II. Background Research

Background research was conducted to provide a context for the identification of archaeological resources. The locations of known archaeological sites, both pre-contact and historic, was used to determine the types of settings on which archaeological sites may be found. Historic maps and documentation were utilized to determine whether any archaeological sites were previously known, or were likely to be located, within the project area. Historic documents were examined to provide a context for the survey and to determine what activities had occurred within the APE. Historic maps and other relevant documents were examined to determine if non-extant buildings or other structures were once located within the APE.

Background research was conducted in the following repositories: New Castle County Recorder of Deeds, Historical Society of Delaware, Hagley Museum and Library, Nemours Mansion and Archives, New Castle County Land Use Department, Delaware State Archives, Delaware State Historic Preservation Office, the Delaware Planning Commission, Widener University Law Library-Brandywine Valley Historical Collection, Wilmington Department of Public Works Water Department, and the Wilmington Institute Libraries.

A. Physical Environment

Delaware is one hundred miles long and from nine to thirty-five miles wide. It is divided into three counties; New Castle, Kent and Sussex. Each county is further subdivided into Hundreds (unincorporated subdivisions of counties) and the current project lies in Brandywine Hundred. Although they served as legislative districts in the Colonial period, today Delaware's Hundreds are used for property tax assessment. The eastern shore abounds with rivers, creeks, and streams, all eventually finding their way to either to the Delaware River or Delaware Bay (Scharf 1888). The APE for this project is drained by Alapocas and Matson Runs, which are tributaries of Brandywine Creek. Brandywine Creek joins the Christana River approximately two miles north of the Christana River's confluence with the Delaware River. The elevations within the APE range from approximately 250 to 350 feet (~76 to 107 meters) above sea level. The landforms within the archaeological APE are upland and are mostly comprised of open fields or wooded zones along field margins. Portions of the project area have been disturbed by modern residential and commercial development.

1. Climate

New Castle County has a humid continental climate that is altered by the nearby Atlantic Ocean. Generally weather systems move from west to east in the warmer half of the year, but during the colder half, alternating high and low pressure systems dominate the weather. Winds from the west and northwest are associated with high pressure systems, and bring cooler temperatures and clear skies. Easterly winds caused by low pressure systems are affected by the Atlantic, providing higher temperatures, clouds, and much of the precipitation to the county (Mathews and Lavoie 1970).

The average annual temperature in New Castle County is 54 degrees Fahrenheit, with an average daily temperature of 33 degrees in January (the coldest month) and 76 degrees in July (the

warmest month). The County averages about 45 inches of annual precipitation, which is fairly evenly distributed throughout the year. In Wilmington, the growing season lasts from the middle of April to the end of October, but this varies in other parts of the county. In the western and northwestern parts it is 175 to 185 days, while it is 195 to 205 days in the eastern and southeastern parts of the county. Annually, Wilmington receives 21.4 inches of snow, but this varies greatly from year to year (from as little as 1 inch up to as much as 50 inches). Elevations range from sea level to about 400 feet (~122 meters) above sea level in New Castle County (Mathews and Lavoie 1970).

2. Geology and Soils

The APE for this project is located on the Piedmont Physiographic Province, near the Fall Line marking the transition from the Piedmont to the Coastal Plain. The Piedmont province is an eroded and dissected area of uplands developed on metamorphic crystalline bedrock. The majority of the APE is underlain by the Bryn Mawr Formation ***(Figure 2)***, which is characterized red and brown quartz sand with silt, clay and fine gravel. Rockford Park Gneiss (Orpg), an Ordivician age rock composed of medium aged felsic gneisses, is located mostly within the southeast corner of the APE. These sands and gravels are poorly sorted and erratically distributed. They typically overlay the gneiss at depths of up to 5 or 10 feet (Ramsey 2005). The southwest corner of the APE contains Brandywine Blue Gneiss (Obbg), which is characterized as medium to coarse grained granulites and gneisses composed of plagioclase, quartz, orthopyroxene, clinopyroxene, brown-green hornblende, magnetite, and ilmenite. Typical depths to bedrock are up to approximately 20 feet (~6 meters) (Ramsey 2005).

The soil underlying the majority of the APE is Talleyville silt loam, 3-8 percent slopes (TaB) ***(Figure 3).*** This well-drained soil found on uplands was formed in a silty mantle and the underlying residuum from basic igneous rocks (United States Department of Agriculture). Glenville silt loam, 0-3 percent slopes (GnA), a moderately well-drained soil to somewhat poorly drained soil that has a fragipan, is mapped to the east of S.R. 202. A sliver of Wachtung silt loam, 3-8 percent slopes (WaB), a soil type with numerous stones and boulder near the ground surface, is located along the west shoulder of S.R. 202. The developed/disturbed portions of the project, particularly in the area to the west of S.R. 202, contain Udorthents, Bedrock Substratum, 0-8 percent slopes (UaB). Smaller areas of disturbed soils in the APE included Urban land Wheaton Complex 0-8 percent slopes (VwB) and Urban land, bedrock substratum (Uy) (United States Department of Agriculture).

3. Flora and Fauna

New Castle County was a densely forested region before Euro-American settlement. Hardwoods such as oak were the most popular tree. Tulip poplar, gum, and yellow pine were also present, but true stands of pine were probably few in number. The stands of pine that exist today were made possible by a change in the composition of soils, due to clear-cutting and farming. Only a small part of New Castle County remains wooded today, with a higher ratio of pines to hardwoods, as compared to the time before deforestation (Mathews and Lavoie 1970).

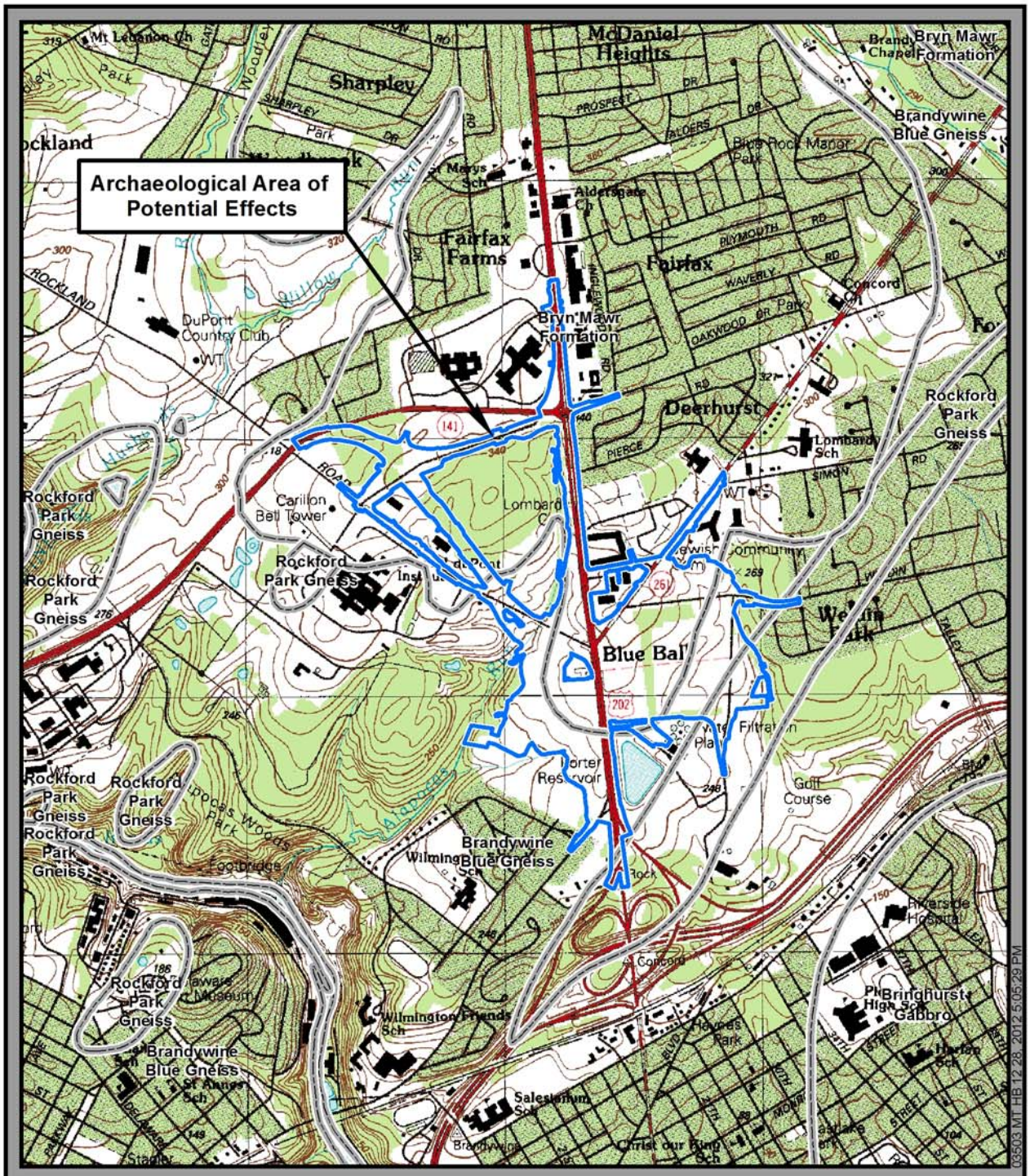

Figure 2
Bedrock Geology within the Archaeological Area of Potential Effects

Blue Ball Area Properties Transportation Improvement Project
Brandywine Hundred, New Castle County, Delaware

(Delaware Geological Survey, 2005
Wilmington North, DE 7.5' USGS Topographic Map, 1993)

McCormick Taylor
Engineers & Planners Since 1946

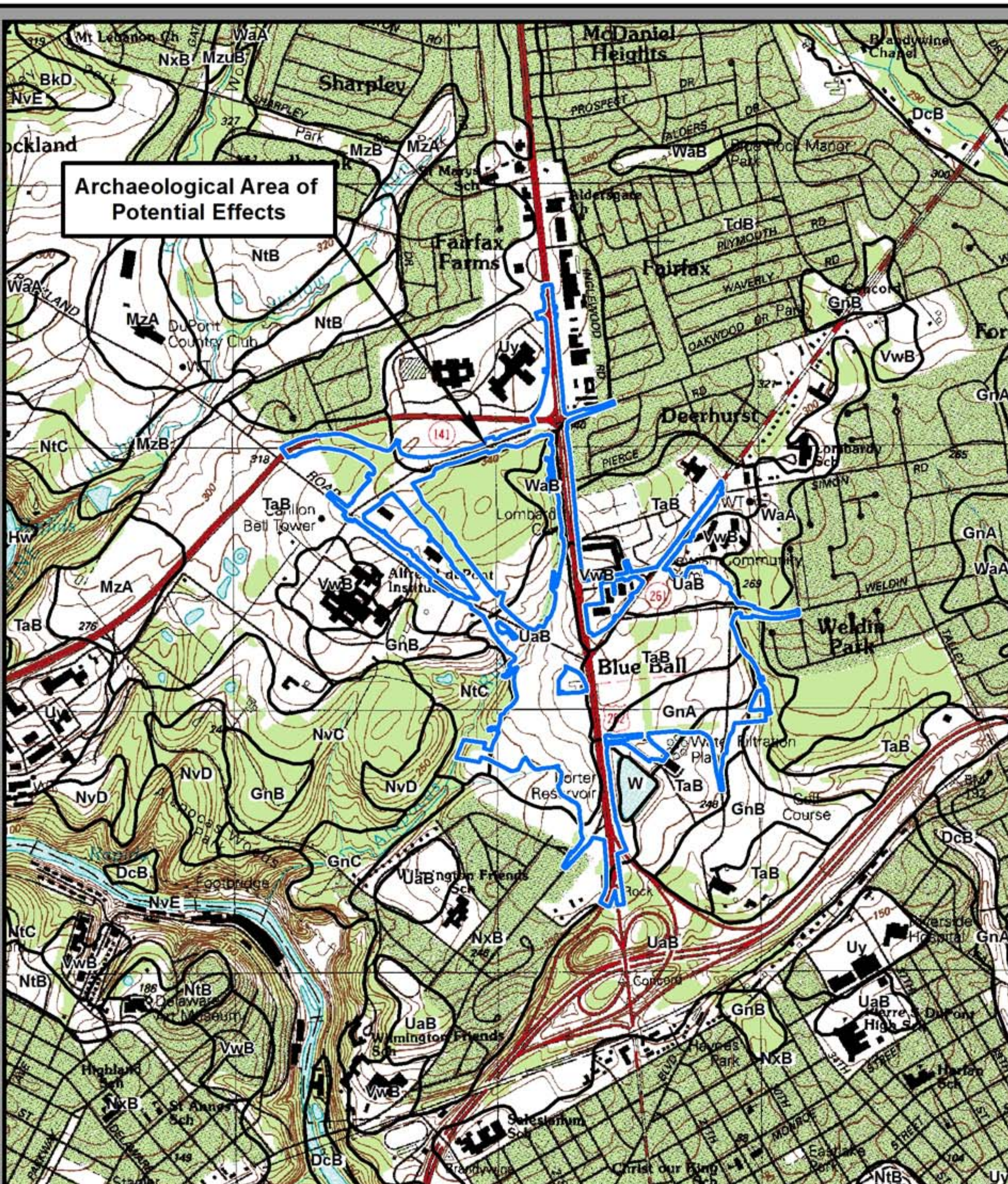

Figure 3
Soil Mapping Units within the Archaeological Area of Potential Effects

Blue Ball Area Properties Transportation Improvement Project
Brandywine Hundred, New Castle County, Delaware

(Soil Data: USDA, 2010
Wilmington North, DE 7.5' USGSTopographic Map, 1993)

McCormick Taylor
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Pre-contact faunal resources within New Castle county were numerous with a wide variety over a small area. Although no megafauna remains, such as mammoth and mastodon, have been found in New Castle County, faunal remains from the submerged Continental Shelf and the Coastal Plain of New Jersey serve as evidence of the distribution of these animals into the Delaware Coastal Plain during the Pleistocene (Custer 1986). Deer, elk, bear, turkey, rabbits, squirrels, and other small mammals were prevalent, as well as migratory birds, fish, and shellfish (Mathews and Lavoie 1970).

B. Pre-Contact Context

1. Pre-Clovis (ca. 16000 to 11, 500 B.P.)

The presence of pre-Clovis peoples in eastern North America remains controversial. Meadowcroft Rockshelter in Pennsylvania and the Cactus Hill site in Virginia offer the most robust evidence for pre-Clovis occupation in the eastern United States. The Cactus Hill site in Virginia's Coastal Plain has produced quartzite blade cores, blade tools, and thinned, lanceolate bifaces with an associated radiocarbon date of 15,070 ± 70 B.P. This occupation is vertically separated from an overlying Clovis component dated to 10,920 ± 250 B.P. by a ca. 0.12 meter-thick sand stratum (McAvoy and McAvoy 1997). Recent investigations at the Miles Point site on the western shore of the Delmarva Peninsula have produced a small assemblage of lithic artifacts below a buried A horizon which yielded AMS dates of 21,490 ± 140 B.P., 26,920 ± 230 B.P., and 27,240 ± 230 B.P. The assemblage included a thinned chert lanceolate biface, quartzite cobble-based tools, quartzite flake tools, and a chert multidirectional core (Lowery et al. 2010). If the radiocarbon assays from Cactus Hill and Miles Point accurately date their respective assemblages, which is supported by pedological analysis at both sites (Lowery et al. 2010, Wagner and McAvoy 2004), current models for the time of initial colonization and the appearance of Clovis will require significant revision.

2. Paleoindian (ca. 11,500 to 8,500 B.P.)

Early Paleoindian groups (~11,500 to 10,000 B.P.) inhabited Late Pleistocene ecosystems with no exact modern analogs. Their sites are most commonly identified by the presence of distinctive fluted bifaces. Other parts of the toolkit include formal flake tool types, large bifacial cores, and possibly by blade cores. In comparison to those of later pre-contact periods, Paleoindian toolkits are marked by a conspicuous use of high-quality cryptocrystalline lithic materials from sources that are sometimes far removed from the sites on which their artifacts are recovered. Their use of high-quality toolstone is thought to have resulted from a need for durability over numerous episodes of intensive use at locations distant from sources (Goodyear 1989), and distances from sites to bedrock sources have been used to estimate maximum travel distances ranging from 75 to 400 kilometers for eastern North America (Custer and Stewart 1990). While western fluted point occupations are often associated with the remains of extinct megafauna, eastern Paleoindian subsistence is more poorly understood due to the relative dearth of preserved food remains. The few fluted point sites excavated in the Middle Atlantic region do not include the specialized tools for plant processing that became common during the Archaic period, a fact that has been interpreted to signify limited reliance on gathered foods (Carr and Adovasio 2002, Custer 1989). A greater emphasis on hunting has also been proposed on

theoretical grounds (Kelly and Todd 1988, Waguespack and Surovell 2003), however charred seeds and fish remains from Shawnee-Minisink suggest that more generalized foraging adaptations may have been practiced (Dent 2002, Dent and Kauffman 1985, cf. Gingerich 2011).

Custer's initial environmental reconstruction of the terminal Pleistocene (ca. 15,000-10,000 B.P.) for the Delmarva Peninsula suggested that early Paleoindians lived in a mosaic of spruce-pine forests interspersed with areas of wet and dry grasslands. This environment likely supported faunal communities composed of extinct and extirpated animals species together with those that survived into the Holocene, however is no direct faunal evidence from the Peninsula (Custer 1989:47-51, 88-93). Custer's general reconstruction of this interval remains useful, however more recent research has yielded important environmental data. Climate during the terminal Pleistocene changed from cold and wet to cold and dry with the advent of the Younger Dryas climate event, ca. 10,900 to 10,100 B.P. The effects of this event on North American Paleoindians and their environments is a subject of ongoing debate (Meltzer and Holliday 2010, Newby et al. 2005, Anderson et al. 2008). Loess deposits burying Paleoindian sites on the western Delmarva Peninsula appear to have been emplaced during the Younger Dryas (Lowery et al. 2010, Wah 2003), and Lowery (2002:129-130) suggests that deteriorating conditions during this event may have resulted in reduced early Paleoindian populations on the Peninsula. Drying associated either with the Younger Dryas or the onset of warm and dry conditions by 10,000 B.P may have been responsible for the depositional hiatus seen in High Coastal Plain bay\basin features after ca. 11,000 B.P. (Webb et al. 1994).

Custer presented two models of early Paleoindian settlement systems on the Delamarva Peninsula that link three concentrations of early Paleoindian sites in different ways, using the working hypothesis developed by Gardner (1974, 1977) for the Flint Run Paleoindian Complex that sources of preferred toolstone constrained mobility. The first model proposed two coeval settlement systems. Site concentrations in the Piedmont and Mid-Peninsular Drainage Divide represent group movements from the toolstone sources of the Delaware Chalcedony Complex to subsistence rounds in the lithic-poor Mid-Peninsular Drainage Divide. Similarly, site concentrations in the Choptank/Nanticoke represent a system in which groups moved between an area with abundant toolstone in cobble form and locations in the Mid-Peninsula. The second model posits peninsula-wide movement of one group that alternated movements between the two toolstone sources and the Mid-Peninsula. Both of these models are variations within a larger-order model of cyclical settlement developed by Custer et al. (1983). His analysis of projectile point length and condition from the three areas supported a cyclical model of movement between the Piedmont and Mid-Peninsular Drainage divide concentrations, however it is unclear how the Choptank/Nanticoke concentration functioned (Custer 1989:109-112).

Custer predicted that a cyclical model of early Paleoindian settlement should apply to the Peninsula based on the assumption that high-quality toolstone sources were relatively rare and that the full range of site types envisioned for the Flint Run Paleoindian Complex should be found near these sources. However, the constituent sites of each of these concentrations are based primarily on surface finds of fluted points, and Custer noted that additional field studies are necessary to test the various models (1989:105). Large-scale field surveys in Delaware over the two decades since Custer's writing have identified few early Paleoindian sites. Single fluted point fragments were recovered from the Snapp site, southern New Castle County (Custer and

Silber 1994) and the Two Guys site, Sussex County, Delaware (LeeDecker et al. 1996). Surface collection data from the Thomas Paleoindian site suggest a possible early Paleoindian quarry reduction site (Stanzeski and Hoffman 2006).

Lowery's work on the Delmarva's western shore at the Paw Paw Cove site complex and shoreline erosion sites (Lowery 1989, 2002) however, produced data that challenges the cyclical model. Over the last 20 years, Lowery has systematically documented over 100 fluted point sites exposed by shoreline erosion and conducted test excavations at the Paw Paw Cove site complex. Compared to the large number of sites and fluted points per site on the western shore, Lowery (2002:179-180) suggests that the 15 fluted points from six sites around the Delaware Chalcedony Complex do not indicate a cyclical system on the scale of Flint Run or Williamson, which feature high numbers of quarry-related sites. Also, Lowery noted that despite the concentration of cobble lithic sources near the present mouths of the Choptank and Nanticoke, none of the sites along the western shore of Delmarva can be presently be categorized as quarry-related (2002:187-188). Lowery emphasizes that sea level rise since the Pleistocene has left a very partial Paleoindian settlement record that over-represents sites that may have been the most interior and upland portions of settlement rounds (Lowery 2002:120), and that that the majority of fluted points sites currently known on the Peninsula appear to be short-term hunting-related sites. Because sea level rise has covered approximately half of the Delmarva landmass since the terminal Pleistocene, larger base camps, lithic sources and quarries in the ancestral Susquehanna and Delaware River valleys are submerged and inaccessible. Finally, Lowery suggests that even though the number of known early Paleoindian sites on the western shore is higher than the rest of the Peninsula, their true number is artificially depressed due to aeolian burial during the Younger Dryas, while sites in the Mid-Peninsular Drainage divide are more visible due to net soil deflation (2002:186-187).

Another significant point of contrast between Lowery and Custer has to do with the record of Delmarva's immediate post-Clovis sites represented by Cumberland/Barnes, Crowfield, Holcombe, and Hardaway-Dalton points. Lowery suggests that these later types, particularly Crowfield through Hardaway-Dalton are very rare on Peninsula sites, possibly due to depopulation brought on by the Younger Dryas (2002:125-130). Custer, however, indicated that these later types are only slightly less common than Clovis, but that Dalton and Hardaway-Dalton points are quite rare (1989:Table 8). A single Hardaway-Dalton point was recently recovered from the Beech Ridge site in Delaware's Low Coastal Plain (Barse and Marston 2007). Although the assemblage is limited to the point and a few flakes, the component was housed in an eroded B horizon below aeolian sands, therefore its context has significant implications for conducting identification-level surveys in the Low Coastal Plain.

In contrast to more traditional chronological schemes, Custer (1984, 1989) included notched points typically assigned to the Early Archaic (Palmer, Amos, Kirk) with the later portion (ca. 10,000 to 8500 B.P.) of his Paleoindian cultural period. This reassignment was proposed by Gardner (1974, 1989) based on his analysis of the Flint Run Paleoindian Complex in Virginia's Shenandoah Valley. In Gardner's and Custer's formulations, the Early Archaic is included as a subperiod within an encompassing Paleoindian period, based on perceived continuities in settlement patterns and lithic raw material preferences. Early Holocene notched point concentrations are located in the same physiographic zones as early Paleoindian sites, however,

sites numbers increase in the Mid-Peninsular Drainage Divide and in the Fall Line Zone around Churchman's Marsh. Custer attributes this more dispersed pattern to the emergence of freshwater swamps in the early Holocene. The sites themselves however, are generally located in the same stream headwater and swamp-proximal settings as fluted points sites. Similarly, notched projectiles, particularly the earlier Palmer and Amos types, continue to be manufactured on high-quality cryptocrystalline materials. Beginning with Kirk Corner Notched and Kirk Stemmed, non-local rhyolite and argillite were used to a much greater degree than before, which may represent either direct procurement or exchange (Custer 1989:107-108, 114, 117).

Data from excavated, radiocarbon-dated early Holocene sites in the upper and middle Delaware drainage (i.e. Shawnee-Minisink [McNett 1985], Harry's Farm [Kraft 1975], Sandt's Eddy [Bergman et al. 1994]) highlight the addition of chipped stone adzes, drills, and significant numbers of cobble tools to toolkits, which serve as proxy data for a greater diversity of subsistence and activities after ca. 10,000 BP. Notched points cross-dated to ca. 10,000 to 9,000 B.P. have been recovered in low numbers from excavated sites featuring more extensive manifestations of later components in the Piedmont and Coastal Plain (e.g., the Two Guys site [Leedecker et al . 1996]). As is true for fluted point sites, no notched point sites with datable features and appreciable artifact assemblages have been excavated on the Peninsula. Known notched point site that would probably yield important data of this type include the Crane Point site (Lowery and Custer 1990) and the Chance site (Cresthull 1971, 1972) in Maryland's Low Coastal Plain.

After the Younger Dryas, climate began a long-term warm and dry trend that lasted until ca. 8500 B.P. Decreases in nonarboreal pollen and an increase in pine pollen in sediments dated between 10,000 and 8500 B.P. suggest a decrease in the extent of grasslands and expansion of pine-dominated forests during the Pre-Boreal and Boreal climate intervals. The changes in the extent of these floral communities would have likely resulted in a decrease of faunal diversity as forest-edge and grassland settings were reduced. Custer theorizes that emerging poorly-drained interior and coastal settings would have become more attractive to terrestrial game and their human predators during the Early Holocene, and that the carrying capacity within closed boreal forests was generally low (Custer 1989:93). Although the locations of notched point sites generally support this interpretation, some poorly-drained settings dried out (Webb et al. 1994).

3. Archaic (8,500-5,000 B.P.)

This cultural period tracks the mid-Holocene transition to predominantly deciduous forests, which is attributed to a change from warm and dry conditions during the Pre-Boreal and Boreal climatic periods to warmer and wetter conditions during the Atlantic climatic period ca. 8,500 B.P. (Davis 1983, Delcourt and Delcourt 1994, Vento and Rollins 1990). The most widely accepted explanation for the shift in climate, proposed by Knox (1983), has to do with the final ablation of the Laurentide ice sheet. By 8,000 B.P., the glacier was restricted to a small portion of Quebec Province (see maps in Jacobsen 1987). Zonal flow from the Pacific Airmass was weakened, allowing the penetration of polar and tropical systems into the Midwest and Middle Atlantic. Regardless of the causes of vegetation change at the Early to Middle Holocene transition, the development of oak-dominated deciduous forests by 8,000-7,000 B.P. would have had obvious consequences for Native Americans. Delcourt and Delcourt (1994) indicate that

chestnut, hickory, and beech were present in Ridge and Valley forests by ca. 6,000 B.P. These incremental increases in the variety of mast-producing species would have increased the carrying capacity of the environment, resulting in higher terrestrial game populations. The same vegetational succession is likely to have occurred slightly earlier on the Delmarva Peninsula given the more favorable edaphic conditions in these unglaciated, lower relief physiographic zones. Custer (1989:47) reports an oak-hemlock pollen zone dated 7790±340 B.P. from a sinkhole at the Mitchell site (7NC-A-2). A similar, but undated hemlock-oak pollen zone overlies boreal and tundra pollen zones at the Marsh Creek locality in the Pennsylvania Piedmont near the Delaware/Maryland state lines (Martin 1958).

In his chronology for the Delmarva Peninsula, Custer (1989) set the beginning of the Archaic period at 8,500 B.P. based on what he saw as major changes in Native American lifeways from those of the early Holocene. In Custer's formulation, these cultural changes reflect Native Americans' adaptation to environmental conditions that were more like those of the present (1989:122-127). Diagnostic artifacts from the beginning of the period are the bifurcate-base projectile series (St. Albans, LeCroy, Kanawha) which were first dated in the Ohio drainage at the St. Albans site (Broyles 1971). These types are followed after ca. 8,000/7,500 B.P. by less easily recognized stemmed types which may be similar to those in sequences developed in the Northeast (Dincauze 1974) and Southeast (Coe 1964). Custer's idea that new cultural adaptations began ca. 8,500 B.P. was based on changes in the range of artifacts produced and changes in preferred site locations and settlement patterns. Radiocarbon-dated and/or stratified sites throughout eastern North America indicate that many of the ground stone tool types (i.e. axes, gouges, pestles) were new additions to Native American toolkits, suggesting greater efforts at localized forest clearance, woodworking, and more intensive plant processing. Within the Middle Atlantic region a wider range of lithic materials began to be used for the production of chipped stone tools. Custer suggested that increased use of local toolstone sources represents the replacement of quarry-focused, cyclical settlement systems of the terminal Pleistocene/early Holocene with serial systems in which toolstone procurement took place at a number of locations that were embedded within the seasonal round (1989:128). Perhaps the most compelling evidence of systemic change ca. 8.500 B.P. is site location. Throughout the greater Middle Atlantic, the earliest sustained use of non-riverine uplands appears to be associated with bifurcate occupations, which several researchers have linked to the spread of mast-bearing trees into interior areas (Carr 1998, Gardner 1987, Stewart 1989). Similarly, Custer suggests that bifurcate-using groups on the Delmarva Peninsula regularly exploited more diverse environmental settings than late Paleoindian groups. These included freshwater swamps near the Fall Line, bay/basin features and other poorly-drained areas in the Mid-Peninsular Drainage Divide, tidal swamps near the modern Chesapeake and Delaware Bay coasts which may have been freshwater swamps prior to sea level rise, as well as larger rivers (Custer 1989:131-139).

Custer's settlement model for the Delmarva Archaic included three basic site types (1989:129-131). Macro-band base camps represent occupations by multiple family groups. Characterized by the widest range of tool types and large numbers of artifacts and manufacturing debris, these sites should be located to exploit several different resource zones. Micro-band base camps represent fissioning of the maximum social group into individual families or smaller related groups to areas with significantly lower carrying capacity. These sites may contain the same range of tool types as macro-band sites, but artifact density should be lower. Finally,

procurement sites represent short-term hunting/gathering forays by smaller task groups in support of either macro- or micro-band camps. These sites are the smallest and contain the lowest diversity of tool types and debris. Group fissioning from macro- to micro-band camps corresponded to seasonal downturns in resource availability or local resource depletion around the former site types. Custer identified potential base camps near the most resource-rich areas of the Delmarva. These sites included the Clyde Farm site near Churchman's Marsh at the Fall Line, the Chance site near coastal swamps at the Wicomico/Nanticoke estuary, several sites near the Burnt/Cedar Swamp-Upper Pocomoke Drainage of south-central Delaware, and a few sites along major tributaries to the Chesapeake and Delaware Bays . Archaic site density in the Mid-Peninsular Drainage Divide increased greatly over Paleoindian levels, and Custer suggests that many of these are probably procurement sites. Similarly, characterizes many of the small sites with Archaic components near poorly-drained settings in the Piedmont as probable procurement sites.

As was true for the preceding Paleoindian period, Custer's Archaic settlement model is based on diagnostic artifacts (bifurcate types) from surface collected and excavated plowzone sites. Tests of this model are hampered by the small number of bifurcate sites with radiocarbon-dated features with clearly associated artifacts assemblages. It is also unknown how the model applies to the later portion of the period from ca. 8,000/7,500 to 5,000 B.P. due to difficulties involved to confidently identifying diagnostic artifacts from this interval on the Delmarva (Custer 1989:124) and elsewhere in the Middle Atlantic (Carr 1998, Custer 1996, Bergman et al. 1994). The Two Guys site in the Mid-Peninsular Drainage Divide zone of the Lower Coastal Plain in Sussex County, Delaware may be the most intact late Paleoindian to bifurcate-age site excavated on the Delmarva, yet it illustrates some of the difficulties in assessing component function. The site was located on a small sandy knoll surrounded by extensive forested freshwater wetlands (LeeDecker et al. 1996). Phase III efforts documented stratified contexts with evidence for increased use during the latest portion (ca. 9,000 to 8,000 B.P.) of the traditional Early Archaic sub-period as represented by Kirk Stemmed and bifurcate points. Compressed stratigraphy and post-depositional movement, however, prevented the assignment of an undated formal hearth area and several artifact concentrations to a specific component. LeeDecker et al. (1996:147) characterized the site as a procurement camp based on low artifact diversity. However, a variety of tasks were likely undertaken during the interval of its most intensive use (plant processing, butchering, hide preparation, and stone toolkit replacement and maintenance) which could be interpreted as evidence for a small base camp. The excavation of additional sites with separable occupations should provide the necessary data to develop more explicit criteria for site function. Nevertheless, analysis of data from the Two Guys site supported the trend identified by Custer for increased use of poorly drained settings in the Mid-Peninsular Drainage Divide by the early portion of the Archaic period (compare Figures 10, 12, 23 in Custer 1989).

4. Woodland I (5,000 to 950 B.P.)

This period bridges the late mid-Holocene and late-Holocene environmental periods and the combines the Late Archaic, Early Woodland, and Middle Woodland subperiods used by most archaeologists in eastern North America. The most significant regional vegetational change of the Middle Holocene was the catastrophic reduction in hemlock ca. 4,500 B.P. Although Custer (1989:178) suggested that the hemlock decline probably indicates a change to warm-dry

conditions associated with the Sub-Boreal climatic period, Davis (1983) attributes the sharp and nearly simultaneous drop in hemlock pollen throughout its range to a possible pathogen attack. Prior to its recovery nearly 2,000 years later, increased oak, hickory, and beech pollen apparently filled the gap created by hemlock's decline in the northern Middle Atlantic and Northeast (Delcourt and Delcourt 1994, Gaudreau 1988). More recent work in central Delaware has provided somewhat conflicting evidence for environmental conditions during the Woodland I sub-period. Webb et al. (1994) suggested that dessication of bay/basin features ended ca. 6,000/5,500 B.P., however Brush (1994) documented a protracted interval of dry climate and possibly fires from ca. 5,000 to 3,000 B.P. in the Leipsic River valley followed by dry-wet cycles from ca. 3,000 to 2,000 B.P. Farther north in the Duck Creek watershed, a tributary of Leipsic, data indicative of drying and periodic fire from were dated to ca. 4,500 to 1,500 B.P. with a return to wet conditions until European settlement. Farther south in the Low Coastal Plain, wetlands adjacent to the St. Jones River registered wet conditions ca. 2,000 B.P. changing to dry with fire from 2,000 to 1,000 B.P.. Curry and Custer (1982) presented evidence for increased aeolian deposition at Piedmont and Coastal Plain sites, which would have required unvegetated or sparsely vegetated sediment source areas, indicating some level of dessication between ca. 5,000 and 2,500 B.P. Perhaps the most significant environmental change that occurred near the Archaic/Woodland I period boundary, however, was a decrease in the rate of sea-level rise, which would have created more laterally stable estuarine environments resulting in increased carrying capacity for both coastal and anadromous fish species and shellfish (Belknap and Kraft 1977, cited in Custer 1989:182).

Custer argues that the most significant cultural changes associated with Woodland I are greater levels of sedentism, more evidence for domestic structures and storage, increasing population, the appearance (and decline) of stratified societies, and the elaboration of exchange systems (Custer 1989:142), each of which is manifested at different times during the period. Although evidence for horticulture during Woodland I times is sparse (Custer 1994:128), charred sumpweed recovered in feature contexts radiocarbon dated to 2,460 ± 130 B.P. at the Two Guys site may indicate that some level of horticulture was practiced (LeeDecker and Holt 1996:136-137). For the northern portion of the Delmarva Peninsula, archaeological sites from ca. 5,000 B.P. to 2,500 B.P. are grouped under the Clyde Farm Complex (originally conceived by Thomas 1977, Custer 1994:20, 24, 1989:193-221, 185). Larger sites of this complex are much larger than Archaic sites, and contain a wide variety of chipped and ground stone tool types, steatite bowls, and early ceramic types (i.e. Marcey Creek, Dames Quarter, Selden Island). A small percentage of non-local lithic material (rhyolite, argillite, steatite) are frequently recovered from these sites, indicating exchange with groups to the north and northwest. In addition to the ceramic types listed above, various broadspear and Orient projectile types are diagnostic of the complex, however, stemmed varieties such as Bare Island/Lackawaxen appear to have been used throughout the Woodland I period and have restricted value as short-term temporal indicators (Custer 1989:151-155).

In the Piedmont the largest Woodland I sites are typically situated on or near the floodplains of major drainages, while in the Fall Line and High Coastal Plain, these are more frequently located at confluences of the Delaware River with the largest-order tributary streams, or near extensive wetland settings such as Churchman’s Marsh (1989:192-220). Excavations at the Clyde Farm site (Custer, Watson, and DeSantis 1986) revealed a feature interpreted as a pithouse together

with possible storage pits and a platform hearth which was dated to 2,955 ± 90 BP (Custer 1989:197-198). At the nearby Delaware Park site (7NC-E-41, Thomas 1981) similar house features were dated to 3,800 ± 100 and 2,740 ± 40 B.P. (Custer 1989:199). Features interpreted as pithouses were also encountered at the Snapp, Leipsic, and Pollack sites (Custer and Silber 1994, Custer et al. 1994a, Custer et al. 1994b), however, their identification as houses is not universally accepted (Egghart 2005, Mueller and Cavallo 1995, Petraglia et al. 2005). Although Custer formerly interpreted these sites as macro-band base camps (1989:196-198), he later revised this aspect of Woodland I site typology. Based on feature patterning at the Snapp, Leipsic, and Pollack sites, Custer has suggested that the majority of sites previously classified as Woodland I macro-band base camps probably represent repeated occupations by nuclear family groups. Put another way, the largest Clyde Farm Complex sites are the result of the overprinting of numerous, non-sequent micro-band base camps (1994:74-83). Nevertheless, the dense concentration of storage and processing features, the presence of possible house features, and the large size of these and other sites indicate a greater degree of sedentism than was the case during the preceding Archaic period. A more extensive pattern of land use is suggested by investigations at the Lums Pond site (7NC-F-18, Petraglia et al 1998) located in the Mid-Peninsula Drainage Divide Zone of the High Coastal Plain near a tributary of St. Georges Creek. A portion of this site contained numerous storage features dated between 2,960 ± 60 and 2,660 ± 100 B.P. (Petraglia et al. 1998:61) that are not clearly associated the range of features that would indicate a base camp occupation. One implication of the data at Lums Pond is that Woodland I land-use at many sites was much more complex than current settlement models suggest, however, this is to be expected as more sites are subjected to a wider battery of analytical techniques, particularly those aimed at establishing tighter chronological controls between different activity areas within a single site.

Smaller sites with features and a range of tool types have been interpreted as micro-band base camps. These smaller sites are typically located along smaller tributary streams in both the Piedmont and Fall Line Zones. Even smaller sites with more limited tool types are characterized as resource procurement sites which supported both macro- and micro-band base camps. Procurement sites are common in headwater portions of drainages. The Hawthorn site, a Clyde Farm complex site located near the Fall Line Zone yielded evidence for plant processing and butchering areas adjacent to a possible tent ring (Custer and Bachman 1983). A date of 4200±75 BP was returned on the plant processing feature (Custer 1989:149, 360). Considered slightly larger than most procurement sites, but with lower artifact diversity than micro-band base camps sites, Custer created a new site type, the "procurement staging site" to account for these anomalies (Custer 1989:200-201). It is similar in many ways to the Piedmont Hockessin Valley site, which yielded a single radiocarbon date of 5205 ± 70 B.P. (Custer and Hodny 1989:33). Analysis of the small but unplowed Ronald McDonald House site (7NC-B-54) located in the Piedmont near a low-order tributary of Brandywine Creek highlights some of the problems in characterizing small, very short-term sites within standard site typologies (Gundy et al. 2008).

In the northern Delmarva Peninsula, the Black Rock Complex succeeds the Clyde Farm Complex between ca. 2,500 and 1,500 B.P. Differences between the two complexes are mainly related to changes in pottery, projectile points, the possible intensification of food collecting and storage, and the lack of evidence for shellfish utilization (Custer 1994:24, 1996:247-248). Quartz or other rock tempered, cord- and net-marked ceramics assignable to Wolfe Neck Ware

or Vinette I along with Rossville and later Fox Creek projectiles are diagnostic of the complex (Custer 1989:249-250). Custer noted that the settlement system probably remained unchanged from the Clyde Farm Complex, with macro- and micro-band base camps and procurement camps comprising the most common site types (1989:253-256). The Delaware Park site provides the most convincing evidence for extensive storage and more intensive collecting efforts Custer 1989:254).

Sites of the ensuing Delaware Park Complex date ca. 1450 to 950 B.P. are recognized by quartz tempered, fabric- and cord-impressed Hell Island pottery and Jacks Reef projectiles. Excavated examples of Delaware Park Complex components are restricted to the type site, although sites with Hell Island ceramics and Jacks Reef projectiles are present in the Piedmont and Fall Line Zones (Custer 1989:289-291). Custer noted no significant changes in settlement patterns or economic focus for the complex (1989:280). Storage pit features at the Delaware Park site dated between 1,885 and 1,495 B.P. indicate similar usage of the site from earlier times (Thomas 1981, cited in Custer 1989:277).

5. Woodland II (950 to 350 B.P,)

In the middle and lower portions of the Delaware Valley, sites of the Woodland II (Late Woodland) period most commonly contain pottery ascribable to the Overpeck, Bowmans Brook, and Minguannan series, all of which display slightly different arrangements of complex incised or cordmarked decoration. The stylistic differences between these Delaware drainage pottery types and Shenks Ferry types of the Susquehanna drainage have led several researchers to view the former types as cultural markers for proto-Lenape groups (Custer 1987, Stewart 1998). In contrast to early Late Woodland Pahaquarra phase sites in the upper Delaware, Minguannan complex sites of the lower Delaware Piedmont have not been shown to contain house patterns, storage features, or dense middens. Evidence for Mesoamerican cultigens is limited to finds of squash rind and possible maize kernels at the Pearsall site in Chester County, Pennsylvania (Hart and Cremeens 1991, cited in Custer 1996:288-289), which is surprising given the horticultural focus established for the Shenks Ferry complex (Kinsey and Graybill 1971, Nass and Graybill 1991). Custer notes that most Minguannan complex base camps are located on multicomponent Woodland I sites, which suggests that these groups were not shifting the focus of their primary settlements towards landforms and soils with high agricultural potential. The implication of these traits is that Minguannan groups continued a hunting and gathering settlement system from earlier times (Custer 1996:287-289). In general, Minguannan complex sites have not been as extensively excavated or radiometrically dated as neighboring Shenks Ferry complex sites. Although Shenks Ferry complex sites are most numerous in the lower Susquehanna drainage, a few of their sites are located farther east in the Piedmont in the Brandywine watershed of Chester County (Custer 1996:286-287).

C. Historic Context

1. Contact, Exploration, and Frontier Settlement (1524 to 1730 A.D.)

Historical documents indicate that contact between Delaware's coastal Native American groups and Europeans may have occurred as early as 1524, with the frequency of encounters increasing

from the last quarter of the sixteenth century through the first quarter of the seventeenth century A.D. (Quinn 1979),Weslager and Dunlap 1961). The Delaware River Drainage and the coastal areas of the Delaware Bay was home to several culturally- and linguistically-related Native American groups referred to collectively as "Delaware" Indians only after their removal to the Susquehanna River Valley in the early- to mid-eighteenth century. Today, Delaware is the self-designation for descendants in Canada and Oklahoma (Goddard 1978a:213, 235). Major language divisions included Munsee, spoken by groups in the Lower Hudson and Upper Delaware drainages, and Unami, used by groups from the Delaware Water Gap south to Cape Henlopen (Goddard 1978b:72-73). After 1624, when sustained contact with Dutch and Swedish colonists on the Lower Delaware River and Delaware Bay began, both Munsee and Unami speakers appear to have been organized in small, autonomous local groups. These local groups would sometimes act together for mutual defense, in large hunting or fishing parties, and in diplomatic and land transactions. Although chiefs or village headmen were consistently chosen from a specific lineage they had no coercive power; they typically served as spokesmen and ceremonial leaders for their local group (Goddard 1978a:216). Contact period Lenape subsistence was based on a combination of maize, bean, and squash horticulture, hunting, fishing, and gathering. Settlement types recorded by Europeans included both palisaded and open longhouse villages, as well as smaller houses at hunting and fishing camps (Goddard 1978a:216-219). Kraft, however, points out that palisaded villages are unknown for both the Late Woodland and Contact periods in the Delaware Drainage (1986:122).

Although no unequivocal Contact period sites have been identified in Delaware (Custer 1989:340), mid-seventeenth century A.D. documents indicate that Native American groups in the Brandywine River and White Clay Creek drainages were Unami-speaking Lenape collectively referred to as the Brandywine Indians (Weslager 1972). Like many of the other Lenape groups, they were organized as bands that came together in small villages during the agricultural season and fissioned into nuclear families in the winter (Becker 1988, Weslager 1972). The Brandywine Indians held their land until ca. 1729 A.D., moving north to the Seneca-Susquehannock after this date (Weslager 1972). Although they have been described as "subject to" the Susquehannock in 1697, the exact nature of their relationship was probably more reciprocal given the politically weak condition of the people at Conestoga Town (Kent 1993).

The first attempt at permanent European settlement in Delaware was the Dutch whaling/trading station "Swanendael" ("valley of the swans"), which was founded in 1631 by patroons of the Dutch West Indies Company. Located near the modern town of Lewes, Swanendael was the first semi-private venture sanctioned by the Dutch West Indies Company, and only its second attempt at settlement in over twenty years of exploration and trade on the Delaware River. Unlike the Hudson River area, where the Dutch West Indies Company had established a number of permanent, year-round settlements, in its earliest days, the Delaware was administered as a seasonal interest, with intermittent visits from the Company's trade center, Fort Amsterdam, on present-day Manhattan. Swanendael's individual sponsors hoped that their year-round settlement on the Delaware, or "South River" as it was then called, would stimulate the Company to a greater interest in the entire region (Weslager 1987, 1961).

The patroons' settlement proved to be a tragic failure. In 1632, the Swanendael settlers were massacred by members of the local "Ciconisin," group of Unami-speaking Lenape. The

following year, the Dutch reoccupied the site, but failed in their efforts to establish a whaling operation. The Company soon reverted to its prior use of the Delaware region as a catchment area for the lucrative fur trade. Several times a year, the Company's ships would sail into the Delaware to trade with the Minquas, known to the English as Susquehannock, a powerful inland Iroquoian group that was linguistically and culturally distinct from the Lenape. Because they enjoyed a virtual monopoly in this trade, initially, the Dutch saw little reason for an increased investment in the Delaware or another attempt at a year-round presence (Weslager 1961).

By the late 1630's, the Dutch West Indies Company's ambivalence towards the South River was rewarded by challenges from other European interests, specifically English and Swedish. The first serious incursion occurred in 1634, when an English ship, led by Thomas Yong, entered the river. During their foray into the Delaware, the English crew mapped much of upper regions of the river, and briefly occupied Fort Nassau, the Dutch seasonal trading post (then vacant) on the east side of the river (Williams 1985; Weslager 1961).

In 1638, Peter Minuit, the former governor of the Dutch West Indies Company, erected the first Swedish settlement on the Delaware. Shrewdly purchasing land on the west side of the river--nearest the Minquas' trade routes--he directed the colonists to erect a fort at the confluence of the Christina and Brandywine Rivers, within present-day Wilmington (Weslager 1987). Because of its location, "Fort Christina" posed an immediate threat to the Dutch monopoly on trade with the inland native groups. In defense of their interests, the Dutch made a show of aggression towards the Swedes. But Minuit, who had extensive knowledge both of the Delaware region and of the Dutch Company's activities within it, was not perturbed, and the Swedes took up residence on the Delaware (Becker 1999; Gehring 1995; Weslager 1987).

The inhabitants of "New Sweden" were actually a combination of Dutch, Swedish, and Finnish settlers. Unlike the Dutch, who used the region only for trade with the Minquas, the Swedes intended a more intensive occupation of the region. A motley crew of farmers, soldiers, and commuted prisoners, the settlers of "New Sweden" hoped to supplement their activities in the fur trade with cash crops (such as tobacco and wine) and subsistence farming (Dahlgren 1995; Ordahl-Kupperman 1995).

By the late 1640s, the Swedish settlers were ensconced on the Delaware. Several expeditions had brought additional settlers to the valley, and "New Sweden" was being administered by a Swedish noble named Johan Printz, whose palisaded trade post was located south of present-day Philadelphia. Parceled out on small, riverfront plots that they had purchased from the Lenape--who had fled to the eastern shore of the river following conflicts with the more powerful Minquas--the Swedes outnumbered the Dutch on the Delaware by a margin of 7 to 1 (Gehring 1995; Williams 1995). Their small farms were engaged in a variety of agricultural pursuits, ranging from livestock to orchards, tobacco, and hemp (Catts and Kellogg 2000).

Despite its geographic advantages, its impressive recruitment of settlers, and its commitment to a wider variety of activities in the area, New Sweden was never able to displace the Dutch trade cartel as the primary European agent in the fur trade on the Delaware. This was primarily because the Swedish colonists lacked access to the most crucial element in the fur trade: a steady supply of European trade goods. Unlike the Dutch, who maintained a continuous flow of

blankets, beads, and hatchets from their storehouses at Fort Amsterdam, New Sweden was infrequently provisioned by its continental backers. Finding the Swedish traders empty-handed, the Susquehannock continued to favor the Dutch at Fort Nassau until well into the 1660's (Gehring 1995; Weslager 1987).

Following the appointment of Peter Stuyvesant to the directorship of the Dutch East Indies Company in 1647, the Company began a slow shift in its policy towards its use of the Delaware. In 1648, Stuyvesant ordered his Fort Nassau contingent to erect a second fort, this one on the west side of the Delaware, at the mouth of the Schuylkill (within present-day Philadelphia). Next, he met with the Lenape to re-affirm the Dutch Company's settlement rights in areas to the south that were then occupied by New Sweden. After receiving assurances from the Lenape, Stuyvesant funneled soldiers and settlers from the northern forts (Nassau and Beversreede) to a new, much larger fort at present-day New Castle.

The Swedes quickly retaliated against this invigorated Dutch interest in the Delaware. In a bloodless maneuver, they seized the new Dutch fort, called "Fort Casimir," and renamed it "Fort Trinity." The Swedish occupation of the Dutch fort was brief, though. In 1655, Stuyvesant returned to the Delaware with a force of seven armed ships and over 300 men. Recapturing Fort Casimir, the Dutch force went on to take the Swede's Fort Christina, to the north, effectively bringing "New Sweden" to an end. Since the Swedish settlers living on the Delaware offered no resistance to the invasion, they were allowed to remain on their farms along the river (Weslager 1987).

Just two years after the Dutch West Indies Company reclaimed its rivers from the Swedes, the cartel was dissolved, and "New Amstel," the town that had grown up around Fort Casimir, was turned over to the city of Amsterdam. However, very little changed on the Delaware until 1664, when Charles II, King of England, granted all lands between the Connecticut and Delaware Rivers to his younger brother, James, Duke of York. Just as the Dutch had done a decade before, England claimed the lands occupied by the Swedes and Dutch on the Delaware by right of prior discovery. The crown asserted that John Cabot's "discovery" of the Northeast coast in 1497 superseded the Dutch claim to the Delaware, which was based on Henry Hudson's "discovery" in 1609.

Acting to solidify his grant, James sent a fleet of 4 ships and 450 men to seize New Amsterdam, New Amstel, and all lands held by the Dutch in the Northeast. After New Amsterdam was subdued, Sir Robert Carr sailed into the Delaware and captured both New Amstel and the southern Dutch trading post on the "Hoerenkil" (the original site of Swanendael). Carr's men killed four Dutch soldiers at Fort Casimir and pillaged both of the Dutch trading posts, but once again, the settlers were permitted to remain on the river, unmolested, in exchange for their allegiance. Except for a brief reoccupation by the Dutch in 1674, English sovereignty of the three counties of modern Delaware went uncontested until the American Revolution.

When the English assumed the colonial mantle in the late 1660's, modern-day New Castle County was a melting pot of Dutch, Swedish, English, and Finns. The settlers were primarily farmers and tradesman, settled on small tracts of land fronting the Delaware River. The fur trade was on the wane, and, following the dissolution of the Susquehannock around 1664, Lenape

groups continued to occupy their ancestral lands in the Pennsylvania, New Jersey and what would become Delaware before moving north and west, away from European settlement at various between ca. 1660 and 1750 (Becker 1995). Those Lenape that remained in their homeland made various cultural accommodations with people of European and African ancestry. They, along with other dispossessed Native Americans, continue to live in Delaware (Heite and Bloom 1999, Speck 1915).

In 1682, Sussex, Kent, and New Castle, the three "lower counties" of Delaware, were conveyed to William Penn and annexed to Pennsylvania. Under Penn's directorship, a flood of English, Welsh, Scottish, and Scots-Irish settlers entered the lower counties. Dutch, Swedish, and Finnish farmers gradually began to move inland, clearing new tracts along the tributaries of the Delaware (Munroe 1978; Hoffecker 1977; Bridenbaugh 1976; Scharf 1888). By 1683, all of Penn's six counties were at least partially cultivated, and the combined regional population exceeded 4000 persons (Myers 1912).

Accompanying this population shift was a shift in the economic base of the region. As the English Empire integrated the Delaware valley more fully into its own vast economic network, area farmers shifted from primarily subsistence activities to market-oriented agriculture. The principal Swedish/Dutch grains (rye and barley) were replaced by corn and English wheat. Even tobacco, which had been the region's cash crop for several decades, was eclipsed by an emerging market demand for wheat (Pursell 1958).

Throughout this period, waterways provided the primary mode of transportation. Since most farms were located adjacent to streams, farmers were able to ship their grain directly to small milling facilities that were located on the tributary rivers and creeks throughout the valley. Two of the earliest such stations were located in New Castle (1658), and along the Red Clay Creek (1679). After milling, wheat flour was transported to Philadelphia or shipped directly to markets in the West Indies, southern Europe, or other parts of North America (Catts and Kellogg 2000: 10; Walzer 1972). Farms remained wholly dependent upon water-based transportation until the first quarter of the 18th century, when overland trade routes first began to emerge across the region. As late as 1730,it could be said that, "over one half of the colony's farmers were located within a half-day's journey (eight miles)" of a gristmill or shipping wharf (Walzer 1972: 163).

During the early years of Penn's proprietorship, he established a system of "hundreds," which were clusters of farms roughly equivalent to townships in other states (Siders *et al.* 1991: 6). Within the hundreds, lands were sold in parcels averaging 200-299 acres in size. Farmhouses were usually located on high, well-drained soil, in proximity to a fresh water source (either a spring or brook). Structures were typically earth-fast, log or wood-framed, with a small minority of brick structures in urban areas. Land clearing on farms was minimal, with small lots typically located close to the house and outbuildings, while the majority of the property was kept in wood lot (De Cunzo and Catts 1990: 36-40).

Starting in the early 1700's, population and development pressures abated and the Delaware Valley entered a period of minimal growth. In the wake of the first 35 years of English colonization, Philadelphia had emerged as the primary economic, political, and cultural center of

a broad "hinterland" stretching west to Lancaster, north to the Lehigh Valley, east to southern New Jersey, and south to include all of modern Delaware (Lemon 1967; Walzer 1972).

While New Castle, Kent and Sussex Counties were inextricably linked to Philadelphia's markets, political and cultural ties between the southern and northern counties were strained. For years, the southern counties had bemoaned their lack of a central judicial facility, while the northern counties (Philadelphia, Chester, and Bucks) resented the control that the less populous lower counties exercised over the General Assembly. In 1704, a compromise was reached, and New Castle, Kent and Sussex were permitted to sever their political tie to the other Pennsylvania counties. The town of New Castle--which had been the regional hub during the first decade of England's rule--became the political center of the "lower counties," and the seat of the new region's General Assembly (Munroe 1978).

2. Intensified and Durable Occupation (1730 to 1770)

Most discussions of 18th century urban development in Delaware and Southeastern Pennsylvania draw on the seminal work of geographer James T. Lemon (1967). Advocating a central-place model of urban development for Philadelphia and its "hinterland," Lemon defined a hierarchy of urban "types" to characterize the variety of communities that emerged across the region from the late 1600s to 1800. Based on economic and population trends, he divided this timespan into five periods: 1652-1680, 1681-1700, 1701-1729, 1730-1770, and 1766-1800. Since the bulk of his discussion deals with developments that took place after the 18th century, we have not used it as a reference in the preceding section.

As noted above, the first quarter of the 18th century witnessed an increase in the settlement of inland areas and an attendant growth in the network of connecting roads. To a great extent, the period 1730-1770 represented an intensification of this trend, driven by a second influx of immigration. Farms emerged across the interior, extending Philadelphia's farming hinterland across northern Delaware and into Maryland (Lemon 1967). Because of its excellent soils and access to markets, New Castle County evolved into a commercial farm community, characterized by its growing affluence and the numbers of artisans, professionals and merchants in its population (Main 1973).

During the middle of the 18th century, "hamlets" began to emerge at transportation junctures. The largest of these communities had grown from early mill stations along waterways and were typically located at a point where a major road crossed a tributary stream. The fast-flowing Brandywine River (which runs to the southwest of the project area), boasted over 8 large commercial mills by the 1770's (Cooper 1983: 31-32). Connected to the interior farms by a nexus of new roads, similar mill stations in Wilmington and the surrounding area drew grain from as far away as Maryland and southeastern Pennsylvania (Lemon 1967).

Accompanying the growth and spread of the internal road system, hamlets also emerged at major road crossings. Generally comprised of no more than a handful of dwellings, these marginal communities thrived because they offered necessary services to travelers in remote areas. Typically, they centered around taverns and blacksmith/wheelwright shops (Lemon 1967).

The changes that took place in the economy and settlement pattern of New Castle County during this period was driven by a wave of English and Scots-Irish immigrants who arrived in the region between 1725 and 1755. Most of these immigrants were indentured servants, contracted to local farmers for a period of 3 to 7 years of service (Munroe 1978: 196). In addition to these laborers, some Delaware farmers also owned African slaves (Catts and Kellogg 2000: 12). By 1740, the county's population had ballooned to 6,000 people, 80-90% of whom were involved in some form of agriculture (De Cunzo and Catts 1990: 42; Egnal 1975).

Farm practices of the period took the form of mixed husbandry, typically combining grain cultivation with livestock raising (Bidwell and Falconer 1941: 84). Land use is described as "extensive," meaning that crop fields were not rotated, nor fertilized with manure or lime. When soils became exhausted, new areas were opened up for cultivation. Though soil conservation and crop rotation were practiced in Europe at this time, Delaware farmers clung to older techniques because they lacked adequate labor to clear areas for rotation and also because the market demand for wheat discouraged the use of other crops to replenish fields (Lemon 1972: 179).

In the mid-1700's, the average size of a New Castle County farm was about 200 acres. By extrapolating from a study of farms in southeastern Pennsylvania (Lemon 1972: 167), we can estimate land-use on an average local farm. Typically, 40 acres (20%) were sown in wheat; 22 acres (11%) in meadow for hay; 32 acres (16%) for pasture; and 14 acres (7%) for flax, hemp, roots, other vegetables, fruits, and tobacco. The remaining acreage - roughly half of the total - was left to woodlot.

The average farmstead occupied a little less than half an acre and was comprised of a domestic structure as well as six to eight outbuildings. Outbuilding types included: detached kitchens, corn cribs, stables, meat or smokehouses, barns, and tenant houses (in descending order of appearance). Domestic-oriented outbuildings and gardens were located in proximity to the house, while agricultural buildings were closer to fields. Gardens contained the draw-well, and were fenced to keep out farm animals (Herman *et al.* 1989: 63-65).

Farmhouses of the period averaged 16 to 20 feet (~5 to 6 meters) square. Typical construction was log or frame (or stone depending on locality) on a one-room plan, and either one or two stories high. The ground-floor room was accessed directly from the outside, with windows on either side of the entrance as well as a window in the gable opposite the chimney. If it was a two-story structure, the second floor was usually accessed by a spiral staircase in the corner adjacent to the hearth. This "hall-plan" style house afforded scant privacy within the family and little separation between it and the outside world. While New Castle farmsteads typically had either a separate or adjoining kitchen, most domestic and social interaction took place within the ground-floor room of the main house (Herman *et al.* 1989: 14-19).

3. Early Industrialization (1770 to 1830)

During the late 18th and early 19th centuries, the Piedmont region of northern New Castle county remained predominately agricultural in character. Directly to the south and east of the project area, in the valley communities of Brandywine Village and Wilmington, respectively,

nascent industries emerged and began to re-shape the economic and social landscape of the lower Brandywine and Christina Rivers (Catts and Kellogg 2000: 14; Blume *et al.* 1990: 14, 44).

These shifts in the region's mode of production occurred against a backdrop of fluctuating agricultural markets and periods of conflict with England over taxation and trade-restrictions against American farm-products in the British West Indies. Both the Revolutionary War and the War of 1812 resulted in boycotts of American goods and blockades of American shipping centers by British forces (Lindstrom 1978: 20). These political and economic conflicts resulted in profound changes to the cultural fabric of the entire Delaware region (Catts and Kellogg 2000).

Two episodes of military activity occurred in New Castle County during the Revolutionary War. During the "Philadelphia Campaign" of 1777-1778, General Howe's troops marched from the Chesapeake, through northern Delaware, en route to battles in southeastern Pennsylvania. After routing a far smaller continental force at the Battle of Cooch's Bridge at Akinstavern (Glasgow), British troops captured and occupied Wilmington for a month (Munroe 1954:92-93). In 1781, General Lafayette reversed this route on his way to face Benedict Arnold in northern Virginia.

The most significant and enduring effect of the Revolutionary War on Delaware was the British blockade of the Delaware and Chesapeake Bays. The blockade forced regional manufacturers and agriculturalists to shift from ocean-based international trade to land-based regional trade in the Philadelphia - Delaware - Baltimore corridor. The emergence of this trade network facilitated the growth and diversification of manufacturing and agricultural goods throughout the region. In northern Delaware, much of this growth was localized to the Piedmont region, where commercial growth surged from 1790 through 1810 (De Cunzo and Catts 1990: 58-59; Shaffer *et al.* 1988; Welsh 1956).

In the post-war economy, Wilmington emerged as northern Delaware's most important and diverse urban / manufacturing community. Classified by Lemon (1976) as a "processing town," a 1791 report of Wilmington's industry's reported, "12 flour mills, 6 saw mills, 1 paper mill,1 slitting mill [metal cutting], and 1 snuff mill" (Shaffer *et al.* 1988; Hancock 1947). At Brandywine Village, paper, powder, and textile mills were added to the existing conglomeration of grain-processing mills, which had appeared during the previous period. Quite different from earlier "custom mills," the mills of this period were larger and far more commercialized (Munroe 1954: 28-29).

In contrast to the strides being made in local industry, agriculture was beset by crises. Following a century of extensive farming, farm productivity dropped dramatically during this period. Across New Castle County, eroded and exhausted fields failed to produce significant yields, and as a result, many smaller, marginal farms were abandoned or left fallow. A great many such properties were consolidated into large estates by wealthy landowners.

In the early 1800s, national financial crises worsened prospects for local farmers. Hard-pressed to support themselves even on a subsistence level, a considerable portion of the working agrarian population either moved west to clear new areas or was absorbed into the emergent industrial sector in and around Wilmington (De Cunzo and Catts 1990: 52-53, 59; Herman *et al.* 1989;

Lindstrom 1979: 300; Hancock 1947: 374). While population and agricultural growth leveled in the period between 1810-1830 (Hancock 1947: 374), by the end of the period, some local agriculturalists had made productive in-roads by diversifying crop species. The popularity of this technique increased during the following period (Lindstrom 1978: 20).

4. Industrialization and Capitalization (1830 to 1880)

The years between 1830 and 1880 encompass the most complex and dynamic period of social and economic development in the history of northern Delaware. Improvements in local and regional transportation, the continued expansion and diversification of industrial activities in the Wilmington and Brandywine Valley, the rise of Baltimore as a trading center, and the revolution in agriculture taking place across the region all contributed to a shift away from market-dependence on Philadelphia and a movement towards a more locally-based economy (Lindstrom 1978: 122).

Improvements in regional transportation routes had begun in the first quarter of the century with the completion of a number of interstate turnpikes. One local example was the Wilmington and Great Valley Turnpike, or, modern Route 202. Completed in 1811 this road provided local farmers with a dependable overland route to markets in Wilmington as well as Pennsylvania.

These early road works were the first stage in a campaign of internal transportation improvements that reached its zenith with the completion of the Philadelphia, Wilmington, and Baltimore Railroad in 1839. Competing with the Chesapeake and Delaware Canal, which was begun in 1809 but not completed until 1829, the Philadelphia, Wilmington, and Baltimore Railroad soon handled the bulk of transportation and shipping across the state (Potter 1960; Dare 1856). After its completion, a number of other railroads soon connected northern Delaware to the Pittsburgh area and the Ohio River Valley.

Bolstered by new transportation routes, a large native and immigrant labor pool, and a ready supply of raw materials, northern Delaware's industries grew and diversified at an unprecedented rate during this period. Having devoting much of its resources to industrial development, by the start of the Civil War, New Castle County boasted a total of 380 manufactures (De Cunzo and Catts 1990: 73; Lindstrom 1978: 122). Local facilities included grain mills, textile mills, paper mills, powder mills, ironworks, slitting mills, wheel rights, cooperies, and tanneries. In the vicinity of the Brandywine, scattered industrial enclaves evolved into full-fledged company towns. By the 1860's, Wilmington emerged as the state's most densely settled urban region. In addition to its textile mills, the city was also becoming a leading manufacturer of transportation-related equipment such as carriages, railroad cars, and iron ships (Hoffecker 1977).

These dramatic changes in industry were paralleled by important shifts in agricultural practices in the region's hinterland. After abandoning its market reliance on wheat exports to Philadelphia during the first quarter of the century, the farm economy of northern and central Delaware restructured itself around a diversified and locally consumed produce base in the middle of the century. By providing fruits, meat and dairy items to the new urban markets in Wilmington, farmers in New Castle County rebounded from the stagnancy of the past decades. In the

Piedmont region, dairy farming supplanted livestock raising as the principal agricultural activity (Bidwell and Falconer 1941: 427).

From a productivity standpoint, the most important change to local agriculture was the adoption of progressive farming techniques. Local farmers incorporated modern farm machinery, fertilization, and drainage measures to significantly increase productivity while simultaneously employing less human labor. These methods also helped to bring marginal regions that had been abandoned during the last period back under cultivation. By the end of the period, New Castle farmers had managed to cultivate over 90% of the county's total acreage (De Cunzo and Catts 1990: 67-70).

During this agricultural revolution, roughly half of the farms in New Castle County were worked by tenant laborer families. Tenancy took many forms, but it can be defined generally as the working of a plot of land in exchange for a rent and/or a portion of the yield. Begun in the late-eighteenth century, its practice became pervasive after the crop disasters and economic crises of the previous period concentrated large tracts of land into the hands of wealthy landowners who were either unable, or disinclined, to work the land by themselves (Siders *et al.* 1991).

While tenancy left no clearly recognizable farm "type," its effects upon the agricultural landscape of the late nineteenth century were profound (Siders *et al.* 1991: 22). Most notably, tenancy, or rather, the concomitant rise of an agricultural class-system, led to a rebuilding of the local landscape that reflected the ideas, values, and beliefs of the landed elite. By examining the layout of farms of this period, researchers have demonstrated that while the size of the average farm in northern New Castle County shrank to 79 acres during this period, farmhouses and outbuildings virtually doubled in size (Siders *et al.* 1990; Herman *et al.* 1989: 146). This was especially true for old "landed" families, whose rebuilt or remodeled hall and parlor homes, stone bank barns, and corn cribs communicated, "the new values of the agricultural reform movement" (Herman *et al.* 1989: 200-202).

5. Urbanization and Suburbanization (1880 to 1940)

General census figures from the turn of the century show that, for the first time in its history, agriculture ceased to be the predominant occupation in the state. While a number of trade occupations rose in importance during the years between 1870 and 1900, the largest shift occurred between industry (rising from 23.5% to 31% of the state's work force) and agriculture (declining from 39.5% to 26%). Since the majority of industrial and trade jobs would have been centered around Wilmington, these numbers would have been even more skewed towards industry in New Castle County (De Cunzo and Catts 1990: 77-78).

Nonetheless, agriculture continued to play an important role in the regional economy. The trend towards non-staple crops, perishables, and truck farming initiated in the second quarter of the nineteenth century continued in much of New Castle County, as new transportation routes connected the region to emerging urban areas throughout the northeast. Wilmington's continued growth insured continued demand for dairy products from the Piedmont, allowing this form of agriculture to thrive well into the twentieth century. Agricultural tenancy and share-cropping

also held even, with over half of all farms engaged in some form of tenant arrangement at the turn of the century (De Cunzo and Catts 1990: 78-80; Shannon 1945: 418).

While the latter decades of the nineteenth century witnessed growth in New Castle's industries, Wilmington's industrial prominence began to diminish during the early years of the twentieth century. Still one of the most diverse industrial districts in the nation, upper Delaware, "fell behind" industrial sectors in the rest of the nation (Hoffecker 1977). In the early twentieth century, many of Wilmington's firms were purchased by national conglomerates or went bankrupt trying to compete with companies located in the emergent industrial cities of the Midwest (Shaffer *et al.* 1988: 29). Nonetheless, Wilmington continued to attract a large population of European immigrants, especially from eastern and central European countries (De Cunzo and Catts 1990: 85).

Catts and Kellogg (2000: 18) note that the rise of suburban development outside of Wilmington was initiated in the early decades of the twentieth century. Quite unlike any settlement pattern then seen in the state, the settlement of areas north of Wilmington was initially tied, as it is still today, to the spread of light industries outside of the traditional urban industrial core of the city. Both in and around the city, transportation networks were expanded or rerouted to accommodate increased automobile traffic. While New Castle's population declined almost 13 % in the years between 1920 and 1960, formerly rural New Castle County saw a population gain of an incredible 455.9 % (Hoffecker 1977: 60). Indeed, the effects of this shift in settlement pattern continue to be manifest throughout the state up to the present time.

6. History of the J. R. Weldin Property

Originally part of the massive proprietary holding called "Rockland Manor," the 103 acre tract called "Chestnut Hill" was first surveyed in 1680. The exact location of the farm's initial dwelling is not known. However, a 1710 will mentions that the property included a house and cleared land (Taylor *e* 1989: 205). While there is no firm documentation for the location, size or nature of buildings on the property until 1796 (a fire blotter from this date describes a two-story stone house in the vicinity of the existing ruins), existing documents and archaeological evidence suggests that at least a portion of the existing ruins date to as early as 1740.

During much of the farm's eighteenth century occupation, northern Delaware agriculturalists, primarily English and Scotch-Irish settlers, participated in the region's first phase of commercial agriculture. Wheat, the primary crop grown during this period, was shipped to regional mill stations. From these it was sent, via New Castle and Philadelphia merchants, to the West Indies, southern Europe, and other North American Colonies.

Following years of extensive mono-crop farming, agricultural lands in the region became exhausted, and, by the late eighteenth century, local farming appears to have entered into a period of decline. Economic crises in the early years of the nineteenth century combined to force many farmers to abandon their lands and settle elsewhere. At this time, many small farm holdings were bought up by wealthy landowners. Workable farms were tenanted, while more marginal properties were left fallow or put in pasture for livestock (De Cunzo and Catts 1990; Munroe 1978).

These large scale economic events are reflected in the occupation history of Chestnut Hill. Following at least seventy-five years of owner-occupancy, in 1785, the farm was sold to an absentee landowner named John Dickinson, who resided in Philadelphia. Like roughly half of the farms in the state, Chestnut Hill was rented and farmed by a string of tenant farmers during the late eighteenth and early nineteenth centuries (Siders 1991).

Mid-nineteenth century occupations of Chestnut Hill coincided with what some authors have termed a "revolution" in Delaware agriculture. Beginning in the 1830's, local farmers started to incorporate crop-rotation, soil-fertilization, drainage measures, and modern farm machinery in their operations (De Cunzo and Garcia 1992; De Cunzo and Catts 1990). In tandem with this technological progress, the region had also shifted away from its economic dependence on exports to Philadelphia wholesalers. Following the completion of a number of transportation improvements (overland turnpikes in the early nineteenth century, the Chesapeake and Delaware Canal in 1829, and the Philadelphia, Wilmington, and Baltimore Railroad in 1839), local farmers abandoned wheat as their staple crop and began to diversify their produce to include other grains, fruits, dairy products and other perishables. These goods were distributed to regional markets, particularly the emerging urban / industrial centers in Wilmington.

The records relating to Chestnut Hill show evidence of these changes. Census data from 1850 and 1860 indicate that the farm's last tenant, John Bradford, was farming a variety of crop types, including wheat, corn, oats, Irish potatoes and hay. Like other Piedmont farmers of the time, he focused on livestock raising, with some dairy farming as well. Though census data indicate that his dairy operations produced above average yields (Taylor et al. 1989: 208), the farm appears to have been in a state of decline when it was purchased by Jacob R. Weldin in 1862. Much of the arable land was fallow, and the farm's appearance is described by one of his descendants as, "impoverished...dilapidated" (Talley 1899: 178).

Within eight years, Weldin, who had previously split his time between his family's smaller farm adjacent to Chestnut Hill and shad fishing on the Delaware, affected considerable improvements to the farm. By 1870, he had brought a total of 224 acres under cultivation, and by 1881, he appears to have added and improved a number of buildings at the site. When Jacob died in 1892, his estate included "the machinery and other capital required to operate a large dairy farm" (Taylor et al. 1989: 208). Numerous items in his will, including silver utensils, marble table tops and other luxury goods, books, and a telescope, attest to an above-average lifestyle and some degree of learning.

His son, J. Atwood Weldin, seems to have continued his father's agricultural successes. A member of the local Tallyville Grange (Scharf 1888: 910), he is described as, "one of the most extensive dairy farmers in the Hundred" (Runk 1899: 501). By 1905, the property included a blacksmith/wheelwright shop, two tenant houses, and stables. By the time of his death in 1914, the dairy farm appears to have been thoroughly modernized (Taylor et al. 1989: 208). In his will, J. Atwood Weldin conveyed the property to his son, and the farm appears to have been in a state of decline when it was conveyed to a land development company in 1934.

7. Augustine Cutoff Tract

Background research indicates that there were two houses on this property in the early twentieth century. Historic maps and photographs were used to identify the period in which the houses were extant. The houses do not appear on the 1893 Atlas of New Castle County by G. William Baist. They are not extant in a circa 1927 aerial photograph from the Regional Planning Federation of the Philadelphia Tri-State District or on an aerial photograph of the Porter Reservoir and Rock Manor Golf Course taken by Dallin Aerial Surveys in 1935. The houses do appear, however, on a photograph of construction of the Porter Reservoir ***(Photograph 1)***. The Porter Reservoir was completed in 1909. Therefore, the houses must have been constructed sometime after 1893 and were demolished before 1927.

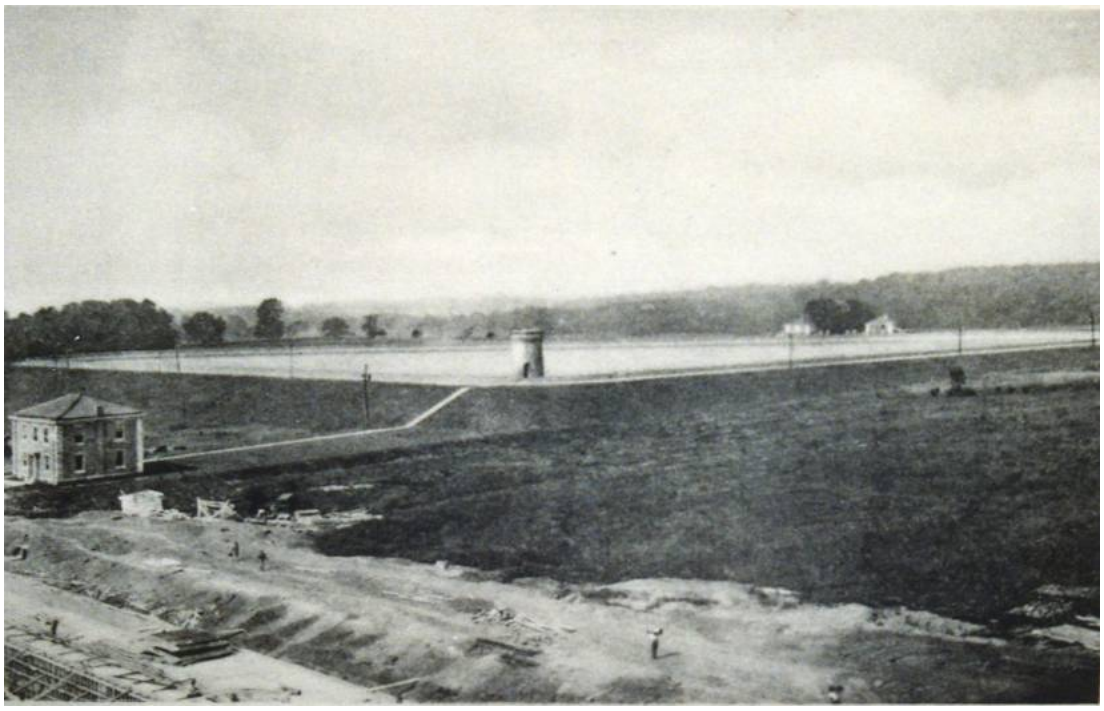
A sketch map of early twentieth century landmarks along Concord Pike (Mariane 1992) includes the two houses. The map consists of the recollections of a woman who lived in the area in the early twentieth century. The land across from Porter Reservoir is referred to as "Alfred I duPont Farmland" and the buildings are labeled "duPont Employee's Homes".

The plans for the 1952 widening Concord Pike from DelDOT (then the State Highway Department) depict Concord Pike as consisting of only two lanes (one lane in each direction).

D. Previous Archaeological Investigations in the Vicinity of the APE

Throughout the last 20 years, the Blue Ball area has been subjected to numerous archaeological investigations associated with DelDOT projects as well as with private developers. As a result of this previous work, it is estimated that approximately 67.33 acres (27.25 hectares), or 37% of the APE, had been previously subjected to Phase I Archaeological testing. The previous surveys were successful in locating 16 archaeological resources in the vicinity of the Blue Ball Area Transportation Improvement project ***(Table 1)***, three of which are located within in the APE for this project ***(Figure 4).*** Information regarding these previous archaeological investigations in the Blue Ball area is summarized in this section.

One of the first cultural resource management surveys of the Blue Ball area was conducted by Middle Atlantic Archaeological Research, Inc. in the late seventies. This work was associated with the proposed improvements to Concord Pike from Interstate 95 to the Pennsylvania state line (Thomas 1980). These investigations included archival and architectural studies of seven historic properties. The Blue Ball Tavern Site (7NC-B-22), located on the west side of the intersection of Concord Pike and Rockland Avenue ***(Figure 4; Table 1),*** was the only archaeological resource subjected to field investigations. The Phase I/II work conducted at the site consisted of a surface collection and subsurface investigations using a posthole digger, followed by the excavation of four test units and four trenches (Thomas 1980: II-2). The excavations successfully located the foundation remnants and builder's trenches associated with the Tavern, possible outbuildings, a potential well, and two midden features. The site was recommended eligible for the National Register of Historic Places and data recovery excavations were subsequently conducted.



Photograph 1: View of the Porter Reservoir during its construction, facing west. The structures associated with the Augustine Cutoff Site are behind the reservoir, on the right side of the photograph.

Table 1: Previously Identified Archaeological Sites

Project	References	Identified Site #/Name	Chronological Affiliation	Eligible
Cultural Resources Assessment of Concord Pike	**Thomas 1980; Wholey and Walker 2002**	7NC-B-22/Blue Ball Tavern	Historic	Yes
Proposed Route 141 Corridor Improvements	**Taylor et al 1989**	7NC-B-12/Concord Pike	Pre-Contact	No
		7NC-B-13/Alopocus Run	Pre-Contact	No
		7BC-B-13/Matson Run	Pre-Contact	No
		7NC-B-15/Rock Manor	Pre-Contact	No
		7NC-B-4/William Murphy	Historic	No
		Rockland Dump	Historic	No
		7NC-B-17/Sweeney	Historic	No
		7NC-B-16/Bird-Husbands	Historic	No
		7NC-B-10/Smithy	Historic	No
		7NC-B-9/T. Husbands	Historic	Undetermined
		7NC-B-11/Weldin	Historic	Yes
Investigations of the Augustine Cutoff Area	**Anderson 1996; Wholey et al 2000**	7NC-B-13/Alopocus Run Expanded	Pre-Contact	No
		7NC-B-16/Bird-Husbands House Expanded	Historic	No
		7NC-B-50/DuPont Dairy	Historic	No
		7NC-B-49/Augustine Cutoff	Historic	No
Astra-Zeneca Triangle Property	**Roberts 1999; Catts et al 2000; Catts 2000; Kellogg 2000**	7NC-B-13/Alopocus Run Expanded	Pre-Contact	No
		7NC-B-54/Milner Site 1	Pre-Contact	Yes
		7NC-B-55/Milner Site 2	Pre-Contact	No
		7NC-B-53/Triangle Woods	Historic	No
		7NC-B-52/DuPont Tenant Houses	Historic	No

The data recovery work included further archival research that revealed that the site originally functioned as a tavern from 1787 to 1849 and subsequently functioned as a tenant farm until 1909, when the Blue Ball Dairy took occupancy of the site (Wholey and Walker 2002). One hundred features were identified and excavated during the data recovery. According to the investigators, each of the three phases of the site's use was discernable archaeologically, and could be subdivided into earlier and later sub-phases. Contexts associated with the tavern operation included the "north foundation room," an adjacent buried yard surface, three pit features, in addition to an eight foot deposit south of the foundation that appeared to be associated with the later tavern operation (Wholey and Walker 2002). Contexts dating to the farm tenancy included a 54 foot stone wall near the main foundation, and the remains of a 13x14 foot stone outbuilding 50 feet (~15 meters) to the south of the foundation, as well as a large midden feature covering approximately 65 square feet (~20 square meters). Features associated with Blue Ball Dairy included a "post 1864" foundation remnant, and the "post 1910" stone remains of another structure.

During 1985 and 1986, Thunderbird Archaeological Associates, Inc. conducted a Phase I Archaeological Identification survey for the proposed Route 141 corridor from Route 100 to SR 0202 (Taylor et al 1989). These investigations identified 10 archaeological sites in the vicinity of the Blue Ball Transportation Improvement Project APE, four of which were pre-contact. These included the Concord Pike Site (7NC-B-12), the Alopocas Run Site (7NC-B-13), the Matson Run Site (7NC-B-14), and the Rock Manor Site (7NC-B-15).

The Concord Pike Site and the Alopocas Run Site were both discovered during a walkover reconnaissance of the fields north of Rockland Road and west of Concord Pike. The Concord Pike Site is situated on a small knoll just west of Concord Pike and east of Alopocas Run, approximately 1100 feet (~335 meters) north of the Concord Pike (SR 0202)/Rockland Road intersection ***(Figure 4).*** The artifacts were recovered from a 150x250 foot (~46x76 meter) area and included one Kirk quartzite corner-notched point, one untyped quartz point fragment, 1 early stage quartz biface, 1 quartzite core fragment, 1 quartz core, 1 bifacially worked quartz chunk, six quartz flakes, one quartzite flake, and four quartz chunks (Taylor et al. 1989: 269-270). A second surface collection conducted at the Concord Pike Site failed to yield additional artifacts, therefore no additional work was recommended at the site (Taylor et al. 1989: 270). The Alopocas Run Site was discovered on the west side of Alopocas Run just north of Rockland Road, approximately 800 feet (~244 meters) west of the Rockland Road/Concord Pike (SR 0202) intersection ***(Figure 4).*** The artifacts were recovered from a 100x150 upland knoll and included 12 quartz flakes, seven quartz chunks, and one chert flake (Taylor *et al.* 1989: 268). Because Thunderbird considered this a "very thin lithic scatter," no additional work was recommended at the site (Taylor *et al.* 1989: 268, 270).

The Matson Run Site was discovered during an initial walkover of the field just north of Weldin Road and west of Matson Run, directly across from the entrance to the Rock Manor Golf Course ***(Figure 4).*** During the walkover survey, 54 artifacts were recovered including one quartzite contracting stem point, one small quartz stemmed point, one quartzite abraded milling stone, one quartz endscraper, one quartz core fragment, one early stage quartz biface, 32 quartz flakes, and 15 quartz chunks (Taylor *et al.* 1989: 278). Because the recovered artifacts were interpreted to

suggest a "certain degree of permanence and a variety of activities not expected for a lithic scatter," extended Phase I excavations were recommended (Taylor et al. 1989: 278). This work consisted of the excavation of the excavation of 36 2.5x2.5 foot TUs at fifty foot intervals. An additional 50 artifacts were recovered during the extended Phase I testing. These included 43 quartz flakes, one piece of quartz shatter, one quartz biface fragment, one quartz point fragment, one quartz core fragment, one jasper flake, one jasper biface fragment, and one chalcedony flake (Taylor *et al.* 1989: 280). South of Weldin Road, the initial Phase I testing consisted of the excavation of a transect of 12 STPs placed along the east side of Carruthers Lane. The pre-contact Rock Manor Site (7NC-B-15) was discovered at this location ***(Figure 4).*** Subsequent extended Phase I testing included the excavation of an additional 14 2.5x2.5 foot TUs placed according to the site topography (Taylor *et al.* 1989: 280-281). A total of 25 pre-contact artifacts were recovered from the Rock Manor Site. These included 10 quartz flakes, two pieces of quartz shatter, one quartzite flake, seven jasper flakes, one jasper biface fragment, three chert flakes, and one feldspar chunk (Taylor *et al.* 1989: 322). At both the Matson Run and Rock Manor Sites, Thunderbird archaeologists concluded that artifacts densities were relatively low and that the sites were interpreted as "small, temporally limited occupations" (Taylor *et al.* 1989: 280). For these reasons, no further archaeological investigations were recommended at either of the sites (Taylor *et al.* 1989: 283).

Six sites dating to the historic period were identified during Thunderbird's investigations, and based on the results of archival research, future Phase I fieldwork was recommended at one historic resource, the William Murphy House (Taylor *et al.* 1989: 297). (Because the house was occupied at the time, Thunderbird did not conduct field investigations at the Murphy House at the time of their survey. Phase I/II excavations were subsequently conducted in 1997; these results are summarized below). The historic sites included the Rockland Dump Site, the Sweeney Site (7NC-B-17), the Bird-Husbands House Site (7NC-B-16), the Smithy Site (7NC-B-10), the T. Husbands Site (7NC-B-9), and the Weldin Plantation Site (7NC-B-11).

The Rockland Dump Site was discovered at the southwestern edge of the current AstraZeneca Triangle property, during the excavation of ten shovel tests on the flat, well drained landforms in Thunderbird's Shovel Test Area 2 (Taylor *et al.* 1989: 263). The site consisted of two nineteenth to twentieth century trash dumps that contained glass, metal, ceramics, and architectural debris which did not appear to be associated with any structures, therefore, no additional archaeological investigations were recommended at the site (Taylor *et al.* 1989: 263, 268).

The Sweeney Site (7NC-B-17) was located at the northwest corner of the Rockland Road/Old Murphy Road intersection ***(Figure 4).*** Archival research indicated that the house associated with the site was constructed sometime between 1841 and 1847 (Taylor *et al.* 1989: 175). The house served as a rental property until 1878, when the Sweeney family purchased the property (Taylor *et al.* 1989: 175). The Sweeney utilized the property as a small family farm until 1918. The Sweeney house and its associated springhouse was demolished just before Thunderbird's Phase I survey. Thunderbird's archaeological investigations of the property involved the excavation of 10 5x5 foot test units and 21 STPs placed in the rear and west yard areas adjacent to the house (Taylor *et al.* 1989: 177). A portion of the springhouse was also exposed and mapped as part of the investigations. The results of the fieldwork indicated that the yard areas were disturbed by the installation of a series of underground water pipes associated with water towers on the

adjacent property, the installation of a septic system, and the demolition of the house (Taylor *et al.* 1989: 181). Due to the lack of intact contexts associated with the farmstead, no further archaeological investigations were recommended (Taylor *et al.* 1989: 181).

The extant Bird-Husbands House is situated just south of Rockland Road approximately 1500 feet (~457 meters) west of SR 0202 ***(Figure 4).*** The house was likely constructed sometime shortly before 1816, and likely functioned as an owner occupied farmstead until 1879, when the property was rented to tenants and was subsequently used to grow garden produce to be sold at market (Taylor *et al.* 1989: 189, 190). The archaeological investigations at the Bird-Husbands House consisted of the excavation of 12 5x5 foot TUs placed in the rear and east yard areas. In addition, two backhoe trenches were excavated in the area northwest of the house in order to investigate the presence of potential barn remains. The archaeological fieldwork indicated that modern construction and landscaping activities heavily disturbed the land surfaces associated with the house and that no intact contexts associated with the farmstead were present (Taylor *et al.* 1989: 190, 194). Although no further archaeological investigations were recommended, Thunderbird conducted additional work in this area in 1998 and found no significant archaeological deposits (Dan Griffith, personal communication, 2000).

The Smithy Site (7NC-B-10) was a blacksmith shop located on the original Chestnut Hill tract on the east side of the existing Concord Pike, just south of its intersection with Foulk Road ***(Figure 4).*** Although a structure labeled "Smithy" was indicated on the 1849 Rea and Price map at this location, no definitive evidence of a blacksmith shop was documented until the 1905 South Brandywine Hundred tax assessment of J.Atwood Weldin's holdings, in which he was taxed for the business (Taylor *et al.* 1989: 190, 196). During the Phase I survey, Thunderbird archaeologists identified a 150x100 foot concentration of artifacts on the ground surface in the location of the blacksmith shop. This area was further investigated with 17 excavation units that exposed the remains of a twentieth century gas station (Taylor *et al.* 1989: 201-202). No features or artifacts directly related to the blacksmith shop were found; therefore no further archaeological investigations were recommended at the Smithy Site.

The T. Husbands Site (7NC-B-9) was a historic farmstead located on either side of SR 141 (New Murphy Road) just east of the intersection of Rockland Road ***(Figure 4).*** Archival research suggested that the first farmhouse was constructed on the property around 1804 (Taylor et al. 1989: 136). The farmstead was subsequently occupied by four generations of the Husbands family until the property became part of the Dupont landholdings in the twentieth century (Taylor *et al.* 1989: 141). No above ground remains of the farmhouse were observed at the time of the Phase I survey, although barn ruins were noted to the north of SR 141. A backhoe trench was initially excavated within the project area south of SR 141 in order to investigate the presence of the original farmhouse (Taylor *et al.* 1989: 135). The test trench penetrated building debris associated with the house, and as a result, an extended Phase I survey was conducted at the site that focused on the location of the house and its associated yard, in addition to the barn and barnyard areas to the north of SR 141. One by one foot shovel tests were arbitrarily excavated at 10 foot intervals in areas where high artifact densities were likely to occur. This was followed by the excavation of 2.5x2.5 foot or 3x3 foot TUs where information regarding stratigraphy was beneficial or in locations where features such as wells and privies were expected (Taylor et al. 1989: 141). Thirty-six STPs and 6 TUs were excavated in the area

around the barn foundation and 35 STPs and 15 TUs were excavated in the area around the house and its associated yard (Taylor et al. 1989: 142). Relatively few artifacts were found in association with the house and those that were recovered came from mixed contexts (Taylor et al. 1989: 156). The tests excavated near a fence line north of the house did yield earlier artifacts and revealed a potential midden feature. Based on these results, additional archaeological investigations were recommended for the portion of the site in the North Fence Line area (Taylor *et al.* 1989: 158). Thunderbird regarded the site as "unique opportunity to study a small working farm which was owned by one family for an extended period of time" (Taylor *et al.* 1989: 158).

Thunderbird's relatively extensive archival investigations of the 103 acre "Chestnut Hill" tract that lay between Alopocas and Matson Runs indicated that this property was first documented in 1680, and was likely developed as a farm during the first quarter of the eighteenth century and was utilized as such into the middle of the twentieth century (Taylor *et al.* 1989: 205, 261). During this time the farmstead was occupied by a number of its owners, except for the period between 1785 and 1861, when it was likely worked by tenant farmers. In 1861, Jacob Weldin acquired the dilapidated property and gradually converted it into a dairy farm. The farmstead operated as a dairy until 1934 when it was acquired from the Weldin estate by a real estate company (Taylor *et al.* 1989: 217). At the time of the Phase I survey, the abandoned structural remains of a number of buildings was found to lie beneath thick vines and thick brush, just south of Weldin Road approximately 200 feet (~61 meters) east of the intersection with Foulk Road ***(Figure 4).*** Due to the likelihood of locating intact archaeological contexts associated with the ruins, Thunderbird conducted an extensive Phase I survey of the property. Thunderbird's field studies included the arbitrary placement and excavation of 24 STPs, 31 3x3 foot TUs, and two linear trenches. Their investigations were successful in locating the remains of six structures associated with the farmstead. These included the main farmhouse (Structure A), a potential detached dependency to the main residence (Structure B), an equipment shed (Structure C), an additional outbuilding (Structure D), a concrete pad associated with a structure of unknown function (Feature 3), and a barn/barnyard complex (Taylor et al 1989: 220-253). They noted that intact archaeological contexts were located at the site. These included a brick-lined sump or well in Structure A, the fill beneath the basement floor in Structure A, the well outside Structure B, Feature 4, the fill horizons present in TU N422E175, the road fill in TU N432E215, and possible builder's trenches associated with the bulkheads in Structure A (Taylor *et al.* 1989: 261). Based on the results of the Phase I work, Thunderbird recommended Phase II investigations because the site would "provide valuable information on tenancies form the late 18th century through the last quarter of the 19th century…In addition, the site provides a valuable opportunity to study owner occupied sites in the last part of the 19th century and contrast this to the tenant occupation" (Taylor *et al*. 1989: 261).

As previously stated, Phase I fieldwork was recommended at the William Murphy House based on the results of the archival research conducted by Thunderbird during the Route 141 survey (Taylor *et al.* 1989: 297). Thunderbird subsequently undertook Phase I/II fieldwork at this property in 1997 ***(Figure 4).*** Phase I fieldwork involved the excavation of 20 2.5x2.5 foot TUs in the yard areas around the extant William Murphy House, followed by the excavation of an additional eight 2.5x3 foot TUs and two 1.5x2 foot TUs during the Phase II (Walker *et al.* 1997: 25, 35). The results of the archaeological investigations revealed that the yard areas contained mixed contexts and no significant concentrations of artifacts were encountered (Walker *et al.*

1997: 25, 35). Evidence of an outbuilding of unknown function was revealed, but half of this remnant foundation was destroyed, likely by twentieth century construction activities (Walker *et al.* 1997: 50). Due to the level of disturbance and lack of intact contexts, the archaeological component of the property was recommended not eligible for nomination to the National Register of Historic Places (Walker *et al.* 1997: 50).

In 1996, Thunderbird archaeologists undertook investigations at the possible location of a Civil War cemetery in the area to the northwest of the intersection of SR 0202 and the Augustine Cutoff, on the periphery of the Alopocas and Alopocas II subdivisions. The possibility of the presence of this cemetery came to the attention of DelDOT after a local citizen contacted the Delaware Bureau of Archaeology and Historic Preservation about the site in 1990 (Anderson 1996). Although background research did not indicate the presence of a cemetery at this location (Anderson 1996: Appendix I), field studies were conducted. The investigations consisted of the excavation of 19 strip trenches of various sizes, placed in the APE of the proposed realignment of the Augustine Cutoff (Anderson 1996: 2). The survey failed to identify any evidence of individual or mass graves and no further work was recommended (Anderson 1996: 3).

Thunderbird undertook additional Phase I work in the area of the Augustine Cutoff in July 1998. The testing was preformed in the 10-12 acre APE for the proposed new road alignments for the Augustine Cutoff and Rockland Connector, a new storm water management basin, a stockpile area, and three wetland mitigation areas (Wholey *et al.* 2000: 1). The surface reconnaissance and subsequent excavation of five 2.5x2.5 TUs and four STPs placed within Wetland Mitigation Area A2 and the portion of the Rockland Road Connector just west of Rockland Road did not identify any archaeological resources. The area associated with Wetland Mitigation Area B, located between the Alopocas Run Site and Alopocas Run, was initially surface collected. The walkover yielded 62 pre-contact artifacts associated with the Alopocas Run Site, with the highest concentrations coming from the edge of the terrace flanking Alopocas Run. These recovered artifacts included one Bare Island point base, a biface fragment, a chert point fragment, and a quartz core, in addition to pieces of debitage (Wholey *et al.* 2000: 30). Quartz was the most prevalent lithic material found, with lesser quantities of quartzite, hornfels, and unidentified metamorphic rock (Wholey *et al.* 2000: 30). An additional two TUs and one STP were subsequently excavated in this area that failed to yield additional pre-contact materials. Thunderbird recommended that no further work be conducted for the portion of the Alopocas Run Site within the APE (Wholey *et al.* 2000: 31). Wetland Mitigation Area D was located on the south side of Rockland Road, just east of the Bird-Husbands House. Ten 2.5x2.5 foot TUs were excavated in this area. A scatter of historic artifacts associated with the Bird-Husband House was recovered, but no features or buried yard surfaces were identified, therefore no additional work was recommended in this portion of the APE (Wholey *et al.* 2000: 35). The part of the APE delineated the Storm Water Management Area and Portions of Road Alignments was located just south of Rockland Road east of the Blue Ball Dairy Barn and east of Alopocas Run. Testing in this area consisted of the excavation of 15 TUs and 13 STPs. A low density of historic artifacts was recovered, although several historic features were encountered; these included a stone foundation, a stone and concrete pier, a low stone wall and architectural debris (Wholey *et al.* 2000: 49). The artifacts and features were considered to be part of the Du Pont Dairy Site (7NC-B-50). Because additional archaeological investigations were considered to be likely unproductive, Thunderbird recommended that additional documentary research and

construction monitoring be an alternative to additional fieldwork if more information regarding the Site was needed (Wholey *et al.* 2000: 67). Seven widely scattered pre-contact artifacts were also recovered from this area that did not constitute an archaeological Site (Wholey *et al.* 2000: 51). The area between the Blue Ball Dairy and the Augustine Cutoff was delineated the Portions of Road Alignments and Stockpile Area. Background research of this area revealed that A.I. Dupont expressed interest in controlling the area, and by 1935, a subdivision map indicates that the property was indeed owned by Du Pont (Wholey *et al.* 2000: 52). Archaeological investigations included a combination of surface collection and the excavation of 15 STPs. The Augustine Cutoff Site (7NC-B-49) was identified in the southern portion of this area. A cistern, a concentration of brick and mortar near the cistern, an artifact concentration north of the cistern, and a rock concentration were found to be associated with the site (Wholey *et al.* 2000: 59). Although it was unclear whom the site was associated, the recovered artifacts suggested a late nineteenth/early twentieth century date and Phase II excavations were recommended (Wholey *et al.* 2000: 59, 67-68).

In November 1999, John Milner Associates, Inc. (JMA) conducted a Phase I survey of the Astra Zeneca Triangle Property, located in the area bounded by S.R. 0202, Old Murphy Road, and Rockland Road ***(Figure 4).*** Within this property, the Phase I survey was conducted in areas of the APE that were considered archaeologically sensitive by the SHPO (Roberts 1999: 6). The fieldwork initially entailed the excavation of 256 STUs (shovel test units) placed at 10 meter intervals in a series of transects within the project area (Roberts 1999: 3). Five archaeological sites were identified that were further investigated through the excavation of EUs (excavation units).

The first was the Alapocas Run Site (7NC-B-13), originally identified during Thunderbird's Phase I survey for the proposed Route 141 corridor from Route 100 to SR 0202. Of the eleven STUs excavated on the site knoll, two contained pre-contact materials, yielding a total of ten quartz flakes (Roberts 1999: 3). Two 1x1 meter EUs were subsequently excavated at the site; these produced an additional six quartz artifacts, including a non-diagnostic quartz biface fragment. The Alopocas Run Site was interpreted as a limited activity area that was heavily disturbed by modern agriculture, therefore no additional investigations were recommended at the site (Roberts 1999: 3).

The second site, the Milner Site 1 Site (7NC-B-54), is located near the headwaters of an ephemeral tributary to Alopocas Run ***(Figure 4).*** It was initially identified in three STPs that contained a total of seven quartz flakes and a quartz tool (Roberts 1999: 4). Two 1x1 meter units were then excavated at the site that yielded an additional four pieces of debitage, a quartzite biface fragment, and a quartz biface base (Roberts 1999: 4). AstraZeneca planned to avoid the site during their proposed construction; however, JMA recommended a Phase II Archaeological Evaluation if proposed construction would adversely affect the site (Catts and Kellogg 2000).

The third site, the Milner 2 Site (7NC-B-55) was discovered at the head of an ephemeral drainage along the west side of the AstraZeneca Triangle property ***(Figure 4).*** Thirty-two jasper flakes were recovered from one of the initial STUs excavated in the area, and subsequent STUs placed at five meter intervals around the original find failed to yield additional artifacts (Roberts 1999: 4). Additional tests were placed at 2.5 meter intervals around the STU containing the

artifacts, and only one of these produced additional artifacts (two jasper flakes). Two 1x1 meter EUs were then excavated, one adjacent to the original positive STU and one directly overtop of it. An additional 280 flakes were recovered in the two EUs (Roberts 1999: 4). JMA's analysis indicated that the site represented one episode of lithic reduction of Pennsylvania jasper. The site lacked a diagnostic artifact, but based on the workmanship of the artifacts and the non-local raw materials, the site was hypothesized to date to either the Early Archaic or Paleoindian period (Roberts 1999: 4). The Milner 2 Site was considered "very likely" to be eligible for the National Register of Historic Places, and further evaluation of the site was recommended (Roberts 1999: 4). Phase II investigations were conducted at the site in March and April, 2000. The boundaries of the site were further initially refined through the excavation of 39 shovel tests placed at 10 meter intervals along four transects, which failed to produce additional cultural materials. A grid of an additional 31 shovel tests were excavated around the original find spot, and an additional two jasper flakes, a utilized jasper flake, and two possible quartz flakes were recovered from two of these tests (Kellogg 2000: 2). Eight additional EUs were also excavated at the site as part of the Phase II. Because the original construction plans for the project indicated that the site would be adversely affected, data recovery excavations were recommended due to the site's high degree of integrity, the exotic raw materials present, and the nature of the flaking technology (Kellogg 2000: 5, 6).

During pedestrian reconnaissance of the APE, JMA identified a forth archaeological resource, the Triangle Woods Site (7NC-B-53) ***(Figure 4).*** A rectangular depression with mortared stone was visible on the ground surface and the excavation of 15 EUs in the area around the depression yielded very little cultural material (Roberts 1999: 5). Two EUs were subsequently placed within the depression that yielded a high density of twentieth century artifacts. Phase II investigations, that were comprised of a surface reconnaissance and the excavation of an additional 10 EUs, identified several features including a backfilled trash pit, possible hearth areas, and a brick pad. In addition 2300 historic artifacts were recovered (Catts 2000: 5). The site was interpreted as a potential gypsy camp, although the background research regarding the site's association with gypsies was not definitive (Catts 2000: 5). For this reason, the site was not recommended eligible for the National Register (Catts 2000: 6).

The final site found by JMA was the Dupont Tenant Houses Site (7NC-B-52), located on the western periphery of the Triangle Woods property ***(Figure 4).*** Surface features such as concrete block foundation walls, brick scatters, and cement-lined sewer drains were identified on the ground surface. Background research indicated that three tenant occupied structures were located in the area by the late 1930s to early 1940s, and none of the buildings were extant by 1982 (Roberts 1999: 5). Six shovel tests were excavated and the results indicated that the site lacked integrity due to modern disturbances. Additionally, it appeared that the recovered artifacts were deposited after the site was abandoned, therefore no further investigations were recommended at the site (Roberts 1999: 6).

In the fall of 1999, a Phase I survey was conducted by JMA for the proposed storm water management work in the area south of Rockland Road and east of the DelDOT retention basin. The limits of the Blue Ball properties delineated this project area to the west and south (Catts and Kellogg 2000: 3-6). The southwestern portion of the project area was found to be covered by two large spoil piles of dirt that encompassed an area of approximately 5.5 acres. The only

cultural resource encountered during the survey was a remnant of the Nemours Estate stone wall (Catts and Kellogg 2000: 3-6). JMA concluded that the stone wall represents a contributing element to the Nemours Historic District (Catts and Kellogg 2000: 3-6).