

4.0 RESULTS

4.1 WESTERN PORTION

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

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

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

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

Segment A

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



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



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

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

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

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

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

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

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

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

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

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

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

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



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



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



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



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

Segment B

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

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

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

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

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

Segment C

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

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

4.2 CENTRAL PORTION

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

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

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

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

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

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

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

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

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

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

4.3 EASTERN PORTION

Wetland Mitigation Site 1

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



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



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

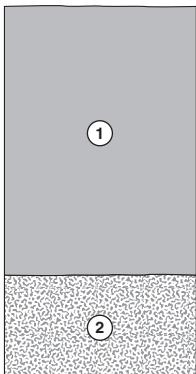
area. A search of the site files at the SHPO revealed a plethora of prehistoric sites in the greater vicinity of Churchmans Marsh, White Clay Creek, and the Christina River. However, no previously recorded sites lie within the Site 1 area; one prehistoric site (7NC-E-79) is reportedly located immediately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

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

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

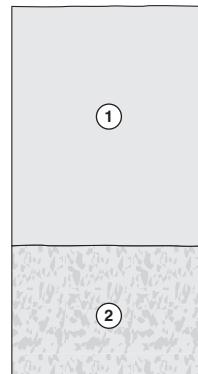
Test A-3 was located approximately 76 meters southwest of A-2 (Figure 18). This test was in more open vegetation than the first two and within close proximity to a stand of Phragmites, which indicates brackish water conditions. (Phragmites is an invasive perennial grass, 2–4 meters tall, occasionally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

7NC-D-234
STU R3 East



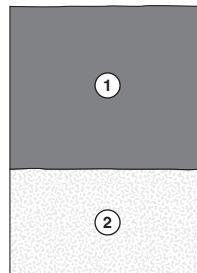
- 1 10YR 4/3 brown silt loam; Ap-horizon
- 2 Banded 10YR 5/8 yellowish brown silt loam; B-horizon

7NC-D-235
STU F3



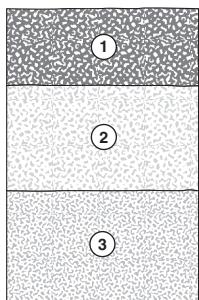
- 1 2.5Y 5/6 light olive brown silt loam; Ap-horizon
- 2 2.5Y 6/2 light brownish gray with 50% mottle of 2.5Y 7/1 light gray silt loam; B-horizon

7NC-D-236.001
STU D12



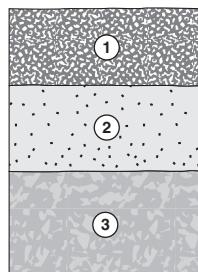
- 1 2.5Y 4/2 dark grayish brown silt loam; Ap-horizon
- 2 2.5Y 5/4 light olive brown silt loam; B-horizon

7NC-D-236.002
STU C18



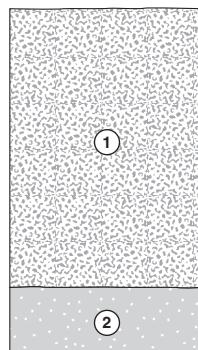
- 1 10YR 3/2 very dark grayish brown silt loam; Ap1-horizon
- 2 2.5Y 5/3 light olive brown silt loam; Ap2-horizon
- 3 2.5Y 6/6 olive yellow silt loam; B-horizon

7NC-D-237
STU O10



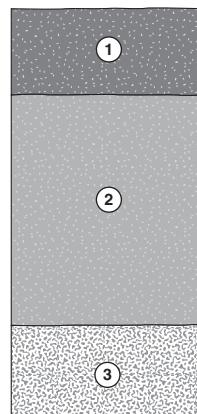
- 1 10YR 3/2 very dark grayish brown silt loam; Ap1-horizon
- 2 2.5Y 6/2 light brownish gray silt clay loam; Ap2-horizon
- 3 2.5Y 6/2 light brownish gray with 20% mottle of 2.5Y 6/4 light yellowish brown silt clay loam; B-horizon

7NC-E-172
STU B2



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

7NC-E-58
STU Z2



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

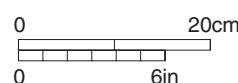


Figure 17. Representative shovel test unit profiles.



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



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

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

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

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

Wetland Mitigation Site 7

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

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

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

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

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



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