Third Street Dam Project
Media Borough
Delaware County, Pennsylvania

PHASE I ARCHAEOLOGICAL SURVEY

ER #

by

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in conjunction with the
Pennsylvania Department of Transportation (PENNDOT)

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ABSTRACT

This report documents the results of a Phase I Archaeological Survey performed for the Third Street Dam Project in Media Borough, Delaware County, Pennsylvania. The project entails the reconstruction of the dam and roadway, and involves extensive filling on the downstream side of the dam. The Area of Potential Effect (APE) lies in the Piedmont Uplands Section of the Piedmont Physiographic Province and is centered around the existing dam and Third Street, which is to be replaced on the same alignment. The Phase I Archaeological Survey examined approximately 0.38 hectares (0.94 acres). Of that, approximately 0.37 hectares (0.91 acres) were assessed through a geomorphological investigation as having a very low potential for prehistoric archaeological resources due to road disturbance, slopes greater than 15 percent, or the presence of an extensive wetland. A small area in the southeast quadrant of the APE was assessed as having a low potential for historic archaeological resources. The Phase I Archaeological Survey tested an area in the southern portion of the APE, a parcel measuring approximately 0.01 hectares (0.03 acres). This is the second cultural resources report prepared for the project. Pennsylvania Historic Resource Survey (PHRS) Forms have been previously submitted. The dam itself has been determined to be not eligible for listing on the National Register of Historic Places. The cultural resources work was performed for the Borough of Media in conjunction with the Pennsylvania Department of Transportation (PENNDOT).

Through the geomorphological investigation, prehistoric archaeological potential within the APE was assessed as very low. The uplands are too steeply sloped (35 to 60 percent) and the terrace would have been too poorly drained to have been utilized by prehistoric populations. However, the background research indicated the presence of an icehouse located south of the dam in the late nineteenth century. The geomorphological investigation found possible corroboration for a building at this location in the compact, platey structure of one particular soil horizon which suggested the effects of compaction. Given the size of the ice house and its seasonal use, it was likely a frame structure set either directly on the ground, or on a shallow stone foundation. No significant research questions are likely to be addressed by the ruins or the building, if present. Few artifacts would be expected at such an industrial site. Therefore, historic archaeological potential within that portion of the APE was assessed as low. Based on this assessment of archaeological potential, the Phase I Archaeological Survey tested a very small area of the APE, measuring approximately 0.01 hectares (0.03 acres).

One shovel test pit (STP) was excavated on the east terrace, in the vicinity of the historically mapped icehouse. The shovel test pit was excavated to confirm if the soil horizons noted by the geomorphological examination of stream bank cuts in Soil Profile 1 extended further southeast within the APE. The historic artifacts recovered from the platey, compacted soil horizon possibly associated with the icehouse (IIC2 Horizon) were limited both in number (N=16) and diagnostic value. Three pieces of colorless bottle glass, three fragments of terra cotta flowerpot, nine small brick fragments (11.3 grams) and one piece of coal were found. None of the recovered artifacts are temporally diagnostic to the late nineteenth century. No structural evidence of the icehouse was found, either in the form of foundations, related features or architectural-related artifacts. Therefore, this will not be considered an archaeological site. Furthermore, it is unlikely that additional excavations would yield significant information. Artifactual deposits would be expected to be limited in the vicinity of a utilitarian structure such as an icehouse, and would most likely have very little research value. Therefore, no additional work is recommended within the APE.

CONTENTS

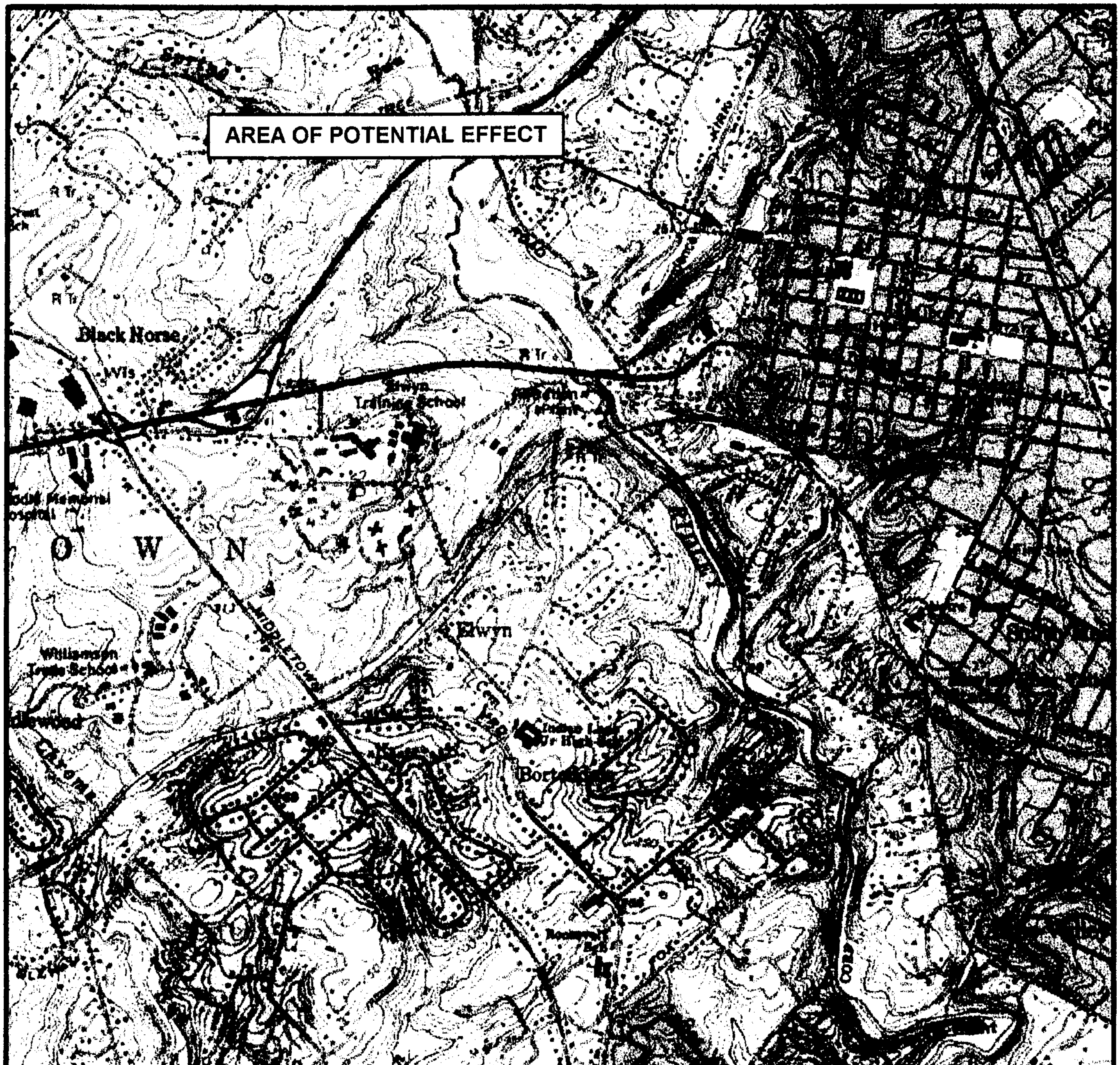
LIST OF ILLUSTRATIONS

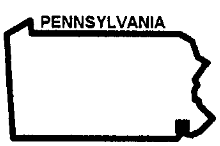
INTRODUCTION

This report documents the results of a Phase I Archaeological Survey performed for the Third Street Dam Project in Media Borough, Delaware County, Pennsylvania (Figure 1; USGS 1994). The project entails the reconstruction of the dam and roadway, and involves extensive filling on the downstream side of the dam. The Area of Potential Effect (APE) lies in the Piedmont Uplands Section of the Piedmont Physiographic Province and is centered around the existing dam and Third Street, which is to be replaced on the same alignment. The Phase I Archaeological Survey examined approximately 0.38 hectares (0.94 acres). Of that, approximately 0.37 hectares (0.91 acres) were assessed through a geomorphological investigation as having a very low potential for prehistoric archaeological resources due to road disturbance, slopes greater than 15 percent, or the presence of an extensive wetland. A small area in the southeast quadrant of the APE was assessed as having a low potential for historic archaeological resources. The Phase I Archaeological Survey tested an area in the southern portion of the APE, a parcel measuring approximately 0.01 hectares (0.03 acres). This is the second cultural resources document prepared for the project. Pennsylvania Historic Resource Survey (PHRS) Forms have been previously submitted. The dam itself has been determined to be not eligible for listing on the National Register of Historic Places. The cultural resources work was performed for the Borough of Media in conjunction with the Pennsylvania Department of Transportation (PENNDOT).

This Phase I Archaeological Survey was conducted in keeping with federal and state laws that protect significant cultural resources, including historical and archaeological sites. Federal and state mandates for cultural resources protection include: The Federal Highway Act of 1966, as amended in 1968; the National Environmental Policy Act of 1969; the National Historic Preservation Act of 1966 (as amended); Executive Order 11593; the Archaeological and Historic Preservation Act of 1974; and the Commonwealth of Pennsylvania State Act No. 1978-273, amended as Act No. 1988-72. This legislation requires that the effect of any federally-assisted undertaking on historically significant buildings, structures, objects or sites be taken into account during project planning. All work was performed in accordance with 36 CFR §800 and the Pennsylvania Historical and Museum Commission's (PHMC) *Cultural Resource Management in Pennsylvania: Guidelines for Archaeological Investigations* (PHMC 1991).

The research and field analysis for this project were undertaken during November and December 2001. The work was performed by Cultural Heritage Research Services, Inc. (CHRS) of North Wales, Pennsylvania. Thomas R. Lewis served as the Principal Investigator. Paula Miller was the Project Manager. Historic research was conducted by Philip Ruth. Geomorphological studies were conducted by Laurel Mueller of Soil Services Company, Inc. Graphics for the report were prepared by Bradley Harrison and editorial work was executed by Lisa Shafer of the CHRS staff (Appendix A). This report was prepared under contract to the Borough of Media, Pennsylvania.



QUADRANGLE LOCATION	SCALE	SOURCE
 PENNSYLVANIA	0m 609.5m 0ft 2000ft *Prepared by CHRS, Inc.*	USGS, 1994 MEDIA, PA

PROJECT LOCATION MAP

THIRD STREET DAM PROJECT, MEDIA BOROUGH, DELAWARE COUNTY, PENNSYLVANIA, PHASE I ARCHAEOLOGICAL SURVEY	FIGURE 1

BACKGROUND RESEARCH

Introduction

Background research was conducted in order to identify and provide a context for evaluating cultural resources within and immediately adjacent to the Area of Potential Effect (APE). Repositories and/or personnel consulted include those associated with the Pennsylvania Historical and Museum Commission (including the Pennsylvania Bureau for Historic Preservation), the Pennsylvania State Archives, the Delaware County Courthouse, the Delaware County Historical Society, and the Media Borough Historic Archives at the Media and Upper Providence Free Library (see table below). A variety of source materials were consulted, including regional and municipal histories, historical and archaeological resource files, as well as environmental, geological, archaeological, and other pertinent studies. Historic maps were consulted in an attempt to identify and pinpoint the locations of historic structures in the vicinity of the APE.

Institution/Repository	Records Consulted
Pennsylvania Historical and Museum Commission	Environmental resource reports
Pennsylvania State Archives	Historic maps, aerial photographs, regional histories
Delaware County Courthouse	Deed records, miscellaneous County records
Delaware County Historical Society	Regional histories, historic maps, census records, tax records, newspaper archives, genealogical records
Media Borough Historic Archives, Media and Upper Providence Free Library	Regional histories, historic maps, newspaper archives

Environment

The study area lies within the Piedmont Uplands Section of the Piedmont Physiographic Province. The underlying geology consists of the Oligoclase-Mica Schist group within the Wissahickon Formation. The Oligoclase-Mica Schist group includes some hornblende gneiss, some augen gneiss, and some quartz-rich and feldspar-rich members. Composition varies with degree of granitization. This group probably formed during the Lower Paleozoic Geological Era (Socolow 1980). The soils are comprised of the Glenelg-Manor-Chester association, which are shallow to deep, silty and channery soils on grayish-brown schist and gneiss (Kunkle 1963). Wedhadkee silt loam (We) dominates the APE, but a small area of Manor soils, 35 to 60 percent slope (MkF) is present in the southwest quadrant (Kunkle 1963). Soils of the Wehadkee series are deep, poorly to very poorly drained, and occur on floodplains. Conversely, Manor soils are shallow and well drained, and occur on uplands. The regional hydrology is part of the Lower Delaware River subbasin. The study area lies along an unnamed tributary of Ridley Creek, approximately 914.4 meters (3,000 feet) upstream (northeast) of the confluence. Ridley Creek then flows southeast for approximately 12.63 kilometers (7.85 miles) toward a confluence with the Delaware River.

Pennsylvania has undergone radical changes in environment during the last 15,000 years. The Pleistocene climate was colder and dryer than present conditions. During this period, a forest tundra mosaic was likely to have existed, consisting of spruce stands intermingled with dwarf birch (Watts

1979). As the climate became warmer following the retreat of the Wisconsin glaciation, fir, pine, and alder entered the forest mosaic. Birches were present by 13,000 BP, and hemlock and chestnut appeared by ca. 8,000 BP (Watts 1979). Although the forest species continued to shift until ca. 1,500 BP, conditions similar to the modern forest were probably present by 5,000 BP (Carbone 1976; Stewart 1981).

The study area is located in the Temperate Deciduous Forest Biome of North America (Shelford 1964:18). This biome, under pristine climax forest conditions, is a multi-layered forest with different species dominating the various layers. Large trees (oak, chestnut, hickory, elm, beech and maple) form the canopy with young members and smaller species (dogwood, sassafras and horn-beam) just below. Immediately beneath this understory tree layer is a bi-level shrub layer, under which is a bi-level herb layer (Shelford 1964:26). This diverse multi-layer forest provides many resources for animal and human exploitation, including food (nuts, seeds, berries and fruit), fuel, wood, fiber and various plant products used for dyes and medicinal purposes.

At the time of European settlement, the forests in this region were not completely untouched; Amerind exploitation for thousands of years had modified considerable portions of them. The effects of the activities of these original inhabitants were minimal, however, when compared to the impact of the Europeans. The extensive clearing of the existing forests for fuel, lumber, and agricultural purposes, rapidly destroyed the integrity of the existing biotic community. Similarly, the faunal resources (elk, deer, bear, wolf, fox, rabbit, hare, beaver, turkey, partridge, pigeon and other fowl) had been exploited by the Amerind populations. Their habitats were largely destroyed by European settlement, causing severe depletion. However, this region contained an abundance of resources for the prehistoric and early historic populations.

Prehistory

Evidence from prehistoric sites in the eastern United States indicates a number of successive regional cultural traditions. Although the exact number and nature of these traditions, which varied locally, remains the subject of debate, three major cultural periods can be defined: Paleo-Indian, Archaic, and Woodland. These traditions are best viewed as responses to changing social and environmental conditions.

The Paleo-Indian Tradition, 12,000 - 8,000 BC: The earliest, widely recognized tradition in the northeastern United States is the Paleo-Indian. This tradition is believed to have been characterized by small hunter-gatherer groups subsisting mainly on large mammals, many of which are now extinct or no longer present in the area (woolly mammoth, mastodon, and caribou). The artifact distinctive to this tradition is the fluted projectile point, lanceolate-shaped with a central flake removed from both faces along its longitudinal axis. This and related tools have been found in association with various floral and faunal resources in sites across the eastern United States (Funk 1969; Gardner 1974; Adovasio 1977; Dent and Kauffman 1978). This evidence suggests that the Paleo-Indian population exploited a wide variety of terrestrial subsistence resources. The Paleo-Indian Period is marked by specific cultural ecological adaptations to the Pleistocene and Early Holocene environments. Custer (1984, 1985) has outlined the expected site types for the Paleo-Indian Period and they include the following: quarry, quarry reduction, base camps, base camp maintenance stations, and hunting sites. Based upon the present data, Paleo-Indian and Early

Archaic occupations in the Piedmont Province tend to be small procurement related encampments associated with small upland bogs, sinkholes, and poorly drained areas in floodplains (Custer and Wallace 1982). The larger sites or base camps are quarry-related (i.e., lithic resource focus) and located near major waterways (Gardner 1978; Custer 1984). The Coastal Plain section of southeastern Pennsylvania may have the potential to contain some of these sites in part because of a suspected high paleo-environmental and lithic resource potential. However, the virtual absence of high quality crypto crystalline materials in the Piedmont Province suggests that few of this site type would be present within this region.

A number of tools diagnostic of the Paleo-Indian Tradition have been found in the Delaware and Schuylkill River Valleys (Mason 1959; Zatz et al. 1985); however, no recorded specimens have been found in the immediate vicinity of the Area of Potential Effect.

The Archaic Tradition, 8,000 - 1,000 BC: The Archaic Tradition emerged from the Paleo-Indian with a more generalized subsistence strategy in response to changing environmental and, perhaps, social conditions. Approximately 10,000 years ago, as glacial conditions slowly gave way to the warmer Holocene climate, hardwood forests gradually replaced the tundra-like vegetation (Sirkin 1977:214). The socio-cultural response to the climatic amelioration and resultant environmental diversification was one of resource exploitative expansion in terms of biotic and lithic consumption. The Early Archaic settlement pattern for the Piedmont Province is similar in southeastern Pennsylvania to the Paleo-Indian Period which is characterized by the presence of small hunting sites in association with upland bogs, sink holes, and poorly drained areas in floodplains (Custer and Wallace 1982; Custer 1985).

The period of time that signals the cultural adaptation to the fully emergent Holocene milieu is the Middle Archaic division. Settlement patterns in the Piedmont Province are thought to be focused on upland slopes adjacent to ephemeral streams and spring heads, and toes of slopes extending into swampy floodplains of the larger drainages (Custer and Wallace 1982:154). The dominant site type is inferred to be procurement or hunting. The focus for base camps in this province is projected to be the extensive swamp lands (Custer and Wallace 1982:34). Changes in habitat are reflected in cultural artifacts by the presence of new tool types (Bryan 1977:363).

Evidence suggests that Archaic peoples lived in small nomadic groups (Cushman 1981:9). The resources exploited varied on the basis of local availability. This factor, coupled with the types and quantities of the lithic materials employed in toolmaking, result in different artifact assemblages at different sites. It is therefore difficult to characterize a typical regional Archaic tool assemblage. Archaic assemblages are, however, clearly distinguished from those of the preceding Paleo-Indian Tradition by the replacement of fluted points with smaller points of cruder materials and the emergence of grinding and ground stone tool (axes, chisels, and gouges) technologies. In general, tool assemblages from this tradition are marked by increasing diversification and specialization through time.

The increased number of sites dating to the Archaic is evidence that population density was greater during the Archaic than it was during the Paleo-Indian Tradition. This increase in population density was possible because, as climatic fluctuations stabilized and hardwood forests became established, the carrying capacity of the environment increased. In addition, the warming trend caused a rise in the sea level which allowed for the formation of extensive marshes and estuaries along the Delaware River. As resources became more abundant in and around major waterways and marshes, settlement was increasingly focused along them (Kraft 1977; Gardner 1980). Despite this trend, there is evidence of continued seasonal nomadism based on a resource-scheduling strategy (Cushman 1981:12).

During the Late Transitional Archaic, trade—particularly in non-local lithic material—expanded and new artifact forms, such as steatite (soapstone) vessels, were used. These attributes are born out by the large number of sites and by the more diverse cultural assemblages found in the region from this cultural period. A larger population with more diverse procurement activities is likely to increase the importance of upland areas in the region during this period. Custer (1985), feeling a continuity in resource exploitation, combines the traditional Late Archaic, Early Woodland, and Middle Woodland Periods together under the term Woodland I. This division is marked by the following items: "focus on the highest productivity settings, an intensified use of certain resources, appearance of large semi-sedentary macro-band base camps, development of storage and processing facilities, extensive use of a wide range of environments, development and maintenance of trade and exchange networks, and the appearance of incipient ranked societies" (Custer 1985:36-37).

Settlement locations for the Woodland I Period in the Piedmont Uplands are thought to closely resemble the Middle Archaic pattern (Custer and Wallace 1982:158). These small procurement site-types are postulated to be found in the following settings: upland slopes adjacent to ephemeral streams and spring heads, and toes of slopes extending into swampy floodplains of the larger drainages (Custer and Wallace 1982:154). Additionally, the presence of base camps is strongly suggested for the first time in this province (Custer 1985:39). The base camp locations are thought to be associated with well-drained ground adjacent to sink holes, swampy floodplains, or interior swamps (Custer and Wallace 1982:158).

<u>The Woodland Tradition, 1,000 BC - AD 1500</u>: Traditionally, the beginning of the Woodland Tradition in this region is marked by the introduction of ceramics (Gardner 1980:3) and by two major trends: increasing sedentism and the development of extensive agriculture (Curry and Custer 1982:4; Cushman 1981:14). During the Woodland Tradition permanent or semi-permanent settlements replaced the seasonal base camp. Settlement patterns derived from sites dating to this period are focused on major waterways (Curry and Custer 1982:1) where the exploitable biomass was the greatest. The harvesting of various plants, waterfowl, fish, and shellfish would have provided a more than adequate supply of food. These waterways supplied relatively easy transportation and also facilitated trade, increasing the range and quantity of resources that could be exploited. The Late Woodland (Custer's "Woodland II") Period is generally characterized by the introduction of maize and squash cultigens and the appearance of sedentary villages. These developments were neither unilateral or temporally concomitant throughout the Mid-Atlantic region.

The Late Woodland Period reflects a continuation of similar land use patterns and settlement locations to the earlier Late Archaic-Early through Middle Woodland Periods. The major difference appears as an "increasing use of floodplain settings for relatively large semi-sedentary communities and the habitation-utilization of certain levees along major drainages" (Custer and Wallace

1982:159). The results from Stewart's (1981) work on prehistoric settlement and subsistence patterns in the Great Valley of Maryland are congruous with Custer's study. He found a wide variety of ecotonal settings have supported both the small hunting-procurement type site and the large base camp site within the Late Archaic to Late Woodland Periods. Stating the obvious, it appears that the primary determinant of prehistoric settlement pattern distributions, excluding mortuary or ceremonial sites, is the location of water resources (Stewart 1981; Custer and Wallace 1982; Hatch et al. 1985; Snethcamp and Ebright 1982; Gardner 1987). Stewart and Kratzer (1989:28) in their study of the Allegheny Plateau found that the significant site predictive factors translate into a combination of landform type and proximity to surface water. Custer's (1985) research into the lithic scatter sites of the Piedmont Uplands is consonant with Stewart's contention. He found that the most common topographical setting was the upland slope, and 67 percent of the sites are located within 40 meters (131.23 feet) of surface water.

The Contact Period, AD 1500 - 1750: The Late Woodland Period ended with European contact, which appears in the archaeological record as an intrusion of European artifacts into Late Woodland assemblages. At the time of Native American/European contact, relations between the two groups took various forms, usually beginning as trade interactions and religious proselytization. Relations then often proceeded to armed conflict, ultimately leading to the displacement of Native populations.

At the time of European forays into southeastern Pennsylvania, the Lenapes (Delawares) occupied the region. Interaction with the Europeans in the early period consisted primarily of the Swedish and Dutch fur trade on the Delaware River. Becker (1985) suggests that the Lenape may have altered their settlement pattern to a more sedentary and concentrated form as a response to a commensurable relationship with Europeans. He suggests that in the 1660s the Lenape were concentrated in the flatlands of Passyunk in what is now southern Philadelphia (Becker 1985:48). At the end of Dutch rule in the area, and with the dispersion of the Minquas by the Seneca, the Lenape may have returned to a dispersed settlement pattern. By the 1680s the Lenape may have operated with the settlement system of one extended family band per feeder river (Becker 1985:50); however, the evidence for such a conclusion is scanty. The Lenape groups were gradually displaced by the Europeans in southeastern Pennsylvania. Lenape groups began arriving in the Susquehanna River area in the 1680s. Some groups were forced further west by the Iroquois as early as the 1720s (Kraft 1986). In 1742, the coastal Delaware Indians groups which remained in eastern Pennsylvania were asked by Governor Thomas to move to the Susquehanna River. In the Treaty of Lancaster of 1744, all of the Indians still remaining in the Lower Delaware River Valley were ordered to leave (Kraft 1986:233).

Regional PASS Data

Four sites have been recorded in the vicinity of the APE. Site 36De1 is listed in the PASS files as a jasper quarry, and is located approximately 1828.8 meters (6,000 feet) west/southwest of the APE. Two of the sites date to the eighteenth and nineteenth centuries. A colonial mill complex is situated on a terrace along Ridley Creek, approximately 670.56 meters (2,200 feet) southwest of the APE. The Rose Tree Tavern, which is vacant but extant, is located approximately 1783.08 meters (5,850 feet) north of the APE. No information was provided in the PASS files for Site 36De714, located 1076.88 meters (5,600 feet) southwest of the APE, although based on the mapped location, it appears to be historic.

Study Area History

The Area of Potential Effect (APE) encompasses the Media Dam, which is located beneath West Third Street in the Borough of Media, Delaware County (Figure 1; USGS 1994). Broomall's Lake lies to the north of the dam; Glen Providence Park lies to the south. An unnamed tributary of Ridley Creek flows from Broomall's Lake, through an aperture in the dam, and into Glen Providence Park.

A map of Media Borough and Upper Providence Township published in 1875 indicated that, as of that year, the APE was included in a large unseated tract of land owned by "J. M. Broomall," lying partly in Media and partly in Upper Providence (Figure 2; Everts & Stewart 1875). Owner John M. Broomall was a Delaware County judge, a Civil War-era Congressman, and a friend of Abraham Lincoln. In 1883, Broomall constructed the barrier known today as "the Media Dam" across the mouth of an abandoned quarry on his land. His intent was to "dam up" the spring-fed quarry so that a reservoir formed behind the barrier of earth and stone. From the surface of this reservoir Broomall's employees would then harvest ice in the winter, store it in a nearby ice house, and market it throughout the Media area during the warmer months of the year (Janco 1994:MD1).

The dam constructed under Broomall's direction, measuring 152.4 meters (500 feet) in length and 8.83 meters (29 feet) in height, had the desired effect and gave rise to a reservoir that came to be known as "Broomall's Lake" (Janco 1994:MD1). A large bulkhead referred to as "the headgates" was installed in the dam to allow Broomall's Lake to be emptied from time to time, but there is no record that the bulkhead was ever used for this purpose (Broomall's Lake County Club 1984:1). To facilitate boating on the lake, Broomall built a two-story frame boathouse with a small upstairs porch (Janco 1994:MD1). On the south side of the dam, Broomall constructed the ice house used to warehouse ice harvested from the lake. The footprints of Broomall's ice house and boat house were depicted on a map of Media Borough published in 1892 (Figure 3; Miller 1892).

After Broomall's death in 1894, his extensive real estate holdings were sold off. Broomall's Lake, the dam that had created it, and additional acreage north of the dam were purchased in 1896 by members of the Longstreth family of nearby Sharon Hill Borough. The Delaware County Fish Protective and Anglers Association began leasing the Lake around this time (Broomall's Lake Country Club 1984:1).

In 1917, members of the Palmer family purchased the northern portion of the former Broomall Property—including Broomall's Lake and its dam—from the Longstreths (Broomall's Lake Country Club 1984:1). In 1919, 4.71 hectares (11.65 acres) encompassing Broomall's Lake were purchased from the Palmer family by the newly-formed Media Swimming and Rowing Club, the goal of which was to "maintain a club for social enjoyment and the encouragement of athletic sports" (Janco 1994:MD1; Broomall's Lake Country Club 1984:1). The club hosted swimming and diving competitions on the lake every Fourth of July for a number of years. A particularly memorable competition was held in 1926 as part of the celebration of the nation's sesquicentennial. Around this time, a wooden diving tower measuring 9.14 meters (30 feet) in height was constructed

Prepared by CHRS, Inc.

0m 609.5m
0ft 2000ft

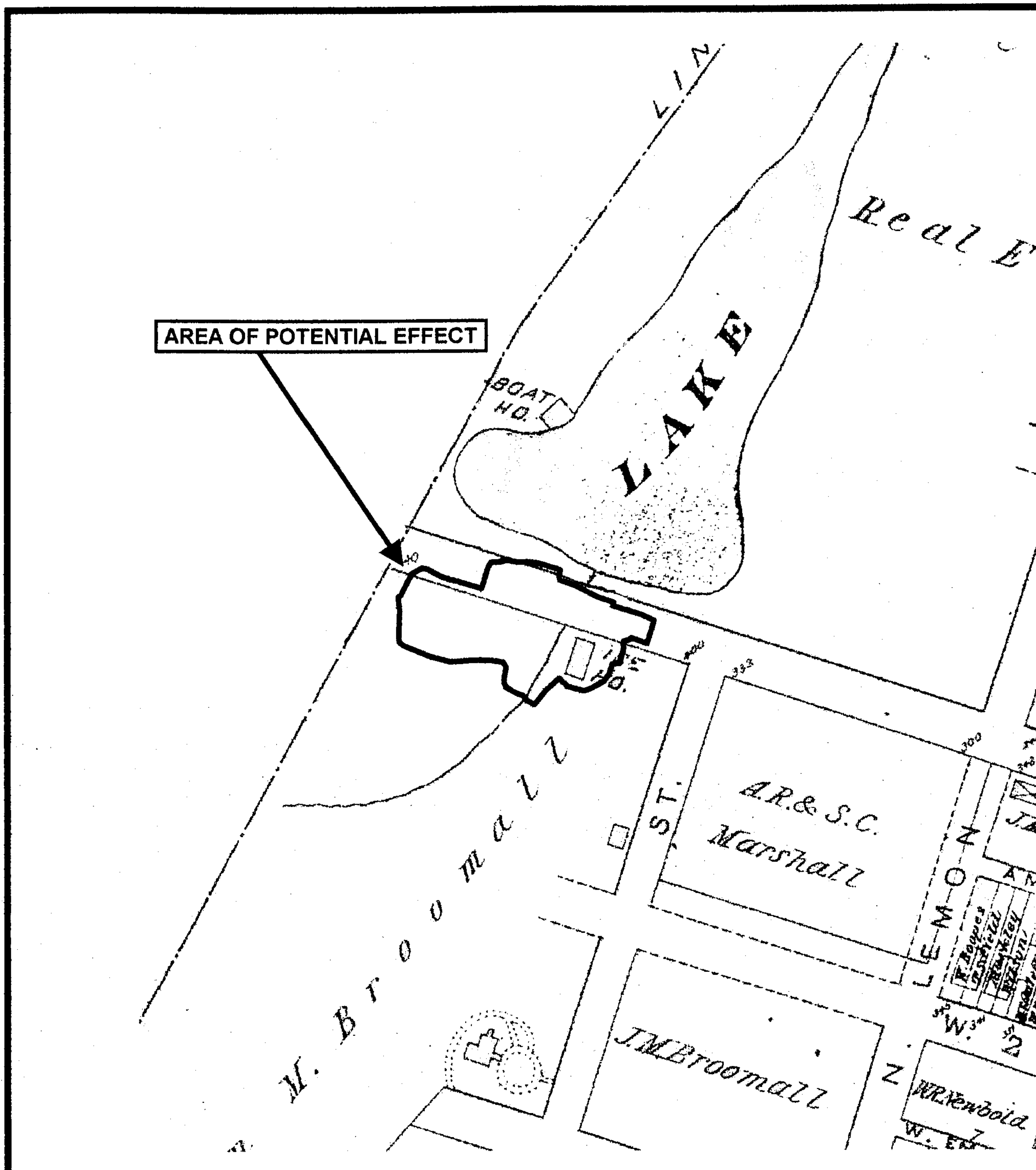
SOURCE:

EVERTS & STEWART
1875

STUDY AREA CIRCA 1875

THIRD STREET DAM PROJECT, MEDIA BOROUGH, DELAWARE COUNTY, PENNSYLVANIA, PHASE I ARCHAEOLOGICAL SURVEY

FIGURE 2



N Prepared by CHRS, Inc.	0m 54.86m 0ft 180ft APPROXIMATE SCALE	SOURCE: MILLER 1892

STUDY AREA CIRCA 1892

THIRD STREET DAM PROJECT, MEDIA BOROUGH, DELAWARE COUNTY, PENNSYLVANIA, PHASE I ARCHAEOLOGICAL SURVEY — **FIGURE 3** and put into operation. This tower was reduced to half that height six years later, and in 1938 it was replaced altogether by a 4.57-meter (15-foot) galvanized steel tower with a concrete base. Several floating rafts were also deployed on the lake. In wintertime, the frozen surface of Broomall's Lake was used for ice skating. The landscaped shoreline and wooded grounds surrounding the lake were increasingly regarded as "romantic" (Broomall's Lake Country Club 1984:2).

On the south side of the Media Dam—where Glen Providence Park is presently located—a parcel of the late John Broomall's land was acquired after 1894 by John B. Townsend, and then, in 1905, by attorney George T. Butler and his wife. Butler was a son of William Butler, who sat on the bench in both Chester and Delaware Counties. The younger Butler had been admitted to the Delaware County Bar in 1893, and he practiced in that capacity for more than a half-century (Wheelock 1944:n.p.).

There were no public parks in Delaware County in 1933, when a Delaware County Park Board was organized. A prime mover in this park-building initiative was long-time Delaware County resident and nature-lover Samuel L. Smedley, whose namesake uncle had helped lay out Philadelphia's Fairmount Park (Wheelock n.d.:n.p.). Smedley served as the Delaware County Park Board's first President. Under his leadership, the Board created its first park in 1936, on approximately 10.11 hectares (25 acres) of land south of the Media Dam, which was donated by George Butler and his wife for the purpose of providing the community with an arboretum and bird sanctuary. Mrs. Butler named the new park "Glen Providence" (Votaw 1949:n.p.; Anonymous n.d.:n.p.). A plaque mounted at the main entrance to the Park indicates that additional land for the Park was acquired from James J. Skelly and the Media Swimming and Rowing Club.

According to a visiting reporter, at the time of its creation Glen Providence Park was already endowed with a variety of ferns, shrubs, flowers, berry bushes, vines, grasses, and trees. To make it even more attractive to both animals and men, laborers under the Works Progress Administration excavated a pond near the center of the Park, and ringed it with a network of paths (Anonymous n.d.). In the coming years, this pond—sometimes referred to as "Mirror Lake"—was stocked with perch, bass, and sunfish, and additional varieties of trees were introduced to the Park by individual donors and organizations such as the Back to Nature Club of Philadelphia, the Girls Club of Upper Providence, and the Field and Stream Club (Votaw 1949:n.p.; Wheelock 1944:n.p.).

By mid-1944, a guard house had been erected near a stone plaza marking the main entrance to the Park, which had become known as a "bird haven" (Wheelock 1944:n.p.). In a newspaper article published in October 1949 the Park was described as "one of the scenic spots in Delaware County." Among its appointments at that time were a number of bridges, lighting fixtures around the lake (which facilitated night-time ice skating), and a cabin where first aid could be administered (Votaw 1949:n.p.). The addition of an amphitheater to the grounds literally set the stage for outdoor concerts and community gatherings such as Easter sunrise services.

Over time, Broomall's Lake became clogged with silt, and was eventually deemed unfit for public bathing. Swimming was last permitted there in the summer of 1967. In March of that year, the boathouse was destroyed by fire. Later that summer, a bathhouse was erected on the site of the old boathouse. Two years later, this bathhouse was converted into the Lake View Club House, and an Olympic size swimming pool was added to the facilities. It was at this time that the name of the club was changed to "Broomall's Lake Country Club" (Broomall's Lake Country Club 1984:3). Tennis courts were added to the complex in the early 1970s. An apartment for the club manager and an equipment storage building were constructed in 1975. In the late 1970s, the dock at the lake was replaced, and in the early 1990s the Lake View Club House was further expanded (Broomall's Lake Country Club 1984:8).

As areas to the east and west of the Media Dam experienced residential and commercial development in the mid-twentieth century, Third Street was extended westward from downtown Media toward Upper Providence Township. The extension was laid along the top of the Media Dam. The dam was declared unsafe for vehicular traffic in the 1980s, and so West Third Street was closed. An assessment of the dam in 1996 indicated that it had continued to erode, and portions of the roadway spanning the dam had deteriorated (Serbin 1997:32).

FIELD DATA

Introduction

The goal of this Phase I Archaeological Survey was to identify the presence of any archaeological resources present within the area of the Third Street Dam Project in Media Borough, Delaware County, Pennsylvania (Figure 1; USGS 1994). According to 36 CFR §800.16(d), the Area of Potential Effect (APE) for any proposed undertaking is defined as "the geographic area or areas within which an undertaking may cause changes in the *character* or *use* of historic [or archaeological] properties, if any such properties exist." The APE for this project consists of the area in which ground disturbance related to bridge replacement activities will occur. The Area of Potential Effect (APE) defined in this report is centered around the existing dam and Third Street, which is to be replaced on the same alignment. The APE begins approximately 31.69 meters (104 feet) east of the spillway and ends approximately 38.7 meters (127 feet) west of the spillway (Figure 4). North of the Third Street Dam, the APE encompasses a small portion of land between the dam and Broomall's Lake that is disturbed and rather steep. South of the Third Street Dam, the APE expands to a length of approximately 91.44 meters (300 feet) and approximately 33.52 meters (110 feet) to the south. The total area of the APE measures 0.38 hectares (0.94 acres).

The archaeological field study included a geomorphological survey and archaeological excavation. The geomorphological survey was performed by Laurel Mueller of Soil Services Company, Inc. (Appendix E). The geomorphological survey was conducted for the purpose of determining the archaeological potential of the soils within the APE. The objective of the geomorphological investigation was to estimate the relative ages and origin of the soil strata and geomorphic surfaces, and to locate the areas and depths with the greatest probability for finding cultural resources (Mueller 2002:2). The geomorphological survey entailed examinations of soil profiles and delineation of landforms within the APE's landscape.

A complete artifact inventory is included in Appendix B. Shovel test pits were excavated according to natural soil stratigraphy. All soil was screened through 0.63-centimeter (0.25-inch) hardware cloth. All recovered artifacts were bagged according to unit and stratum. Information regarding Munsell soil color, texture, depth, and artifacts recovered was recorded on excavation record forms. Photographs were taken using color slide and black and white print film. All artifactual material recovered was processed, inventoried, and cataloged according to *Cultural Resource Management in Pennsylvania: Guidelines for Archaeological Investigations* (Pennsylvania Historical and Museum Commission 1991).

Field Results

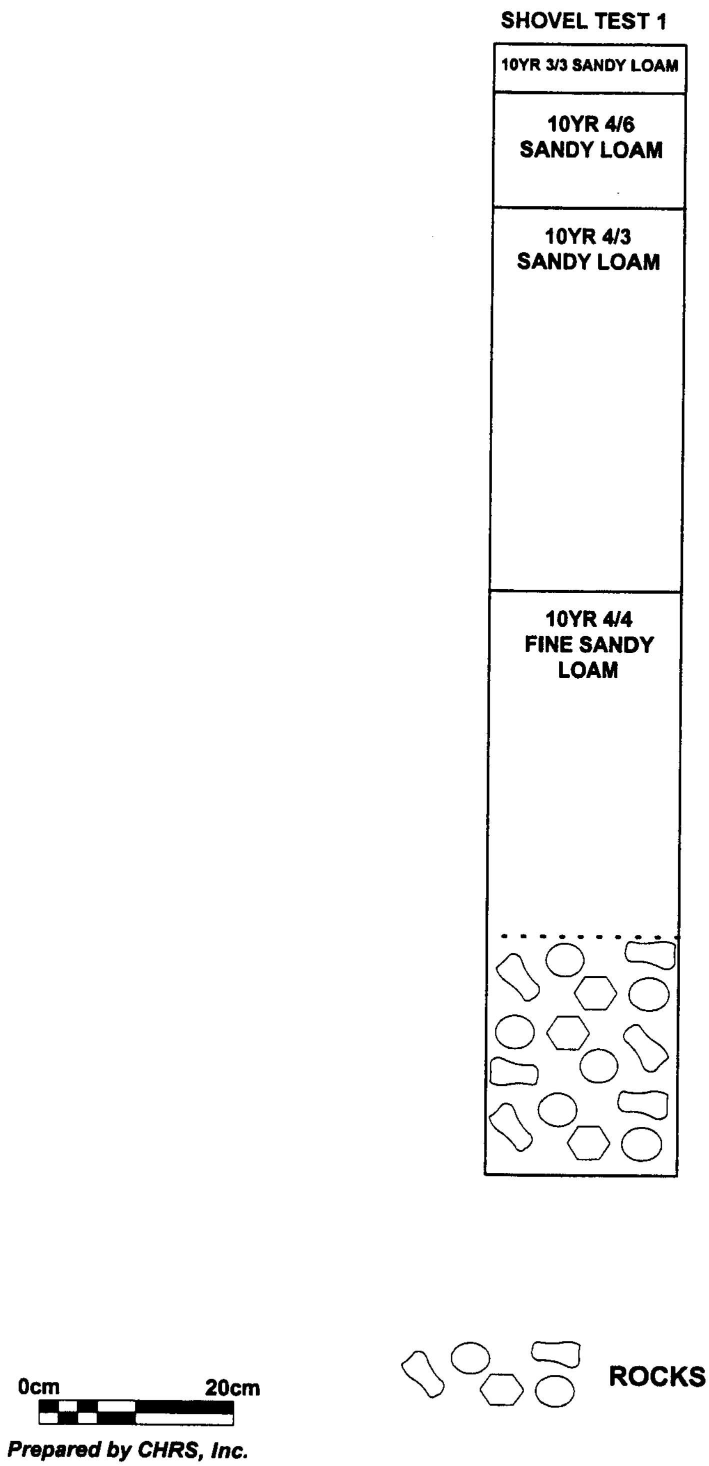
The APE is made up of steeply sloping uplands and a floodplain terrace. The upstream portion of the APE is limited to the dam fill and was considered to have low archaeological potential. The downstream portion of the APE (south of the Third Street Dam) where the geomorphological survey was conducted is a gently sloping, wooded floodplain terrace (Appendix D, Plate 1). Two detailed soil profile descriptions were made at eroded banks along the stream (Figure 4, Soil Profiles 1 and 2). These cuts provided an opportunity to view greater depth than could be reached with hand equipment, and the sample locations were representative of the east and west side terraces (Mueller 2002:9). The terrace on the east side of the stream is several feet higher, and is more convex in shape, than the terrace on the west side. The geomorphological examination on the east side (Figure 4, Soil Profile 1) revealed "deposition from a recent flooding event in the A and C1 horizons [zero to 55 centimeters]" (Mueller 2002:10). The IIC2 to IIC5 horizons are fill soil containing modern and historic artifacts. The soil appears "to have been removed from poorly drained and very poorly drained settings" (Mueller 2002:10). The IIC2 horizon (55 to 80 centimeters), (i.e., strong, fine, firm consistence, platy structural nature, and with little evidence of rooting) shows that "this surface served some form of heavy traffic that was compacted during wet times" (Mueller 2002:10). Historic maps indicate that the icehouse was in this vicinity. There are no intact surfaces from 80 to 240 centimeters. The fill soils overlay the natural bluish clayey subsoil of a former wetland, present at 240 centimeters. "This massive gleyed subsoil has been saturated and/or inundated since its deposition" (Mueller 2002:10). This horizon is typical of the subhorizons of hydric soils that form near the headwaters of springs in gneiss and schist geology (Mueller 2002:10). Pleistocene-age deposits are encountered at 280 centimeters (Mueller 2002:10).

The terrace to the west of the stream is dominated by wetlands. The geomorphological examination on the west side (Figure 4, Soil Profile 2) revealed fill material associated with the dam berm to a depth of ten centimeters. This fill overlays the subsoil of a wetland (B/C Horizon) which has "oxidized rhizospheres," indication that the plants live in saturated conditions (Mueller 2002:11). Horizon IICgl (20 to 45 centimeters) has stronger redoximorphic features (Mueller 2002:11). Horizon IICg2 (45 to 70 centimeters), comprised of gleyed fine sandy clay, is perpetually submerged. Below the clay which supports the hydrology of the wetland, the strata makes a transition to a more permeable loamy sand in the IIICg3 horizon. The strata are underlain by weathered bedrock that lines the channel bottom. There are no Pleistocene sediments, only the pre-Pleistocene bedrock. "In that there is no evidence of structural development below 20 centimeters..., it appears that the Holocene sediments have been saturated, and supporting a wetland or slowly meandering portion of a stream bottom, since deposition" (Mueller 2002:11).

Through the geomorphological investigation, prehistoric archaeological potential within the APE was assessed as very low (Mueller 2002:11). The uplands are too steeply sloped (35 to 60 percent) and the terrace would have been too poorly drained to have been utilized by prehistoric populations. However, the background research indicated the presence of an icehouse located south of the dam in the late nineteenth century (Figure 3; Miller 1892). The ice house appears to have been nearly forth feet long and twenty feet wide and would have covered much of the area to be tested within this portion of the APE. The geomorphological investigation found possible corroboration for a building at this location in the compact, platey structure of one particular soil horizon which suggested the effects of compaction. Given the size of the ice house and its seasonal use, it was likely a frame structure set either directly on the ground, or on a shallow stone foundation. No significant research questions are likely to be addressed by the ruins or the building, if present. Few artifacts would be expected at such an industrial site. Therefore, historic archaeological potential within that portion of the APE was assessed as low. Based on this assessment of archaeological potential, the Phase I Archaeological Survey tested a very small area of the APE, measuring approximately 0.01 hectares (0.03 acres).

Shovel Test Pit 1 was excavated on the terrace, approximately 19.81 meters (65 feet) south of the dam and approximately 16.76 meters (55 feet) east of the spillway (Figure 4; Appendix D, Plate 2). The shovel test pit was excavated to confirm if the soil horizons noted by the geomorphological examination of stream bank cuts in Soil Profile 1 extended further southeast within the APE. The A Horizon, a dark brown (10YR 3/3) sandy loam, extended from ground surface to a depth of five centimeters. No artifacts were recovered from this stratum. Below this was a stratum of dark yellowish brown (10YR 4/6) sandy loam to a depth of 17 centimeters. No artifacts were recovered from this stratum. The C1 Horizon was a brown (10YR 4/3) sandy loam, and extended from 17 to 52 centimeters below ground surface. Within this stratum, the soil consistency transitions with depth to a coarse sandy loam, probably indicating a change in deposition resulting from a single flood event. Recovered artifacts include whiteware, amber, green and colorless bottle glass, brick (15.4 grams), tyrofoam, and coal. The remainder of the horizons encountered within the STP are all fill material. The IIC2 Horizon was a compact, dark yellowish brown (10YR 4/4) fine sandy loam to 93 centimeters. Terra cotta flowerpot fragments, colorless bottle glass, brick (11.3 grams) and coal were recovered from this stratum. Below the IIC2 Horizon, excavations encountered a stratum containing many rocks which, considering the depth of the STP, proved too rocky to be able to be excavated. According to the geomorphological investigation several feet away (Figure 4, Soil Profile 1), this soil corresponds to the IIC3 Horizon, a dark yellowish brown (10YR 5/6) very gravelly sandy loam with 15 to 35 percent angular schist coarse fragments. A fragment of whiteware was observed in this horizon during the geomorphological investigation. A profile of STP 1 is provided in Figure 5. In Soil Profile 1, the fill horizons extended to a depth of 240 centimeters, at which point the natural subsoil was encountered, a blue (5PB 4/1) very fine sandy clay which has been perpetually submerged (Mueller 2002:10).

The historic artifacts recovered from the soil horizon possibly associated with the icehouse (IIC2 Horizon) were limited both in number (N=16) and diagnostic value. Three pieces of colorless bottle glass, three fragments of terra cotta flowerpot, nine small brick fragments (11.3 grams) and one piece of coal were found. None of the recovered artifacts are temporally diagnostic to the late nineteenth century. No structural evidence of the icehouse was found, either in the form of foundations, related features or architectural-related artifacts. Therefore, this will not be considered an archaeological site. Furthermore, it is unlikely that additional excavations would yield significant information. Artifactual deposits would be expected to be limited in the vicinity of a utilitarian structure such as an icehouse, and would most likely have very little research value. Therefore, no additional work is recommended within the APE.



SHOVEL TEST PIT PROFILE

THIRD STREET DAM PROJECT, MEDIA BOROUGH, DELAWARE COUNTY, PENNSYLVANIA, PHASE I ARCHAEOLOGICAL SURVEY

FIGURE 5

SUMMARY AND RECOMMENDATIONS

This report documents the results of a Phase I Archaeological Survey performed for the Third Street Dam Project in Media Borough, Delaware County, Pennsylvania (Figure 1; USGS 1994). The project entails the reconstruction of the dam and roadway, and involves extensive filling on the downstream side of the dam. The Area of Potential Effect (APE) lies in the Piedmont Uplands Section of the Piedmont Physiographic Province and is centered around the existing dam and Third Street, which is to be replaced on the same alignment. The Phase I Archaeological Survey examined approximately 0.38 hectares (0.94 acres). Of that, approximately 0.37 hectares (0.91 acres) were assessed through a geomorphological investigation as having a very low potential for prehistoric archaeological resources due to road disturbance, slopes greater than 15 percent, or the presence of an extensive wetland. A small area in the southeast quadrant of the APE was assessed as having a low potential for historic archaeological resources. The Phase I Archaeological Survey tested an area in the southern portion of the APE, a parcel measuring approximately 0.01 hectares (0.03 acres). This is the second cultural resources report prepared for the project. Pennsylvania Historic Resource Survey (PHRS) Forms have been previously submitted. The dam itself has been determined to be not eligible for listing on the National Register of Historic Places. The cultural resources work was performed for the Borough of Media in conjunction with the Pennsylvania Department of Transportation (PENNDOT).

Through the geomorphological investigation, prehistoric archaeological potential within the APE was assessed as very low. The uplands are too steeply sloped (35 to 60 percent) and the terrace would have been too poorly drained to have been utilized by prehistoric populations. However, the background research indicated the presence of an icehouse located south of the dam in the late nineteenth century. The geomorphological investigation found possible corroboration of this in the compact, platey structure of one particular soil horizon which suggested that the soil may have been subjected to compaction. Given the size of the ice house and its seasonal use, it was likely a frame structure set either directly on the ground, or on a shallow stone foundation. No significant research questions are likely to be addressed by the ruins or the building, if present. Few artifacts would be expected at such an industrial site. Therefore, historic archaeological potential within that portion of the APE was assessed as low. Based on this assessment of archaeological potential, the Phase I Archaeological Survey tested a very small area of the APE, measuring approximately 0.01 hectares (0.03 acres).

One shovel test pit (STP) was excavated on the east terrace, in the vicinity of the historically mapped icehouse. The shovel test pit was excavated to confirm if the soil horizons noted by the geomorphological examination of stream bank cuts of Soil Profile 1 extended further southeast within the APE. The historic artifacts recovered from the platey, compacted soil horizon possibly associated with the icehouse (IIC2 Horizon) were limited both in number (N=16) and diagnostic value. Three pieces of colorless bottle glass, three fragments of terra cotta flowerpot, nine small brick fragments (11.3 grams) and one piece of coal were found. None of the recovered artifacts are temporally diagnostic to the late nineteenth century. No structural evidence of the icehouse was found, either in the form of foundations, related features or architectural-related artifacts. Therefore, this will not be considered an archaeological site. Furthermore, it is unlikely that additional excavations would yield significant information. Artifactual deposits would be expected to be limited in the vicinity of a utilitarian structure such as an icehouse, and would most likely have very little research value. Therefore, no additional work is recommended within the APE.

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QUALIFICATIONS OF RESEARCHERS

Principal Investigator:	Thomas R. Lewis
Professional Experience:	21 years
Education:	M.A. Anthropology, Temple University B.A. Anthropology, Temple University
Project Responsibility:	Administration and review
Senior Historian:	Philip Ruth
Professional Experience:	16 years
Education:	M.A. English, University Of New Hampshire B.A. English, Goshen College
Project Responsibility:	Historical research, review, analysis, and report writing
Project Archaeologist:	Paula Miller
Professional Experience:	7 years
Education:	M.A. Applied Anthropology, University of Maryland B.A. Anthropology, Millersville University
Project Responsibility:	Field supervision and report writing
Archaeology Lab Director:	Christina Civello
Professional Experience:	15 years
Education:	B.A. Anthropology/Art History, University of Delaware
Project Responsibility:	Artifact processing, supervision, artifact inventories and curation
Graphic Illustrator:	Bradley Harrison
Professional Experience:	3 years
Education:	M.Sc. Archaeological Computing, University of South Hampton, England M.A. Eastern Mediterranean Archaeology, Catholic University of Leuven, Belgium M.A. Jewish Studies, Gratz College B.A. Jewish Studies, Gratz College
Project Responsibility:	Graphics preparation
Editor:	Lisa Shafer
Professional Experience:	1 year
Education:	B.A. English, Wilkes University
Project Responsibility:	Report editing

ARTIFACT INVENTORY

STP 1, C1 Horizon
1 whiteware rimsherd; blue banded
4 colorless bottle glass
1 amber bottle glass
2 Coke® bottle green glass
14 brick (15.4 grams)
1 styrofoam
3 coal (21.0 grams)

STP 1, IIC2 Horizon
3 colorless bottle glass
3 terra cotta flowerpot fragments
9 brick (11.3 grams)
1 coal (32.0 grams)

BUREAU FOR HISTORIC PRESERVATION
REPORT SUMMARY FORM

PROJECT CHECKLIST: Please fill out a copy of this checklist and include it with your final report.

1) Report Title *Third Street Dam Project, Borough of Media, Delaware County, Pennsylvania; Phase I Archaeological Survey*

2) ER # (BHP File #) ______

3) Author / Firm (Principal Investigator) Paula Miller/CHRS (Thomas Lewis)

4) Report Date (month/year) 3/02

5) Number of Pages 44

6) Agency (State or Federal) PENNDOT (State)

7) Project Area County(s) Delaware County

8) Project Area Municipality(s) Borough of Media

9) Project Area Drainage(s) (use PA DER State Water Plan and PASS codesheet for codes), list up to four.

Subbasin 50
Watershed 69
Major Stream 70
Minor Stream 71

Subbasin ______
Watershed ______
Major Stream ______
Minor Stream ______

Subbasin ______
Watershed ______
Major Stream ______
Minor Stream ______

Subbasin ______
Watershed ______
Major Stream ______
Minor Stream ______

10) Project Area Physiographic Zone(s), list up to three.
Piedmont Uplands Section of the Piedmont Physiographic Province

11) Survey Type (Some reports are combinations, check as many as apply to this report.)

Pre-Phase I / Sensitivity Study ________
Phase I ____X____
Phase II ________
Phase III ________
Determination of Effects ________
Workplan ________

12) Total Project Area (in acres) 0.94 acres

13) Low Probability / Disturbed Areas (% and acreage) 96.8%; 0.91 acres

14) Total Number of Sites Encountered/Phase I 0
Total Sites Tested/Phase II ________
Total Sites Excavated/Phase III ________

15) For each site discussed in this report record the following variables:

- how the site is located (shovel tests, controlled test units/deep tests, surface survey, informant interview, other)

- chronology (paleo; e, m, or l archaic; transitional; e, m, or l woodland; unknown prehistoric; historic with structure or structural remains; other historic. List up to ten)

- site size (surface area in acres)

- PASS #

- NR Eligibility (eligible, ineligible, undetermined)

- reasons for determination (Y/N for each variable)
  - eligible sites (criterion D)
    - Settlement patterning
    - Intrasite artifact patterning
    - Features
    - Radiocarbon dating
    - Organic preservation
    - Stratified
    - Burials / human remains

        - Historic: technological
        - Historic: economics
        - Historic: ethnicity
        - Historic: dietary
    - eligible: criterion A
    - eligible: criterion B
    - eligible: criterion C

- reasons for determination; ineligible
    - Disturbed
    - ephemeral occupation
    - redundant information
    - Undatable
    - other (specify)

- radiocarbon dates (Y/N, list up to 15)

________	________	________	________
________	________	________	________
________	________	________	________
________	________	________	

- Phase II methods
    - controlled surface collection
    - controlled excavation with screening of plowzone, > 5 units
    - Mechanical stripping of plowzone (%)
    - deep excavation units
    - remote sensing
    - % / acreage of site tested: Phase II

- Phase III methods
    - controlled surface collection
    - controlled excavation with screening of plowzone, > 5 units
    - Mechanical stripping of plowzone (%)
    - deep excavation units
    - remote sensing
    - Environmental reconstruction (soils, floral, pollen)
    - dietary reconstruction (floral, faunal)
    - intensive lithic analysis (functional)
    - intensive lithic analysis (technological)
    - raw material sourcing
    - ceramic analysis (seriation)

[redacted]

Plate 1: Overview of the APE on the downstream side of the dam. The east terrace is in the foreground while the west terrace and steeply sloping uplands are visible in the background.

Plate 2: View of the east terrace in the vicinity of STP 1. The dam berm and roadway is visible in the background in the upper portion of the photograph.

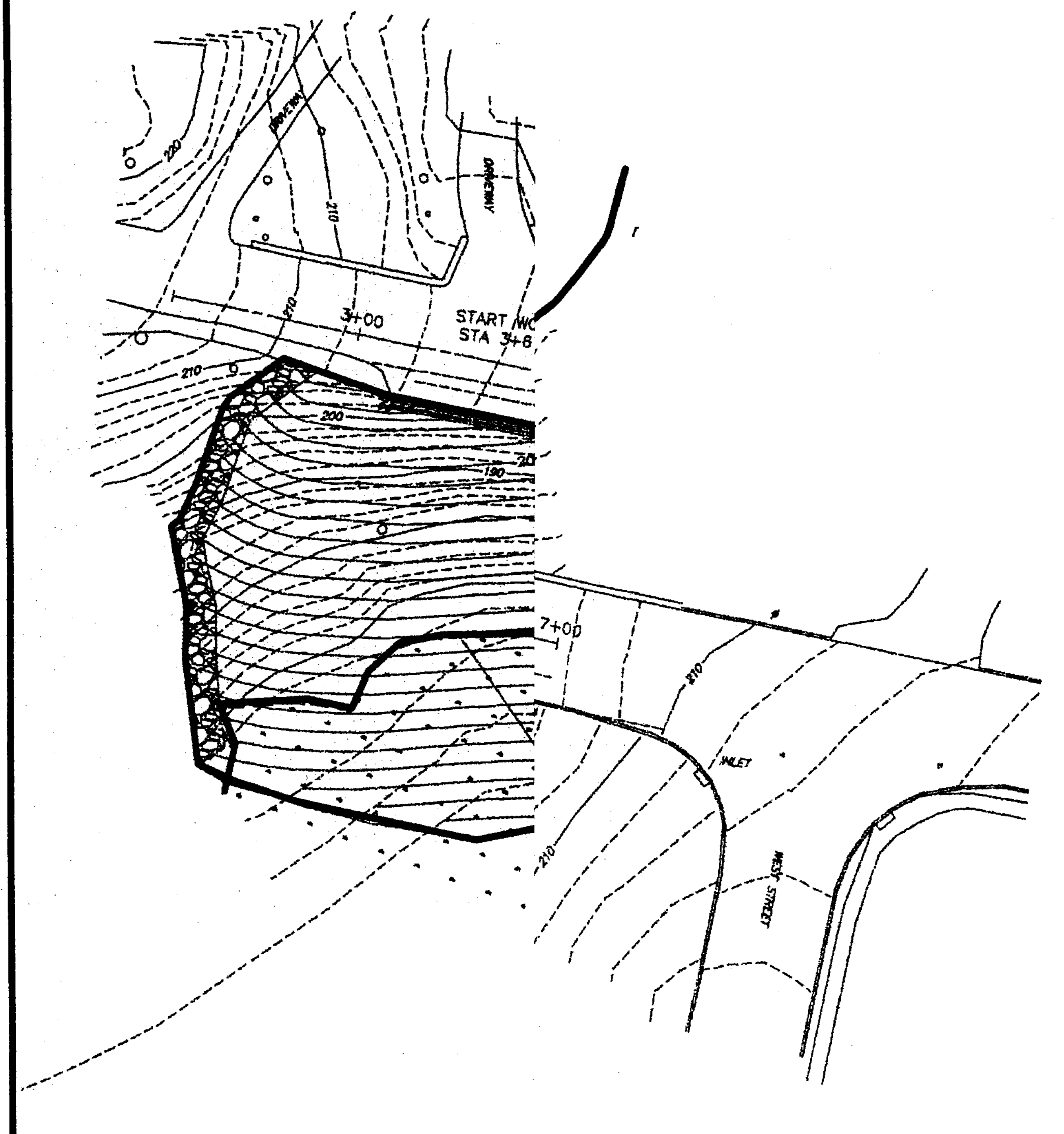

PHOTO LOCATION

GEOMORPHOLOGICAL SOIL PROFILE

SHOVEL TEST PIT

AREA OF POTENTIAL EFFECT

WETLAND

BROOMALLS LAKE AND TRIBUTARY

0m
0ft

AWARE COUNTY,
SURVEY

Prepared by CHRS, Inc.

GEOMORPHOLOGY AND PEDOGENESIS
THIRD STREET DAM PROJECT
BOROUGH OF MEDIA, DELAWARE COUNTY, PENNSYLVANIA

PREPARED BY

LAUREL F. MUELLER

ARCPACS CERTIFIED PROFESSIONAL SOIL SCIENTIST/SOIL CLASSIFIER

NSCSS REGISTERED PROFESSIONAL SOIL SCIENTIST

SOIL SERVICES COMPANY, INC.

JANUARY, 2002

Project Description

A geomorphological investigation was performed where alluvial soils had been mapped in the published Soil Survey of Chester and Delaware Counties, Pennsylvania at a proposed bridge reconstruction, that involves extensive filling along the downstream side of the Third Street dam that impounds Broomalls Lake, in the Borough of Media.

The investigation was made by pedologist Laurel F. Mueller, with project archaeologist Paula Miller of CHRS, Inc. in December, 2001. The objective of this geomorphological investigation was to estimate the relative ages and origin of the soil strata and geomorphic surfaces, and to locate the areas and depths with the greatest probability for finding cultural resources.

Synopsis of Pedogenic and Geomorphic Features Which Correlate with Age

The following discussion is presented to explain how soil morphology relates to age of alluvial land surfaces.

Flood plains can be comprised of many former land surfaces of both stable and unstable fluvial environments. A pedologist's evaluation of the soil profiles within the terrace can be used to approximate the age of the former land surfaces, the age of the sediment deposition, and the longevity of the landscape surfaces. Such an evaluation can assist in assembling a reconstructive model of the former landscape and can help to identify areas and depths with greater potential for bearing preserved cultural resources.

Buried well developed solas are indicative of land surfaces which have been relatively stable for substantial amounts of time. Surfaces (A horizons) of these developed soils can have a greater potential for accumulating cultural resources from occupations (or multiple occupations) than buried unstable (short-lived) surfaces.

Weakly developed surface soils in alluvium indicate the youth of the landscape surface. Transition from a weakly developed solum to a well developed solum can aid in piecing together historic flood events which may have buried and preserved formerly stable surfaces.

As has been documented in research by pedologists and geomorphologists, observed pedological development can be associated with the real age of the soil (Ferring 1992, Mandel 1992, Bettis 1992, Bilzi and Ciolkocz 1977, Parsons and Herriman, 1970.)

The research indicates that taxonomic classification (Soil Survey Staff, 1975) of soils formed in alluvium can be associated with broad groupings of age. Entisols, characterized by lack of subsurface diagnostic horizons are typical of first terraces with less than 1,000 years of age. Inceptisols, characterized by cambic horizons, are more typical of second (higher) terraces of greater age ranging from 500 to 4,000 years. Alfisols and Ultisols, with argillic horizons and sometimes fragipans, are typical of very old abandoned terraces or uplands formed of local alluvium, ranging from 2,000 years to older than 20,000 years of age. More specific age estimates can be made for regions where carbon-dating can be correlated with specific recurring terraces of major channels and rivers. In northeastern Pennsylvania, glacial outwash terraces are known to be at least 12,000 years old. They typically have cambic subhorizons. Use of the described aging criteria for alluvium would not be appropriate for aging glacial outwash terraces.

Other features which indicate age in alluvial sediments are the distinctiveness of horizons, which can be evaluated in the field by a morphological rating scale (Bilzi and Ciolkosz, 1977). Such a scale is based on color differences, strengths of structure, presence of clay films, and the boundary distinctness between the eluviated and illuviated horizons.

An essay by Art Bettis (Bettis, 1992) has provided a model for identifying alluvium of different ages based on pedogenic and weathering characteristics. Bettis' work provides a framework to identify three groups of ages of alluvium: EMH (Early to Mid-Holocene), LH (Late Holocene), and H (Historic). Most importantly, the soil groups can be associated with the potential for finding preserved deposits from cultural periods.

According to Bettis, EMH alluvial soils were deposited 10,500 to 4,000 years before present (BP) and have developed in place for 2,000 to 4,000 years. They are characterized by strong horizonation and argillic horizons when near the present day surface. They are typically Alfisols. The fine fraction of the subsoil is strong brown silt loam and loam (in Ohio). Within the weathering zone, the soil coloration is bright when oxidized with matrix hues of 2.5Y or redder (10YR, 7.5YR, etc) with values of 4 or higher and chromas of 3 or higher. When reduced, segregation of secondary iron compounds (with oxidized colors) into mottles and nodules are common. EMH soils typically comprise high (often inactive flood plain) terraces, alluvial fans and colluvial slopes. Bedded strata are only in the lowest part of the profile.

LH soils were deposited after 3,500 BP and have developed 1,000 to 1,500 years in place. They are usually within the modern flood plain and can overlap older deposits. They are characterized by weak horizonation and weak to moderate grade structures. When near the present day surface, cambic horizons are typical. Taxonomically, LH soils are commonly Inceptisols. The textures are more likely loam, sandy clay loam and clay loam (in Iowa, where studied). The characteristic colors are darker than for EMH soils. Subsoil hues are 10YR with values less than 4 or lower and chromas of 3 or less.

H (Historic) alluvial soils are the youngest deposits in stream valleys. In most cases, these soils were deposited after Euroamerican settlement. These soils are lighter in color than LH deposits. Grade of structure is weak to moderate. Where thicker than 20 inches (51 cm), they exhibit prominent stratification in their lower part. These deposits can bury all older surfaces. Historic alluvial soils are typically Entisols, often with A-C horizonation.

The soil profiles must be interpreted in the context of the surrounding landscape. Most importantly, the profiles must be viewed as transect sampling within a meander belt and within a network of terraces. Gaining an understanding of the fluvial dynamics for the site can help the interpreter to identify the extent of the former terraces. Such study requires an understanding of the migration of stream meanders.

Flood plain terraces are often comprised of "bar and channel" topography, formed by the many changes in channel position throughout their development. The bars are higher convex areas that are less frequently flooded. The channels are typically concave areas that exhibit evidence of more frequent flooding. When the stream is flooded, the varying velocities of flow caused by varying depths and different positions in the channel will deposit varying diameters of sediments. A common stratigraphic sequence is one of decreasing particle sizes from the bottom to the top. Cobbly and sandy alluvium might line the channel bottom and silts may give way to finer clays at the soil surface. This is caused by the decreased carrying capacity of the channel as it fills, which slows the velocities. The slower velocities carry and deposit smaller particles. This pattern has been called "fining upward sequence."

It should be noted that argillic horizons, which might otherwise have formed in glacial outwash terraces of 12,000 years or older, might not be present due to the lack of clay in the parent material. This was documented (Ciolkosz, 1994) specifically with reference to the glacial tills in northeastern Pennsylvania which do not contain limestone (which produces clay) and may not have been moved from previously weathered subsoils.

Other soil features can reveal aspects of the site's history. These can include evidence of compaction in the form of platy structure, which indicates that a soil surface was trampled by some form of traffic while wet. Presence and orientation of redoximorphic features such as clay and iron depletions, iron oxide concretions, "oxidized rhizospheres" near root pores, and gleying. Keen observations of the differences in redoximorphic features in each horizon can be used to detect the history of saturation and inundation, and the nature of former vegetative habitats. The context, orientation and nature of buried bark and wood can help to explain the presence of impoundments, and created ponds.

Land surface shapes, especially where unnatural, can reveal much about historic management and manipulation. Landscape shapes can reveal agronomic tillage practices, filling, cutting, berm construction for rail and road transport, drainage, etc. Hedgerow accumulations at the edges of flood plain terraces and ravines, are comprised of thickened or buried A horizons. These soil accumulations are often comprised of modern (mechanized moldboard gang) plowed surfaces over primitively (single furrow animal-pulled) plowed surfaces and/or virgin (unplowed) surfaces. These occur at "brinks," the landscape positions where farmers have managed fields to the edges of where it was practical to cultivate. In the author's experience, losses of up to 2 feet of topsoil and upper subsoil from cropped fields, with hedgerow soil accumulations of up to 6 feet thicknesses are common in Pennsylvania. Artifact concentration is commonly greater in hedgerows due to the deposition of topsoil lost from the adjacent fields, and the fact that the buried surfaces are out of reach to amateur archaeologists and plows. There is a greater opportunity to finding a virgin soil surface or a plowed-once surface within each hedgerow.

The Setting

The site of the geomorphological investigation is a gently sloping wooded flood plain terrace that is on the downstream side of the steep dam of Broomalls Lake. There is a deteriorating concrete spillway in the center of the dam, and a deeply incised ditch that enters from an outfall structure on the eastern edge of the project area. The terrace on the east side is several feet higher, and is more convex in shape, than the terrace on the west side. The terrace to the west of the stream is dominated by wetlands.

The stream that flows through Broomalls Lake is an un-named tributary of Ridley Creek, which ultimately outlets to the Delaware River.

Background Geology Information

The geology of the entire project area is mapped as "Xw," the Oligoclase-Mica Schist group within the Wissihickon Formation. Oligoclase-Mica Schist includes some hornblende gneiss, some augen gneiss, and some quartz-rich and feldspar-rich members. Composition varies with degree of granitization.

The project area is situated within the Piedmont Upland physiographic province. This province consists of broad, gently rolling hills and valleys. Views from uplands often give the viewer the impression that the uplands comprise the remnants of a once continuously sloping surface that is now dissected by the valleys eroded into it. This upland has developed mainly on metamorphic rocks called schists. These rocks usually have a very well developed plane (schistocity) that was formed during metamorphism. This plane dips at moderately steep angles to the south and stream erosion is often either parallel to the plane of schistocity. In some places the drainage pattern has a very pronounced rectangular orientation, but for the most part the drainage pattern is dendritic. Local relief is generally less than

300 feet, but it can be as much as 600 feet. Elevations in the section range from 100 to 1,220 feet, but are generally between 400 and 600 feet.

Background Soil Information

According to the Soil Survey of Chester and Delaware Counties Pennsylvania, which is published by the U.S.D.A. Soil Conservation Service (SCS), the only alluvial soil encountered by the proposed project is "We," Wehadkee series, an alluvial soil that is typically mapped in the flood plains. The mapping indicates that Broomalls Lake consumes the entire flood plain, and was likely constructed in the same Wehadkee soil. Valleys of the upper reaches of the watershed above the lake are comprised of "GnB," Glenville soils. The surrounding hillslopes are mapped as the Manor and Glenelg series.

Wehadkee Series

The Wehadkee series consists of very deep, poorly drained and very poorly drained soils on flood plains along streams that drain from the mountains and piedmont. They are formed in loamy sediments washed from soils that formed from schist, gneiss, granite, phyllite, and other metamorphic and igneous rocks. Slopes range from 0 to 2 percent. The taxonomic class is Fine-loamy, mixed, active, nonacid, thermic Fluvaquentic Endoaquepts.

Solum thickness for the Wehadkee series ranges from about 20 to more than 60 inches. The content of mica flakes ranges from few to many. The soil ranges from very strongly acid through neutral, but some part of the 10 to 40 inch control section is moderately acid through neutral. Content of rock fragments ranges from 0 to 5 percent by volume in the A and B horizons, and from 0 to 20 percent by volume in the C horizons. Fragments are dominantly pebbles in size.

The Ap or A horizon has hue of 10YR or 2.5Y or is neutral, value of 3 to 6, and chroma of 0 to 4. Some pedons have soft masses of iron accumulation in shades of brown or red. Texture is fine sandy loam, very fine sandy loam, loam, silty clay loam, sandy loam, or silt loam. Some pedons have recent layers of overwash as much as 20 inches thick that are loamy and variable in color. Many pedons have an Ab horizon that has the same color and texture range as the A horizon. The Bg horizon has hue of 10YR to 5Y or is neutral, value of 4 to 6, and chroma of 0 to 2. Soft masses of iron accumulation are in shades of red, yellow, and brown. Texture is sandy clay loam, silt loam, loam, clay loam, or silty clay loam. The Cg horizon has hue of 10YR to 5Y or is neutral, value of 4 to 7, and chroma of 0 to 2. Soft masses of iron accumulation are in shades of brown, red, and yellow. Texture is commonly sandy loam, loam, or silt loam, but in some pedons the Cg horizon contains stratified layers of sandy clay loam, clay loam, silty clay loam, loamy sand, sand, and gravel. Sandy textures are restricted to depths below 40 inches.

Glenville Series

The Glenville series consists of very deep, moderately well drained or somewhat poorly drained soils on uplands. They formed in residuum weathered from mica acid schist and crystalline rock containing mica. Typically, landscapes with Glenville soils are nearly level to strongly sloping soils on upland flats, footslopes or near the heads of drainageways. Where the topography is concave the upper profile may be developed in materials washed from slopes above Slopes range from 0 to 15 percent. Permeability is slow to moderately slow in the fragipan. The taxonomic class is Fine-loamy, mixed, active, mesic Aquic Fragiudults.

Solum thickness for the Glenville series ranges from 30 to 40 inches. Depth to bedrock is more than 60 inches. Depth to fragipan is 15 to 30 inches. Rock fragments of schist or quartzite generally increase with depth, ranging from 0 to 30 percent in the solum and from 5 to 80 percent in the C horizon. Some pedons have flakes of mica that generally increases with depth.

The A horizon of the Glenville series has hue 10YR or 2.5Y, value 3 through 5 and chroma 2 through 6. It is silt loam, loam or fine sandy loam in the fine earth. It has weak fine or medium granular structure and is friable or very friable. The Bt horizon has hue 10YR or 7.5YR, value 4 through 6 and chroma 3 through 8. Low chroma mottles are within the upper 10 inches of the argillic horizon. The Bt horizon is silt loam, clay loam, or silty clay loam in the fine earth. Structure is moderate or strong, fine or medium subangular blocky structure and consistence is friable. The Btx horizon has hue 10YR or 7.5YR, value 4 through 6 and chroma 3 through 6. It is loam or silt loam in the fine earth. Structure is moderate medium and thick platy or weak very coarse prismatic and consistence is firm or very firm and brittle. The BC horizon has the same color and texture as the Btx horizon. Structure is weak or moderate fine or medium subangular blocky and consistence is friable. The C horizon has hue 2.5YR through 10YR, value 4 through 6 and chroma 1 through 8. Fine earth texture is loam, sandy loam, or fine sandy loam. The C horizon is very friable, friable or firm.

Manor Series

The Manor series consists of very deep, well drained to somewhat excessively drained, moderately permeable soils on uplands. They formed on nearly level to very steep soils on strongly dissected uplands in the northern Piedmont Plateau, in materials weathered from micaceous schist. Slopes range from 0 to 65 percent. The taxonomic classification is Coarse-loamy, micaceous, mesic Typic Dystrudepts.

The thickness of the solum for the Manor series ranges from 15 to 35 inches. Depth to bedrock is 6 to 10 or more feet Rock fragments range from 0 to 30 percent throughout the solum and C horizon. Cobbles range from 0 to 5 percent. Fragments are mostly hard quartzite or flat schist. Stones occupy .01 to 3 percent of the surface in some pedons.

The A horizon has hue of 10YR to 5YR, value of 3 to 5, and chroma of 2 to 4. It is loam or silt loam in the fine earth fraction. The E horizon has hue of 10YR to 5YR, value of 4 to 6, and chroma of 2 to 6. Fine earth texture is loam or silt loam. The Bw horizon has hue of 2.5YR to 7.5YR, value of 4 or 5, and chroma of 4 to 8. It is silt loam or loam in the fine earth fraction. The C horizon has hue of 10R to 10YR, value of 4 to 8, chroma of 2 to 8 and commonly is variegated as a result of relict rock structure. It is loam or sandy loam in the fine earth fraction.

Glenelg Series

The Glenelg series consists of very deep, well drained, moderately permeable soils on uplands. Glenelg soils are nearly level to steep soils in well dissected uplands of northern portions of the Piedmont Plateau and the Blue Ridge. Slope ranges from 0 to 55 percent. The soils formed in residuum (saprolite) from micaceous schist. The taxonomic classification is Fine-loamy, mixed, semiactive, mesic Typic Hapludults.

Depth to the base of the argillic horizon ranges from 18 to 35 inches. Depth to bedrock is 6 to 10 or more feet. Rock fragments range from 0 to 35 percent throughout the solum and 5 to 35 percent in the C horizon. Fragments are mostly hard white quartzite or schist and range from pebbles to stones in size. Stone content ranges from 0 to 5 percent. Mica content increases sharply in the lower part of the solum and substratum. Unlimed reaction ranges from very strongly acid to slightly acid.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 1 to 4. It is loam or silt loam in the fine earth fraction. Silt content is close to 50 percent. The E horizon, where present, has hue of 7.5YR or 10YR, value of 3 to 5 and chroma of 2 to 4. It is loam or silt loam in the fine earth fraction, with silt content close to 50 percent. The Bt horizon has hue of 5YR to 10YR, value of 4 or 5 and chroma of 4 to 8. It is loam, silt loam, silty clay loam or clay loam in the fine earth fraction. The particle-size control section is 20 to 35 percent clay. The C horizon has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 2 to 8. It commonly is variegated due to variations in the saprolite. The C horizon is loam or sandy loam in the fine earth fraction. In some pedons, the C horizon has silt loam textures in the lower part where veins of quartz remain from weathering processes.

Methods

Background research was performed, as summarized above. At the site, soils were examined in a variety of locations with hand shovel and auger, since access by backhoe equipment was prohibitive. Two detailed soil profile descriptions were made at eroded banks. These cuts provided an opportunity to view greater depth than could be reached with hand equipment, and the sample locations were representative of the east and west side terraces.

Findings

Soil Profile #1

Setting: This soil profile was described on the south face of a deeply incised ditch that flows into the eastern edge of the project area via an outfall structure. The ditch is deeper than 9 feet. Vegetation at the surface includes tulip poplar, white oak, wild strawberry, and garlic mustard, all not typical of species in wetlands.

0 to 1 cm: Horizon A: 10YR 3/3 sandy loam, strong medium granular structure, very friable moist consistence, clear smooth boundary.

1 to 55 cm: Horizon C1: 10YR 4/3 sandy loam, making a transition to coarse sandy loam (fining upward), weak coarse subangular blocky structure, parting to single grained structure, very friable moist consistence, clear smooth boundary. Horizon contains chips of brick and coal.

55 to 80 cm: Horizon IIC2: 10YR 4/4 micaceous fine sandy loam, strong fine platy structure, firm moist consistence, abrupt smooth boundary. Horizon contains clear thin glass.

80 to 140 cm: Horizon IIC3: 10YR 5/6 very gravelly sandy loam, with 15 to 35% angular schist coarse fragments, many coarse faint mottles, with iron oxide concentrations of 5 5/8, weak coarse subangular blocky structure, with portions structureless, friable to firm moist consistence, abrupt smooth boundary. Horizon contains whiteware, porcelain.

140 to 180 cm: Horizon IIC4: 10YR 5/6 sandy loam, with 5 to 10% angular coarse fragments, many coarse prominent mottles, iron oxide concentrations of 5 YR 5/8, weak coarse subangular blocky structure, friable to firm moist consistence, abrupt smooth boundary. Horizon has twigs and debris, no gleying.

180 to 240 cm: Horizon IIC5: Half 10YR 5/6 sandy clay loam, with 10% angular coarse fragments and iron oxide concentrations of 5 YR 5/8, weak coarse subangular blocky structure, with half gleyed chunks of 10YR 4/1 sandy clay with many twigs in particular orientation (not bedded) , weak massive structure, firm moist consistence, abrupt smooth boundary. Horizon has coal embedded in the sandy clay at 190 cm.

240 to 280 cm: Horizon IIICg6: 5PB 4/1 very fine sandy clay, with iron oxide concentrations of 10 YR 5/4, weak massive structure, firm moist consistence, abrupt smooth boundary.

280 to 300 cm: Horizon IVC7: extremely cobbly coarse sand, under water. Cobbles are subrounded schist, quartzitic, feldspar.

Conclusion: This excavation revealed deposition from a recent flooding event in the A and C1 horizons. This deposit is of a vintage that includes brick and coal, but no plastic. The IIC2 to II C5 horizons are fill soil that contains whiteware, porcelain, and coal. The soil appears to have been removed from poorly drained and very poorly drained settings. There are no in-tact surfaces from 80 to 240 cm. In the IIC2 horizon, the strong, fine, firm consistence and platy structural nature, with little evidence of rooting, is evidence that this surface served some form of heavy traffic that was compacted during wet times. Historic research has shown that a commercial ice warehouse for storing ice from the lake was in this location. The fill soils overlay the natural bluish clayey subsoil of a former wetland. This massive gleyed subsoil has been saturated and/or inundated since its deposition. This horizon is typical of the subhorizons of hydric soils that form near the headwaters springs in gneiss and schist geology. Pleistocene-age deposits are encountered at 280 cm.

Soil Profile #2

Setting: This soil profile was described on the west face of the stream bank that flows southerly from the outfall of the existing dam. The sampled site is 15 feet from the spillway waterfall of the outlet structure, and is at the toe of the dam fill, where the thickness of the fill on the surface ranges from 1 to 5 feet. This is a slightly more aerated surface than the wetland that is to the west of the creek.

0 to 10 cm: A Horizon: 10YR 5/2 sandy loam, with cinders, brick, and coal chips, abrupt smooth boundary.

10 to 20 cm: Horizon B/C: 10YR 4/3 and 4/2 micaceous clay loam with no coarse fragments, iron oxide concentrations of 10 YR 5/6, common medium distinct mottles, weak coarse subangular blocky structure, friable moist consistence, clear smooth boundary.

20 to 45 cm: Horizon IICg1: 10YR 4/1 micaceous sandy clay loam, with no coarse fragments, iron oxide concentrations of 5 YR 5/6, weak massive structure, firm moist consistence, clear smooth boundary.

45 to 70 cm: Horizon IICg2: 10YR 5/1 fine sandy clay (entirely iron depleted), with no coarse fragments, weak massive structure, firm moist consistence, saturated to the extent that water pours from the cut bank, with iron-colored water in places, abrupt smooth boundary.

70 to 90 cm: Horizon IIICg3: 10YR 2/1 micaceous loamy sand, weak massive structure, parting to single grained structure, friable moist consistence, gritty black in nature, fully saturated abrupt smooth boundary.

90 cm+ Horizon R: Seeps from decomposed solid rock base at water level.

Conclusion: This excavation revealed fill material associated with the dam berm to 10 cm. This fill overlays the subsoil of a wetland which has "oxidized rhizospheres," indicating that the plants live in saturated conditions. Horizon IICg1 has stronger redoximorphic features. Horizon IICg2, comprised of gleyed fine sandy clay is perpetually submerged. Below the clay which supports the hydrology of the wetland, the strata makes a transition to more permeable loamy sand in the IIICg3 horizon. The strata are underlain by weathered bedrock that lines the channel bottom. There are no Pleistocene sediments, only the pre-Pleistocene bedrock. In that there is no evidence of structural development below 20 cm, it is the author's opinion that the Holocene sediments have been saturated, and supporting a wetland or slowly meandering portion of a stream bottom, since deposition.

Overall Summary

Based on the soils observed, it is the author's opinion that the potential for finding cultural resources in the context of in-tact soil surfaces is very low. Artifacts, if found, would be in the context of alluvium that arrived by flooding in the past 30 to 50 years, or debris that was a constituent of dumped fill soil that is younger than 100 to 200 years in age.

Below the fill on the east terrace, there are no preserved buried land surfaces. The fill overlies the massive gleyed subsoil of wetlands or unvegetated channel bottom that has been perpetually submerged. On the west terrace, there is evidence of wetland plant rooting from the current vegetative cover. This present-day surface/subsoil overlies the gleyed massive subsoil of perpetually submerged channel bottom or wetlands.

Though the natural Holocene strata is 80 cm thick on the west terrace, and 40 cm thick on the east terrace, there are no preserved buried soil surfaces, and there are no subsurface horizons which provide evidence of ever supporting aerobic life.

Professional Expertise

Laurel F. Mueller is a Certified Professional Soil Scientist and Soil Classifier, and is registered with the American Registry of Certified Professionals in Agronomy, Crops and Soils. Her registered specializations are in soil genesis, morphology, classification, and mapping. She is one of approximately 90 registered Soil Classifiers in the United States. The soil classifier certification requires a minimum of 5 years of field soil survey mapping. Much of her first 7 years of soil mapping was guided by the research of, and field training offered by, professional geomorphologists (Roger Parsons and Dick Herriman). Her specialization reflects a strong working knowledge in the relationships between geomorphology and pedogenesis. She is listed as a geomorphological consultant with the Pennsylvania Historic and Museum Commission.

Laurel was the 1992 president of the National Society of Consulting Soil Scientists (NSCSS), and has served several terms on the Board of the Pennsylvania Association of Professional Soil Scientists. In addition, she is an active member in the following organizations:

Soil Science Society of America
International Society of Soil Scientists
Pennsylvania Society of Land Surveyors
Society of Wetland Scientists

Since 1984, Laurel has been the owner and president of Soil Services Company, Inc., an environmental consulting firm that specializes in soil investigations in Pennsylvania and New Jersey. She has assisted with archaeological investigations since 1990, and has been intermittently employed by A.D. Marble & Company, and other firms, as a geomorphologist. Prior to private consultation, she gained extensive experience in soil survey mapping and geomorphology with the U.S.D.A. Soil Conservation Service. She has an M.S. degree in Resource Conservation from the University of Montana and a B.S. in Resource Economics from the University of New Hampshire.

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