Appendix I – Stage I Archaeological Survey

STAGE I ARCHAEOLOGICAL SURVEY

FLOOD MITIGATION AND PERMANENT RESTORATION OF THE SAYREVILLE PUMP STATION

Borough of Sayreville, Middlesex County, New Jersey
NJDEP Project # 340699-12

PREPARED FOR:

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November 2014

CULTURAL
RESOURCE
CONSULTANTS

STAGE I ARCHAEOLOGICAL SURVEY

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Borough of Sayreville, Middlesex County, New Jersey

NJDEP Project # 340699-12

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EXECUTIVE SUMMARY

Richard Grubb & Associates completed a Stage I archaeological survey in the Area of Potential Effects (APE) for proposed improvements to the Sayreville Pump Station (Block 169, Lots 10.22 and 12) in the Borough of Sayreville, Middlesex County, New Jersey. The proposed project involves the construction of a perimeter flood wall, pump station repairs, new storm water pump stations, throttle valve chambers, generators, transformers, a switchgear, and an electrical building, as well as other improvements. The project will be funded by the United States Federal Emergency Management Agency (FEMA) and the New Jersey Environmental Infrastructure Financing Program. The Stage I archaeological survey was completed in compliance with Section 106 of the National Historic Preservation Act of 1966, as amended, and the New Jersey Department of Environmental Protection Environmental Assessment Requirements for State Assisted Environmental Infrastructure Facilities (NJAC 7:22-10.8).

The Stage I archaeological survey included background research, an archaeological field reconnaissance, an archaeological sensitivity assessment, subsurface testing, and a geomorphological assessment. The pedestrian reconnaissance and archaeological sensitivity assessment concluded that the APE has low sensitivity for prehistoric archaeological resources and low sensitivity for historic archaeological resources due to extensive modern and historic disturbance from excavation, filling, and grading. From the 1950s to the present, the APE has been subjected to several episodes of excavation, filling, and grading from construction and maintenance of the Sayreville Pump Station and its associated facilities. During the nineteenth century, portions of the APE were subjected to clay quarrying and processing, which resulted in the removal of several feet of upland terrain to expose and extract silty clays south of the Raritan River.

A series of three backhoe trenches completed within the APE demonstrated that clay quarrying had extended several feet below the present ground surface. Deep fills overlying laminated sediments and lateral deposits indicated that the quarried landscape was filled with gravels and brick and coal cinder debris while expeditiously disposing of waste materials. Twentieth century glass recovered at a depth of 8.5 feet below ground surface in a backhoe trench in the northeast corner of the APE suggested that some filling occurred after the turn of the twentieth century. Fill layers encountered in backhoe trenches consisted of variable soil textures and inclusions; some modern materials such as polyvinyl chloride (PVC) pipe fragments, oil-soaked rags, and Budweiser aluminum can fragments were noted in the upper four feet of fill deposits of backhoe trenches in the northeast and southwest corners of the APE but not retained. No stable utilized surfaces and no cultural features related to the nearby nineteenth century ceramic and brick industries or to structural features associated with the Washington Canal were observed in the backhoe trenches' stratigraphic profiles.

An intensive-level architectural survey and evaluation of the adjacent Washington Canal was completed as part of the Stage I archaeological survey. The results of this evaluation determined that the Washington Canal no longer retains integrity of setting, design, materials, workmanship, feeling, and association and is not eligible for listing in the National Register of Historic Places. While the APE is adjacent to two National Register of Historic Places-eligible historic archaeological resources (the Price Pottery Site/36-Mi-152 and the Sayre and Fisher Brick Company Site/36-Mi-163), and is proximate to perennial water sources, extensive ground disturbance has occurred within the APE historically and within the past 50 years. Primary documents from construction and upgrades to the Sayreville Pump Station record disturbances of 10 to 35 feet below the modern ground surface in the majority of the APE. Backhoe trenches completed in areas on the margins of this construction disturbance indicated that construction-related filling and grading extended into the margins of the APE. Intact archaeological deposits associated with the adjacent historic archaeological resources were not identified in backhoe trenches completed within and near proposed floodwall and electrical facility locations, and are unlikely to be present within the APE. No further archaeological survey is recommended.

TABLE OF CONTENTS

Executive Summary i

Table of Contents ii

List of Figures, Photo Plates and Tables iii

1.0 Introduction 1-1
- 1.1 Regulatory Context 1-1
- 1.2 Project Description 1-1
- 1.3 Area of Potential Effects 1-5

2.0 Research Goals and Design 2-1
- 2.1 Research Goals 2-1
- 2.2 National and New Jersey Registers of Historic Places Criteria 2-1

3.0 Environmental Setting 3-1
- 3.1 Environmental Conditions 3-1
- 3.2 Previous Land Modifications 3-4
- 3.3 Geotechnical Assessment 3-4

4.0 Background Research 4-1
- 4.1 Prehistoric Context 4-1
- 4.2 Historic Context 4-3
- 4.3 Archaeological Background Research 4-14

5.0 Results 5-1
- 5.1 Archaeological Reconnaissance 5-1
- 5.2 Assessment of Archaeological Sensitivity 5-1
- 5.3 Subsurface Testing and Geomorphological Assessment 5-24

6.0 Conclusions and Recommendations 6-1

7.0 References 7-1

Appendices:

- Appendix A: Qualifications of the Principal Investigator
- Appendix B: Project Documents
- Appendix C: Previous Geotechnical Studies
- Appendix D: Emergency Bypass Plan
- Appendix E: 2014 Geotechnical Study
- Appendix F: Washington Canal Survey Form
- Appendix G: Geomorphology Report
- Appendix H: Historic Artifact Catalog
- Appendix I: Annotated Bibliography

LIST OF FIGURES, PHOTO PLATES AND TABLES

FIGURES:

Figure 1.1: U.S.G.S. Map 1-2

Figure 1.2: County Map 1-3

Figure 1.3: Site Plan 1-4

Figure 3.1: Physiographic Provinces Map 3-2

Figure 3.2: Soils Map 3-3

Figure 4.1: 1685 Reid, A Map of Rariton River, Millstone River, South River, Rahway River, Bound Brook, Green Brook & Cedar Brook with the Plantations thereupon etc., etc. ..4-5

Figure 4.2: 1850 Otley and Keily, Map of Middlesex County. 4-7

Figure 4.3: 1877 Cook and Smock, Map of the Clay District of Middlesex County, showing locations of beds of stoneware clay, kaolin and fire clay. 4-8

Figure 4.4: 1889 United States Coast and Geodetic Survey, Raritan River, New Jersey. 4-10

Figure 4.5: 1930 Aerial Photograph. 4-11

Figure 4.6: 1931 Sanborn Map Company, Sayreville, New Jersey..... 4-12

Figure 4.7: 1946 United States Coast and Geodetic Survey, Raritan River, New Jersey. 4-13

Figure 4.8: 1955 Aerial Photograph showing pump station construction. 4-15

Figure 5.1: Site Plan showing photograph locations from the pedestrian reconnaissance.....5-2

Figure 5.2: Site Plan showing backhoe trench and photograph locations from the subsurface testing and geomorphology assessment 5-25

Figure 5.3: Artifacts recovered from subsurface testing: 5-28

PHOTO PLATES:

Plate 5.1: Overview of the Sayreville Pump Station showing the original 1950s section.....5-3

Plate 5.2: Overview of the 1975 relief pump station addition 5-3

Plate 5.3: Overview of the 1975 relief pump station addition 5-4

Plate 5.4: Overview of the flow meter chamber and valve chambers in the northeast quadrant of the APE.....5-4

Plate 5.5: Overview of the northwest corner of the APE perimeter showing gravel surface and equipment stockpiles 5-5

Plate 5.6: Overview of the northern perimeter of the APE showing the northwestern portion of the construction staging area with materials stockpiles, storage containers and dumpsters 5-5

Plate 5.7: View looking out from the northern perimeter fence 5-6

Plate 5.8: Overview of the northern perimeter of the APE showing storage containers and equipment piles 5-6

Plate 5.9: View looking out from the north perimeter fence showing a housing subdivision in the background 5-7

Plate 5.10: View looking out from the north perimeter fence showing dumpsters, supply stockpiles, a construction trailer and a storage container along the north fence and a housing subdivision in the background 5-7

Plate 5.11: Overview of the northern perimeter of the APE showing the location of a geotechnical boring in the foreground and storage containers and dumpsters in the background 5-8

Plate 5.12: Overview of the northern perimeter of the APE showing the construction staging area and a construction trailer 5-8

Plate 5.13: Overview of the northern perimeter of the APE showing the construction staging area and a construction trailer 5-9

Plate 5.14: Overview of the northern perimeter of the APE showing construction trailers and a series of geotechnical borings in the northeast corner of the APE 5-9

Plate 5.15: Overview of the northern perimeter of the APE showing construction trailers in the northeast corner of the APE 5-10

Plate 5.16: Overview of the northern perimeter of the APE showing the construction staging area and construction trailers 5-10

Plate 5.17: Overview of the northern perimeter of the APE showing the construction staging area, a construction trailer and an I-beam stockpile 5-11

Plate 5.19: Overview of the northern perimeter of the APE showing the northeastern portion of the construction staging area and a construction entrance 5-12

Plate 5.20: Overview of the eastern perimeter of the APE showing the red posts marking high voltage buried electrical cable, gravel aggregate paving, and a topsoil stockpile in the southeast corner of the APE 5-12

Plate 5.21: Overview of the eastern perimeter of the APE showing a gravel surface and a topsoil stockpile in the background 5-13

Plate 5.22: Overview of the eastern perimeter of the APE showing the red posts marking high voltage buried electrical cable and gravel aggregate paving.....5-13

Plate 5.23: Overview of the southeast corner of the perimeter fence and a topsoil stockpile.....5-14

Plate 5.24: Overview of the southeast corner of the APE showing piping in the foreground and a topsoil stockpile in the background 5-14

Plate 5.25: Overview of the southern perimeter of the APE showing the red posts marking high voltage buried electrical cable and pipes located on the ground surface 5-15

Plate 5.26: Overview of the southern perimeter of the APE showing the red posts marking high voltage buried electrical cable, piping, and a topsoil stockpile in the southeast corner of the APE 5-15

Plate 5.27: Overview of the southern perimeter of the APE showing the red posts marking high voltage buried electrical cable, piping, and a topsoil stockpile in the southeast corner of the APE 5-16

Plate 5.28: Overview of the southern perimeter of the APE showing a storage contained in the southwestern portion of the APE, red posts marking high voltage buried electrical cable and a timber stockpile.....5-16

Plate 5.29: Overview of the southwest corner of the APE showing the red posts marking high voltage buried electrical cable and ground disturbance from filling and grading.....5-17

Plate 5.30: Overview of the southwest corner of the APE showing the red posts marking high voltage buried electrical cable and ground disturbance from filling and grading.....5-17

Plate 5.31: Overview of the southwest corner of the APE showing the red posts marking high voltage buried electrical cable and a gravel surface on the south side of an electrical substation.....5-18

Plate 5.32: Overview of an electrical substation in the western portion of the APE.....5-18

Plate 5.33: View of the western perimeter fence behind an electrical substation in the western portion of the APE 5-19

Plate 5.34: Overview of the Washington Canal west of the APE.....5-19

Plate 5.35: Overview of an electrical substation along the western perimeter fence surrounding the APE 5-20

Plate 5.36: View of the Washington Canal near an outlet channel west of the original portion of the pump station showing coarse rip rap installed along the east bank of the Washington Canal for erosion control.....5-20

Plate 5.37: View of the western perimeter fence behind an electrical substation in the western portion of the APE showing coarse rip rap installed along the east bank of the Washington Canal for erosion control 5-21

Plate 5.38: Overview of an outlet channel and generator in the western portion of the APE 5-21

Plate 5.39: View looking out from the northwest section of the APE showing an outlet channel constructed in the 1950s and the Washington Canal in the background 5-22

Plate 5.40: Overview of an electrical substation and generator in the western portion of the APE 5-22

Plate 5.41: Opening of BHT-1 showing a thick layer of coarse gravel placed during initial flood repair activities 5-26

Plate 5.42: View of the BHT-1 stratigraphic profile showing layered fills that extend to a depth of 12.8 feet below ground surface 5-26

Plate 5.43: View of the lower portion of the BHT-1 stratigraphic profile showing the heterogeneous character of fills in the northeastern portion of the APE 5-27

Plate 5.44: Opening of BHT-2 showing a 1.5-inch diameter PVC pipe that was part of a disused sprinkler system installed within the APE 5-29

Plate 5.45: View of the BHT-2 stratigraphic profile showing fills containing large brick fragments, brick dust, coal cinder and ash over laminated yellowish brown silt loams and sandy loams 5-29

Plate 5.46: View of the lower portion of the BHT-2 stratigraphic profile showing the transition from the dense brick fill to laminated fill deposits 5-30

Plate 5.47: Opening of BHT-3 showing Strata 1 and 2 5-30

Plate 5.48: View of the lower portion of the BHT-1 stratigraphic profile showing the heterogeneous character of fills in the northeastern portion of the APE 5-31

Plate 5.49: View of the lower portion of the BHT-3 stratigraphic profile showing a dense layer of brick fill over lying silty clay deposits 5-31

Plate 5.50: View of the BHT-3 stratigraphic profile showing the abrupt transitions of the fills overlying silty clay deposits 5-32

TABLES:

Table 4.1: Summary of New Jersey prehistory 4-2

Table 4.2: Registered archaeological sites within one mile of the APE 4-14

1.0 INTRODUCTION

This report presents the results of a Stage I archaeological survey within the Area of Potential Effects (APE) for proposed improvements to the Sayreville Pump Station (Block 169, Lots 10.22 and 12) in the Borough of Sayreville, Middlesex County, New Jersey (Figures 1.1 and 1.2). Sharon D. White, Ph.D., RPA, who exceeds the professional qualifications standards of 36 CFR 61 set forth by the National Park Service, served as Principal Investigator and authored this report (Appendix A). Allison Gall conducted background research and Patricia McEachen produced report graphics. Mary Lynne Rainey and Richard C. Grubb served as report editors, and Cathy Reagan served as technical editor. Copies of this report and all field notes, photographs and project maps are on file at the Richard Grubb & Associates (RGA) offices in Cranbury, New Jersey.

1.1 Regulatory Context

This Stage I archaeological survey report meets the requirements for an initial submission to the New Jersey Department of Environmental Protection (NJDEP) - Municipal Finance and Construction Element and the Historic Preservation Office (HPO). Funding for the project will be provided by the Federal Emergency Management Agency (FEMA) and the New Jersey Environmental Infrastructure Financing Program. According to the NJDEP Environmental Assessment Requirements for State Assisted Environmental Infrastructure Facilities (NJAC 7:22-10.8), archaeological and historical resources eligible for listing on the New Jersey and National Registers of Historic Places (NRHP) must be identified in order to determine if the project will affect such resources.

In a review letter dated April 3, 2014, the NJDEP - Municipal Finance and Construction Element required a Stage I cultural resources survey to assess the potential for archaeological resources and to determine if two registered archaeological sites (i.e., Sayre and Fisher Brick Co. Site/28-Mi-163 and the Price Pottery Site/28-Mi-152) located adjacent to the Sayreville Pump Station property extend into the proposed construction areas (see Appendix B). The Sayre and Fisher Brick Co. Site and the Price Pottery Site are eligible for listing on the NRHP (SHPO Opinion: 9/12/1989). Following the results of a Stage IA survey, the NJDEP - Municipal Finance and Construction Element required mechanical trenching in the perimeter of the APE where previous ground disturbance appeared to be shallow, and an evaluation of the Washington Canal to assess its eligibility for listing on the NRHP.

The Stage I archaeological survey was conducted in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended in 1980 and 1992, and the regulations of the Advisory Council on Historic Preservation (36 CFR 800). In addition, the Stage I archaeological survey meets the requirements of the HPO's Guidelines for Preparing Cultural Resources Management Reports, Guidelines for Archaeological Investigations, and Archaeological Survey and Reporting Clarifications (1994, 1996, 2003).

1.2 Project Description

The Middlesex County Utilities Authority (MCUA) proposes flood mitigation measures and permanent restoration of the Sayreville Pump Station in the Borough of Sayreville. The Sayreville Pump Station property lies on a floodplain of the Raritan River east of the Washington Canal. The pump station building is 160 feet east of the canal. The proposed project involves the construction of a perimeter flood wall, pump station repairs, new storm water pump stations, throttle valve chambers, generators, transformers, a switchgear, and an electrical building, as well as other improvements (Figure 1.3).

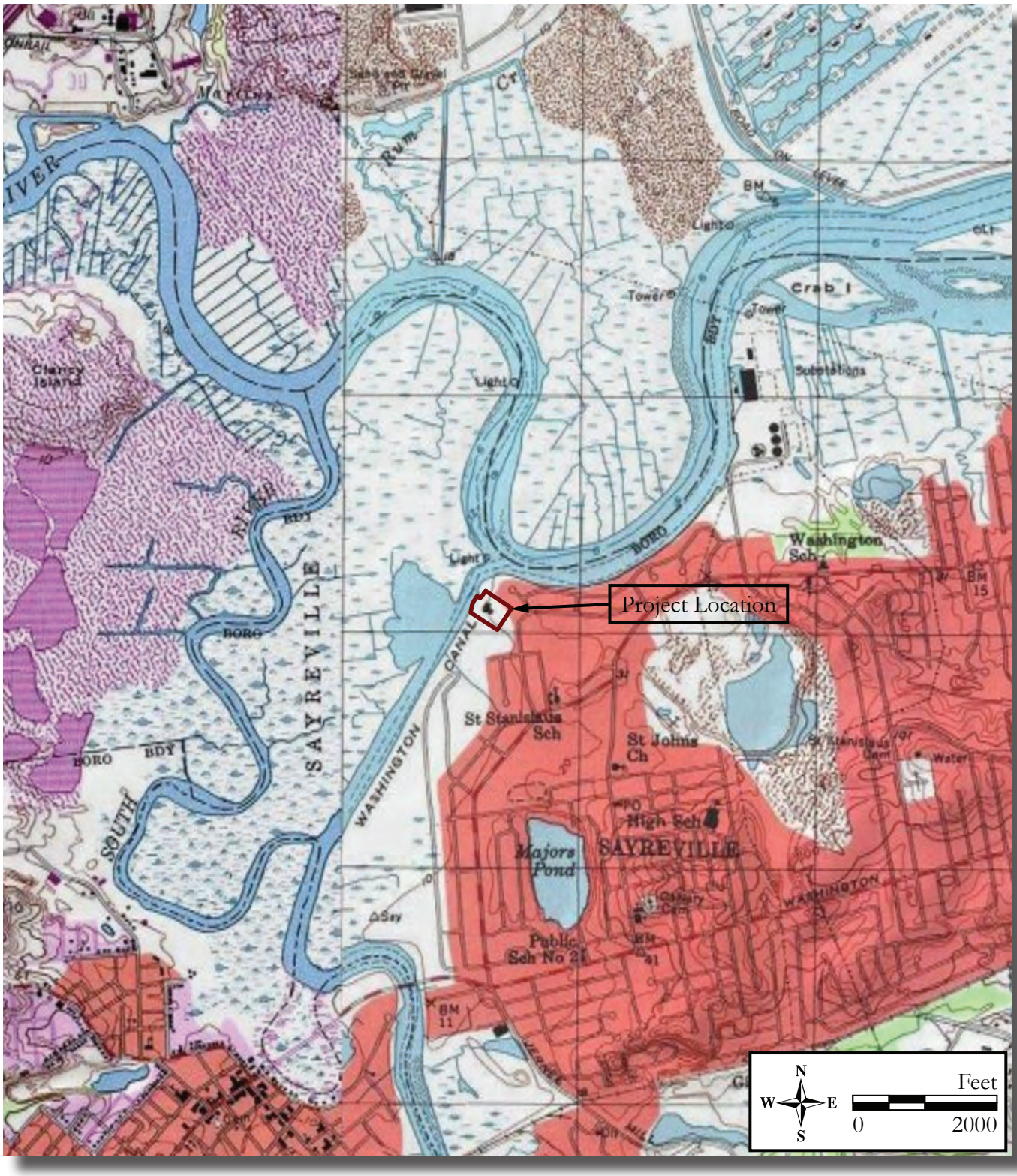

Figure 1.1: U.S.G.S. Map
(from 1995 U.S.G.S. 7.5' Quadrangles: South Amboy, NJ and New Brunswick, NJ).

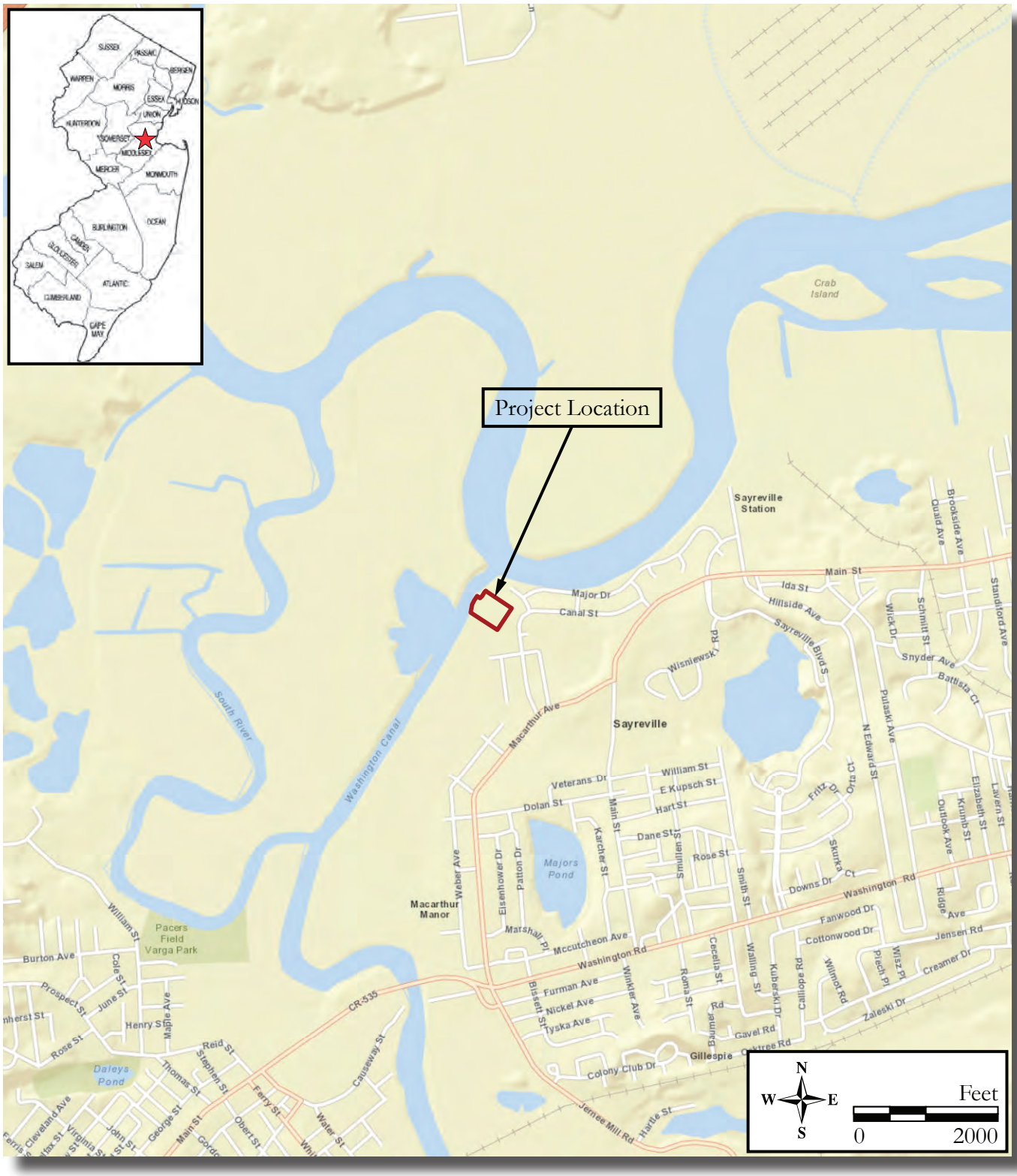

Figure 1.2: County Map
(World Street Map, ESRI 2013).

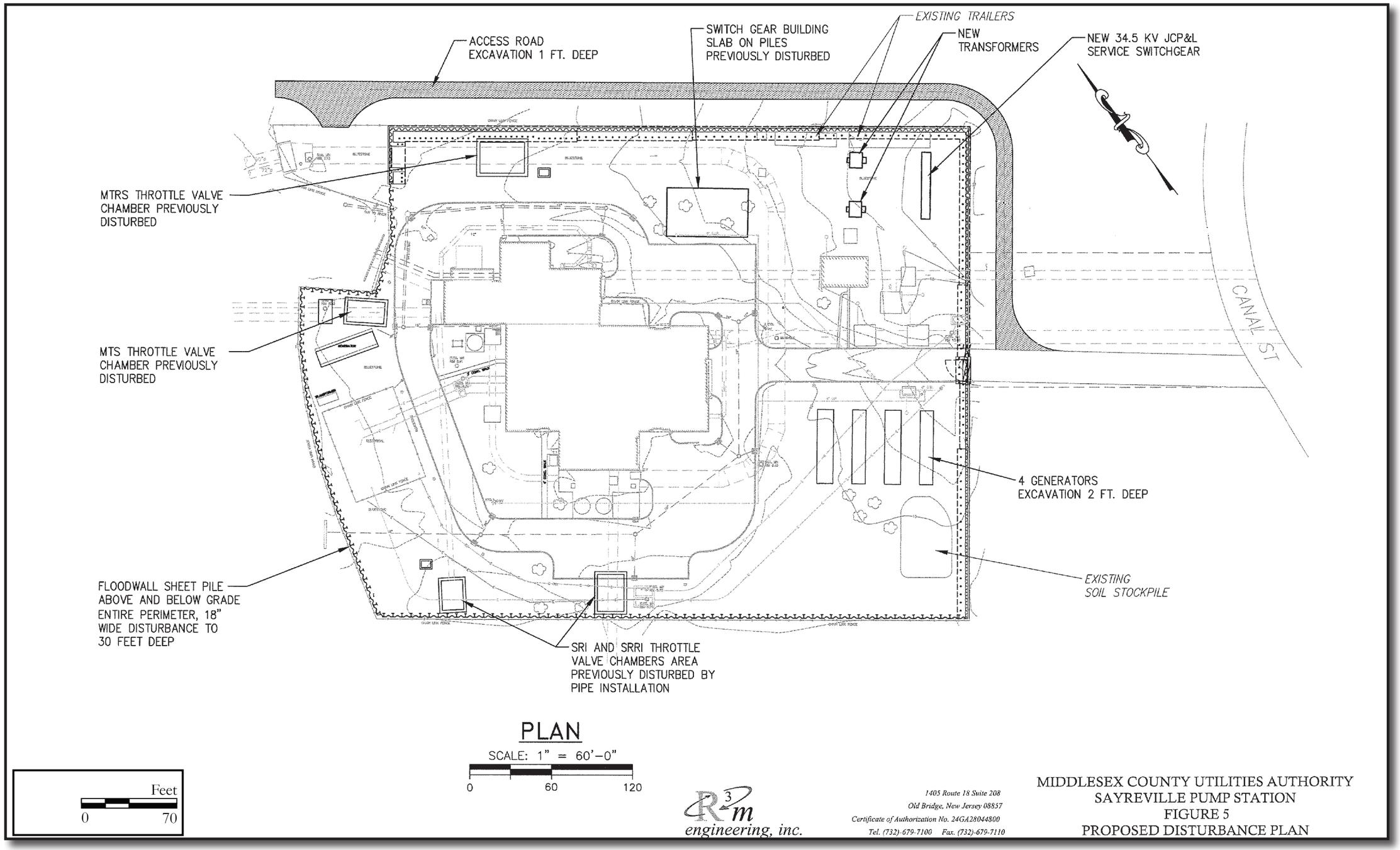

Figure 1.3: Site Plan
(R3M Engineering, Inc. 2014).

1.3 Area of Potential Effects

The APE is defined in 36 CFR 800.16(d) as follows: "the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist. The [APE] is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking."

The APE includes locations that potentially may be impacted by construction or that may experience effects once construction is completed. For example, the APE includes all locations where a proposed project may result in disturbance of the ground and where the activity may result in changes in land use. Project effects can include physical destruction, demolition, damage, or the alteration of an historic resource. For the proposed project, the APE includes the limits of disturbance for construction of the perimeter flood wall, new storm water pump stations, a new electrical building, new transformers, a new switchgear, new generators, and associated improvements (see Figure 1.3).

2.0 RESEARCH GOALS AND DESIGN

2.1 Research Goals

The goals of the Stage I archaeological survey were to determine if documented prehistoric and historic archaeological resources are present within the APE, and to identify undocumented, significant archaeological resources. Determinations of significance or potential significance are based on the NRHP Evaluation Criteria (see Section 2.2).

The Stage I archaeological survey methods included background research, a review of previous geotechnical studies within the project area, a site reconnaissance to examine existing conditions, an assessment of archaeological sensitivity, and completion of subsurface testing and geomorphological analysis.

2.2 National and New Jersey Registers of Historic Places Criteria

Significant historic properties include districts, structures, objects, or sites that are at least 50 years of age and meet at least one National Register criterion (National Park Service 1995). Criteria used in the evaluation process are specified in the Code of Federal Regulations, Title 36, Part 60, National Register of Historic Places (36 CFR 60.4). To be eligible for inclusion on the NRHP, a historic property(s) must possess:

> the quality of significance in American History, architecture, archaeology, engineering, and culture [that] is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association and:

a) that are associated with events that have made a significant contribution to the broad patterns of our history, or

b) that are associated with the lives of persons significant in our past, or

c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components lack individual distinction, or

d) that have yielded, or may be likely to yield, information important in prehistory or history (36 CFR 60.4).

There are several criteria considerations. Ordinarily, cemeteries, birthplaces, or graves of historical figures, properties owned by religious institutions or used for religious purposes, structures that have been moved from their original locations, reconstructed historic buildings, properties primarily commemorative in nature, and properties that have achieved significance within the past 50 years shall not be considered eligible for the NRHP. However, such properties will qualify if they are integral parts of districts that do meet the criteria or if they fall within the following categories:

a) a religious property deriving primary significance from architectural or artistic distinction or historical importance, or

b) a building or structure removed from its original location but which is significant primarily for architectural value, or which is the surviving structure most importantly associated with a historic person or event, or

c) a birthplace or grave of a historical figure of outstanding importance if there is no other appropriate site or building directly associated with his/her productive life, or

d) a cemetery which derives its primary significance from graves of persons of transcendent importance, from age, from distinctive design features, or from association with historic events, or

e) a reconstructed building when accurately executed in a suitable environment and presented in a dignified manner as part of a restoration master plan, and when no other building or structure with the same association has survived, or

f) a property primarily commemorative in intent if design, age, tradition, or symbolic value has invested it with its own historic significance, or

g) a property achieving significance within the past 50 years if it is of exceptional importance. (36 CFR 60.4)

When conducting NRHP evaluations, the physical characteristics and historic significance of the overall property are examined. While a property in its entirety may be considered eligible based on Criteria A, B, C, and/or D, specific data are also required for individual components therein based on date, function, history, and physical characteristics, and other information. Resources that do not relate in a significant way to the overall property may contribute if they independently meet the NRHP criteria.

A contributing building, site, structure, or object adds to the historic architectural qualities, historic associations, or archaeological values for which a property is significant because a) it was present during the period of significance, and possesses historic integrity reflecting its character at that time or is capable of yielding important information about the period, or b) it independently meets the NRHP criteria. A non-contributing building, site, structure, or object does not add to the historic architectural qualities, historic associations, or archaeological values for which a property is significant because a) it was not present during the period of significance, b) due to alterations, disturbances, additions, or other changes, it no longer possesses historic integrity reflecting its character at that time or is incapable of yielding important information about the period, or c) it does not independently meet the NRHP criteria.

Archaeological sites are frequently eligible for inclusion on the NRHP under Criterion D. The application of Criterion D to archaeological sites is based on a researcher's assessment of a particular site's significance and whether a particular site is likely to yield important information for the reconstruction of past lifeways (Glassow 1977; Talmage and Chesler 1977; Raab and Klinger 1977; Moratto and Kelly 1978; Raab 1981; Tainter and Lucas 1983; Shott 1987).

Raab and Klinger (1977) have argued that significance should be measured in terms of a site's potential to provide information on specific research issues that are carefully formulated based on prior research studies. Glassow (1977) and Tainter and Lucas (1983) have argued that significance should be judged on the theory neutral dimensions of variety, quantity, clarity, integrity, and environmental context. An archaeological site is evaluated as significant when it possesses the potential to address important research issues and the integrity to convey this significance.

The empirical dimensions of a site, including the presence of sufficient data sets to address significant research issues, must be considered to determine integrity. Only sites possessing both the potential to address specific research questions coupled with integrity are considered significant (King 1998:77; Little 1997:179-180; Little et al. 2000; National Park Service 1995:44-46).

3.0 ENVIRONMENTAL SETTING

3.1 Environmental Conditions

Situated within the Lower Raritan River drainage, Sayreville lies near the interface of two physiographic provinces: the Inner Coastal Plain and the Piedmont Lowlands. The interface of these two provinces trends southwest from New Brunswick to meet the Delaware River at Trenton. The Borough of Sayreville is located in the Inner Lowlands subdivision of the Inner Coastal Plain Physiographic Province (Figure 3.1). The geology of the Inner Coastal Plain consists of unconsolidated clays, marls, silts, and sands of Late Cretaceous and Tertiary age, overlain in places by Pleistocene interglacial gravels (Wolfe 1977). The Inner Lowlands contains gently rolling hills that reach elevations of 120 feet to 130 feet above mean sea level. These form relatively steep bluffs along the edges of parts of the Raritan Valley.

The bedrock geology of the APE is composed of Upper Cretaceous micaceous clay, silt, and sand of the Raritan Formation (Owens et al. 1998). Surficial sediments in the APE consist of Holocene Salt-Marsh and Estuarine Deposits composed of silt, sand, peat, clay and pebble gravel (Newell et al. 2000). Raritan Formation clays are part of a narrow belt of clay deposits that extend from Perth Amboy southwest to Trenton. First identified in the mid-nineteenth century, these high-quality clay deposits fostered the development of numerous clay extraction and manufacturing enterprises in the Sayreville area, including the Sayre and Fisher Company located on a high bluff adjacent to the south bank of the Raritan River. Clay extraction from the bluff face gradually reduced its elevation from 80 feet to its present elevation of 10 to 15 feet above mean sea level (Cook 1878).

Elevation within the APE ranges from approximately seven to 15 feet above mean sea level. The terrain is low, gently sloping floodplains and terraces adjacent to the Washington Canal, which connects the South River to the Raritan River, bypassing a series of tidal meander loops in the South River's lower reaches. From Sayreville, the Raritan River flows in a meandering easterly course into Raritan Bay and ultimately the Atlantic Ocean.

Soils mapped in the APE consist of Psamments, sulfidic substratum, 0 to 3 percent slopes (PstA) and Udorthents, clayey substratum, 0 to 8 percent slopes (UdcB) (Figure 3.2; NRCS 2014b). Psamments consist of sandy lateral spread deposits over organic material and are found in filled marshlands. This soil is classified as moderately well-drained with high water movement and low shrink-swell potential. A zone of seasonal saturation occurs at 39 inches below ground surface from November through June (NRCS 2014a). Udorthents consist of loamy earth spread deposits found on cuts, fills, and low hills on uplands. This soil is classified as somewhat poorly drained with low water movement and a moderate shrink-swell potential. A zone of seasonal saturation occurs at 12 inches from October through May (NRCS 2014a).

Generally, the natural vegetation of the Inner Coastal Plain is classified as Mixed Oak Forest, Coastal Plain Phase, a term that reflects the drastic decline in American chestnut since prehistoric times (Collins and Anderson 1994). The American chestnut tree (Castanea dentata) was once one of the most abundant trees in this region, and estimates for the central Appalachian forest suggest that one out of every four trees belonged to this group (Cochran 1990:130). During the early part of the twentieth-century, the Asiatic fungus (Cryphonectria parasitica) eradicated several billion trees in the eastern woodlands, although small pockets survive in Michigan and Long Island. This void was rapidly filled by species that took advantage of the new ecological niche, and the region is now part of the Mixed Oak Forest. White and black oaks, as well as species of American beech, pignut and mockernut hickories, black walnut, tulip tree, red maple, persimmon, sweet gum, Virginia pine and Spanish oak compose the Mixed Oak Forest in central New Jersey. A shrub cover primarily composed of mountain laurel, blueberry, huckleberry, and swamp azalea is typical of the Coastal Plain Phase (Collins and Anderson 1994:185).

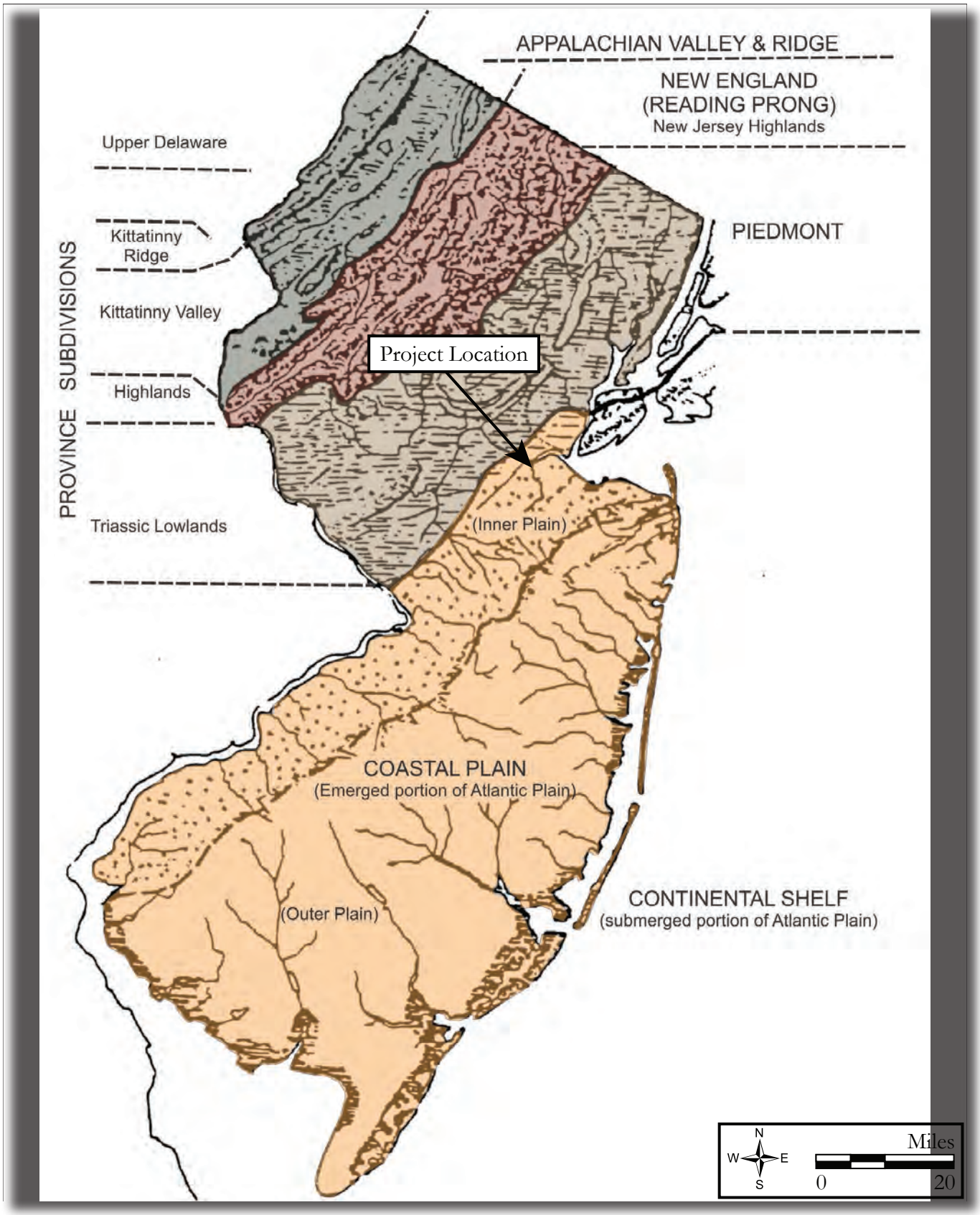

Figure 3.1: Physiographic Provinces Map
(adapted from Wolfe 1977).

Figure 3.2: Soils Map
(from 2014 Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Soil Survey Geographic (SSURGO)).

Floodplains along the lower Raritan River and its major tributaries typically contain tidal marsh composed of salt-marsh cordgrass and salt-meadow grass. Black marsh grass, glasswort, saltwort, sea blite, orache, marsh fleabane, sea lavender, sea myrtle, marsh elder, and salt-marsh aster may be found on higher marshland further from tidal inflows (Robichaud and Buell 1983:123).

3.2 Previous Land Modifications

The APE has been subject to multiple episodes of modern disturbance that have resulted in significant land modifications. Construction of the Sayreville Pump Station began in 1956 with excavation for the station substructure and facilities that extended to a depth of 52 feet below ground surface (Frank H. Lehr Associates 2014; see Appendix C: Part I). The pump station was expanded in 1979 and 1980 by the construction of a relief pump station, an electrical substation on the west side of the APE, a flow meter chamber and valve chambers on the east side of the APE, a 132-inch trunk sewer and siphon outlet chamber along the northern perimeter of the APE, and related improvements (see Appendix C). Seven soil borings completed in 1975 in support of the construction of the pump station addition sampled the central portion of the APE (see Appendix C: Part 2, Charles J. Kupper, Inc. 1975). Deep fill deposits ranging in thickness from 10 to 35 feet were recorded, underlain by laminated fine to medium silty sands and interbedded silty sands and silty clays. These findings supported the findings of two soil borings completed in the southwest corner of APE, adjacent to the Washington Canal, and in the northeast corner of the APE during a 1972 geotechnical study (United States Army Corps of Engineers n.d.). The 1972 borings recovered fill deposits from three to seven feet thick underlain by stratified silty sands and silty clays.

In 2010, two soil borings were completed in the east-central area of the APE in advance of force main repairs at the Sayreville Pump Station (see Appendix C: Part 2, Frank H. Lehr Associates 2010). These two borings confirmed the presence of fill deposits to depths approximately 30 feet below ground surface in the central portion of the APE, which were underlain by dense silty sands and sands and hard silty clays (Frank H. Lehr Associates 2010:4). Combined, these geotechnical investigations documented the extensive cutting and filling from the construction of the pump station and its related facilities. Soil boring information indicated that modern fills have truncated Psamments soils, which are sandy Entisols deposited by alluvial processes and lack developed soil horizons (Lal 2006:520; Sumner 1999:E-231).

In 2012, Hurricane Sandy inundated the Sayreville Pump Station. An emergency bypass plan was implemented to restore service and to halt the release of untreated sewage into the water supply (see Appendix D). Surface grading conducted in the aftermath of Hurricane Sandy removed saturated topsoil on the perimeter of the APE and created six stone stabilization areas for the installation of above ground bypass piping and emergency pump station repairs (see Appendix D: Figure D-1).

3.3 Geotechnical Assessment

A geotechnical assessment was completed in 2014 to assess soil and groundwater conditions. Frank H. Lehr Associates (2014) analyzed 15 soil borings and 32 groundwater observation wells arrayed in nine vectors, or judgmentally positioned along the perimeter of the APE (see Appendix E: Boring, Piezometer, and well location plan, R3M, Engineering, Inc. 2014). Soil borings were probed to a maximum depth of 80 feet. The 2014 soil borings documented fill deposits ranging between six and 27 feet in depth (Frank H. Lehr Associates 2014:9). Deep fills generally corresponded to the locations of pipe excavations, while shallower fills were noted in borings completed outside of pipe backfill zones (see Appendix E: Previous Disturbance Plan and Profiles, R3M, Engineering, Inc. 2014). In general, loose to medium compact sands that contained frequent brick fragments were recorded in the upper six to 10 feet of fill. Sands and silty sands were recorded below the fill layers. Organic tidal marsh deposits were not observed below the fill, which was interpreted as evidence of their removal

during earlier construction episodes (Frank H. Lehr Associates 2014:10). Groundwater infiltrated soil borings and wells at elevations of zero to five feet, as a result of tidal influence on the water table.

Soil borings completed along the northern property boundary (MB-1, MB-2, and MB-3) indicated that layered fills ranging in depth from 11 to 15 feet below ground surface exist. Soil borings completed approximately 40 feet south of the fence line (MB-9, MB-10, and MB-11) documented deeper fills that extended to 25 feet and are interpreted as pipe trench backfill related to trunk sewer line installation. Soil borings in the northeast corner of the APE (MB-12 and MB-13) contained multiple fill layers, typically two feet thick, which extended to a depth of 12 feet and alternated between silty sand with gravel inclusions and sand with brick and stone fragments. Soil borings completed in the southwest corner of the APE (MB-7 and MB-15) contained similar profiles of alternating silty sand and sand fills with brick fragments that extended to 10 feet in depth. Soil borings along the southern property boundary (MB-5 and MB-6) and in the southeast corner of the APE (MB-14) contained layered fills to a depth of eight to 10 feet, composed of silty sands, clayey silts, and sands. A soil boring completed along the eastern perimeter of the APE (MB-4) contained a silty sand fill layer with inclusions of fine gravel, brick fragments, and asphalt fragments that extended to a depth of 10 feet (Frank H. Lehr Associates 2014:Soil Boring Logs). Collectively, the 2014 soil boring data is consistent with a classification of APE soils as spread deposits that appear to represent a mosaic of Psamments and Udorthents sediments. Distinct color and texture changes between fill layers suggested multiple depositional episodes. The presence of asphalt fragments in the upper four feet of fill indicated modern ground disturbance.

4.0 BACKGROUND RESEARCH

Background research was conducted to locate any previously identified historical or archaeological resources within and adjacent to the APE, to identify the potential for additional undocumented archaeological resources, and to develop an appropriate historic context. Research was conducted at the HPO in Trenton to identify resources listed on or eligible for listing on the NRHP. Previous historic sites surveys and regulatory surveys on file at the HPO were reviewed. Files at the New Jersey State Museum (NJSM) were reviewed for the presence of registered archaeological sites within or near the APE. Additional background research consisted of a review of pertinent secondary sources, including historic maps, atlases, photographs, and local and county histories available at the New Jersey State Library in Trenton.

4.1 Prehistoric Context

Archaeologists organize chronological and cultural information about the prehistoric occupants of New Jersey and the Middle Atlantic into three broad time periods: Paleo-Indian +/-9500B.C.-8000 B.C., Archaic 8000-1000 B.C., and Woodland 1000 B.C.-A.D. 1600 (Table 4.1; Chesler 1982; Custer 1996; Grossman-Bailey 2001; Kraft 1986, 2001; Mounier 2003). These periods act as a framework in order to study the approximately 12,000 years of human occupation in the area. The Archaic and Woodland periods are subsequently subdivided into Early, Middle, and Late sub-periods. The prehistoric era is considered to have ended approximately 1550 to 1600 A.D., during the time of initial contact between Native groups and Old World populations, and is followed by a period of extensive colonization by the Dutch, Swedish, and English. A brief summary is presented below.

Early human populations inhabiting New Jersey during the Paleo-Indian period were most likely organized as small hunter-gatherer bands characterized by low population density and high mobility that occupied caves and rockshelters as well as short-term open air camps. Lower sea levels from glacial expansion exposed a broad, flat continental shelf of marshes and meadows cut by deep river channels and branching streams (Kraft 1977; Chesler 1982; Cavallo 1981). Based on the distribution of the over 200 fluted projectiles, primarily Eastern Clovis points and Dalton points, recovered throughout New Jersey, Paleo-Indian groups may have preferred riverine settings along the Delaware River and its main tributaries (Mason 1959).

The Early Archaic period was associated with a continuing expansion of forest habitats. Floodplains and river islands were attractive locations for hunter-gatherer camps as upland areas continued to be predominated by boreal forest. However, during this period, limited use of upland lakes and bogs is evidenced by a small number of archaeological sites adjacent to these locales. Sinkhole complexes may have supported clusters of natural ponds throughout the Late Pleistocene and Early Holocene that would have been attractive locations for migratory wildlife and the human populations that exploited them. Such freshwater wetlands added to the diversity of resources available in the periods immediately following the last glaciation and made broad-spectrum foraging a successful subsistence strategy for human populations (Custer 1996; Meltzer and Smith 1986; Cavallo and Mounier 1982; Pagoulatos 1991).

By the Late Archaic, more intensive utilization of sites in preferred ecological settings characterizes Native American settlement patterns. Moreover, use of more productively marginal resource areas increases and regional exchange networks appear for the first time. Overall, climatic changes during the Late Archaic would have significantly enhanced the productivity of some habitats, such as coastal marshes and mixed interior forests, while diminishing the output of traditional resource rich areas (Carbone 1982; Custer 1996; Pagoulatos 1991). Significant increases in population density are noted in some areas as is a general decrease in mobility. Especially in proximity to riverine settings, large sites characterized by dense scatters of artifacts begin to appear. Use of swamp and marsh habitats intensifies during this period (Custer 1996:188). Finally, the far-reaching distribution of high-quality lithics may

Table 4.1: Summary of New Jersey prehistory.

Time Frame	Period	Characteristics
A.D. 1550/1600 to A.D. 1750	Contact	- European contact and initial colonization - Continuity of aspects of Algonkian ideology
A.D. 900 to A.D. 1600	Late Woodland	- Triangular projectile points; bow and arrow - Unfortified hamlets, camps, smaller territories - Territories of the proto-Lenape/Unami; Algonkian ideology - Foraging, limited agriculture in portions of southern NJ - Cord-decorated and incised ceramics - Use of cobble cherts and jasper - Climate: modern; Sea level rise remains a factor
A.D. 0 to A.D. 900	Middle Woodland	- Hunter-gatherers; seasonal fission/fusion of social groups - Large and small camps - More kinds of ceramics - Mortuary ceremonialism - Large scale exploitation of seasonal resources
1000 B.C. to A.D. 0	Early Woodland	- Band level society with first evidence of community identity - Mortuary ceremonialism - Extensive trade networks for exotic raw materials - Shellfish exploitation - Experimentation and early use of ceramics - Climate: cool and wet
1000 B.C. to 3000 B.C.	Late Archaic	- Broadspear, narrow-stemmed, fishtail points - Mortuary ceremonialism - Extensive trade networks for exotic raw materials - Intensive use of local materials - Social differentiation - Increased sedentism - Change in vessel technology- soapstone bowls - Climate: warmer & dryer than present, sea level rise slows
3000 B.C. to 6500 B.C.	Middle Archaic	- Bifurcate points, stemmed points - Hunter-gatherers with increasing intensification of resource use - Use of shell fish documented in the region - Use of more varied lithic materials and tool categories - Large and small camps; stratified riverine settlement system - Band level society - Climate: warm and wet
6500 B.C. to 8000 B.C.	Early Archaic	- Corner-notched and stemmed point types - Spear-thrower technology - Use of more types of stone for tools - Exploitation of more kinds of food resources? - Very similar to Paleo-Indian period - Climate: cold and drier than present; rapid sea level rise
8000 B.C. to 9500 B.C.	Paleo-Indian	- Highly mobile - Large game hunting followed by generalized foraging patterns - Fluted projectile points usually made of jasper or chert - Band level society - Climate: cold and wet; mosaic of mixed grasslands; extremely rapid sea level rise

suggest the development of regional exchange networks as some groups' mobility patterns brought them into closer contact with other regional communities (Carbone 1982; Custer 1996; Pagoulatos 1991). Economic and technological changes reflect the selection of a broader range of habitats for settlements with larger encampments located near major rivers and small sites near coastal areas, estuaries, freshwater springs, lakes and drainage basin divides to take advantage of resource bases created by the formation of estuarine marshes and the development of oak-hickory forests.

The Early Woodland period (3000 to 2000 B.P./1000 B.C. to A.D. 0) marks the shift to modern climatological and environmental regimes in the Eastern United States. Vast deciduous forests dominate the landscape and temperature and rainfall patterns take on marked seasonal fluctuations. Culturally, the environmental changes of the Early Woodland favored the continued development of trends initiated during the Late Archaic. Intensification in the use of plant foods, as well as a trend toward increasing degrees of sedentism, marks the transition from the Archaic to Woodland eras. Floodplains and their surroundings continued to attract base camp settlement in an even more focused manner than the previous period. Finally, continuing trends of the Late Archaic, exchange networks and mortuary ceremonialism became further elaborated throughout the Early and Middle Woodland (Carbone 1982; Custer 1984; Custer 1996).

The Middle Woodland period (2000 B.P. to 1100 B.P./A.D. 1 to A.D. 900) is represented by settlement patterns focused on the seasonal fission/fusion of hunter-gatherer social groups between large and small camps. Intensified use of coastal habitats is demonstrated in the large scale exploitation of seasonal resources including shellfish at large coastal sites occupied on a semi-permanent basis. Large shell middens are reported along the estuaries and bays of the Inner Coastal Plain, located on promontories overlooking tidal marshes. In particular, the Raritan River and Bay were heavily exploited by Native Americans as a major source of oysters. Regional models for settlement systems suggest that seasonal fission/fusion of social groups occurred as people occupied different types of sites throughout the year. Large base camps where smaller extended family groups came together are often found in rich environments at mid- to upper tributary stream confluences. Smaller procurement camps and specialized work camps are found in many settings at shorelines, headwaters, and marshes (e.g., Custer 1996; Grossman-Bailey 2001; Mounier 1978; Stewart et al. 1986).

The Late Woodland period is distinguished from earlier periods largely due to the inception of maize horticulture, which originated in Central America and began to be practiced in the Middle Atlantic circa A.D. 900 and perhaps earlier. The growing of maize, and a suite of plants that included beans, pumpkins, squash, and tobacco, had significant implications for Native Americans. Horticultural activities were supplemented by hunting and gathering of food staples, such as large game, freshwater mussels and berries. During the Late Woodland, settlement patterns exhibit a shift away from estuarine settings in favor of more exclusively floodplain locations. Settlement pattern is characterized by unfortified hamlets and camps with a decrease in band territory size as seasonal economic strategies included hunting and foraging in upland areas as well as shellfishing and maize horticulture in riverine settings. Tools include small triangular arrow heads and various implements, such as bone awls, scrapers, celts and ceramic pipes, some with effigies.

The Raritan River is sometimes defined as the boundary between proto-Unami speakers to the south and the proto-Munsee to the north. Based on seventeenth century ethnohistoric accounts, these linguistically related groups may have had organized polities that controlled, among other things, oystering and hunting territories during the Late Woodland and proto-historic periods (Goddard 1978:215). Shellfish gathering occurred in the spring and summer months from smaller camps and the meats were dried for later use (Goddard 1978:216-7). A settlement model focused on seasonal fission/fusion of social groups along river drainages developed in the Inner Coastal Plain (Kraft 1986:101; Mounier and Martin 1992). The prehistoric era ends at the arbitrary date of A.D. 1550 to 1600, about the time of first contact between Native groups and Old World populations, and the period of extensive colonization by the Dutch, English and French.

4.2 Historic Context

For much of the seventeenth century, primary land use of the Sayreville area was seasonal occupation by Native American groups who used the fish and shellfish resources of the tidal marshes during visits to the Raritan Bay. The Lower Raritan River Valley was first settled in the early 1680s, when Dutch and English colonists began occupation of a large tract surrounding the Raritan Bay as part of the colony of East Jersey. The sandy soils limited the amount of good agricultural land and resulted in a

scattered settlement pattern for the area throughout the eighteenth century. Isolated farmsteads were established in a long lot system of land division. Under this system, land tracts were laid out as long, narrow plots that extended away from river frontage, through fluvial wetlands, and on to the more fertile uplands. This land use pattern provided farmsteads with access to water transportation, salt marsh resources, lowland grazing plots, and upland hunting areas that supported a mixed subsistence economy.

In 1683, land divisions in East Jersey led to the formation of several counties, including Middlesex (Snyder 1969). Middlesex County was initially divided into three townships: Woodbridge, Perth Amboy, and Piscataway (Snyder 1969:169). A map drawn by John Reid circa 1685 shows land acquisitions along the Raritan River, including those that eventually would become part of Sayreville Borough (Figure 4.1; Reid 1685). However, these acquisitions were not settled until nearly a century later. The Lawrie Road, between South Amboy and Bordentown, was built between 1683 and 1686 in an attempt to divert traffic from the Upper Road, which bypassed the East Jersey capitol of Perth Amboy. The northern terminus of the Lawrie Road was Long Ferry, established in 1684 on the south bank of the Raritan River opposite Perth Amboy at the location where South Amboy would be founded during the eighteenth century (Clayton 1882; Wall and Pickersgill 1921).

Few settlers were recorded in this portion of Middlesex County in the eighteenth century. Early ferriage records indicate that travel along the Lawrie Road was light, compromised by the sparse population in the area and the paucity of public houses available to travelers. The 1784 tax assessment of Middlesex County counted only about 50 square miles of South Amboy as improved (Louis Berger Group, Inc. 2001). These early settlers subsisted mainly through timbering and agriculture; their products were shipped to New York City from South Amboy. The section of Perth Amboy Township that would become Sayreville was settled as early as 1770, when Elijah Drisbow took up residence in the vicinity of Burt's Creek (Wall and Pickersgill 1921:469). Other early settlers in the area included Charles Morgan who settled near the mouth of Cheesequake Creek, Ebenzer Price and Henry French at Roundabout Landing, Christopher Van Deventer, Frances Letts, Joseph M. Taylor and Benjamin Peterson (Clayton 1882:853-854). These pioneer homesteads were scattered along the Raritan and South Rivers to utilize arable uplands, the oak-cedar forests of the interior, and the marshes bordering the rivers, which provided salt hay. As a result of the slow, but steady growth, part of Perth Amboy Township was subdivided in 1798 to create South Amboy Township (Snyder 1969:173). By the early nineteenth century, Henry French was operating a tavern along a bend in the Raritan River in South Amboy Township known as Roundabout Landing.

The growth of overland transportation between the mouth of the Raritan River and Bordentown on the Delaware River for the Philadelphia-to-New York trade served as an important engine of growth. Initially chartered in 1822, the Washington Canal was constructed by the Washington Canal Company between 1823 and 1827 to shorten navigation and speed travel times up and down the South River for transport between Philadelphia and New York. Its original dimensions are not known but reportedly consisted of an 80-foot wide open ditch without tidal controls (see Appendix F, Survey Form 1). As stated in the act of incorporation, the canal was cut from the village of Washington through lands owned by Robert Montgomery, Christopher Van Deventer, and Henry Obert to a point on the Raritan River near the house of Xerxes Price (State of New Jersey 1822). Use of the canal for the Philadelphia and New York trade faltered in the wake of stiff competition and the opening of the Camden & Amboy Railroad, but served as a channel for general South River commerce, consisting of agricultural produce, sand, clay, and clay products. In 1870, the United States Army Corps of Engineers (USACE) assumed responsibility for improving and maintaining the South River, including the Washington Canal. Subsequently, the Washington Canal's width and depth was expanded dramatically through a program of dredging and dike construction throughout the South River.

The riverine focus of economic activities may have led to the recognition of the area's extensive clay resources, because some time after 1800, Ebenzer Price, Jr. and Xerxes Price established a stoneware pottery at French's Landing that produced stoneware until 1851. The Price Pottery operated on land acquired by Ebenezer Price, Sr. and his sons Ebenezer, Jr. and Xerxes in 1802 (Louis Berger Associates

Figure 4.1: 1685 Reid, A Map of Rariton River, Millstone River, South River, Rahway River, Bound Brook, Green Brook & Cedar Brook with the Plantations thereupon etc., etc.

1990:55). They also acquired farmland in the Sayreville area, which supplied the pottery with wood, clay, and sand. From its establishment until 1820, when Ebenezer, Jr. died, the pottery was jointly operated by the two sons. After 1820, Xerxes ran the pottery and by 1829, Xerxes was having financial difficulties. Xerxes' son George acquired a partial interest in the pottery through an 1830 sheriff's sale (Louis Berger Associates 1990:57). George Price continued to make stoneware until 1843 when his share of the property was sold through a sheriff's sale to satisfy outstanding debts. Isaac Fourat, the son-in-law of George Price, bought George's share of the pottery. After 1843, the pottery most likely was operated as a small-scale craft shop by James Holmes (Louis Berger Associates 1990:63).

By the mid-nineteenth century, the earliest stages of Sayreville's clay-related expansion were evident. The Price Pottery and three brickyards are depicted in the Sayreville area on an 1850 map of Middlesex County (Figure 4.2; Otley and Keily 1850). Large, easily mined, shallow clay beds of the Cretaceous Magothy and Raritan formations were excavated along the Raritan River from the South River to the Raritan Bay (Cook 1878). The mining of extensive deposits of clays for fire brick, common brick, and pottery, and later, the mining of sand, grew into large scale industries between 1850 and the 1870s (Clayton 1882). The Price Pottery continued to operate until 1851, when the property's extensive clay bank attracted the interest of James R. Sayre, Jr. and Peter Fisher.

James R. Sayre, Jr. and Peter Fisher established a partnership in 1851 to develop a common brick works along the Raritan River. The Sayre and Fisher Company purchased the Price property just west of the property of James Wood, who had begun making common brick in the 1840s (Clayton 1882). The Sayre and Fisher property included an 80-foot high bluff that extended along the Raritan River for nearly one-half mile and was a rich source of red brick clay (Cook and Smock 1877; Cook 1878; Karcher 1949). This investment was followed by further land acquisitions throughout the 1860s and 1870s that increased the Sayre and Fisher Company holdings to 438 acres (Karcher 1949:4). During this period, the Sayre and Fisher Company established a fire brick works on land east of the Wood Brickyard, absorbed several smaller brick making operations, and had established a second common brick works along the South River on a portion of the former Christopher Van Deventer farmstead near the R.L. Serviss Brickyard (Clayton 1882; Karcher 1949; Louis Berger Associates 1990; Wall and Pickersgill 1921). To the south, on another part of the Van Deventer former land, H.F. Worthington opened the Washington Brick Company, a common brick works, in 1868 that operated until his death in 1879 (Louis Berger Associates 1982:35). Throughout the 1860s, the expansion of South Amboy Township's brick industry, and the Sayre and Fisher brick works in particular, spurred growth along the lower Raritan River.

Such was the Sayre and Fisher Company's investment that by 1872, the Sayreville name was in use for the area. In 1876, Sayreville Township was divided from South Amboy and incorporated as a new municipality that extended from the South River to Marsh Point (Snyder 1969:173). Maps published in the 1870s depict the dramatic increase in size and operations of the Sayre and Fisher Company (Figure 4.3; Cook and Smock 1877; Everts and Stewart 1876). Brickyards extended from the northern terminus of the Washington Canal east along the south bank of the Raritan River for a mile and included brickyards, drying sheds, kilns, boarding houses for workers, a blacksmith shop, an office, an engine house and a store as well as several working clay banks and pits (see Figure 4.3; Cook and Smock 1877; Everts and Stewart 1876). A network of roads developed to facilitate the movement of materials, products and workers in the developing community. By 1882, the Sayre and Fisher Company was one of the largest brick manufacturers in the United States with five brickyards, 21 kilns, and 200 employees (Clayton 1882:860).

The Sayre and Fisher Company continued to acquire land in Sayreville throughout the last decades of the nineteenth century and into the early twentieth century in an effort to add quality clay sources to its company holdings (Karcher 1949; Panamerican Consultants, Inc. 2002). More than 500 acres of land in Sayreville and another 238 acres in East Brunswick Township were purchased by the company between 1886 and 1912 (Karcher 1949:4). These extensive holdings facilitated the continued exploitation of the brick clay and fire clay beds of what geologists named the Woodbridge Clays.

Figure 4.2: 1850 Otley and Keily, Map of Middlesex County.

Figure 4.3: 1877 Cook and Smock, Map of the Clay District of Middlesex County, showing locations of beds of stoneware clay, kaolin and fire clay.

The Woodbridge Clays are laminated clay and sand strata within the Upper Cretaceous Raritan Formation that during the nineteenth century were widely recognized as high quality material for the manufacture of both brick and stoneware (Cook 1878; Panamerican Consultants, Inc. 2002). The Woodbridge Clays range in thickness from 50 to 80 feet along the Raritan River with shallow exposures in many areas in Sayreville. Upper strata included lignitic and pyritic grey to black clays interbedded with white quartz sands and provided material for the manufacture of common brick, fire brick, and hollow brick (Cook 1878; Panamerican Consultants, Inc. 2002). Lower strata were considered higher quality clays that ranged in color from grey to light blue and were used to produce pressed and front brick (Cook 1878; Panamerican Consultants, Inc. 2002).

In 1887, the Sayre and Fisher Company incorporated. Sayreville's continued expansion was aided by the incorporation of the Raritan River Railroad (RRR) in 1888 (Deibert 1983). Sayre and Fisher negotiated with the RRR for a spur line to service the brickyards. The initiative augmented a diverse shipping operation that included a fleet of sailing vessels, tug boats, and barges (Panamerican Consultants, Inc. 2002). During this period, Sayre and Fisher added the manufacture of enamel brick to its diverse product line, and soon came to dominate the U.S. market by providing a high-quality domestic alternative to imported enamel brick (Karcher 1949; Panamerican Consultants, Inc. 2002). As depicted in an 1889 survey map of the Raritan River shoreline, the company's brickyards extended in a nearly continuous line along the river to the mouth of the Washington Canal where two sheds stood along the canal's east bank proximate to the APE (Figure 4.4; United States Coast and Geodetic Survey 1889).

By 1905, the Sayre and Fisher Company operated 11 brickyards throughout Sayreville. In 1909, the William Fisher Company was purchased, adding four additional brickyards to the corporation (Karcher 1953:92-93). Ultimately, the Sayre and Fisher Company extended for two miles along the Raritan River and included a power plant, granary, bakery, slaughterhouse, coal yard, machine shop, blacksmith shop, ice plant, general store, post office, worker housing units, and a social center known as the Sayre and Fisher Reading Room (Louis Berger & Associates, Inc. 1990:30). At its peak, the Sayre and Fisher Company employed 1,700 workers, held title to 2,000 acres of land, and owned 5.5 miles of frontage along the Raritan River, the South River, and the Washington Canal in Sayreville (Karcher 1949; Wall and Pickersgill 1921:470).

Sayreville Borough replaced Sayreville Township in 1919 (Snyder 1969:173). The early twentieth century also saw the expansion of regional road networks with the construction of bridges between Perth Amboy and South Amboy in 1906 (Perth Amboy Drawbridge) and 1926 (Route 35 Victory Bridge). These bridges facilitated the burgeoning industrial development of the Raritan River's upper bay. In the early decades of the twentieth century, industrial development of the lower Raritan River Valley brought E.I. Dupont de Nemours & Co., Inc., Hercules Powder Co., Jersey Central Power & Light Co., National Fireproofing Co., Owen Illinois Glass & Co., Crossman Company, and National Lead Co. to the Sayreville-South Amboy area. The Sayre and Fisher Company was purchased in 1926 by a group of Chicago utility interests and organized as the Sayre and Fisher Brick Company (Karcher 1949:19).

The Sayre and Fisher Brick Company continued to operate throughout the mid-twentieth century, modernizing its operations to improve efficiency and satisfy changing markets. A 1930 aerial photograph records the extensive operation, including the railroad spur, clay banks, and riverfront facilities (Figure 4.5; NJDEP 1930). A large kiln shed was located in the APE during this period, although it is recorded as "Kiln Shed Yard No. 8, not used" on Sanborn fire insurance maps from 1931 (Figure 4.6; Sanborn Map Company 1931). The economic impact of the Great Depression eroded the demand for brick as new construction slowed, and the company was forced to file for reorganization. The Sayre and Fisher Brick Company was administered by a trustee between 1934 and 1943 (Karcher 1949). When the company emerged from administration, it focused on modernization; brick plants were retooled, rehabilitated, and rebuilt to meet the changing needs of production (Panamerican Consultants, Inc. 2002). The 1946 survey map of the Raritan River shoreline depicts the company's renovated and expanded facilities (Figure 4.7; United States Coast and Geodetic Survey 1946). Soon,

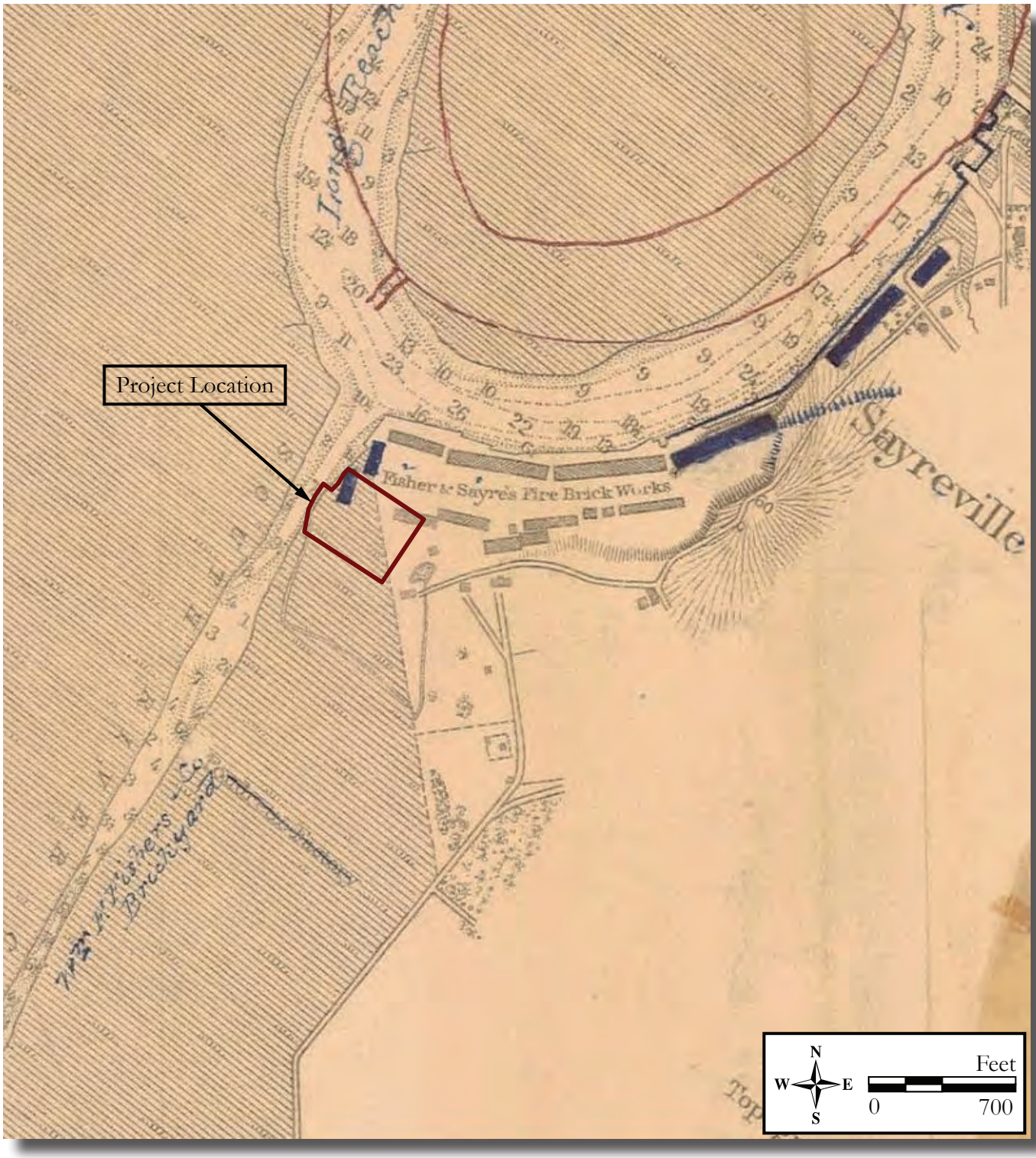

Figure 4.4: 1889 United States Coast and Geodetic Survey, Raritan River, New Jersey.

Figure 4.5: 1930 Aerial Photograph.

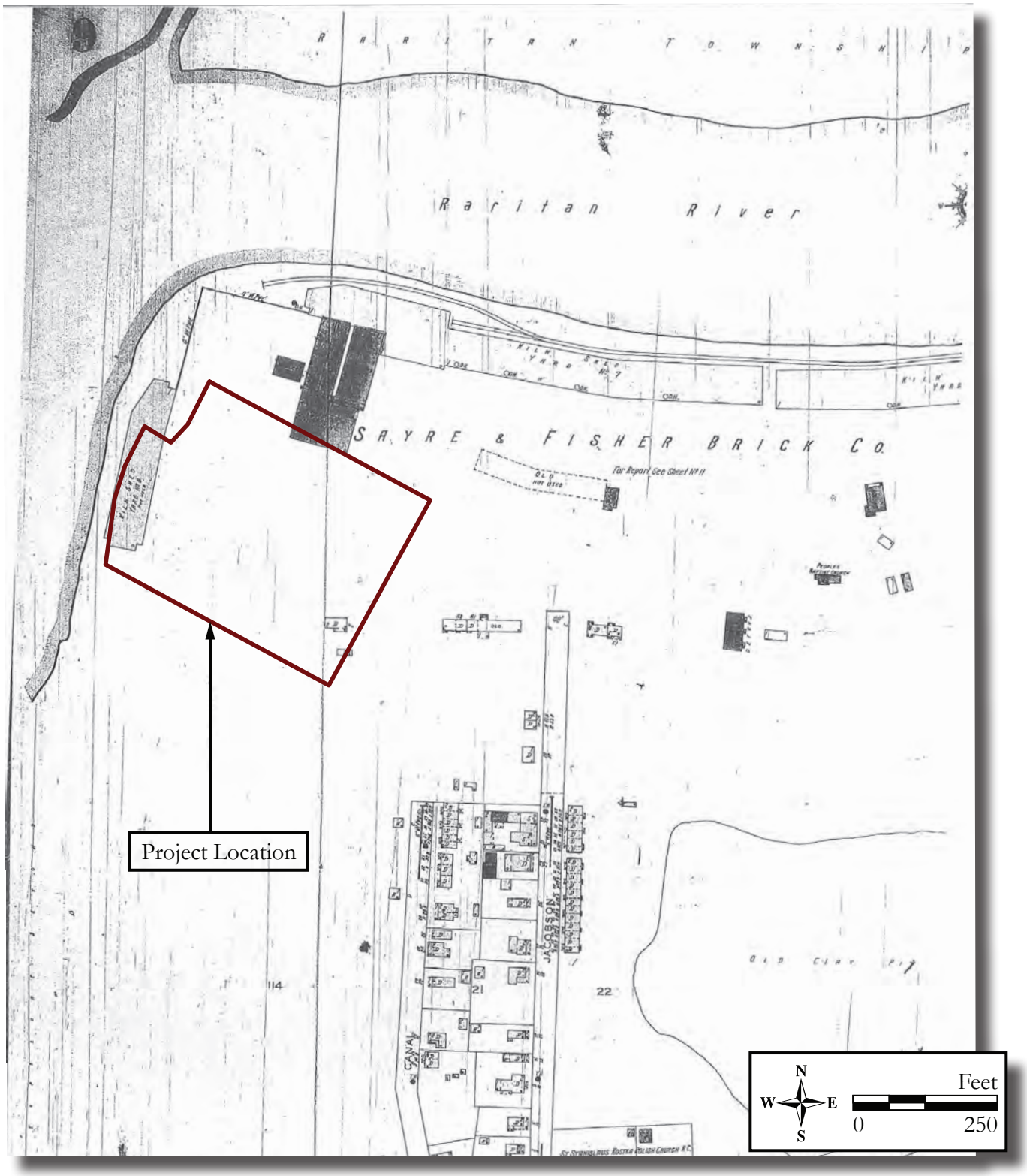

Figure 4.6: 1931 Sanborn Map Company, Sayreville, New Jersey.

Figure 4.7: 1946 United States Coast and Geodetic Survey, Raritan River, New Jersey.

however, concrete and steel supplanted brick as a preferred building material. Throughout the 1950s and 1960s, the Sayre and Fisher Brick Company suffered steep declines in sales. Some landholdings were converted to public use during this period. In 1956, Middlesex County's Utility Authority began construction of the Sayreville Pump Station on land formerly occupied by Kiln Shed Yard No. 8, which had been demolished by 1940 (Figure 4.8; Appendix C; Middlesex County Utility Authority 1955; NETR 1940). In 1970, the Sayre and Fisher Brick Company ceased operations and began to demolish its remaining buildings (Louis Berger & Associates, Inc. 1990; Panamerican Consultants, Inc. 2002).

In the early 1990s the Raritan River waterfront was rehabilitated as the Harbortowne residential subdivision, a community of single family homes built on the property of the former Sayre and Fisher Brick Company (Louis Berger & Associates, Inc. 1990). Since the construction of the Harbortowne subdivision, the community has experienced four major floods, most recently as a result of Hurricane Sandy (Morrison 2012). The Sayreville Pump Station also was inundated by flood waters during Hurricane Sandy that rendered it inoperable (Morrison 2014).

4.3 Archaeological Background Research

Archaeological Sites

An examination of standard references (Cross 1941; Skinner and Schrabisch 1913) and site files at the NJSM and the HPO indicated that no registered archaeological sites are located within the APE. However, six registered historic archaeological sites are located within one mile of the APE, five of which are associated with brick manufacturing (Table 4.2).

Table 4.2: Registered archaeological sites within one mile of the APE.

Site Name/Site Number	Period	Type	Direction/ Distance from APE	Reference
Price Pottery Site/28-Mi-152	Early Nineteenth Century	Pottery	NE/120 ft.	Louis Berger Associates 1989, 1990
Sayre and Fisher Brick Company/28-Mi-163	Mid-Nineteenth to Late Twentieth Century	Industrial Brickworks	NE/100 ft.	Louis Berger Associates 1989, 1990
Sayre & Fisher Company Site/ 28-Mi-16	Mid-Nineteenth to Late Twentieth Century	Industrial Brickworks; Workers Housing	E/3,500 ft.	Research & Archaeological Management, Inc. 1990
PCI S.R. Brickyard 1/28-Mi-209	Historic	Industrial Brickworks	S/4,750 ft.	Panamerican Consultants, Inc. 2000
PCI S.R. Brickyard 2/28-Mi-210	Historic	Industrial Brickworks	S/1,500 ft.	Panamerican Consultants, Inc. 2000
PCI S.R. Brickyard 3/28-Mi-211	Historic	Industrial Brickworks	S/800 ft.	Panamerican Consultants, Inc. 2000

NJSM: New Jersey State Museum

The Sayre and Fisher Company was a leading manufacturer of several varieties of bricks from the mid-nineteenth through late twentieth century, and occupied an extensive area of the Raritan River waterfront from the Washington Canal east for almost two miles. Several portions of this extensive industrial complex have been archaeologically investigated including brick kilns and dryers at 28-Mi-163 (Louis Berger Associates 1988, 1989, 1990) and industrial and residential buildings at 28-Mi-166 (Research & Archaeological Management, Inc. 1990). Three clusters of foundation features (28-Mi-209, 28-Mi-210, and 28-Mi-211), interpreted as support bases for industrial machinery related to brick manufacturing, are located south of the APE (Panamerican Consultants, Inc. 2000, 2001). Panamerican Consultants, Inc. (2012) conducted further archaeological investigations of 28-Mi-209, documented cultural features that retained a high degree of integrity, and recommended the site eligible for listing on the NRHP. In addition, portions of the early nineteenth century Price Pottery (28-Mi-152) are

Figure 4.8: 1955 Aerial Photograph showing pump station construction.

located proximate to the APE (see Table 4.2; Louis Berger Associates 1988, 1989, 1990). In a review letter dated April 3, 2014, the NJDEP - Municipal Finance and Construction Element speculated that the Price Pottery and the Sayre and Fisher Brick Company sites could extend into the APE.

While no prehistoric archaeological sites are recorded within one mile of the APE, numerous Native American villages and camp sites have been identified on uplands east of the South River between Sayreville and Old Bridge and along the lower reaches of the Raritan River and Raritan Bay (Skinner and Schrabisch 1913:45-47). Skinner and Schrabisch (1913:46) reported a "village site among the sand dunes…near the Sayreville clay pits…", "graves and shell heaps" were found during the construction of streets in Perth Amboy (Skinner and Schrabisch 1913:42), and sites are known from the mouth of the South River (Cross 1941). In Sayreville, local informants have reported undocumented prehistoric shell middens, burials and other types of sites, such as within the grounds of the Crossmans plant (see Richard Grubb & Associates, Inc. 1998). West of the APE, Cross (1941:29-30) conducted excavations at the Island Farm Site (28-Mi-1), located on an isolated hill east of the confluence of Lawrence Brook and the Raritan River. Cross (1941:29-30) recovered 100 lithic artifacts, including two caches of argillite raw material and biface blanks, 18 prehistoric ceramic fragments, and noted the presence of a large volume of fire-cracked rock from the site.

Further east along the south coast of the Raritan Bay, a large number of shell-bearing sites are known from nineteenth and twentieth century surveys and accounts. Estuary stabilization by the end of the Archaic period (circa 5000 B.P.) created habitats for oyster in brackish waters of the upper bay and lower river and for hard shell clam (quahog) in the higher salinity waters of the lower bay (Richard Grubb & Associates, Inc. 2005). Boyd (2005:74-75) lists 12 shell-bearing sites along the southern coastline of the Raritan Bay, which suggests that the area was a rich location for shell fish harvesting and occupation, particularly during the Woodland period.

National Register Files

No historic properties eligible for or listed on the NRHP are located within the APE. However, three historic properties eligible for listing on the NRHP are located within one-half mile of the APE. The Sayre and Fisher Brick Company Site/28-Mi-163 (SHPO Opinion: 9/12/1989) and the Price Pottery Site/28-Mi-152 (SHPO Opinion: 9/12/1989) are archaeological historic properties destroyed by the construction of the Harbortowne subdivision that were considered eligible under Criterion D for their ability to contribute significant information to the understanding of early industry in Sayreville and central New Jersey. The Sayre and Fisher Company Stable (SHPO Opinion: 6/2/1976), now demolished, was a late nineteenth century building within the extensive property of the Sayre and Fisher Brick Company. Eligibility criteria for the structure were not specified in documents on file at the HPO.

Previous Cultural Resources Surveys

Background research at the HPO indicated that four cultural resources surveys have been conducted in and adjacent to the APE (Kardas and Larrabee 1975; Louis Berger Associates 1982; Panamerican Consultants, Inc. 2000, 2001, 2012). In addition, six cultural resources surveys have been conducted within one-half mile of the APE (Louis Berger Associates 1988, 1989, 1990; The Louis Berger Group, Inc. 2001; Mudge 1998, 1999). Included in the latter group are archaeological investigations of portions of the Sayre and Fisher Company, an industrial complex that formerly encompassed the APE.

In 1975, Kardas and Larrabee conducted a Phase I archaeological survey for proposed sewer lines along the Raritan River from Bound Brook to Crossmans and along the South River from Sayreville to Old Bridge. This survey assessed the Sayreville area as having a high sensitivity for prehistoric and historic archaeological resources and recommended further archaeological survey. The Phase I archaeological survey did not include subsurface testing within the APE.

Panamerican Consultants, Inc. (2000, 2001) conducted a Phase I archaeological survey for the proposed construction of a levee and flood wall protection system along the southwest shore of the South River and the east side of the Washington Canal. In 2000, 50-foot intervals STPs were completed for the

proposed East Levee/Floodwall including a 450-foot long segment and a 750-foot long segment located north and south of the Sayreville Pump Station (Panamerican Consultants, Inc. 20011:4-10). No historic or prehistoric cultural material was recovered from any of the 23 STPs completed in the vicinity of the Sayreville Pump Station. Soil profiles recorded for STPs south of the pump station were composed of strata ranging in texture from sand to loam and in color from very dark grayish brown (10YR 3/2) to pale brown (10YR 6/3) (Panamerican Consultants, Inc. 2001:A-5 and A-6). In STPs E58 through E64, soil strata interpreted as modern fill contained brick fragments, stone, and cement rubble, which halted some STPs (Panamerican Consultants, Inc. 2001:A-5 and A-6). For example, STP E64, which was located adjacent to the southwest corner of the Sayreville Pump Station fence, was halted by cement rubble at 34-centimeters below ground surface (Panamerican Consultants, Inc. 2001:A-6). Approximately 40 feet north of the pump station's perimeter fence, STPs E65 through E74 contained soil profiles described as modern fills that contained brick, slag, rubble, Styrofoam, plastic, cement and rock in a sandy to loamy matrix that was described as mottled in five of the 10 completed STPs (Panamerican Consultants, Inc. 2001:A-6). The Phase I survey final report noted that the portion of the project area adjacent to the Sayreville Pump Station had been "highly disturbed by the rip-rap erosion control fill and fill used for landscaping and flood protection" (Panamerican Consultants, Inc. 2001:5-1). The survey assessed the potential for intact remains related to the Sayre and Fisher Brick Works in this part of the project area as highly unlikely (Panamerican Consultants, Inc. 2001:5-1). The results of the Phase I shovel testing were consistent with NRCS soil survey data that classified the soils within the East Levee/Floodwall project area as lateral spread deposits.

The Panamerican Consultants, Inc. (2000, 2001) Phase I archaeological survey resulted in the identification of three historic archaeological sites (28-Mi-209, 28-Mi-210, and 28-Mi-211) composed of mortared brick foundations that were interpreted as support bases for industrial machinery or structures related to brickworks that operated in Sayreville from the mid-nineteenth through late twentieth century. No further archaeological investigation was recommended for these archaeological sites due to a lack of integrity and limited information potential. The survey also assessed the Washington Canal as a potentially eligible archaeological resource under Criterion A, and a Phase II archaeological investigation was recommended to determine its eligibility for listing on the NRHP (Panamerican Consultants, Inc. 2000:6-3).

In 2011, Panamerican Consultants, Inc. (2012) conducted a supplemental Phase I survey in a redesigned portion of the East Levee/Floodwall project area and Phase II investigations to assess the National Register eligibility of the Washington Canal and the PCI S.R. Brickyard 1 Site (28-Mi-209), which is located approximately 4,750 feet south of the Sayreville Pump Station. Supplemental Phase I survey focused on a 1,780-foot segment of the East Levee, the majority of which extended north through marshland west of Junker Street, angled northeast toward Hinton Street, then turned northwest to a terminus near the southwest corner of the Sayreville Pump Station (Panamerican Consultants, Inc. 2012:4-4 and 4-5). Forty-seven STPs (2.1 to 2.47) were completed in the redesigned segment of the East Levee between Junker Street and the Sayreville Pump Station, all of which contained soil profiles similar to those recorded in the previous archaeological testing and in geotechnical studies in and near the Sayreville Pump Station (see Appendix C: 1975 Soil Boring Logs; Frank H. Lehr Associates 2010, 2014; Panamerican Consultants, Inc. 2000, 2001). In 53.2 percent of those 47 STPs, redoximorphic characteristics were recorded in soil profiles, consistent with the project area's marshland setting. In another 25.5 percent of those 47 STPs, mottled/mixed profiles suggestive of ground disturbance were recorded (Panamerican Consultants, Inc. 2012:A-1 to A-6). Brick fragments, coal, slag, and modern bottle glass were observed in 78.7 percent of the 47 STPs, noted on field forms, and discarded. All of this cultural material was interpreted as inclusions introduced through filling episodes (Panamerican Consultants, Inc. 2012:5-1). No impacts on cultural resources were identified as a result of the supplemental Phase I survey, and no further archaeological survey was recommended (Panamerican Consultants, Inc. 2012:5-1). Phase II investigations of the PCI S.R. Brickyard 1 Site (28-Mi-209), approximately 4,750 feet south of the Sayreville Pump Station, indicated that features associated with a brick kiln retain a high degree of integrity and have the potential to provide important new information on the local brick industry. As a result, the PCI S.R. Brickyard 1 Site (28-Mi-209) was recommended eligible for the NRHP under Criterion D (Panamerican Consultants, Inc. 2012:5-

3). Based on background research and an evaluation of current conditions, the Washington Canal was recommended not eligible for the NRHP since it "does not meet any of the four criteria for National Register eligibility" (Panamerican Consultants, Inc. 2012:5-2). The HPO determined that further contextual information was necessary to issue an eligibility opinion for the Washington Canal (Panamerican Consultants, Inc. 2012:5-2).

Louis Berger Associates (1982) completed a multipurpose cultural resources study in support of proposed USACE flood control projects along the Raritan River and the South River. The Sayreville area was covered under the Plan D portion of this study, and the APE was considered as part of the Sayreville Levee Area. The Sayreville Levee Area was assessed as made land created through dredging, cutting, and filling during the nineteenth and twentieth century. No registered or previously unidentified prehistoric sites were located in the Sayreville Levee Area as a result of the Phase I archaeological survey (Louis Berger Associates 1982:174). However, several map-documented historical resources related to nineteenth century brickworks and pottery enterprises, and to the late eighteenth century occupation of French's Landing, were investigated as part of the pedestrian reconnaissance for this study. The pedestrian reconnaissance identified foundations, wood pilings, timber walling and docking facilities, narrow gauge and triangular gauge rail lines, brick platforms, brick walls, waste brick piles, stoneware drainage pipes, and in-filled depressions associated with former brickworks. The pedestrian reconnaissance also noted that many areas within the brickworks had been subjected to extensive post-brickworks grading, filling, and disturbance associated with bridge, industrial, and residential construction (Louis Berger Associates 1982:141-144).

North and east of the APE, Louis Berger Associates (1988, 1989, 1990) completed Phase I, II, and III archaeological investigations for the Harbortowne residential subdivision, an approximately 55-acre single-family home community constructed on the site of the Sayre and Fisher Company's main brickworks as well as the Price Pottery, which previously occupied a portion of the Sayre and Fisher Company property. Phase II investigations extensively documented structural remains related to the Sayre and Fisher brickworks including kilns and dryers located more than 1,800 feet east of the Sayreville Pump Station. The overall area of archaeological investigation was designated the Sayre and Fisher Brick Company Site (28-Mi-163) and was determined eligible for listing on the NRHP. Since the Phase II investigations extensively documented the features in the eastern portion of the site, a finding of no adverse effect was made by the HPO and no further archaeological investigation was required (Louis Berger Associates 1990:I-3). The Phase II archaeological investigation also identified the Price Pottery Site (28-Mi-152) in the western third of the project area, which was determined eligible for listing on the NRHP (Louis Berger Associates 1990:I-3). Phase II and Phase III archaeological investigations of the Price Pottery Site (28-Mi-152) were completed approximately 400 feet northeast of the Sayreville Pump Station property. A domestic trash pit, a ceramic waster deposit, and a dry-laid stone wall were identified in the core area of the Price Pottery Site during the archaeological investigations, all of which were considered to be associated with the Price Pottery. Structural remains associated with the Sayre and Fisher Brickworks had truncated some of the Price Pottery remains (Louis Berger Associates 1990:VI-1). Price Pottery remains were concentrated in an area of approximately 150 feet by 50 feet and approximately 150 feet south of the Raritan River, based on project mapping (Louis Berger Associates 1990:VI-22). Trenches completed along the southern perimeter of the Phase III archaeological mitigation area did not contain ceramics or other cultural material related to the Price Pottery.

South of the APE, the New Jersey Department of Transportation (NJDOT) completed two cultural resources surveys to assess the archaeological sensitivity of proposed wetlands mitigation sites related to the Route 9 Edison Bridge and the Route 35 Victory Bridge (Mudge 1998, 1999). The NJDOT survey included historical background research and a field reconnaissance of the Washington Canal. The field reconnaissance noted a two-foot thick layer of dredge deposits over a brick deposit interpreted as placed along the canal bank for erosion control (Mudge 1999:4). Mudge (1998) completed a review of primary and secondary sources related to the Washington Canal. This historical research indicated that several episodes of dredging, and related widening and diking, were conducted between 1871 and 1940 (Mudge 1999). Mudge (1999:Historical Background for the Washington Canal) concluded that

"the Washington Canal fails to achieve the level of significance for inclusion on the National Register of Historic Places" based on its limited influence on local development, and lack of engineering significance.

Finally, The Louis Berger Group (2001) completed a historic context study of Raritan River crossings between Raritan Landing and the mouth of the Raritan River on behalf of the NJDOT. This study summarized the history of transportation in central New Jersey as it relates to overland routes that crossed the lower Raritan River as well as efforts to manage navigation of the river.

5.0 RESULTS

5.1 Archaeological Reconnaissance

Archaeological reconnaissance was conducted on June 4, 2014 and consisted of a pedestrian reconnaissance and photographic documentation of the APE. The APE is located on the property of the Sayreville Pump Station west of Canal Street and east of the Washington Canal in the northwestern part of Sayreville (see Figures 1.1 and 1.2). The APE contains the original Sayreville Pump Station, a relief pump station built in 1975, as well as an electrical substation, flow meter chamber, valve chambers, and associated facilities (Figure 5.1; Plates 5.1-5.36).

The setting of the APE is suburban residential with single family house lots north and east of the pump station. The tidal marshlands of the South River and the Washington Canal border the pump station property on the south and west (see Figure 5.1). The terrain within the APE is nearly level with gentle slopes in the northeastern portion of the APE.

A pump station (Plate 5.1) and an adjoining relief pump station and associated facilities (Plates 5.2 and 5.3) are located in the center of the APE. The northeast quadrant of the APE contains a flow meter chamber structure, a series of valve chambers, and related piping (Plate 5.4). Ongoing repairs to the pump station since Hurricane Sandy have resulted in several episodes of ground disturbance within the APE. Along the northern perimeter fence, six to eight inches of topsoil was stripped and gravel aggregate placed over the ground surface to create a stable base for the installation of emergency bypass piping used in the aftermath of Hurricane Sandy (personal communication, Greg Brady, June 5, 2014; see Plates 5.5-5.19). At the time of the field reconnaissance, the northern perimeter of the APE contained materials and equipment stockpiles, construction trailers, storage containers, and dumpsters as part of an extensive temporary staging area, the length of which was covered with dense gravel aggregate.

Along the eastern perimeter fence, topsoil had been stripped and stockpiled and a layer of gravel aggregate emplaced (see Figure 5.1; Plates 5.19-5.24). Buried high voltage electrical cables ran diagonally through this portion of the APE (see Figure 5.1; Plates 5.20-5.22). Two, 18-inch diameter pipes had been placed on the ground surface south of the pump station driveway, which extended through the southeast quadrant of the APE and along the southern perimeter fence to a terminus in the south central portion of the APE (Plates 5.24-5.27). A construction trailer, storage container and stockpiled equipment were also located in the southern perimeter of the APE (Plates 5.27-5.29). Ground disturbance had occurred in the southwest quadrant of the APE where underground high voltage electrical cable had been installed (see Plates 5.29-5.31).

An electrical substation and generator were located along the western perimeter of the property between the relief pump station and the Washington Canal (Plates 5.32, 5.33, 5.35, 5.38). Coarse rip rap had been installed along the east bank of the Washington Canal outside the pump station fence to control erosion along the canal's bank (Plates 5.34, 5.36, 5.37). A concrete headwall and outlet channel that flows into the Washington Canal was located in the northwest quadrant of the APE (Plate 5.39-5.40). Large coarse rip-rap had been installed to stabilize the outlet channel banks.

5.2 Assessment of Archaeological Sensitivity

The assessment of archaeological sensitivity considers the presence of environmental correlates within the APE identified in regional settlement models in order to identify locations likely to contain prehistoric and historic archaeological sites. In areas where no sites are documented, the sensitivity assessment for prehistoric resources is based primarily on environmental setting: topography, proximity to water, availability of resources, and soil permeability. The sensitivity

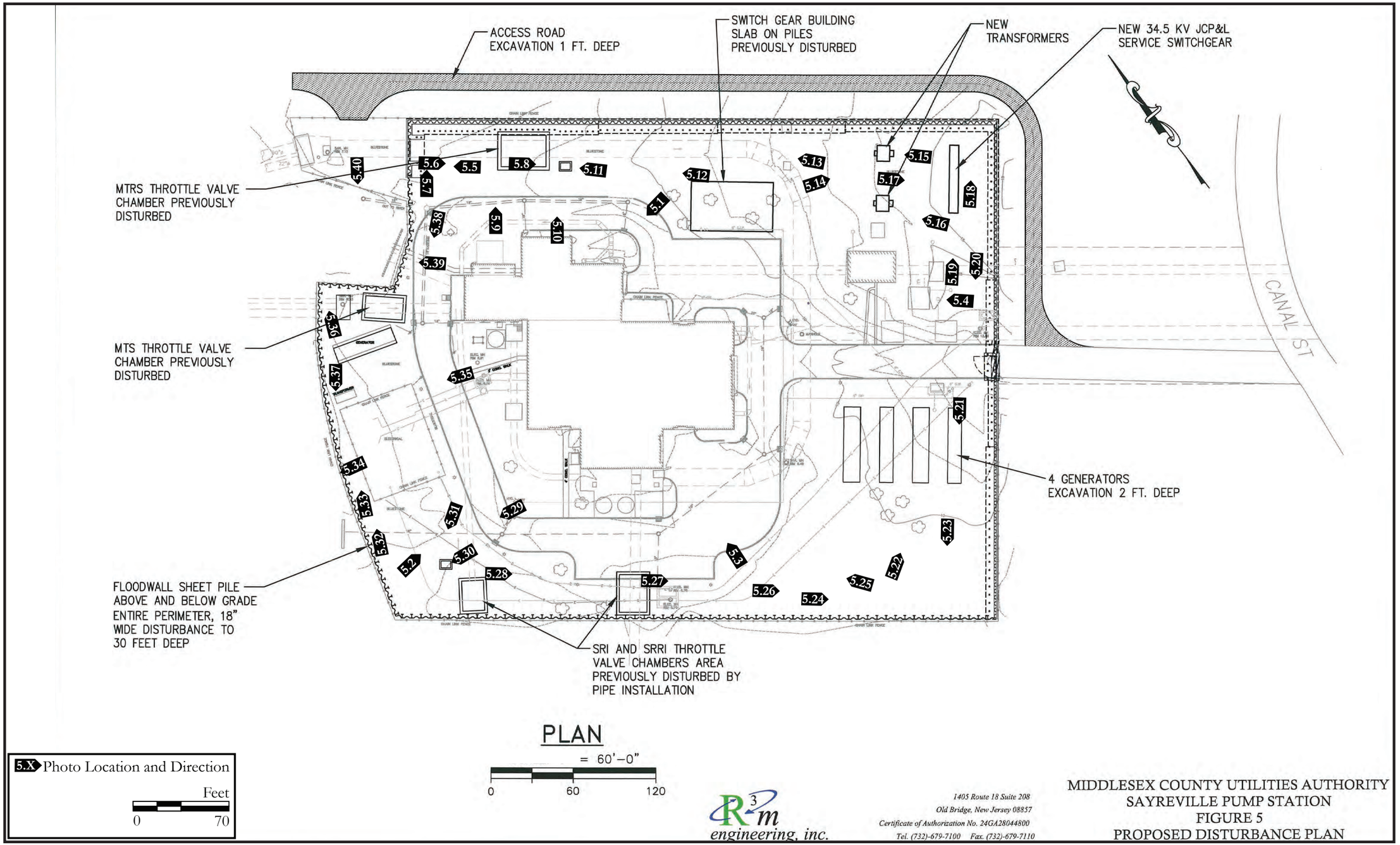

Figure 5.1: Site Plan showing photograph locations from the pedestrian reconnaissance (R3M Engineering, Inc. 2014).

Plate 5.1: Overview of the Sayreville Pump Station showing the original 1950s section.

Photo view: West

Photographer: Sharon D. White

Date: June 4, 2014

Plate 5.2: Overview of the 1975 relief pump station addition.

Photo view: East

Photographer: Sharon D. White

Date: June 4, 2014

Plate 5.3: Overview of the 1975 relief pump station addition.

Photo view: North

Photographer: Sharon D. White

Date: June 4, 2014

Plate 5.4: Overview of the flow meter chamber and valve chambers in the northeast quadrant of the APE.

Photo view: Northwest

Photographer: Sharon D. White

Date: June 4, 2014

Plate 5.5: Overview of the northwest corner of the APE perimeter showing gravel surface and equipment stockpiles.

Photo view: Northwest

Photographer: Sharon D. White

Date: June 4, 2014

Plate 5.6: Overview of the northern perimeter of the APE showing the northwestern portion of the construction staging area with materials stockpiles, storage containers and dumpsters.

Photo view: Southeast

Photographer: Sharon D. White

Date: June 4, 2014

Plate 5.7: View looking out from the northern perimeter fence.

Photo view: Northeast

Photographer: Sharon D. White

Date: June 4, 2014

Plate 5.8: Overview of the northern perimeter of the APE showing storage containers and equipment piles.

Photo view: Southeast

Photographer: Sharon D. White

Date: June 4, 2014

Plate 5.9: View looking out from the north perimeter fence showing a housing subdivision in the background.

Photo view: Northeast

Photographer: Sharon D. White

Date: June 4, 2014

Plate 5.10: View looking out from the north perimeter fence showing dumpsters, supply stockpiles, a construction trailer and a storage container along the north fence and a housing subdivision in the background.

Photo view: Northeast

Photographer: Sharon D. White

Date: June 4, 2014

Plate 5.11: Overview of the northern perimeter of the APE showing the location of a geotechnical boring in the foreground and storage containers and dumpsters in the background.

Photo view: Northwest

Photographer: Sharon D. White

Date: June 4, 2014

Plate 5.12: Overview of the northern perimeter of the APE showing the construction staging area and a construction trailer.

Photo view: Northwest

Photographer: Sharon D. White

Date: June 4, 2014

Plate 5.13: Overview of the northern perimeter of the APE showing the construction staging area and a construction trailer.

Photo view: Northwest

Photographer: Sharon D. White

Date: June 4, 2014

Plate 5.14: Overview of the northern perimeter of the APE showing construction trailers and a series of geotechnical borings in the northeast corner of the APE.

Photo view: East

Photographer: Sharon D. White

Date: June 4, 2014

Plate 5.15: Overview of the northern perimeter of the APE showing construction trailers in the northeast corner of the APE.

Photo view: Northwest

Photographer: Sharon D. White

Date: June 4, 2014

Plate 5.16: Overview of the northern perimeter of the APE showing the construction staging area and construction trailers.

Photo view: Northwest

Photographer: Sharon D. White

Date: June 4, 2014

Plate 5.17: Overview of the northern perimeter of the APE showing the construction staging area, a construction trailer and an I-beam stockpile.

Photo view: Southeast

Photographer: Sharon D. White

Date: June 4, 2014

Plate 5.18: Overview of the northeast corner of the perimeter fence showing an I-beam stockpile and a construction trailer.

Photo view: Northeast

Photographer: Sharon D. White

Date: June 4, 2014

Plate 5.19: Overview of the northern perimeter of the APE showing the northeastern portion of the construction staging area and a construction entrance.

Photo view: Northeast

Photographer: Sharon D. White

Date: June 4, 2014

Plate 5.20: Overview of the eastern perimeter of the APE showing the red posts marking high voltage buried electrical cable, gravel aggregate paving, and a topsoil stockpile in the southeast corner of the APE.

Photo view: Southwest

Photographer: Sharon D. White

Date: June 4, 2014

Plate 5.21: Overview of the eastern perimeter of the APE showing a gravel surface and a topsoil stockpile in the background.

Photo view: Southwest

Photographer: Sharon D. White

Date: June 4, 2014

Plate 5.22: Overview of the eastern perimeter of the APE showing the red posts marking high voltage buried electrical cable and gravel aggregate paving.

Photo view: Northeast

Photographer: Sharon D. White

Date: June 4, 2014

Plate 5.23: Overview of the southeast corner of the perimeter fence and a topsoil stockpile.

Photo view: Southwest

Photographer: Sharon D. White

Date: June 4, 2014

Plate 5.24: Overview of the southeast corner of the APE showing piping in the foreground and a topsoil stockpile in the background.

Photo view: Southeast

Photographer: Sharon D. White

Date: June 4, 2014

Plate 5.25: Overview of the southern perimeter of the APE showing the red posts marking high voltage buried electrical cable and pipes located on the ground surface.

Photo view: Northwest

Photographer: Sharon D. White

Date: June 4, 2014

Plate 5.26: Overview of the southern perimeter of the APE showing the red posts marking high voltage buried electrical cable, piping, and a topsoil stockpile in the southeast corner of the APE.

Photo view: Southeast

Photographer: Sharon D. White

Date: June 4, 2014

Plate 5.27: Overview of the southern perimeter of the APE showing the red posts marking high voltage buried electrical cable, piping, and a topsoil stockpile in the southeast corner of the APE.

Photo view: Southeast

Photographer: Sharon D. White

Date: June 4, 2014

Plate 5.28: Overview of the southern perimeter of the APE showing a storage contained in the southwestern portion of the APE, red posts marking high voltage buried electrical cable and a timber stockpile.

Photo view: Southeast

Photographer: Sharon D. White

Date: June 4, 2014

Plate 5.29: Overview of the southwest corner of the APE showing the red posts marking high voltage buried electrical cable and ground disturbance from filling and grading.

Photo view: West

Photographer: Sharon D. White

Date: June 4, 2014

Plate 5.30: Overview of the southwest corner of the APE showing the red posts marking high voltage buried electrical cable and ground disturbance from filling and grading.

Photo view: West

Photographer: Sharon D. White

Date: June 4, 2014

Plate 5.31: Overview of the southwest corner of the APE showing the red posts marking high voltage buried electrical cable and a gravel surface on the south side of an electrical substation.

Photo view: Southwest

Photographer: Sharon D. White

Date: June 4, 2014

Plate 5.32: Overview of an electrical substation in the western portion of the APE.

Photo view: North

Photographer: Sharon D. White

Date: June 4, 2014