity and stratigraphic context of archaeological sites warranting such study so that a determination of National Register eligibility could be made. Phase II investigations consisted of the excavation of 3- x 3-foot test units in areas of high archaeological potential, as defined by the Phase I shovel test pit survey. As with the Phase I testing, soil was passed through a 1/4-inch screen of hardware mesh, and all cultural materials bagged and labeled according to stratigraphic excavation levels. Field records for the Phase II testing included measured levels of thickness, and color and textural characteristics of all soil horizons encountered. Floor plans and profiles of test units were video-taped, photographed, and drawn. Features, when encountered, were recorded in the same manner.