2.0 BACKGROUND RESEARCH

2.1 ENVIRONMENTAL OVERVIEW

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

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

The Aldino Series (AdB_2) soil is moderately well-drained and found on uplands of the Delaware Coastal Plain Physiographic Provinces (Matthews and Lavoie 1970). The typical profile of the Aldino Series begins with a brown (10YR 4/3) silt loam. This is followed by a subsoil with a yellowish brown (10YR 5/4) silty clay loam overlaying a light brownish-gray (10YR 6/2) fragipan of very dense and firm silt loam. Below the fragipan is a saprolite overlying bedrock. Native vegetation on the Aldino Series soils is primarily oaks and hickory (Matthews and Lavoie 1970:11).

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

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

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

The Keyport Series (KeA and KeB_2) are characterized as deep, moderately drained soils that occur on uplands of deposits of clay and silt clay on the Delaware Coastal Plain Physiographic Provinces (Matthews and Lavoie 1970). The typical profile of the Keyport Series begins with a plowzone (Ap) of dark yellowish-brown (10YR 4/4) silt loam. The subsoil is a yellowish brown (10YR 5/6 to 10YR 5/8) silt clay loam. The underlying material is a yellowish brown (10YR 5/6) clay or silt clay variegated with yellowish red (5YR 4/8) that has prominent light gray (10YR 7/1) mottles. Native vegetation on the Keyport Series soils is primarily moisture tolerant mixed hardwoods (Matthews and Lavoie 1970:26).

The Matapeake Series (MeB_2, MeD_3, and MkB_2) are deep, well-drained soils found on uplands of the Coastal Plain Physiographic Provinces (Matthews and Lavoie 1970). A typical profile of the Matapeake Series egins with a plowzone (Ap) of dark brown (10 YR 4/3) silt loam. Underlying the plowzone is an A-horizon of yellowish brown (10YR 5/4) silt loam. The subsoil is a yellowish brown (10YR 5/4) silt loam in the upper portion that transitions to a brown (7.5YR 5/4) silty clay loam in the middle and ends with a yellowish brown (10YR 5/6) very fine sandy loam at the base. The underlying material is a yellowish brown (10YR 5/6) fine sandy loam. Native vegetation on the Matapeake Series soils is primarily oaks and other mixed hardwoods (Matthews and Lavoie 1970:29).

The Mattapex Series (MtB_2) soil is a deep, moderately well drained soil of the Delaware Coastal Plain Physiographic Provinces (Matthews and Lavoie 1970). A typical profile of the Mattapex Series soil starts with a plowzone (Ap) of grayish brown (10RY 4/2) silt loam followed by an A-horizon of yellowish brown (10YR 4/4) silt loam. The subsoil begins with a dark yellowish brown (10YR 4/4) silt loam that transition through a yellowish brown (10YR 5/6 silt loam and a dark brown (7.5YR 4/4) silty clay loam and ends in a dark brown (7.5YR 4/4) silty clay loam with grayish brown (10YR 5/2) mottles. Below the subsoil is a yellowish brown (10YR 5/8) coarse sandy loam. Native vegetation on the Mattapex Series soils is dominantly oaks and other water tolerant hardwoods (Matthews and Lavoie 1970:30).

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

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

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

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

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

2.2 PREHISTORIC AND CONTACT PERIOD OVERVIEW

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

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

2.2.1 PALEOINDIAN PERIOD

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

2.2.2 ARCHAIC PERIOD

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

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

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

2.2.3 WOODLAND I PERIOD

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

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

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

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

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

2.2.4 WOODLAND II PERIOD

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

2.2.5 CONTACT PERIOD

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

2.3 HISTORIC OVERVIEW

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

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

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

2.3.1 EXPLORATION AND FRONTIER SETTLEMENT (1630-1730)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

2.3.2 INTENSIFIED AND DURABLE OCCUPATION (1730-1770)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

2.3.3 EARLY INDUSTRIALIZATION (1770-1830)

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

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

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

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

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

2.3.4 INDUSTRIALIZATION AND EARLY URBANIZATION (1830-1880)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

2.3.5 URBANIZATION AND SUBURBANIZATION (1880-1940+)

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

2.3.7 HISTORIC CONTEXT: AGRICULTURE OF NORTHERN DELAWARE

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

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

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

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

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

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

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

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

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

Property Types

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

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

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

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

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

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