1.1 Project Description and Need

Phase II additional site evaluation and Phase III data recovery were conducted by Archaeological & Historical Consultants, Inc. (A&HC) for the proposed SR 1 Frederica North Grade-Separated Intersection Project between 2009 and 2012. The project is located in South Murderkill Hundred, Kent County, Delaware (Figure 1.1). The undertaking is part of the SR 1 Corridor Capacity Preservation Program and consists of a proposal to redesign the intersection of SR 1 and SR 12, located north of the town of Frederica.

In 2004, a roadway design was proposed termed "Conceptual Alignment 2004." It included plans to redirect traffic northbound on SR 12 across SR 1 by means of an overpass to the northbound lane of SR 1. The plan eliminated traffic on SR 12 northbound from crossing SR 1 at an unsignalized intersection to merge with the northbound lane of SR 1. A revised plan was introduced in 2005, termed "Conceptual Alignment March 2005." The revised plan exhibited some minor modifications, including relocation of the overpass and its approaches slightly to the south of the 2004 location, a longer deceleration lane from northbound SR 1 to the SR 12 overpass, and an improved off-ramp and acceleration lane from the overpass to the northbound lane of SR 1. In addition, the "Conceptual Alignment March 2005" included the construction of two stormwater retention basins situated north of the intersection and east of SR 1, flanking the north and southeast sides of an existing farm pond.

Phase Ib and previous Phase II surveys were conducted by A.D. Marble and Company (ADM, Emory et al. 2007). The Area of Potential Effect (APE) for the Phase Ib survey encompassed a broad project area, which was divided into eight numbered areas (Areas 1-8) to facilitate description (Figure 1.2). For the previous Phase II survey, the APE was restricted to the area of proposed ground disturbance of the "Conceptual Alignment March 2005."

Based on the Phase Ib and II survey results, an historic archaeological site, the Soulie Gray Farmstead (CRS#K00835, Site 7K-F-169), was found within portions of Areas 2, 5, and 6 and the presence of a previously recorded prehistoric site, the Gray Farm Site (Site 7K-F-11) was confirmed in Area 1.

As originally conceived, research to be conducted by A&HC for the SR 1 Frederica North Grade-Separated Intersection Project included additional Phase II survey at the Soulie Gray Farmstead Site (Site 7K-F-169) in Areas 2 and 5 as well as Phase III data recovery in the portion of Site 7K-F-11 within Area 1. However, Phase II survey by A&HC indicated that the portion of Area 5 closest to SR 1 included a potentially significant prehistoric component. Although within the recorded boundaries of Site 7K-F-169, this prehistoric component was likely an extension of Site 7K-F-11 which was located on the opposite (west) side of SR 1. Consequently, the Phase III data recovery for Site 7K-F-11 was expended to include the prehistoric component on the east side of SR 1 within Area 5, which was technically within Site 7K-F-169. As ultimately performed, the Phase III data recovery encompassed approximately 7,800 m^2 in Area 1 located to the west of SR 1 as well as approximately 4,200 m^2 in Area 5, east of SR 1.

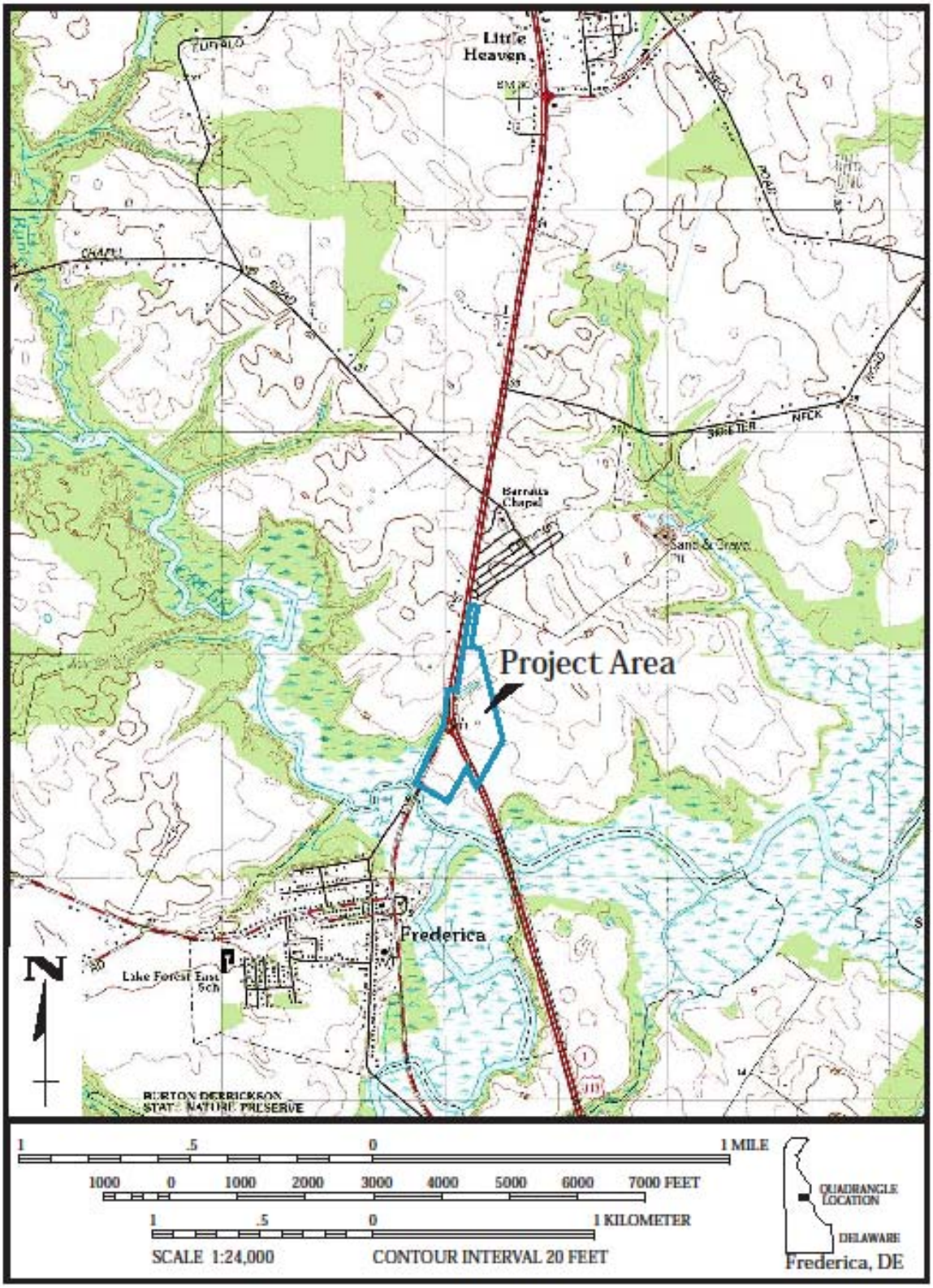


Figure 1.1 General Vicinity of the Project Area

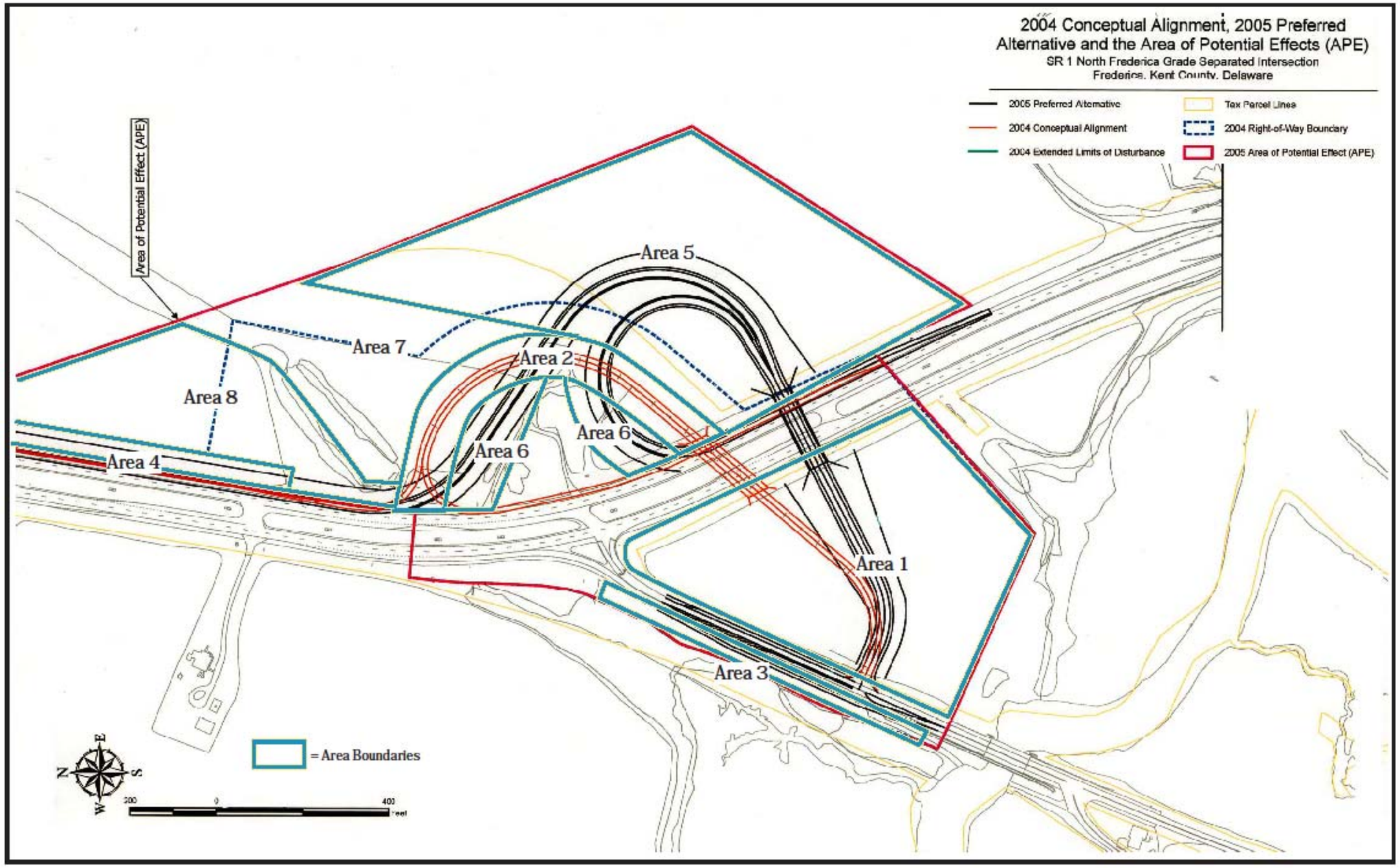


Figure 1.2 Index Map of Project Excavation Areas

The archaeological investigation was performed under the management of the Federal Highway Administration (FHWA) and the Delaware Department of Transportation (DelDOT). Federal mandates for the proposed work include the Department of Transportation Act of 1966, as amended, the National Environmental Policy Act of 1969, the National Historic Preservation Act of 1966, and the Archaeological and Historic Preservation Act of 1974. The guidelines of the Delaware Division of Historical and Cultural Affairs, which acts as the state historic preservation office (SHPO), were followed in conducting the fieldwork, research, report preparation, and artifact curation activities for this project (SHPO 1993). The work was also performed in accordance with stipulations of the project's Memorandum of Agreement.

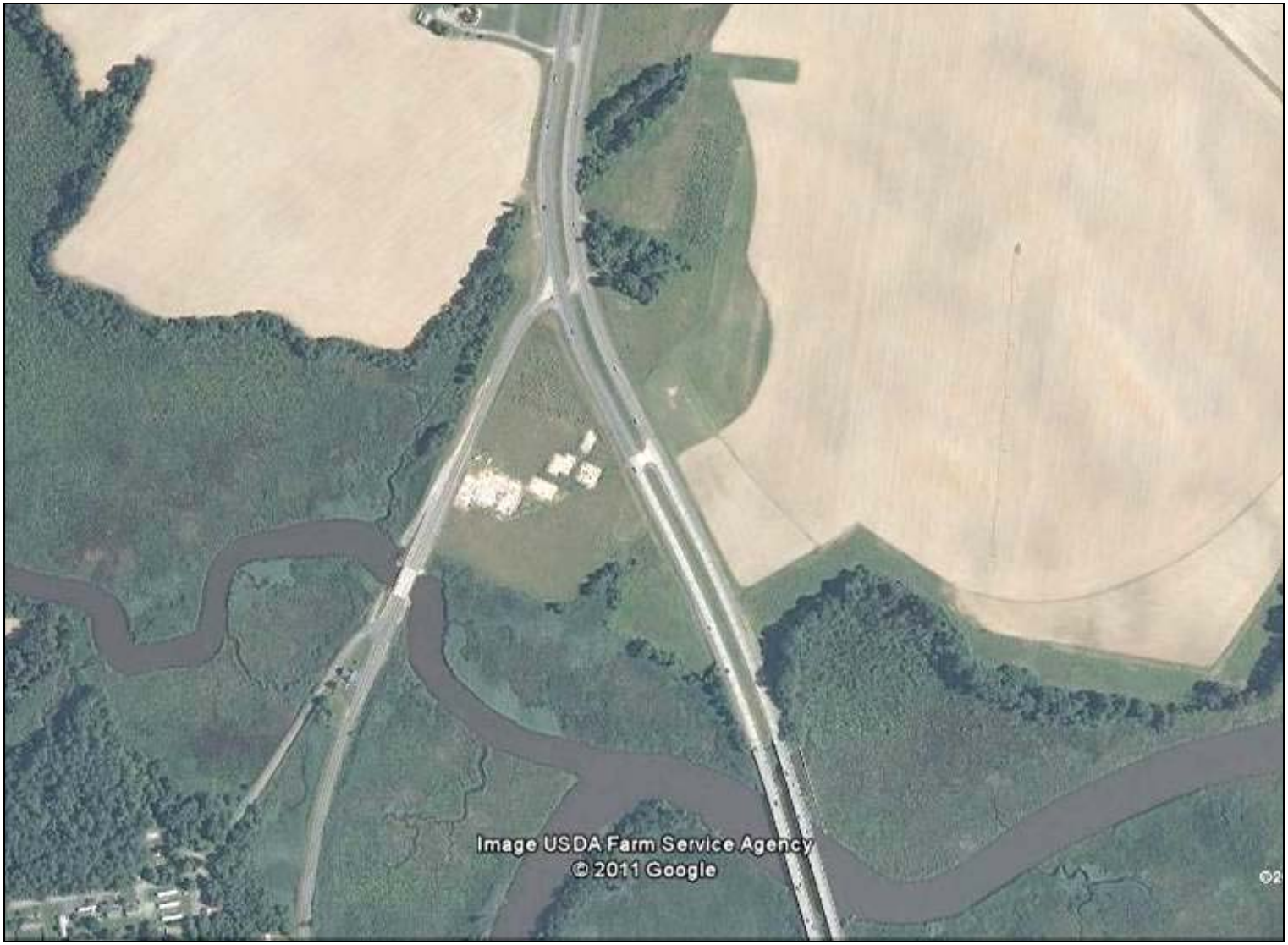
Historic background research was conducted by Wendy Zug-Gilbert. Prehistoric research, literature review, analysis, and reporting were performed by Melissa Diamanti, Conran Hay, and David Rue. Fieldwork was supervised by Scott Padamonsky, Field Director, and James Breneman, Crew Chief. Laboratory and data analysis was under the direction of Monica Padamonsky. Geomorphological analysis was undertaken by John Stiteler. Prehistoric ceramics were analyzed by Dan Griffith and George Pevarnik. Bruce Harvey performed the microwear analysis, Justine McKnight conducted botanical analyses, and Durland Shumway performed statistical analyses. The qualifications of key personnel are in Section 10.3.

1.2 Environmental Setting

Modern Environment

Sites 7K-F-11 and 7K-F-169 are located in the Mid-Drainage Zone of the Lower Coastal Plain physiographic province. Landforms of this region were formed in the Pleistocene and have trellised drainage systems, with brackish and freshwater surface water flowing generally west to east. The principal drainage in the vicinity of the site is the Murderkill River, a fourth order stream that flows northeast into the Delaware Bay. Spring Creek is a third order tributary of the Murderkill River. The project area is located north of the confluence of these two streams (Photograph 1.1). The APE for excavations in Area 1 was approximately 80 m north of Spring Creek and 240 m northeast of the stream confluence. A small unnamed tributary drains from northeast to southwest along the northern and western edges of the project area, feeding a farm pond on the east side of SR 1 and emptying into Spring Creek on the west side of SR 12. The terrain slopes gently down from northeast to southwest, ranging from a high of 16 feet above sea level at the northeast edge of the Area 1 APE to the marshes that border the stream confluence south of the APE. Both the Murderkill River and Spring Creek are tidally influenced to a point just upstream from the project area and tidal marshes line the channels of both streams. Just to the south of the southern APE boundary, a band of Phragmites (common reed) 25-30 m wide occupies the riparian zone between the Spring Creek channel and the cultivated upland. As in many east coast tidal and estuarine marshes, the stand of Phragmites is essentially monocultural, with few or no other species present.

Well drained soils occur on upper stream terraces and drainage divide headlands, while poorly drained soils occur on lower terraces and tidal flats (USDA 2011). Soils within the APE were mapped as Downer sandy loam, a well drained soil found on flats and fluviomarine terraces. Soils along the unnamed tributary were mapped as Fallsington loam, a poorly drained soil found



Photograph 1.1 Aerial view of the project setting in 2009. The trench excavations are visible in the center, with SR 1 on the right and SR 12 on the left. The confluence of Spring Creek and the Murderkill River is south of the excavations, both streams being bordered by marshes. The town of Frederica is at lower left (Google Earth image 8/6/2009).

in depressions and drainage swales. Both of these soils series were formed in loamy fluviomarine sediments. Soils along Spring Creek and the Murderkill River were mapped as Transquaking and Mispillion soils, very frequently flooded, a very poorly drained soil found in tidal marshes, which is formed from organic materials over silty estuarine sediments. The substrate in this area consists of coarse-grained sands of the Lynch Heights Formation, which has been defined as part of the Delaware Bay Group, dating to the late Pleistocene (Groot and Jordan 1999).

Historic land use included cultivation of most of the project area. The historic Soulie Gray Farmstead (CRS#K00835, Site 7K-F-169) was located on the east side of the intersection of SR 1 and SR 12. South of the farmstead was a cultivated field that extended down the gentle slope to a wood line at the edge of the tidal marsh. This field was bisected by the construction of SR 1 in the 1960s. Thereafter, both segments of the field continued to be cultivated. At the time of the Phase II and III field investigations reported herein, the area east of SR 1 was in corn cultivation and the area between SR 1 and SR 12 was fallow (Photograph 1.2). The location of the demolished farmstead was covered in scrubby secondary brush (Photograph 1.3).

ADDITIONAL INFORMATION COMMENTS 1 through 9

Paleoenvironment

Dramatic environmental changes occurred during the duration of precontact period human occupation of the mid-Atlantic region, occasioned by climatic warming accompanied by rising sea and ground water levels. One consequence of climatic warming was a gradual change in plant communities, as species that had of necessity retreated to warmer southern latitudes during the period of maximal glacial advance migrated northwards into the areas they had previously occupied. Although local and regional variations undoubtedly occurred, the process of post-Pleistocene plant community succession was generally similar throughout the mid-Atlantic region.

Pollen data suggest that glacial ice began its final melt and retreat between 14,000 and 15,000 BP (Watts 1979). At Longswamp, immediately south of the ice front, tundra vegetation with grasses, ericaceous shrubs, and dwarf birch was present, suggesting a cold, dry, and windy environment. With the terminal Wisconsinan moraine situated approximately 150 miles to the north at what is today the location of New York City, the project vicinity probably did not experience the full effects of the proximity of Wisconsinan continental ice, and it seems improbable that true tundra vegetation existed there. Nevertheless, the late Pleistocene plant communities would likely have been very different from those that existed at the time of European contact. Extrapolating from Watts (1979), the vegetation in the project vicinity may have been a mosaic of stands of spruce, dwarf shrubs, and wet meadows. This environment would have presented little in terms of edible plant resources for human populations. However, large, cold-adapted herbivores such as mastodon, buffalo, and caribou were likely available.

Beginning approximately 13,000 BP, the vegetation of the study area began to change as a result of the expansion of species ranges due to warming climate. Fir, jack pine, paper birch, and white pine were likely among the earliest immigrants to the area, advancing from glacial-period refugia in the south. Hemlock was probably present by 9600 BP, and oak was also present at a relatively early date. Beech and hickory appear in the pollen record of the mid-Atlantic region

Photograph 1.2 View of the Gray Farm Site (7K-F-11) Area 1 during Stage 1 excavation of grid test units, looking north along SR 12 from the end of the bridge over Spring Creek.

Photograph 1.3 View of the Soulie Gray Farmstead Site (7K-F-169) in Area 2, looking north. The locations of former structures was covered in brush, between two cultivated fields.

by about 7500 BP. Chestnut, an exceedingly slow migrant, was not found in the region until approximately 5500 BP.

Custer (1989) proposes that the period from c. 8500 to 5500 BP was one of gradual climatic change presumably due to ongoing climatic warming. Others suggest that this period was characterized by a climate even warmer and drier than the present. Evidence for this Hypsithermal Period is strong in the Midwest, where pollen data show an advance of the prairie eastward into Illinois, reaching its maximum extent at about 7000 BP (King 1980; Bartlein et al. 1984). In the eastern United States, evidence of a warmer, drier period at this time includes a peak in grasses at Bear Meadows in Centre County, Pennsylvania (Kovar 1965) and xeric vegetation on the Cumberland Plateau in Tennessee (Delcourt 1979). And Davis et al. (1980) point to an increase in the altitudinal range of hemlock and white pine as evidence of a warmer, drier period between 9000 and 5000 BP in New England. Watts (1979) in his examination of pollen diagrams in the mid-Atlantic region supports the hypothesis of a warmer, drier climate between 8500 and 5500 BP.

Effects of such climate would have included a decrease in the number of low order streams, lower water volume in streams generally, a decrease in biomass on ridges, and a lowering of the water table (Watts 1979). Evidence provided by pollen core data suggests that the overall composition of the vegetation did not change radically (Bradstreet and Davis 1975). However, changes in hydrology and decreases in productivity would likely have had some effect on the distribution of prehistoric populations.

By 5000 BP, mid-Atlantic forests probably approximated precontact forests in overall composition. However, Custer (1989) argues that the period between 5500 BP and 2760 BP was one of pronounced climatic fluctuations. What impacts these changes may have had on plant communities is unclear. Known as the Sub-Atlantic climatic episode, the period from 2760 BP to 1690 BP was one of short term minor perturbations from the "normal" pattern (Custer 1989), and impacts on vegetation were likely minimal.

Allowing for some variation due to climatic fluctuations, upland plant communities following 5000 BP were probably generally similar to those that existed at the time of European contact. According to Braun (1950), the project vicinity lies within the Oak-Pine Forest, Atlantic Slope Section; Kuchler (1969) places it within the Oak-Hickory Pine forest association. Uplands at the site and in its vicinity would have supported a forest characterized by medium to tall deciduous and evergreen trees. Dominant species would have included hickory, short leaf pine, loblolly pine, white oak, and post oak.

Many of these arboreal species represent food resources, especially mast, known to have been utilized both by humans and by faunal species hunted by humans, such as deer, elk, bear, and other small mammals (Davis 1976). Additionally, canopy gaps caused by falls of senescent trees and severe storms would have been colonized by opportunistic plant varieties such as wild grasses, wild sunflower, raspberry, blackberry, and others that produced fruits and seeds that were edible by humans.

Although upland plant communities may have been essentially stable from 5000 BP to the time of European contact, stable tidal marsh communities are more recent, a result of rising sea levels. From late Pleistocene times until about 5000 BP, world wide sea level rise was markedly rapid, on an average of 3 cm per year. After that, sea levels rise gradually slowed, until by about 3000 BP it was equal to or less than 1 cm per year, and it was not until then that estuarine environments could stabilize, rather than being inundated almost as soon as they formed (Custer 1989). So it was not until after 3000 BP that the margins of the Murderkill River and Spring Creek would have supported tidal marsh communities. Unlike today, however, these communities would likely have been diverse, and not the Phragmites monoculture which exists there today. Recently, researchers have concluded that Phragmites monocultures in eastern US tidal marshes are a recent phenomenon, having developed in the last one to two hundred years (Orson 1999, Saltonstall 2002). They conclude that although Phragmites is probably a native North American plant, the aggressive invasive nature of the plant in recent times may have been enhanced by the introduction of genetic stock from Europe. Before that, Phragmites would have been a co-dominant in many different tidal marsh communities, associated with sedges, bulrushes, and various forbs such as water plantain and tidal arrowhead, as well as woody shrubs such as marsh elder, but would not have formed monocultures such as that adjacent to the project area today. As indicated below in Section 6.5, archaeological finding at Sites 7K-F-11 and 7K-F-169 provided some support for this latter conclusion, since evidence was recovered indicating that several edible tidal marsh plants were collected and processed by the prehistoric site occupants, and thus were presumably available nearby. And Custer (1989) describes the tidal marshes of the Delamarva Peninsula as the richest ecological communities in the region.

ADDITIONAL INFORMATION COMMENTS 10 through 13

1.3 Previous Research

Professional archaeological investigations in the vicinity of the project began in the 1970s. In a survey for the Dover Bypass Project, 26 prehistoric archaeological sites were identified in the project vicinity (Griffith and Artusy 1976). The Gray Farm Site (7K-F-11) was identified as a small prehistoric site, located east of SR 12 near the north side of Spring Creek (within Area 1 of the current APE). The Robbins Farm Site (7K-F-12) was identified approximately 74 m west of the current APE. Limited excavation at this site exposed a prehistoric storage refuse pit that produced Keyser Cork Marked and Potomac Creek ceramics, wares associated with occupations in western Maryland and northern Virginia (Stocum 1977). Excavations at the Island Field Site (7K-F-17), located approximately 8 km downstream from the current project, identified the presence of a Woodland I/Woodland II mortuary complex. At this site, the mortuary patterns and grave goods associated with human remains showed similarities to other sites from New Jersey to Ohio, suggesting a network of regional interaction (Custer et al. 1990).

Initial cultural resources research for the Frederica North project was conducted by ADM. A Phase Ia planning study evaluated the potential for prehistoric and historic archaeological resources within the project area (Emory 2003). The entire project area was identified as having a high potential for intact historic resources, based on the presence of the previously recorded Soulie Gray House (CRS K-00835), as well as the presence of historic artifacts at Site 7K-F-163B, both located within the project area on the east side of SR 1. A high potential for intact prehistoric resources was indicated by the presence of previously recorded archaeological sites

both within and near the project area, together with the largely undisturbed character of the soils and the landscape setting of the project.

Phase Ib and II surveys were conducted by ADM (Emory et al. 2007). As indicated above, the APE for the Phase Ib survey encompassed a broad project area, which was divided into eight numbered areas to facilitate description (Figure 1.2). Phase II survey by ADM was restricted to the area of proposed ground disturbance of the "Conceptual Alignment March 2005," which included all or portions of Areas 1, 2, and 5.

Previous Research in Area 1: Area 1 was a roughly triangular area bounded by SR 1 on the east, SR 12 on the west, and the marshes bordering Spring Creek on the south. Phase Ib research covered 4.5 hectares, and included controlled surface collection of 10 m x 10 m squares, shovel testing, and excavation of twenty-three 1 m x 1 m test units. The formerly cultivated area, flanking marshland to the south, consisted of very gently rolling, low terrain with relief varying by just a few feet (circa 8-12 feet amsl). A previously recorded Site 7K-F-11 (Gray Farm Site) was mapped as being located in the southeastern sector of the area. Based on Phase I and II research, the whole of Area 1 was considered to be within the boundaries of the site. Here, soils are mapped as Downer sandy loam, 0-2% slopes. The soils are typical of flats, knolls, and fluviomarine terraces (USDA n.d.). Stratigraphy consisted of a 20-39 cm thick Ap horizon, a 20 cm thick E horizon, and a Bt horizon of sandy loam. Prehistoric and historic artifacts were encountered in the Ap horizon. Prehistoric artifacts exclusively were recovered from the E horizon, generally at lower frequencies than in the Ap horizon. The Bt horizon was culturally sterile except for artifacts that had likely migrated into the stratum, mostly small debitage. Several prehistoric cultural features and natural disturbances were identified in the floor plan at the Ap/E horizon interface during test unit excavations.

A geomorphological survey was conducted during the Phase Ib effort. In general, the results were consistent with the soil sequence outlined above. An Ap horizon of 10YR3/2 sandy loam formed the surface layer, with an abrupt boundary separating it from the E horizon of 10YR5/4 sandy loam. An EB horizon, a transition from E to B soils, of 7.5YR5/4 and 7.5YR5/6 sandy loams typically 10 cm thick was differentiated below the E horizon with a clear boundary. Generally, the Ap, E, and EB horizons were contained within a zone extending 65 cm below the surface. A Bt1 horizon of 7.5YR4/6 sandy loam was encountered beneath the EB horizon.

Phase Ib surface collection and excavation yielded a moderate density of prehistoric lithic and ceramic artifacts, with diagnostics suggesting occupation during the Woodland I and Woodland II periods (approximately 3000 BC – AD 1600). Forty three 1 m x 1 m units were completed during Phase II testing. The results generally reinforced the Phase Ib findings. Several cultural features were identified and the prehistoric chronology of the site was further defined.

Woodland I projectile points from the combined excavations included Lamoka (Late Archaic), MacPherson, Teardrop, Wharton Corner-Notched, Rossville, Goose Creek Spike, and Jacks Reef Pentagonal specimens. Woodland II points included Levanna triangles. Jasper (50%) was the predominant raw material, followed by quartz (20%). Other raw materials included quartzite, cherts, chalcedony, rhyolite, argillite, and miscellaneous other materials. Lithic debitage was

dominated by relatively late reduction stage flakes associated with tool making and refurbishing. Generally, chipped stone artifact densities were low to moderate, with a mean of twenty-nine per 1 m x 1 m unit in the Phase II testing. A relatively high frequency of tools was included in the assemblage for a site with such low overall artifact frequencies. In addition to the projectile points listed above, tools included scrapers, utilized flakes, and a grooved abrader. Various groundstone and steatite items were also found.

A diverse ceramic sub-assemblage of Woodland I period (3000 BC – AD 1000) manufacture was present. Included were Accokeek, Popes Creek, Dames Quarter, Hell Island, Mockley, and Wolfe Neck wares. Woodland II (AD 1000 – 1600) ceramics included Townsend and Minguannan wares. Steatite vessel fragments were also found.

Six cultural features were identified during Phase II testing. They were generally amorphous stains noted at the base of the plowzone, measuring from 30 cm in diameter up to 1.0 m x 1.5 m. They typically exhibited charcoal flecking and had light densities of fire-cracked rock (FCR), with artifact densities varying from low to slightly higher than typical plowzone soils sampled elsewhere on site. In some cases, E horizon prehistoric artifact densities were elevated in the area around the feature. None of the features had a clear function, such as hearth, storage pit, etc., and none had concentrated FCR. Features occurred in areas with both high and low artifact densities as suggested by surface collections.

In general, the testing results were suggestive of a location to which numerous small work or residential groups returned on numerous occasions for various resource procurement and processing activities. Lithic tools and blanks were brought to the site or pebbles were obtained nearby for tool making/maintenance and the tools were used for resource procurement and processing activities. Ceramic and steatite vessels were likely also used in these activities.

The historic artifact assemblage included a relatively light scatter of primarily early nineteenth through early twentieth century ceramics, container glass, architectural items (flat glass, brick, and nails), and other miscellaneous items. Domestic ceramics included creamware, pearlware, redware, whiteware, stoneware, porcelain, and Yellowware. These were attributable to the Soulie Gray Farmstead formerly located to the northwest. A possible eighteenth or early nineteenth century occupation was documented several hundred meters west of SR 1, where creamware was present in the assemblage.

Previous Research in Areas 2 and 5: Phase Ib survey covered a large area (over eight hectares) on the east side of SR 1, including Areas 2, 3, 5, 6 and 7. The area consisted primarily of relatively level cultivated fields with the exception of the former farm complex ruins of the Soulie Gray Farm and some poorly drained areas around a small drainageway. Stratigraphy was similar to that of Area 1, with the exception of disturbed areas around the farm complex and some areas where the E horizon was lacking. Surface collection identified a scatter of early nineteenth through mid-twentieth century artifacts over much of this overall area. In Areas 2 and 6, portions of the former building lot complex of the Soulie Gray Farm (7K-F-169) were investigated through strip trenching and test units. To the northwest of the former farm building complex, a concentration of brick and other historic debris was investigated, and a scatter of

prehistoric artifacts was also found. In Area 5 a scatter of prehistoric artifacts was identified, possibly the periphery of Site 7K-F-11 to the west in Area 1.

During ADM's Phase II survey, seven test units in Area 5 yielded 57 prehistoric artifacts, for a mean of approximately eight per 1 m x 1 m unit. Stratigraphy was similar to Area 1, with an Ap/E/Bt sequence with most artifacts in the Ap horizon. Fifty-six lithic artifacts included debitage, a biface, and a tested cobble, with jasper predominating (55%), quartzite the second most prevalent raw material (28%), and small percentages of other raw materials. A single ceramic sherd, probably of Minguannan (Woodland II) affiliation was recovered. The prehistoric artifact scatter extended throughout all or most of Area 5.

Phase II survey at the site of the former Soulie Gray Farm buildings in Areas 2 and 6 involved hand excavation of thirteen test units and mechanical excavation of five slit trenches. The units and trenches were placed in an area of approximately 60 m x 60 m, situated based on high surface artifact densities. The test units identified an Ap horizon approximately 35 cm in thickness, overlying a 25 cm E horizon and a Bt horizon. The trenches identified several linear features associated with outbuilding foundations and a concrete-capped well. The excavations also revealed substantial mid-twentieth century disturbance, with early nineteenth through mid-twentieth century domestic, architectural, and other artifacts in mixed contexts. A low frequency of possible eighteenth century ceramics (redware and creamware) was also present.

In Area 6 on the northwest edge of the farm building complex, Phase Ib surface collection identified a concentration of brick and other historic artifacts. In this area, Phase II testing by ADM identified fill layers and a buried Ap horizon. The fill layers contained historic artifacts, mostly brick, that were not in primary context. Several shallow pit features were found, and interpreted as the result of twentieth century disturbance. In all, 1,550 artifacts were recovered, over 65% of which were brick. Domestic artifacts included relatively low frequencies of redware, creamware, pearlware, and whiteware. Moderate frequencies (n=135) of prehistoric artifacts were also noted in the Ap horizon, including a Susquehanna Broadspear. Jasper accounted for 50% of the assemblage, with argillite and rhyolite the next most numerous raw material types. However, the materials were deemed to be in a disturbed context and no further work was recommended

ADDITIONAL INFORMATION COMMENTS 14 through 16