HISTORICAL PERSPECTIVES INC.

Phase IA Archaeological Documentary Study

Saw Mill Creek Wetland Mitigation Bank
Block 1780, Lots 1, 69, 210, 260, 275, and 300;
Block 1790, Lot 100
Block 1815, Lots 74, 75, 85, 125, 135, 150, 204, 220, 235, 251, 300, 325, and 375
Staten Island, Richmond County, New York

LPC Project Economic Development Corp. / LA-CEQR-R

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LPC Project Economic Development Corp. / LA-CEQR-R

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October 2013

MANAGEMENT SUMMARY

SHPO Project Review Number (if available):

Involved State and Federal Agencies: **New York State Department of Environmental Conservation (DEC), United States Army Corps of Engineers**

Phase of Survey: **Phase IA Archaeological Documentary Study**

Location Information

Location: **Block 1780, Lots 1, 69, 210, 260, 275, and 300; Block 1790, Lot 100; Block 1815, Lots 74, 75, 85, 125, 135, 150, 204, 220, 235, 251, 300, 325, and 375**

Minor Civil Division: **08501, Staten Island**

County: **Richmond**

Survey Area

Length: **varies**

Width: **varies**

Number of Acres Surveyed: **ca. 91**

USGS 7.5 Minute Quadrangle Map: **Arthur Kill, N.Y.-N.J.**

Archaeological Survey Overview

Number & Interval of Shovel Tests: **N/A**

Number & Size of Units: **N/A**

Width of Plowed Strips: **N/A**

Surface Survey Transect Interval: **N/A, urban area and wetlands**

Results of Archaeological Survey

Number & name of precontact sites identified: **None**

Number & name of historic sites identified: **None**

Number & name of sites recommended for Phase II/Avoidance: **None**

Report Authors(s): **Julie Abell Horn, M.A., R.P.A. and Cece Saunders, M.A., R.P.A., Historical Perspectives, Inc.**

Date of Report: **October 2013**

EXECUTIVE SUMMARY

As a part of the Mitigation and Restoration Strategies for Habitat and Ecological Sustainability (MARSHES) Initiative, the New York City Economic Development Corporation (EDC) has proposed the Saw Mill Creek Wetland Mitigation Bank on the west side of Staten Island. The lots are largely undeveloped and are part of an expansive natural wetland that borders on the Arthur Kill, Prall's River, and Saw Mill Creek (Figure 1). The overall project site is identified on New York City tax maps as Block 1780, Lots 1, 69, 210, 260, 275, and 300; Block 1790, Lot 100; and Block 1815, Lots 74, 75, 85, 125, 135, 150, 204, 220, 235, 251, 300, 325, and 375 (Figure 2). The parcels are owned by the City of New York and managed by either the NYC Department of Parks and Recreation, NYC Transit (through a Master Leaser) or EDC, on behalf of the Department of Small Business Services. The site is located in the Bloomfield neighborhood of Staten Island, and has frontages along both sides of Chelsea Road/Bloomfield Road south of Edward Curry Road and River Road. It is bounded on the east by the West Shore Expressway (Route 440) and on the west by railroad tracks that carry freight on the Staten Island Railway. Saw Mill Creek traverses the southern end of the site, running from east to west.

There are two distinct areas to the project site, located on the east and west sides of Chelsea Road/Bloomfield Road (for this report Chelsea Road is used for consistency although both street names often are used interchangeably). The East Area, comprising portions of Blocks 1780 and 1790, totals ca. 54 acres (Figure 3a). The West Area, comprising portions of Block 1815, totals ca. 37 acres (Figure 3b). The combined project site measures ca. 91 acres. Within the project site, specific sub-areas are slated for wetland restoration/enhancement, wetland preservation, and upland enhancement. Figure 4 illustrates the locations within the overall project site where each of these actions is proposed.

As part of the proposed action, project materials were submitted to the New York City Landmarks Preservation Commission (LPC) for an initial archaeological review in accordance with CEQR regulations and procedures. LPC indicated that

> LPC review of archaeological sensitivity models and historic maps indicates that there is potential for the recovery of remains from 19th Century and Native American occupation and human burials on the project site. Accordingly, the Commission recommends that in the event that the project will involve ground disturbance that an archaeological documentary study be performed for this site to clarify these initial findings and provide the threshold for the next level of review, if such review is necessary (see CEQR Technical Manual 2012) (Santucci 2013).

It is possible that this project will also require review by the New York State Office of Parks, Recreation, and Historic Preservation (NYSOPRHP) due to state and federal agency involvement.

The Area of Potential Effect (APE) is the area that could be affected by project impacts. Since project plans have not been finalized as of this writing, the APE for the proposed project includes the entire project site. The assessment of the entire project site rather than a smaller subset of the property allows flexibility if project plans change in the future and different areas are slated for project impacts than at this time.

This Phase IA Archaeological Documentary Study was prepared to satisfy the requirements of SEQRA/CEQR, and to comply with the standards of the New York State Office of Parks, Recreation, and Historic Preservation (NYSOPRHP) and LPC (New York Archaeological Council 1994; NYSOPRHP 2005; LPC 2002; CEQR 2012). Where guidelines for the archaeological evaluation and report format of the LPC and the NYSOPRHP varied, those of the LPC, which specifically address New York City conditions and resources, took precedent.

As no records for the project site lots are on file with the Department of Buildings, assessing disturbance to the project site relied on comparing historic maps with modern maps and aerial photographs, on soil boring data, and to a lesser degree, on conditions observed during the site inspection, as there is very substantial ground cover throughout the project site.

HPI concludes that large portions of the northern and interior sections of Block1815 clearly have been disturbed from earthmoving, as historic maps showed this area as containing uplands rising above the marshes, while the modern survey map (Figure 3b) shows that these uplands have largely been graded away and the area is now

wetland. Large portions of Block 1815 have been landfilled as well. The northern and interior portions of Block 1780 also appear to be disturbed, as the modern survey map (Figure 3a) shows areas of uplands within the marshes where historic maps did not.

The project site is located in an area where numerous precontact period archaeological sites have been recorded. These include the Bloomfield site (which has no defined boundaries but should be considered to have encompassed the entire historic Bloomfield area including the project site), the Chelsea Burying Ground, potentially located within the project site near the boundary of Blocks 1780 and 1790, and the Bloomfield Road site, located immediately across Chelsea Road from Block 1790. In its original state, the project site contained a number of raised upland areas, as well as lower-lying areas bordering the marshland, and marshland associated with Saw Mill Creek. During the Paleo-Indian through Early-Middle Archaic periods, these marshlands may have been dry land. All of these factors suggest that in its natural state, the project site had a high precontact archaeological sensitivity.

In his sensitivity assessment for Staten Island, Boesch (1994a) assigns a high precontact sensitivity to the wetlands area between Fresh Kills and Old Place Creek, both the upland areas and the wetlands (including those areas capped by fill at the time of his assessment). The project site falls within this large area. It should be noted, however, that the preservation of archaeological sites under marshland is dependent on the degree of marine transgression associated with rising sea levels and later tidal and current effects. In his companion study of archaeological sensitivity for the Bronx, Boesch (1994b) offers that peat deposits (which formed in marshy areas) acted as a preservation agent, and soils beneath peat layers should date to the period prior to development of the marshes. In areas where this peat deposit is absent, Boesch claims marine transgression would have destroyed former occupation surfaces. Boesch further asserts that the peat layer itself may have scientific value. These deposits may contain data concerning climatological conditions, plant communities, and fauna from the period.

The soil boring data presented in Appendix A, as well as information provided by Tavis Lloyd, the director of the borings program at LBG, confirm that there is not a distinct peat layer within the marshland soils on the project site. LBG observed more general marshland type soils, often described as black organic clayey silt with organic matter that would be consistent with a more recent "meadow mat" (Lloyd, personal communication 10/17/13). In the absence of a clear peat layer that could preserve earlier soil horizons, if they exist, HPI concludes that the marshlands on the project site do not contain precontact archaeological sensitivity.

Nearly all the precontact sites in the vicinity have been recorded on top of elevated hummocks, generally around the 10-foot contour line (e.g. Skinner 1909; *Staten Island Advance* 1934, 1935; Merwin 2007). The upland areas within the project site generally were within elevations measuring 5-10 feet above sea level, and so in their natural state would have a high precontact period archaeological sensitivity. That said, a large portion of those upland areas at the northern end of Block 1815 appears to have been graded by several feet, and much of the area is now mapped as wetlands, reducing archaeological sensitivity in this part of the project site. Those uplands within the project site that HPI concludes still retain precontact archaeological sensitivity are located on portions of Block 1780 and 1790, as well as portions of Lots 85, 135, 150, 204, 300, and 375 of Block 1815. Figures 14a-14b illustrate those upland areas that HPI concludes contain precontact period archaeological sensitivity.

Several locations within the project site uplands contained historic period structures associated with local Bloomfield residents. The map documented structures are listed in the table, below, and the areas of historic period archaeological sensitivity are shown on Figures 14a-14b.

Map Documented Structures within the Project Site

MDS #	Block and Lot	Structure and Owner/Occupant	Disturbance level
1	Boundary of Block 1780, Lot 1 and Block 1790, Lot 100	School building, pre-1857 to ca. 1890	Some dumping and mounding disturbance is visible in the area
2	Block 1780, unknown lot	Former Merrell mill abutting the east side of Chelsea Road (18th century- ca. 1850)	Unclear; specific location is unknown, may be off project site or under Chelsea Road
3	Block 1780, Lot 69	Decker structure, pre-1857 to ca. 1917	Dumping and probable earthmoving disturbance visible

MDS #	Block and Lot	Structure and Owner/Occupant	Disturbance level
4	Block 1815, Lots 85, 300, 325	Vroom/Merrell structures, pre-1850 to ca.1917	Area has been graded and is now mapped as wetlands, former structure locations likely heavily disturbed
5	Block 1815, Lot 204	Thomas Merrell structure, pre-1850 to ca.1859	Area is heavily overgrown, disturbance unknown but maps show little change in elevation over time

The former structures on the project site predated the introduction of municipal water and sewer service to this area by at least 35 years (and probably much longer), leaving the residents to rely on private wells, cisterns, privies, and cesspools for their needs. Piped water was not introduced on Staten Island until the 1880s and sewers in the 1890s (Leng and Delevan 1924:26-29). Privies, wells, and cisterns, which are often filled with contemporary refuse related to the dwellings and their occupants, can provide important stratified cultural deposits for the archaeologist and frequently provide the best remains recovered on sites. Frequently, wells or cisterns would be located in reasonably close proximity to a residence, for use in washing or cooking (additional wells and/or cisterns might be located further away from a residence for other uses, such as watering livestock). Privies often were situated further away from the residence, for sanitary purposes. Portions of these shaft features are often encountered because their deeper and therefore earlier layers remain undisturbed by subsequent construction, and in fact, construction often preserves the lower sections of the features by sealing them beneath structures and fill layers. Wells would have been excavated as far as the water table, and cisterns and privies often were dug up to 10-15 feet below grade. Thus, these shaft features often survive in truncated form after grading episodes. Other commonly occurring but more fragile backyard remains include fence lines, paths, traces of landscaping and sheet midden scatter. It is possible that other subsurface features, such as sheet middens or former outbuilding foundations, could be preserved as well if disturbance is not extensive.

Identifying and examining buried features associated with the nineteenth century occupation of the project site may reflect the daily activities of the residents and provide insight into cultural behavior of this very homogenous population. If undisturbed deposits of cultural material do still exist in this location, they may have the potential to provide meaningful information regarding the lives of the people who lived there. When recovered from their original context and in association with a specific historical occupation, historical deposits can provide a wealth of information about consumption patterns, consumer choice, gender relations, ethnicity, economic status, and other important issues.

HPI concludes that three of the five former locations of the Vroom/Merrell structures on Block 1815, Lots 85, 300, and 325 do not retain historic period archaeological sensitivity due to the obvious disturbance to the area from grading. These former upland areas are now wetlands, and the raised topography that allowed the structures to be built has been all but eliminated. Two of the Vroom/Merrell former structures locations are not within wetlands, and HPI concludes that truncated shaft features could still survive in these locations. The remainder of the Map Documented Structures, including the school building near the boundary of Blocks 1780 and 1790, the Decker structure on Block 1780, Lot 69, and the Merrell structure on Block 1815, Lot 204, are in areas where disturbance would not necessarily preclude recovery of archaeological resources. The former Merrell mill location cannot be positively located but likely was not within the project site boundaries.

Based on the conclusions outlined above, HPI recommends further consideration for potential below grade archaeological resources from both the precontact and historic periods. Due to the range of conditions across the project site, HPI recommends that a phased approach be undertaken.

Figures 14a and 14b illustrate areas of archaeological sensitivity within upland areas of the project site. These areas include locations of precontact sensitivity, historic period sensitivity, and a combination of precontact and historic period sensitivity. Within these areas, HPI recommends that a program of Phase IB archaeological testing be undertaken if project plans will impact these locations. Not all locations marked as archaeologically sensitive may be impacted by project plans. However, those archaeologically sensitive areas where there will be ground disturbance should be subjected to archaeological testing. This testing might involve a combination of shovel testing, backhoe trenching, or other field methods as determined by archaeologists in consultation with regulatory agencies. The testing should be undertaken in coordination with construction planning, but ideally be completed

prior to construction. All archaeological testing should be conducted according to OSHA regulations and applicable archaeological standards (New York Archaeological Council 1994, NYSOPRHP 2005; LPC 2002; CEQR 2012). Professional archaeologists, with an understanding of and experience in urban archaeological excavation techniques, would be required to be part of the archaeological team.

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PHOTOGRAPHS
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1. Block 1780 showing winding channel of Saw Mill Creek with project site marshlands on Lots 260 and 275 in background. View looking northeast from Chelsea Road.

2. Block 1780, Lot 1 showing upland area east of Chelsea Road and south of Saw Mill Creek. Area is covered with gravel and weeds and has experienced considerable dumping. View looking east from near Chelsea Road.

3. Photograph 3: Block 1780, Lot 69 near location of former Decker house. View looking northeast from Chelsea Road.

4. Block 1780, Lot 69 showing upland area on south side of Edward Curry Avenue. View looking south.

5. Block 1780, Lot 69 showing interior upland area marked by tall trees in background. View looking south from Edward Curry Avenue.

6. Block 1780, Lot 1 showing example of marshlands. View looking east with Route 440 in far background.

7. Block 1790, Lot 100 on left with Chelsea Road in foreground showing upland area. View looking south.

8. Block 1790, Lot 100 showing upland area in vicinity of former school building. View looking southeast from Chelsea Road.

9. Block 1790, Lot 100 showing marshland. Off ramp to Route 440 is in far background. View looking southeast from Chelsea Road.

10. Block 1815, Lot 235 (marshland) and Lot 204 (upland with trees). Saw Mill Creek is on left. View looking northwest from Chelsea Road.

11. Block 1815, Lots 150 and 375 showing paved upland area. View looking west from Chelsea Road.

12. Block 1815, Lot 85 showing upland area. View looking south from River Road.

13. Block 1815, Lot 300 showing landfilled and paved upland used to store cars. View looking north.

14. Block 1815, Lot 300 showing marshlands. Overhead wires on left mark railroad tracks and edge of project site. View looking northwest.

15. Block 1815, Lot 251 (foreground) and Lot 235 (background) showing marshlands. View looking south.

I. INTRODUCTION

As a part of the Mitigation and Restoration Strategies for Habitat and Ecological Sustainability (MARSHES) Initiative, the New York City Economic Development Corporation (EDC) has proposed the Saw Mill Creek Wetland Mitigation Bank on the west side of Staten Island. The lots are largely undeveloped and are part of an expansive natural wetland that borders on the Arthur Kill, Prall's River, and Saw Mill Creek (Figure 1). The overall project site is identified on New York City tax maps as Block 1780, Lots 1, 69, 210, 260, 275, and 300; Block 1790, Lot 100; and Block 1815, Lots 74, 75, 85, 125, 135, 150, 204, 220, 235, 251, 300, 325, and 375 (Figure 2). The parcels are owned by the City of New York and managed by either the NYC Department of Parks and Recreation, NYC Transit (through a Master Leaser) or EDC, on behalf of the Department of Small Business Services. The site is located in the Bloomfield neighborhood of Staten Island, and has frontages along both sides of Chelsea Road/Bloomfield Road south of Edward Curry Road and River Road. It is bounded on the east by the West Shore Expressway (Route 440) and on the west by railroad tracks that carry freight on the Staten Island Railway. Saw Mill Creek traverses the southern end of the site, running from east to west.

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II. METHODOLOGY

The present study entailed review of various resources.

- Historic maps were reviewed at the New York Public Library, the Staten Island Historical Society, the Staten Island Topographical Bureau, and using various online websites. These maps provided an overview of the topography and a chronology of land usage for the study site.
- Selected records at the Richmond County Clerk's Land Records Office were reviewed to establish ownership of the property, concentrating on upland portions of the project site where historic structures were located and where ownership data would have a direct bearing on potential historic period archaeological resources. Due to the fact that most of the project site was held by a few interrelated families over time and conveyance records are incomplete, a full title search was not undertaken.
- Several types of archival records normally consulted for an Archaeological Documentary Study, including tax assessment records, city directories, and New York City Department of Buildings records, either had very spotty or non-existing coverage for the project site and so were not helpful for this project.
- Several primary and secondary sources concerning the general precontact period and history of Staten Island and specific events associated with the project site were reviewed at the New York Public Library, the Staten Island Historical Society, and using online resources.
- Information about previously recorded archaeological sites and surveys in the area was compiled from data available at the NYSOPRHP and the LPC.
- The EDC provided survey maps and hazardous materials soil testing data for the property.
- The Louis Berger Group (LBG) provided soil boring data as presented in Appendix A. Tavis Lloyd of LBG, who directed the soil boring program, provided additional insights into the soil boring data.
- Last, a site visit was conducted by Julie Abell Horn of HPI on September 13, 2013 to assess any obvious or unrecorded subsurface disturbance (Photographs 1-15; Figures 3a-3b).

III. CURRENT CONDITIONS AND ENVIRONMENTAL SETTING

A. Current Conditions

The project site consists of both upland and marshland on portions of Blocks 1780, 1790, and 1815. The present boundaries between the uplands and marshlands have been flagged and are shown on Figures 3a-3b. There are no buildings on any of the project site lots. For ease of identification, the property is discussed by block, below.

- Block 1780

The portions of Block 1780 within the project site are bounded by Edward Curry Avenue on the north, Chelsea Road and several outparcels on the block on the west, the West Shore Expressway on the east, and Block 1790 on the southeast. Branches of Saw Mill Creek run through this block (Photograph 1). The upland portions of the Block 1780 project site are located along sections of Chelsea Road (Photographs 2 and 3) and Edward Curry Avenue (Photograph 4), and an interior section near the northeast corner of the block (Photograph 5). The remainder of the Block 1780 project site is covered by marshland (Photograph 6). Ground cover visibility within all areas of Block 1780 was nearly zero percent due to heavy vegetation and pavement. Two of the non-marshland areas, just south of Saw Mill Creek and near the southeast corner of Chelsea Road and Edward Curry Avenue, exhibited substantial dumping and other disturbance to the ground surface. The other upland area, along the south side of Edward Curry Avenue, is covered with very heavy vegetation, making visibility of the ground surface nonexistent.

- Block 1790

The portion of Block 1790 within the project site is bounded by Block 1780 on the northeast, Chelsea Road on the north and northwest, and the West Shore Expressway on the east and southeast. There is an unbuilt easement for Chelsea Road that runs through this lot, as shown on Figure 3a, and the map indicates there is a 12-inch buried water line running within this easement. However, the location of the easement is not visible on the landscape. The areas along both bends of Chelsea Road contain uplands, and the remainder of the lot consists of marshland (Photographs

7, 8, and 9). The upland portions of the block are wooded and have a heavy understory, with some disturbance visible closest to the road from dumping and mounds/berms of soil.

- Block 1815

The portions of Block 1815 within the project site are bounded by River Road on the north, Saw Mill Creek on the south, Chelsea Road and several outparcels on the east, and railroad tracks on the west. As with the rest of the project site, ground cover visibility within all areas of Block 1815 was nearly zero percent due to heavy vegetation and pavement. Upland portions of the Block 1815 project site primarily are located along Chelsea Road, River Road, and some interior sections of the block (Photographs 10, 11, and 12). Some parts of the interior of the block have been landfilled and contain paved gravel parking lots that are used to store new automobiles (Photograph 13). Marshland comprises the remainder of the Block 1815 project site area (Photographs 14 and 15).

B. Topography and Hydrology

The project site is generally level, with elevations ranging from sea level at Saw Mill Creek, to only a few feet above sea level within the marshland areas, to a maximum of only about 10 feet above sea level along the higher upland portions of the property (Figures 1 and 3a-3b). Comparison of modern survey maps with historic topographical maps (U.S.G.S. 1890 [see Figure 10] and Topographical Bureau 1911 [see Figures 12a-12b]) shows that elevations have not changed markedly over time, although some areas have been landfilled and others altered through grading or marshland manipulation, particularly on some interior portions of Block 1815 where historic maps show uplands but today there are marshlands. What is now known as Chelsea Road was a strip of firm land running through low lying marshland on either side. Its elevation above the marsh made it a natural thoroughfare from the communities of Bloomfield to the north and Chelsea to the south.

C. Geology

The project site sits within the western edge of the Piedmont Lowlands. As described by Boesch (after Wolfe 1977),

> The Piedmont Lowlands make up about one fifth of the land area of Staten Island and consist of gently rolling terrain, generally between 50 and 100 feet in elevation, which gradually slopes to the southeast. The undulating surface is interrupted by an intrusive ridge, 200 to 250 feet in elevation, and by slightly lower, plateau-like topographic features. The rolling lowlands are generally underlain by Triassic and Jurassic age shales, siltstones, and sandstones of the Brunswick Formation of the Newark Group[,] while the ridges are composed of basaltic lava flows and diabase traprock. The plateau-like features developed on erosion resistant Lockatong Formation Argillites. (Boesch 1994a: 3)

During the precontact era the woodlands of the Piedmont Lowlands consisted of broadleaf deciduous trees, which provided a habitat for "game birds, small mammals, deer, bear, and during at least a portion of the precontact period, elk" (Boesch 1994a: 6). Mixed wetland ecologies provided numerous floral and faunal resources, the most important faunal resources being the shellfish found in saltwater and brackish environments. Freshwater faunal resources include "mussels, fish, certain amphibians and reptiles, migratory fowl, and semi-aquatic mammals. Anadromous fish species would have been present seasonally within Staten Island via streams emptying into the estuary system (Boesch 1994a: 5-6).

D. Soils

According to the soil survey for New York City, there are four soil mapping units that fall within the project site.

The majority of the wetland areas fall within mapping unit 6, "Ipswich-Pawcatuck-Matunuck mucky peats, 0 to 3 percent slopes." It is described as:

> Low lying areas of tidal marsh that are inundated by salt water twice each day at high tide, with a mixture of very poorly drained soils which vary in the thickness of organic materials over sand. (USDA 2006:14).

The northeast end of the project site, south of Edward Curry Avenue, falls within mapping unit 7, "Laguardia-Ebbets-Pavement & buildings, wet substratum complex, 0 to 8 percent slopes." It is described as:

> Nearly level to gently sloping areas filled with a mixture of natural soil materials and construction debris over swamp, tidal marsh, or water; a mixture of anthropogenic soils which vary in coarse fragment content, with 15 to 49 percent of the surface covered by impervious pavement and buildings (USDA 2006:14).

A portion of Block 1819 on the western side of Chelsea Road falls within mapping unit 101, "Pavement & buildings, wet substratum-Laguardia-Ebbets complex, 0 to 8 percent slopes." It is described as:

> Nearly level to gently sloping urbanized areas filled with a mixture of natural soil materials and construction debris over swamp, tidal marsh, or water; a mixture of anthropogenic soils which vary in coarse fragment content, with 50 to 80 percent of the surface covered by impervious pavement and buildings (USDA 2006:16).

Finally, the southern tip of the project site falls within mapping unit 238, "Windsor-Windsor, loamy substratum-Deerfield loamy sands, 0 to 8 percent slopes." It is described as:

> Nearly level to gently sloping areas of sandy outwash plains and dunes that are relatively undisturbed and mostly wooded; a mixture of excessively drained and moderately well drained sandy outwash soils; located in western Staten Island (USDA 2006:19).

Figure 5 illustrates the location of the project site on the soil survey map for New York City.

As part of the current project, LBG completed a series of soil borings, groundwater screenings, and sediment samplings across the project site; a full report of the findings is in progress. The locations of these testing loci and the accompanying soil boring logs are included as Appendix A. The purpose of these tests was to investigate areas of potential hazardous materials and areas of project impacts. Those locations where soils were heavily compacted from filling were tested using a mechanical direct push drill, and the borings were advanced to about 15 feet below grade. In the sediment samples, soils were tested using a hand auger and the borings generally were completed to about 2.5 feet below grade. Groundwater screenings also used a hand auger but were excavated from ca. 2.5 to 15 feet below grade. None of the tests reached bedrock.

The soil testing program recorded a variety of subsurface conditions across the project site. Most upland locations contained at least some fill and most marshland locations contained either dark marshland clayey silts or dark yellowish brown coarse to fine sands. The soil testing program confirmed that there is not a distinct peat layer within the marshland soils on the project site. Rather, LBG observed more general marshland type soils, often described as black organic clayey silt with organic matter that would be consistent with a more recent "meadow mat" (Lloyd, personal communication 10/17/13).

IV. BACKGROUND RESEARCH/HISTORICAL OVERVIEW

A. Precontact Summary

For this report, the word precontact is used to describe the period prior to the use of formal written records. In the western hemisphere, the precontact period also refers to the time before European exploration and settlement of the New World. Archaeologists and historians gain their knowledge and understanding of precontact Native Americans on Staten Island from three sources: ethnographic reports, Native American artifact collections, and archaeological investigations.

The Paleo Indian Period (c. 10,500 B.C. - c. 8000 B.C.) represents the earliest known human occupation of Staten Island. Approximately 14,000 years ago the Wisconsin Glacier retreated from the area leading to the emergence of a cold dry tundra environment. Sea levels were considerably lower than modern levels during this period (they did not reach current levels until circa 5,000 B.C., in the Early to Middle Archaic Period). As such, Staten Island was situated much further inland from the Atlantic Ocean shore than today, and was characterized by higher ground

amid glacial lakes and rivers (Boesch 1994a). The material remains of the Paleo Indians include lithic tools such as Clovis-type fluted projectile points, bifacial knives, drills, gravers burins, scrapers, flake cores, and flake tools, although sites generally are represented by limited small surface finds. The highly mobile nomadic bands of this period specialized in hunting large game animals such as mammoth, moose-elk, bison, and caribou and gathering plant foods. It has been theorized that the end of the Paleo-Indian Period arose from the failure of over-specialized, big-game hunting (Snow 1980:150-157). Based on excavated Paleo-Indian sites in the Northeast, there was a preference for high, well-drained areas in the vicinity of streams or wetlands (Boesch 1994a). Sites have also been found near lithic sources, rock shelters and lower river terraces (Ritchie 1980). Paleo-Indian materials have been recovered at several sites on Staten Island including Port Mobil, the Cutting site, Smoking Point and along the beach in the Kreischerville area, all of which are at least several miles distant from the project site.

During the ensuing Archaic Period (c. 8000 B.C. - 1000 B.C.) a major shift occurred in the subsistence and settlement patterns of Native Americans. Archaic period peoples still relied on hunting and gathering for subsistence, but the emphasis shifted from hunting large animal species, which were becoming unavailable, to smaller game and collecting plants in a deciduous forest. The settlement pattern of the Archaic people consisted of small bands that occupied larger and relatively more permanent habitations sites along the coast of Staten Island, its estuaries and streams and inland areas (Boesch 1994a). Typically such sites are located on high ground overlooking water courses. This large period has been divided up into four smaller periods, the Early, Middle, Late and Terminal Archaic.

The environment during the Early Archaic (c. 8000 B.C. - 6000 B.C.) displayed a trend toward a milder climate and the gradual emergence of a deciduous-coniferous forest with a smaller carrying capacity for the large game animals of the previous period (Ritchie and Funk 1971). The large Pleistocene fauna of the previous period were gradually replaced by modern species such as elk, moose, bear, beaver, and deer. New species of plant material suitable for human consumption also became abundant. The increasing diversification of utilized food sources is further demonstrated by a more complex tool kit. The tool kit of the Early Archaic people included bifurcated or basally notched projectile points generally made of high quality stone. Tool kits were more generalized than during the Paleo-Indian period, showing a wider array of plant processing equipment such as grinding stones, mortars and pestles. Although overall evidence of Early Archaic sites on Staten Island is sparse, it should be noted that the Old Place site, located approximately one and a half miles north of the project site, is recognized as one of the most important Early Archaic component sites in the area (Ritchie and Funk 1971; Ritchie 1980; Cantwell and Wall 2001). Other Early Archaic component sites on Staten Island include the Hollowell, Charleston Beach, Wards Point, Travis, and Richmond Hill sites, which all are located at least several miles from the project site (Ritchie and Funk 1971; Boesch 1994a).

The archaeological record suggests that a population increase took place during the Middle Archaic Period (c. 6000 - c. 4000 B.C.). This period is characterized by a moister and warmer climate and the emergence of an oak-hickory forest. The settlement pattern during this period displays specialized sites and increasing cultural complexity. The exploitation of the diverse range of animal and plant resources continued with an increasing importance of aquatic resources such as mollusks and fish (Snow 1980). In addition to projectile points, the tool kits of Middle Archaic peoples included grinding stones, mortars, and pestles. Such artifacts have been found throughout Staten Island, including the Old Place site, located just over a mile northeast of the project site and the Wards Point site on the southern tip of the island (Boesch 1994a).

Late Archaic people (c. 4000 - c. 1000 B.C.) were specialized hunter-gatherers who exploited a variety of upland and lowland settings in a well-defined and scheduled seasonal round. The period reflects an increasingly expanded economic base, in which groups exploited the richness of the now established oak-dominant forests of the region. It is characterized by a series of adaptations to the newly emerged, full Holocene environments. As the period progressed, the dwindling melt waters from disappearing glaciers and the reduced flow of streams and rivers promoted the formation of swamps and mudflats, congenial environments for migratory waterfowl, edible plants and shellfish. The new mixed hardwood forests of oak, hickory, chestnut, beech and elm attracted white-tailed deer, wild turkey, moose and beaver. The large herbivores of the Pleistocene were rapidly becoming extinct and the Archaic Indians depended increasingly on smaller game and the plants of the deciduous forest. The projectile point types attributed to this period include the Lamoka, Brewerton, Normanskill, Lackawaxen, Bare Island, and Poplar Island. The tool kit of these peoples also included milling equipment, stone axes, and adzes. A large number of Late Archaic Period sites have been found on Staten Island. These include the Pottery Farm, Bowman's Brook, Smoking Point, Goodrich, Sandy Brook, Wort

Farm, and Arlington Avenue sites. All of these sites are at least several miles distant from the project site. In addition, the Old Place Site contained a Late Archaic component (Boesch 1994a).

During the Terminal Archaic Period (c. 1700 B.C. - c. 1000 B.C.), native peoples developed new and radically different broad bladed projectile points, including Susquehanna, Perkiomen and Orient Fishtail types. The use of steatite or stone bowls is a hallmark of the Terminal Archaic Period. Sites on Staten Island from the Terminal Archaic Period include the Old Place site, as well as the Pottery Farm, Wards Point, and Travis sites (Boesch 1994a).

The Woodland Period (c. 1000 B.C. - 1600 A.D.) is generally divided into Early, Middle and Late Woodland on the basis of cultural materials and settlement-subsistence patterns. Settlement pattern information suggests that the broad based strategies of earlier periods continued with a possibly more extensive use of coastal resources. The Early Woodland was essentially a continuation of the tool design traditions of the Late Archaic. However, several important changes took place. Clay pottery vessels gradually replaced the soapstone bowls during the Early Woodland Period (c. 1000 B.C. to A.D 1). The earliest ceramic type found on Staten Island is called Vinette 1, an interior-exterior cordmarked, sand tempered vessel. The Meadowood-type projectile point is a chronological indicator of the Early Woodland Period.

Cord marked vessels became common during the Middle Woodland Period (c. A.D. 1 to c. 1000 A.D.). Jacks Reef and Fox Creek-type projectile points are diagnostic of the Middle Woodland. Another characteristic projectile point of the early to Middle Woodland Period is the Rossville type, named for the site at Rossville where it predominated. It is believed to have originated in the Chesapeake Bay area and is found in New Jersey, southeastern New York and southern New England (Lenik 1989:29). The Early and Middle Woodland periods display significant evidence for a change in settlement patterns toward a more sedentary lifestyle. The discovery of large storage pits and larger sites in general has fueled this theory. Some horticulture may have been utilized at this point but not to the extent that it was in the Late Woodland period.

In the Late Woodland period (c. 1000 A.D. - 1600 A.D.), triangular projectile points such as the Levanna and Madison types, were common throughout the Northeast, including Staten Island (Lenik 1989:27). Made both of local and non-local stones, brought from as far afield as the northern Hudson and Delaware River Valleys, these artifacts bear witness to the broad sphere of interaction between groups of native peoples in the Northeast. Additionally, during this period collared ceramic vessels, many with decorations, made their appearance.

Woodland Period Native Americans in Staten Island and surrounding regions shared common attributes. The period saw the advent of horticulture and with it, the appearance of large, permanent or semi-permanent villages. Plant and processing tools became increasingly common, suggesting an extensive harvesting of wild plant foods. Maize cultivation may have begun as early as 800 years ago. The bow and arrow, replacing the spear and javelin, pottery vessels instead of soap stone ones, and pipe smoking, were all introduced at this time. A semi-sedentary culture, the Woodland Indians moved seasonally between villages within palisaded enclosures and campsites, hunting deer, turkey, raccoon, muskrat, ducks and other game and fishing with dug-out boats, bone hooks, harpoons and nets with pebble sinkers. Their shellfish refuse heaps, called "middens," sometimes reached immense proportions of as much as three acres (Ritchie 1980:80, 267). Habitation sites of the Woodland Period Indians increased in size and permanence. A large number of Woodland Period archaeological sites have been found on Staten Island in a variety of environmental settings. A favored setting for occupation during this period was well-drained ground near stream drainages and coastal waterways. The Old Place Site, which also had a Woodland component, exhibited all of these locational characteristics.

During the early Contact period (1500 to 1700 A.D.) there was a continuation of the Late Woodland settlement patterns of the coastal Algonquians. By the seventeenth century the Dutch settlers of lower New York were in frequent contact with the many Native Americans who lived in the vicinity. Historic accounts describe both peaceful and violent interchanges between these two groups (Brasser 1978, Flick 1933). Through at least the 1650s, Native Americans known as the Raritans occupied portions of Staten Island and New Jersey's Raritan Valley (Ruttenber 1872). The Raritans were but one of many native groups which as a whole were known as the Delaware Indians by the European settlers. As the European population increased, and internecine warfare due to increased competition for trade with the Europeans intensified, the Raritans, and the Delaware in general, retreated inland away from the eastern coast. By the 1800s their migration had scattered them across the Mid West and even into

Canada (Weslager 1972), where they have continued living to the present day. Journal accounts by European explorers, settlers and travelers describe Native settlements and lifeways. However, only a few Historic Contact Period sites have been found on Staten Island. Sites include those at Wards Point, Old Place, Corsons Brook, Travis, New Springfield, and at the PS56R Site in Woodrow (Boesch 1994a; HPI 1996).

B. Previously Recorded Archaeological Sites and Surveys

Records on file at the NYSOPRHP and the New York State Museum as well as the Boesch (1994a) *Archaeological and Sensitivity Assessment of Staten Island, New York* indicate that numerous precontact sites and one historic period archaeological site have been documented within one mile of the project site. The table, below, summarizes archaeological sites that have been documented by the NYSM, the NYSOPRHP, and by Boesch (1994a) within a one mile radius of the project site (within New York; sites on the New Jersey shore that fall within one mile of the project site were not reviewed). In some cases, the sites appear to have been recorded duplicate times, often obtaining several different site number designations. Where the duplication was obvious, the sites and their attributes are combined into one listing in the table. Of note, NYSM site locations and descriptions often are vague, due to the fact that many of these sites were documented based on non-professional records (such as information from local landowners, avocational collectors, or historic accounts); descriptions and distances of these sites from the project site are given based on available mapping and other data, but should not be considered definitive.

Archaeological Sites within a One-Mile Radius of the Project Site

NYSOPRHP Site # and Site Name	NYSM Site # and Site Name	Distance from project site	Time Period	Site Type
	NYSM #4596 Bloomfield	Vague location; see below	Unknown Precontact	Camps
	NYSM #4597 Bulls Head	Circa 0.3 mile east	Unknown Precontact	Burying Ground
	NYSM #4598 Long Neck Sites	Circa 0.6 mile south	Unknown Precontact	Camps? Hamlets? Middens?
	NYSM #4627 Chelsea 2	Abutting project site on south	Unknown Precontact	Camps
	NYSM #7216	Circa 0.7 mile northeast		
	NYSM #7324	Large area including the project site	Transitional	Isolated point?
	NYSM #8323	Circa 0.2 mile southwest	Unknown Precontact	Unknown
	NYSM #8501	Circa 0.1 mile southwest	Unknown Precontact	Camp
	NYSM #8502	Circa 0.2 mile south	Unknown Precontact	Traces of occupation
	NYSM #8503	Overlapping west side of project site	Unknown Precontact	Camp
	NYSM #8504	Large area including the north side of the project site	Unknown Precontact	Traces of occupation

NYSOPRHP Site # and Site Name	NYSM Site # and Site Name	Distance from project site	Time Period	Site Type
08501.000135	NYSM #746, 4597; Chelsea Burying Ground	Overlapping south side at bend of Chelsea Road	Archaic? Transitional?	Burying Ground
08501.002886 Bloomfield Road Prehistoric Site		Adjacent to Block 1790 on the north side of Chelsea Road	Woodland	Disturbed lithic scatter
08501.002901 Meredith Avenue Historic Site		Circa 0.4 mile southwest	Nineteenth century	Domestic yard deposits

A number of the archaeological sites listed in the table include or overlap the project site. Four of these sites are described in further detail below.

Bloomfield Site

The first mention of the Bloomfield archaeological site is from the Skinner (1909) publication, which summarized precontact period sites on Staten Island:

> *Bloomfield (Watchogue).* There is no special large village site in this region, but relics occur more or less abundantly on all of the dunes and sand-hills. A stone plummet (?), grooved axes, Iroquoian pottery, pipes, arrow points, etc. have been found here. Mr. Isaiah Merrill has a fine collection of objects said to have been collected about here, among which is a steatite bead. An inscribed clay bead, with incised figures, is also said to have been found here. This site is peculiar on account of the scarcity of shell pits and similar remains. Relics occur almost entirely as surface finds. Celts have been found. A fine perforated brass arrow point was found by the writer some years ago at a spot where Iroquoian pottery was frequent. Objects which seem to be gun flints, but are chipped from native yellow jasper, etc. were in the collection of Mr. Merrill. These seemed to the writer to be authentic, and it is possible that the Indians did manufacture these useful objects rather than buy the English flints from the Whites. The stone bead in Mr. Merrill's collection is of pink steatite – thick, square, and altogether remarkable. It is said that Mr. Merrill had at one time a "handful" of these beads; but when the writer viewed this collection, some years ago, only one remained. Other notable objects in his collection were a banner stone, fragments of others, and several celts (Skinner 1909:9).

According to historic maps, the property of Isaiah Merrill, who was interviewed by Skinner, was on the southwest corner of Chelsea Road and Water/River Road, on Block 1815 of the project site. However, it appears that Merrill collected artifacts from various locations around Bloomfield, not just on his own property.

All subsequent references to this site derive from the original description (e.g., Parker 1920); no professional excavations ever occurred at this site and little new data were ever assembled beyond the Skinner description, above. The few bits of follow up information about this vaguely-defined site are from accounts in the local newspaper. Two *Staten Island Advance* articles noted that as late as 1934-1935, precontact period artifacts were still being found in Bloomfield. Local resident Marcellus T. Merrill found an "Indian Hatchet" on his farm property in 1934 (*Staten Island Advance* 11/20/1934). Merrill's property was on the west side of Chelsea Road, two properties south of the road's intersection with Bloomfield/Decker Avenue and abutting the Block 1815 portion of the project site. In 1935, the paper reported that high school students had befriended another Merrill family member, Orvil Merrill, who lived on Chelsea Road, although the exact location was not given. He was quoted as saying he hunted for artifacts in sandy, "higher up" locations, but not in marshes. The students also were regularly collecting artifacts in Bloomfield at this time (*Staten Island Advance* 3/21/1935).

The last attempt to officially locate the Bloomfield site came in the early 1980s, when professional archaeologist Edward Lenik undertook a development project just east of the West Shore Expressway, encompassing a portion of the former Bloomfield community. Despite a research strategy that included intensive archival work including comparison of historic and modern topographic maps, interviews with local residents, and a comprehensive field testing program, Lenik failed to find the Bloomfield site. He concluded:

> The documentary references to the Bloomfield Site are vague and the community of Bloomfield or Watchogue is a general or ill-defined area. Furthermore, Skinner and Parker both describe Indian relics as being found on the surface of "dunes and sandhills" in the area (Skinner 1914: 102; Parker 1920:681). Such dunes and sandhills do not exist in this locality at the present time. The Bloomfield Site was undoubtedly destroyed by the construction of the West Shore Expressway, as well as by the continued development, utilization, and alteration of the landscape in the remaining portions of this former community (Lenik 1983:62).

Burying Ground Site

The second archaeological site that deserves elaboration is the Burying Ground Site, located in Chelsea. This was another site recorded initially by Skinner (1909), but which was never precisely defined on the modern landscape. The description clearly indicates that the site was located in Chelsea, and not in Bloomfield:

> *Chelsea*. At the angle of Watchogue Road, near its junction with Union Avenue, graves are reported to have been found. The site is well known locally as the "Burying Ground." Several grooved axes have come from this site. Attempts to locate any remaining graves have been unsuccessful. Another dune with relics is between Chelsea and Travisville (Skinner 1909:9).

Watchogue Road is the former name of Bloomfield or Chelsea Road, and Union Avenue was another name for Chelsea Road. The angle of the road referred to in the description abuts Blocks 1780 and 1790 of the project site.

Bloomfield Road Prehistoric Site

As part of improvements planned for New York State Route 440, the north side of Chelsea Road (also known as South Street and Bloomfield Road), immediately adjacent to the project site on Block 1801, was subjected to a Cultural Resources Phase I Reconnaissance in 2006-2007 (Merwin 2007). Field testing along the northern side of the road, across the streetbed from project site Block 1790, Lot 100, documented a precontact period archaeological site designated the Bloomfield Road Prehistoric Site. The site was investigated using shovel tests and excavation units. A total of 20 artifacts were recovered at the site, consisting of jasper, chert, and shale flakes and one bifacial tool, as well as three pieces of eroded pottery. A general Woodland period was assigned to the site based on the pottery, which could not be further typed. All of the artifacts were found in disturbed contexts, which the author suggested was due to earthmoving and filling associated with earlier road improvements. No artifacts were found in natural soils beneath the disturbed strata, despite the notation of a Buried A horizon and a lower B2 horizon. Based on the low density of artifacts and a lack of any artifacts in a non-disturbed context, the site was recommended not eligible for the National Register of Historic Places and no further studies were warranted.

Meredith Avenue Historic Site

In 2008, Historical Perspectives, Inc. completed a study of Block 2810, Lot 91, located on the southwest side of Meredith Avenue, approximately 0.4 mile southwest of the present project site (HPI 2008a, 2008b). The investigation included a Phase IA Archaeological Documentary Study, which concluded that the property had the potential to contain nineteenth-century residential resources associated with occupants of the former house on the property. Phase IB Archaeological Testing confirmed that this lot contained a series of nineteenth century archaeological deposits in the former rear yard of the house, which had been capped by fill used to bring the once sloping property up to its now level grade. These features included refuse pits and several wood lined privies. The Meredith Avenue site was located on firm ground but contained marshland to the south; a similar landform to portions of the present project site.

Surveys

In addition to the previously documented archaeological sites, a number of cultural resources investigations have occurred within a one or two mile radius of the project site. Although studies were completed for a variety of clients in a range of locational settings, several issues were addressed repeatedly in these reports and are worth reiterating here. Most importantly, archaeologists working in this part of Staten Island knew definitively that the area was once highly sensitive for precontact period sites. The sheer number of sites recorded in this vicinity is a testament to this fact. However, pinpointing the locations of precontact sites that had been previously recorded by amateur archaeologists, on the basis of historic accounts, or using data from early nineteenth century scholars such as Skinner or Parker proved to be difficult, and sometimes impossible. Often, locations or vicinities where sites were supposed to have been situated yielded no precontact materials, even where disturbance to the ground surface was minimal (e.g., Roberts and Stehling 1988). In other cases, modern construction and other earthmoving activities associated with recent development in the area rendered project sites too disturbed to recover any precontact resources, even if they had existed (e.g. Lenik 1983; Hunter and Liebeknecht 2003). Lenik (1983:63-64) summed up the frustrations of trying to pinpoint the location of the Bloomfield and Bulls Head sites this way:

> In summary, the early twentieth century survey reports, which are often cited in cultural resource management studies, must be examined critically and with a great deal of skepticism. These early reports are often vague as to location, and frequently refer to collections long since gone or dispersed, or to hearsay reports. Such data must be carefully cross-checked and correlated with historical maps and present-day maps. The names, places, roads and sites often change or disappear entirely as time passes by.

In general, the only locations where precontact sites or artifacts in an undisturbed context have been documented have been north of Old Place Creek, generally over a mile from the project site, where development through the late twentieth century has been less intense and intact soil horizons have survived (e.g., Payne and Baumgardt 1986, Louis Berger Associates 2008, and PAL 2011, 2012). In nearly all cases, these areas were upland landforms (generally terraces or hummocks) in close proximity to waterways.

C. History of the Project Site

The project site falls within an area on Staten Island originally known as "Daniel's Neck," a name that described the peninsula of upland extending into the surrounding marshland. According to a reconstructed map of colonial patents, the upland portions of the project site, as well as much of the surrounding Bloomfield area, originally were granted to John West in 1680, while the marshy areas were unpatented (Skene 1907).

The earliest known occupants of Daniel's Neck were the Merrill (or Merrell) family, descendents of Richard Merrill, who emigrated from Warwickshire, England in 1675 and settled on Staten Island. Richard Merrill and his descendents operated a mill along Saw Mill Creek, which flows under Chelsea Road and through portions of the project site, for many years during the eighteenth century, although it had been dismantled by circa 1850 (McMillen 1949:17, 21). It is clearly shown on the Anglo-Hessian map of 1780-1783, abutting Chelsea Road on the east side, although the scale of the map does not permit determination if the mill was on or off the project site itself.

Sources differ as to the amount of land to which Richard Merrill gained ownership at Daniel's Neck, but it was probably several hundred acres and no doubt included the project site. One of his descendents, known variously as John or Iyon Merrill, appears to have obtained the deed to much of Bloomfield by the eighteenth century; apparently his holdings consisted of 250 acres stretching from Bull's Head (an area north of modern Victory Boulevard and west of Richmond Avenue) to the Arthur Kill (*Staten Island Advance* 1905; Leng and Davis 1930, II:928). He also apparently was the millwright; his house reportedly was located just north of the mill, and appears to have been within Block 1815, Lot 204 of the project site (McMillen 1949:21).

The project site appears to have remained within the large Merrell family holdings for many years. There were many Merrell descendants on Staten Island, in Northfield in particular, where the project site is located. Other early Staten Island families included the Vrooms, the Bushes, the Housemans, and the Deckers, all of whom settled in Bloomfield, or Merrell Town, as the area was also known. The Vroom (or Vroome) family had several members documented in the 1790 census for Northfield. Members of the Vroom family intermarried with members of the

Bush and Houseman families during the nineteenth century (e.g. Leng and Davis 1930, II:872, 971). Land records on file at the Richmond County Clerk's Office show that these interrelated families owned much of the land in the project site and vicinity through at least the nineteenth century. The Merrell family in particular retained a large proportion of the land over time, although many heirs had other family surnames through marriage. A redistribution of Thomas Merrell's land occurred in the 1830s among his descendants, and included much of the project site (Richmond County Clerk records).

The first visual indication of settlement at Bloomfield is from an 1850 map made by Dripps, which is the earliest nineteenth-century cartographic depiction including structures in the project area and vicinity. A similar map by Butler in 1853 (Figure 6) indicates nearly identical conditions. Chelsea Road is clearly shown on the map, with a number of structures located to its west. Within the Block 1815 portion of the project site there was a structure shown just north of Saw Mill Creek, attributed to "Mrs. Merritt," which was a variant of the Merrell or Merrill spelling. This likely was the old house associated with the Merrill mill on the north side of the creek, as mentioned above. Another structure at the southwest corner of what is now Chelsea Road and River Road was attributed to "A. Vroom." Although shown as vacant, the Block 1780 portion of the project site may also have had structures by the 1850s. The former Merrell mill was torn down around this time, but both the 1857 Whiting and Dorr map (Figure 7) and the 1859 Walling map (Figure 8) illustrate buildings east of the road, as well as a school building on the east side of Chelsea Road within the project site at or near the boundary of Blocks 1780 and 1790. The structure attributed to M. Decker likely was within the project site. The names on the 1859 Walling map represent many of the family surnames of the Merrell descendants.

The 1850 and 1860 federal censuses provide a complementary account of the Bloomfield community at mid-century, and are a good counterpart to the historic maps. According to the census data, nearly all the Bloomfield heads of households (and many of their sons) were boatmen, presumably oystermen who plied their trade along the marshes and creeks of the project site and vicinity. All of the Bloomfield residents had been born locally, attesting to the longevity of the community.

The two available historic maps from the 1860s and early 1870s, the 1866 Colton map and the 1872 Dripps map, generally repeated the same data as the 1859 Walling map, and revealed no new information. The 1860 and 1870 federal censuses confirmed the overall continuity of the Bloomfield community, although by 1870, occupations of heads of households had shifted to more agricultural pursuits, with fewer men listed as boatmen or oystermen. A number of the residents were noted as "market gardeners," suggesting that transportation improvements were allowing them to sell their crops in nearby markets.

The 1874 Beers map (Figure 9), is one of the first historic maps to show both property boundaries and structures and owners. In some instances acreage of parcels also is included. This map also is one of the earliest known references to the name "Bloomfield." The map shows the Decker house on the east side of Chelsea Road within the Block 1780 portion of the project site, as well as the "old school" near the boundary of Blocks 1780 and 1790 within the project site. Curiously, no structures are shown on the Vroom property on the west side of Chelsea Road within Block 1815, although both earlier and later maps do indicate structures, suggesting the 1874 Beers map was in error. The 1874 Beers map does clearly show the areas of upland and marshland within the project site.

Additional historic maps from the last decades of the nineteenth century show little change to the project site, although some of the property owners changed over the years (Beers 1887, Colton 1889, U.S.G.S. 1890 [Figure 10], Robinson 1898). By 1898, the Vroom property on Block 1815 had become part of the Merrell family holdings again, with several Merrell descendants noted on the map. The 1890 U.S.G.S. map illustrates that there were five structures within the Vroom/Merrell holdings on Block 1815, and that a portion of the interior of the block, formerly shown as marshland, appears to have been reconfigured to create a pond or other water retention body. Although the pond is not shown on the 1907 Robinson map (Figure 11), it is clearly depicted on both the 1911 Borough of Richmond Topographical Bureau Maps (Figures 12a-12b) and the 1917 Bromley map (Figure 13). The 1911 and 1917 maps both show an access road traversing the spine of the upland surrounding the pond. The road also allowed access to the structures that stood on the Vroom/Merrell property through the first decades of the twentieth century. An aerial photograph from 1924, however, while still showing the access road, suggests that the pond was no longer there (New York City Bureau of Engineering 1924).

Additional aerial photographs including coverage of Staten Island, beginning in the late 1940s and continuing through the present, show that by at least the 1950s, Block 1815 was being transformed through rechanneling of water and landfilling. These aerial photographs (available on historicaerials.com and Google Earth, among other sites) show a distinct change over time on Block 1815, as many of the former marshlands were eliminated through landfilling and at the same time, some of the uplands were graded away. Today, much of the northern extent of Block 1815, where the Vroom/Merrell structures once stood, is mapped as wetland rather than upland, and the raised topography that once comprised this area has been largely reduced or eliminated (see Figure 2). This process of wetland reconfiguration was less widespread on the portions of the project site east of Chelsea Road, although comparison of the 1911 topographic maps (Figures 12a-12b) with present conditions shown on Figure 2 indicates at least some changes did occur during the twentieth century.

The entire project site has remained devoid of structures since the mid-twentieth century. As noted in the Introduction, all of the individual lots that comprise the project site now are owned by the City of New York and managed by either the NYC Department of Parks and Recreation, NYC Transit (through a Master Leaser) or EDC, on behalf of the Department of Small Business Services. Appendix B summarizes this information.

V. CONCLUSIONS

A. Disturbance Record

As no records for the project site lots are on file with the Department of Buildings, assessing disturbance to the project site relied on comparing historic maps with modern maps and aerial photographs, on soil boring data, and to a lesser degree, on conditions observed during the site inspection, as there is very substantial ground cover throughout the project site.

HPI concludes that large portions of the northern and interior sections of Block1815 clearly have been disturbed from earthmoving, as historic maps showed this area as containing uplands rising above the marshes, while the modern survey map (Figure 3b) shows that these uplands have largely been graded away and the area is now wetland. Large portions of Block 1815 have been landfilled as well. The northern and interior portions of Block 1780 also appear to be disturbed, as the modern survey map (Figure 3a) shows areas of uplands within the marshes where historic maps did not.

B. Precontact Archaeological Sensitivity

The project site is located in an area where numerous precontact period archaeological sites have been recorded. These include the Bloomfield site (which has no defined boundaries but should be considered to have encompassed the entire historic Bloomfield area including the project site), the Chelsea Burying Ground, potentially located within the project site near the boundary of Blocks 1780 and 1790, and the Bloomfield Road site, located immediately across Chelsea Road from Block 1790. In its original state, the project site contained a number of raised upland areas, as well as lower-lying areas bordering the marshland, and marshland associated with Saw Mill Creek. During the Paleo-Indian through Early-Middle Archaic periods, these marshlands may have been dry land. All of these factors suggest that in its natural state, the project site had a high precontact archaeological sensitivity.

In his sensitivity assessment for Staten Island, Boesch (1994a) assigns a high precontact sensitivity to the wetlands area between Fresh Kills and Old Place Creek, both the upland areas and the wetlands (including those areas capped by fill at the time of his assessment). The project site falls within this large area. It should be noted, however, that the preservation of archaeological sites under marshland is dependent on the degree of marine transgression associated with rising sea levels and later tidal and current effects. In his companion study of archaeological sensitivity for the Bronx, Boesch (1994b) offers that peat deposits (which formed in marshy areas) acted as a preservation agent, and soils beneath peat layers should date to the period prior to development of the marshes. In areas where this peat deposit is absent, Boesch claims marine transgression would have destroyed former occupation surfaces. Boesch further asserts that the peat layer itself may have scientific value. These deposits may contain data concerning climatological conditions, plant communities, and fauna from the period.

The soil boring data presented in Appendix A, as well as information provided by Tavis Lloyd, the director of the borings program at LBG, confirm that there is not a distinct peat layer within the marshland soils on the project site.

As noted above, LBG observed more general marshland type soils, often described as black organic clayey silt with organic matter that would be consistent with a more recent "meadow mat" (Lloyd, personal communication 10/17/13). In the absence of a clear peat layer that could preserve earlier soil horizons, if they exist, HPI concludes that the marshlands on the project site do not contain precontact archaeological sensitivity.

Nearly all the precontact sites in the vicinity have been recorded on top of elevated hummocks, generally around the 10-foot contour line (e.g. Skinner 1909; *Staten Island Advance* 1934, 1935; Merwin 2007). The upland areas within the project site generally were within elevations measuring 5-10 feet above sea level, and so in their natural state would have a high precontact period archaeological sensitivity. That said, a large portion of those upland areas at the northern end of Block 1815 appears to have been graded by several feet, and much of the area is now mapped as wetlands, reducing archaeological sensitivity in this part of the project site. Those uplands within the project site that HPI concludes still retain precontact archaeological sensitivity are located on portions of Block 1780 and 1790, as well as portions of Lots 85, 135, 150, 204, 300, and 375 of Block 1815. Figures 14a-14b illustrate those upland areas that HPI concludes contain precontact period archaeological sensitivity.

B. Historic Period Archaeological Sensitivity

Several locations within the project site uplands contained historic period structures associated with local Bloomfield residents. The map documented structures are listed the table, below, and the areas of historic period archaeological sensitivity are shown on Figures 14a-14b.

Map Documented Structures within the Project Site

MDS #	Block and Lot	Structure and Owner/Occupant	Disturbance level
1	Boundary of Block 1780, Lot 1 and Block 1790, Lot 100	School building, pre-1857 to ca. 1890	Some dumping and mounding disturbance is visible in the area
2	Block 1780, unknown lot	Former Merrell mill abutting the east side of Chelsea Road (18th century- ca. 1850)	Unclear; specific location is unknown, may be off project site or under Chelsea Road
3	Block 1780, Lot 69	Decker structure, pre-1857 to ca. 1917	Dumping and probable earthmoving disturbance visible
4	Block 1815, Lots 85, 300, 325	Vroom/Merrell structures, pre-1850 to ca.1917	Area has been graded and is now mapped as wetlands, former structure locations likely heavily disturbed
5	Block 1815, Lot 204	Thomas Merrell structure, pre-1850 to ca.1859	Area is heavily overgrown, disturbance unknown but maps show little change in elevation over time

The former structures on the project site predated the introduction of municipal water and sewer service to this area by at least 35 years (and probably much longer), leaving the residents to rely on private wells, cisterns, privies, and cesspools for their needs. Piped water was not introduced on Staten Island until the 1880s and sewers in the 1890s (Leng and Delevan 1924:26-29). Privies, wells, and cisterns, which are often filled with contemporary refuse related to the dwellings and their occupants, can provide important stratified cultural deposits for the archaeologist and frequently provide the best remains recovered on sites. Frequently, wells or cisterns would be located in reasonably close proximity to a residence, for use in washing or cooking (additional wells and/or cisterns might be located further away from a residence for other uses, such as watering livestock). Privies often were situated further away from the residence, for sanitary purposes. Portions of these shaft features are often encountered because their deeper and therefore earlier layers remain undisturbed by subsequent construction, and in fact, construction often preserves the lower sections of the features by sealing them beneath structures and fill layers. Wells would have been excavated as far as the water table, and cisterns and privies often were dug up to 10-15 feet below grade. Thus, these shaft features often survive in truncated form after grading episodes. Other commonly occurring but more fragile backyard remains include fence lines, paths, traces of landscaping and sheet midden scatter. It is possible that other subsurface features, such as sheet middens or former outbuilding foundations, could be preserved as well if disturbance is not extensive.

Identifying and examining buried features associated with the nineteenth century occupation of the project site may reflect the daily activities of the residents and provide insight into cultural behavior of this very homogenous population. If undisturbed deposits of cultural material do still exist in this location, they may have the potential to provide meaningful information regarding the lives of the people who lived there. When recovered from their original context and in association with a specific historical occupation, historical deposits can provide a wealth of information about consumption patterns, consumer choice, gender relations, ethnicity, economic status, and other important issues.

HPI concludes that three of the five former locations of the Vroom/Merrell structures on Block 1815, Lots 85, 300, and 325 do not retain historic period archaeological sensitivity due to the obvious disturbance to the area from grading. These former upland areas are now wetlands, and the raised topography that allowed the structures to be built has been all but eliminated. Two of the Vroom/Merrell former structures locations are not within wetlands, and HPI concludes that truncated shaft features could still survive in these locations. The remainder of the Map Documented Structures, including the school building near the boundary of Blocks 1780 and 1790, the Decker structure on Block 1780, Lot 69, and the Merrell structure on Block 1815, Lot 204, are in areas where disturbance would not necessarily preclude recovery of archaeological resources. The former Merrell mill location cannot be positively located but likely was not within the project site boundaries.

VI. RECOMMENDATIONS

Based on the conclusions outlined above, HPI recommends further consideration for potential below grade archaeological resources from both the precontact and historic periods. Due to the range of conditions across the project site, HPI recommends that a phased approach be undertaken.

Figures 14a and 14b illustrate areas of archaeological sensitivity within upland areas of the project site. These areas include locations of precontact sensitivity, historic period sensitivity, and a combination of precontact and historic period sensitivity. Within these areas, HPI recommends that a program of Phase IB archaeological testing be undertaken if project plans will impact these locations. Not all locations marked as archaeologically sensitive may be impacted by project plans. However, those archaeologically sensitive areas where there will be ground disturbance should be subjected to archaeological testing. This testing might involve a combination of shovel testing, backhoe trenching, or other field methods as determined by archaeologists in consultation with regulatory agencies. The testing should be undertaken in coordination with construction planning, but ideally be completed prior to construction. All archaeological testing should be conducted according to OSHA regulations and applicable archaeological standards (New York Archaeological Council 1994, NYSOPRHP 2005; LPC 2002; CEQR 2012). Professional archaeologists, with an understanding of and experience in urban archaeological excavation techniques, would be required to be part of the archaeological team.

VII. REFERENCES

Anglo-Hessian Map
1780-83 *Plan (No. 31) du Camp Anglo-Hessois dans Staten Island, Baie de New York de 1780 à 1783*. On file at the Staten Island Historical Society.

Beers, F.W.
1874 *Atlas of Staten Island, Richmond County, New York, from official records and surveys; compiled and drawn by F. W. Beers*. J.B. Beers and Co., New York. On file at the New York Public Library.

Boesch, Eugene J.
1994a *Archaeological Evaluation and Sensitivity Assessment of Staten Island, New York*. Prepared for the New York City Landmarks Preservation Commission.

1994b *Archaeological Evaluation and Sensitivity Assessment of the Bronx, New York*. Prepared for the New York City Landmarks Preservation Commission.

Borough of Richmond Topographical Bureau
1911 *Borough of Richmond, Topographical Survey*. New York. On file at the New York Public Library.

Brasser, T. J.
1978 "Early Indian-European Contacts," in *Handbook of North American Indians: Northeast,* vol. 15, B. G. Trigger (ed.), Smithsonian Institution, Washington, D.C..

Bromley, G.W.
1917 *Atlas of the City of New York, Borough of Richmond, Staten Island. From actual surveys and original plans, by George W. and Walter S. Bromley*. G.W. Bromley and Co., Philadelphia.

Butler
1853 *Map of Staten Island or Richmond County*. On file at the New York Public Library.

Cantwell, Anne-Marie and Diana diZerega Wall
2001 *Unearthing Gotham: The Archaeology of New York City.* Yale University Press, New Haven.

City Environmental Quality Review (CEQR)
2012 *City Environmental Quality Review Technical Manual.* City of New York, Mayor's Office of Environmental Coordination.

City of New York, Department of Buildings
1898-present Indexed records. <http://www.nyc.gov/html/dob/html/bis.html>. Accessed 20 September 2013.

Colton and Co.
1866 *Map of Staten Island.* C.W. and C.B. Colton and Co. On file at the New York Public Library.

1889 *Map of Staten Island, Richmond County*. On file at the New York Public Library.

Dripps, M.
1850 *Map of Staten Island or Richmond County*. M. Dripps, New York.

1872 *Map of Staten Island, Richmond County, New York.* M. Dripps, New York.

Flick, Alexander C.
1933 *History of New York*, Vol. I. The New York State Historical Association.

Historical Perspectives, Inc.
1996 *Final Report: Phase 3 Archaeological Data Recovery of the P.S. 56 R School Site, Staten Island, New York.*

2008a *Phase IA Documentary Study, Meredith Ave. Bus Depot Project Site, Block 2810, Lots 82, 91, 94, and part of 59, Staten Island, Richmond County, New York.*

2008b *Phase IB Field Investigation, Meredith Avenue Bus Depot Project Site, Block 2810, Lot 91, Staten Island, Richmond County, New York.*

Hunter, Richard and William Liebeknecht
2003 *Phase IB Archaeological Survey, Arthur Kill Power Plant Lateral, Staten Island, Borough of Richmond, Richmond County, New York.* Prepared by Hunter Research, Trenton, New Jersey for Natural Resource Group, Inc., Minneapolis, Minnesota.

Landmarks Preservation Commission (LPC)
2002 *Landmarks Preservation Commission Guidelines for Archaeological Work in New York City.*

Leng, Charles W. and William T. Davis
1930 *Staten Island and Its People, A History, 1609-1929.* Lewis Historical Publishing Company, Inc., New York.

Leng, Charles W. and Edward C. Delavan, Jr.
1924 *A Condensed History of Staten Island (Borough of Richmond, New York City).* The Staten Island Edison Corporation, Staten Island, New York.

Lenik, Edward J.
1983 *Stage IB Cultural Resource Survey of the East Side Project, Staten Island Industrial Park, Bloomfield, Staten Island, New York.* Prepared by Historic Conservation and Interpretation, Inc., Newton, New Jersey for Andrews & Clark, Inc., New York, New York.

1989 "Cultural Contact and Trade in Prehistoric Staten Island." *Proceedings Staten Island Institute of Arts and Sciences*, Vol. 34, no. 1.

Louis Berger Associates
2008 *Goethals Bridge Replacement Richmond County, New York and the City of Elizabeth, New Jersey Phase 1 Archaeological Report.*

Lloyd, Tavis
2013 Personal telephone and email communication between Tavis Lloyd of Louis Berger Group and Julie Abell Horn of Historical Perspectives, Inc. October 17, 2013.

McMillen, Loring
1949 "Old Mills of Staten Island." *The Staten Island Historian.* July-September, 1949. Vol. X, No. 3.

Merwin, Daria
2007 *Cultural Resource Reconnaissance Survey and Site Examination Report PIN X096.18.101, New York State Route 440 (West Shore Expressway), Edward Curry Avenue to Bloomingdale Road Staten Island, Richmond County, New York.* Prepared by State University of New York at Stony Brook.

New York Archaeological Council (NYAC)
1994 *Standards for Cultural Resource Investigations and the Curation of Archaeological Collections.* New York Archaeological Council.

New York City Bureau of Engineering
1924 *Sectional aerial maps of the City of New York.* On file at the New York Public Library, Maps Division.

New York State Office of Parks, Recreation, and Historic Preservation (NYSOPRHP)
2005 *Phase I Archaeological Report Format Requirements.*

Parker, Arthur C.
1920 "The Archaeological History of New York." *New York State Museum Bulletin*. Nos. 235, 236. The University of the State of New York, New York State Museum, Albany, New York. July and August, 1920.

Payne, Ted M. and Kenneth Baumgardt
1986 *Draft Howland Hook Marine Terminal Expansion Cultural Resources Reconnaissance*. Prepared by MAAR Associates, Inc., Newark, Delaware for International Technologies, Edison, New Jersey.

Public Archaeology Laboratory (PAL)
2011 *Phase IB Archaeological Identification Survey M&R 058 Additional Temporary Workspace and Phase II Archaeological Site Evaluation Old Place Neck Site (OPRHP #A08501.002971) Goethals Bridge HDD Workspace, Staten Island, Richmond County, New York.*

2012 Phase III Archaeological Data Recovery Clearance Memorandum: Old Place Neck Site, NJ-NY Expansion Project- Staten Island, New York- October 31, 2012.

Ritchie, William A.
1980 *The Archaeology of New York State.* Revised edition. Harbor Hill Books, Harrison, New York.

Ritchie, William A. and Robert E. Funk
1971 Evidence For Early Archaic Occupation On Staten Island. *Pennsylvania Archaeologist* 31(3):45-60.

Roberts, William I. and Nancy A. Stehling
1988 *Stage IB Archaeological Survey of the Southridge Development Project, Staten Island, New York.* Prepared by Greenhouse Consultants, Inc., New York, New York for Carpenter Environmental Associates, Inc., Northvale, New Jersey.

Robinson, E.
1898 *Atlas of the Borough of Richmond, City of New York. From official records, private plans and actual surveys compiled by and under the supervision of E. Robinson*. E. Robinson and Co., New York.

1907 *Atlas of the Borough of Richmond, City of New York*. E. Robinson, New York.

Ruttenber, E. M.
1872 *Indian Tribes of Hudson's River to 1700.* Reprinted in 1992 by Hope Farm Press & Bookshop.

Santucci, Gina
2013 Landmarks Preservation Commission Environmental Review Letter for Sawmill Creek Wetland Mitigation Bank. July 1, 2013.

Skene, Frederick
1907 *Map of Staten Island, Richmond Co., N.Y. showing the Colonial Land Patents from 1668-1712*. On file at the Staten Island Historical Society.

Skinner, Alanson
1909 *The Lenape Indians of Staten Island*. Reprinted from the Anthropological Papers of the American Museum of Natural History, Volume III. New York.

Snow, Dean R.
1980 *The Archaeology of New England*. Academic Press, New York.

Staten Island Advance
1905 *The Merrills are Bred for the Sea*. (no date on file copy at Staten Island Historical Society).

1934 *Indian Hatchet is Dug Up*. November 20, 1934.

1935 *Paleface Pupils Dig Relics in Bloomfield Meadows*. March 21, 1935.

United States Department of Agriculture (USDA)
2006 *New York City Reconnaissance Soil Survey*. United States Department of Agriculture, Natural Resources Conservation Service, Staten Island, NY.

United States Federal Census
1850 Northfield, Richmond County.

1860 Northfield, Richmond County.

1870 Northfield, Richmond County.

1880 Northfield, Richmond County.

1900 Northfield, Richmond County.

United States Geological Survey (USGS)
1890 *Staten Island, N.Y.* 15 Minute Topographic Quadrangle.

1976 *Arthur Kill, N.J.-N.Y.* 7.5 Minute Topographic Quadrangle.

Walling, H.F.
1859 *Map of Staten Island, Richmond County, New York, from surveys under the direction of H.F. Walling*. D.A. Fox, New York.

Weslager, C. A.
1972 *The Delaware Indians A History*. Rutgers University Press, New Brunswick.

Whiting, Henry L. and F.W. Dorr
1857 *Northwest Part of Staten Island and Bergen Point*. Register No. 751. United States Coast Survey.

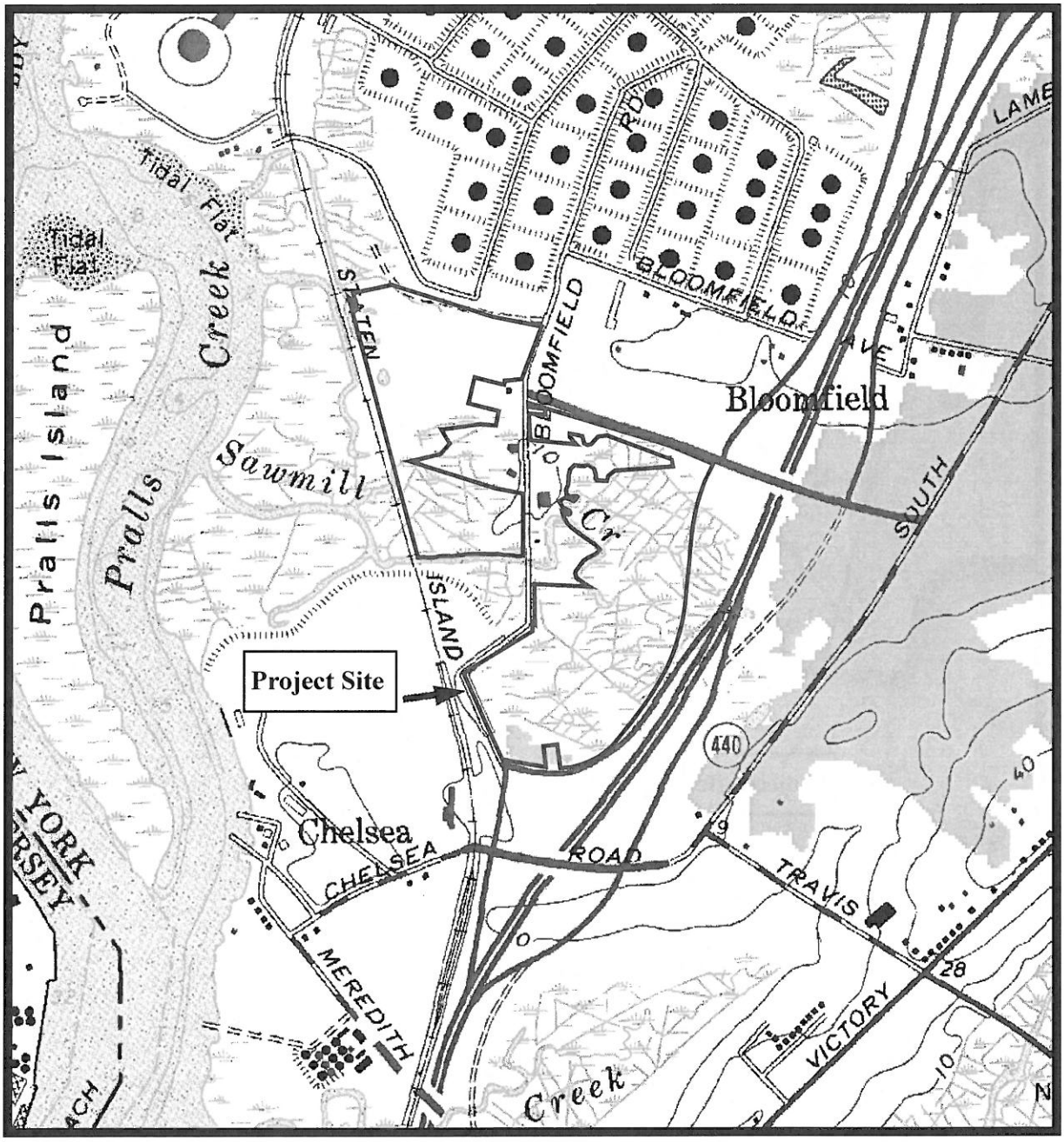

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Figure 1: Project site on *Arthur Kill, N.Y-N.J.* topographic quadrangle (U.S.G.S. 1976).

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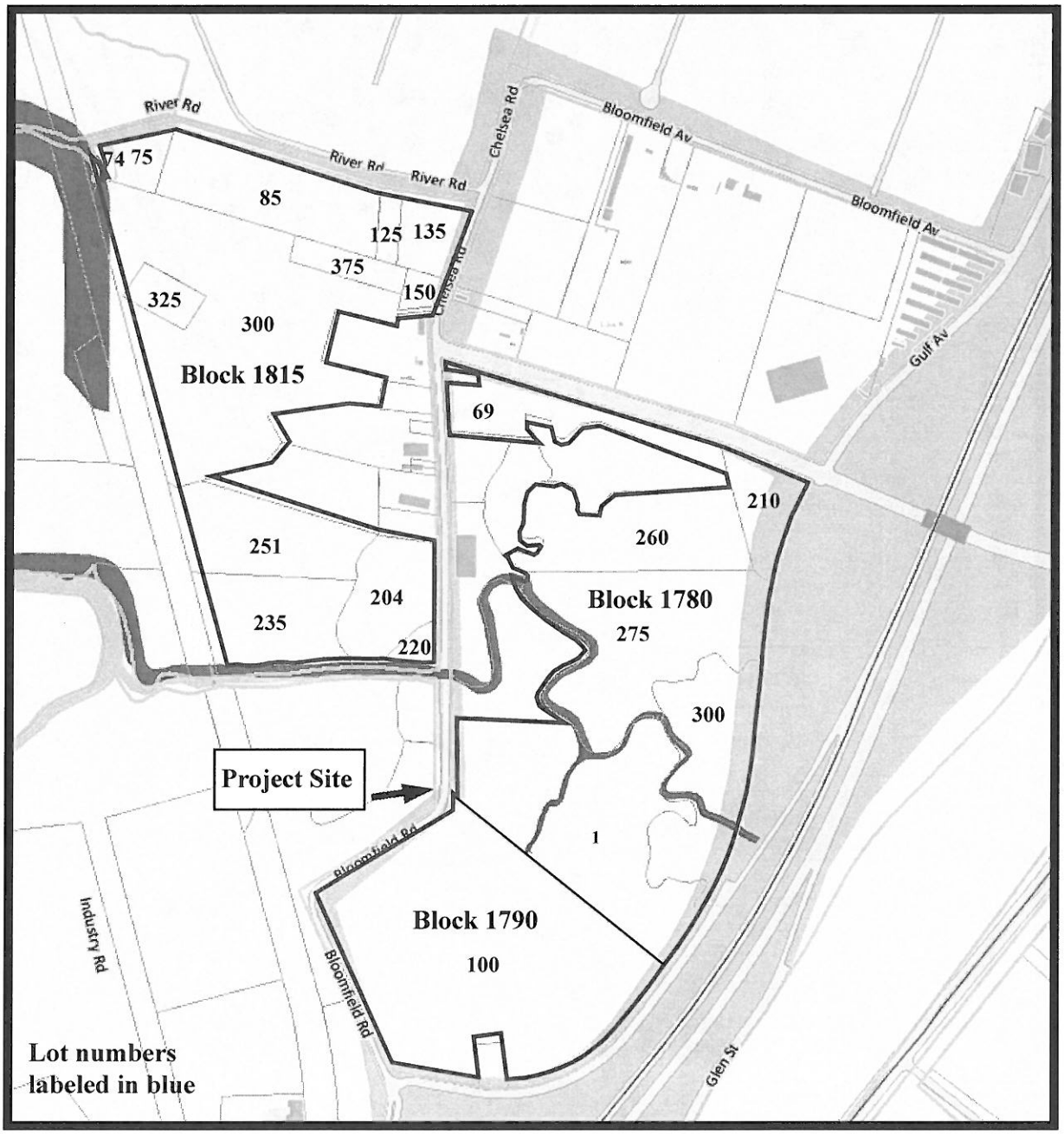

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Staten Island, Richmond County, New York

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Figure 2: Project site showing blocks and lots (HPI and OASIS 2013).

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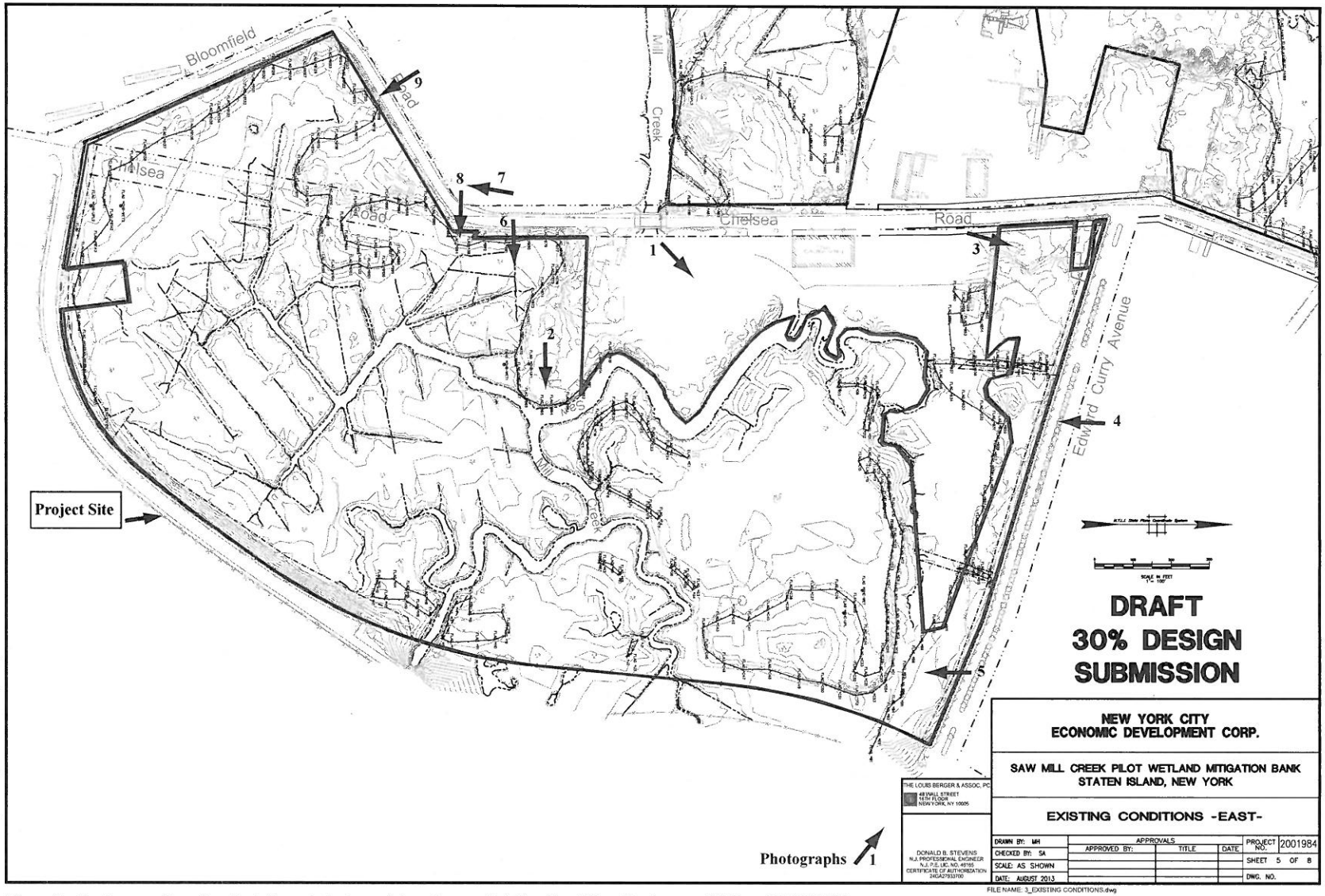


Figure 3a: Eastern portion of project site and photograph locations on Existing Conditions East survey (HPI and EDC 2013).

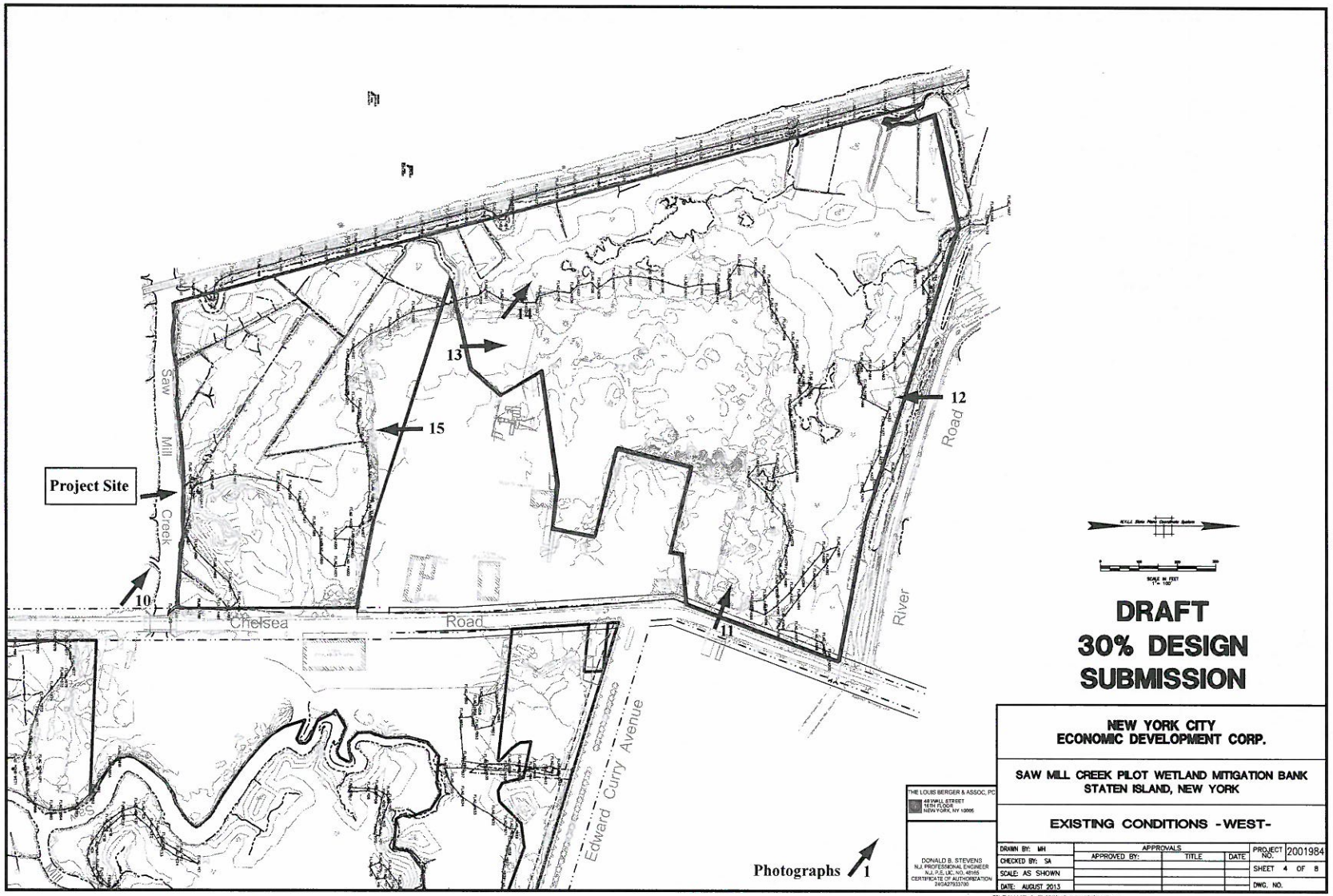
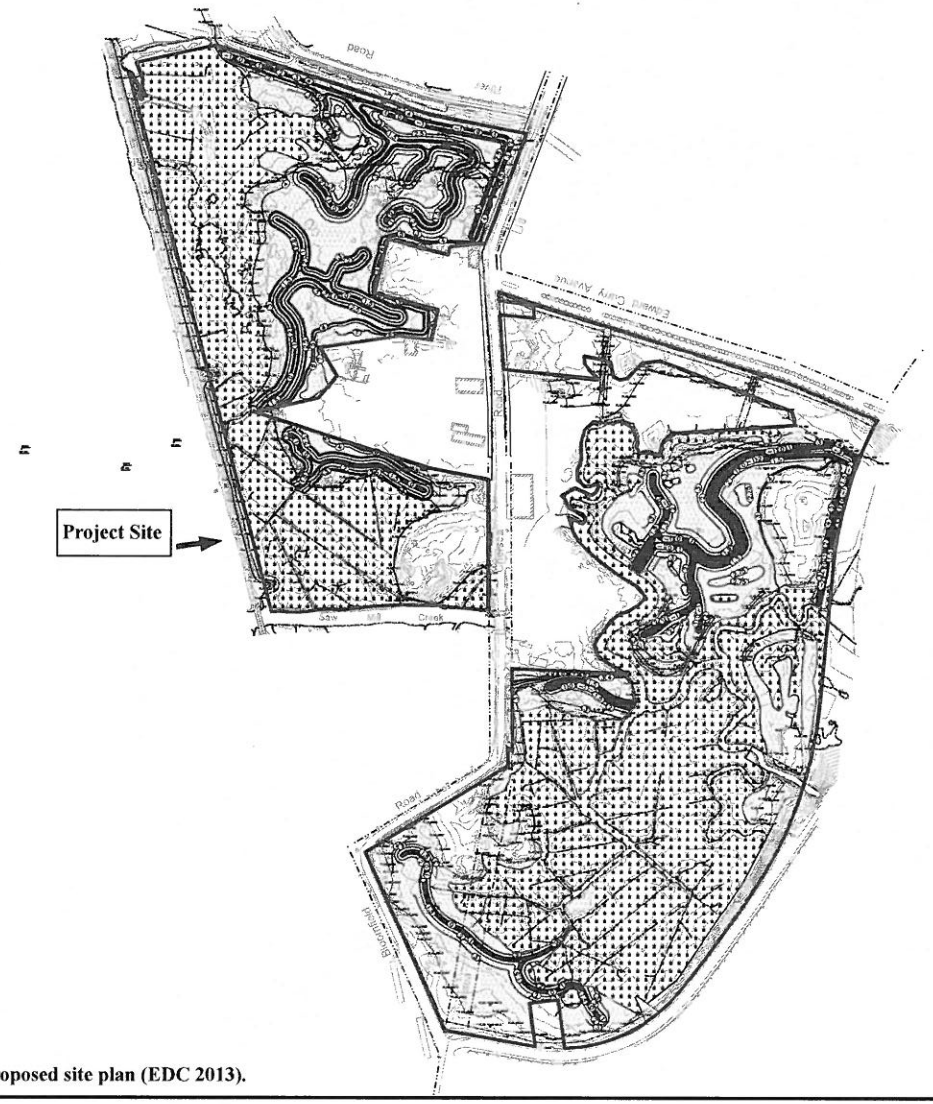


Figure 3b: Western portion of project site and photograph locations on Existing Conditions West survey (HPI and EDC 2013).



HABITAT AREAS			
TYPE	SYMBOLS	EAST AREAS	WEST AREAS
WETLAND RESTORATION/ENHANCEMENT		18.13 ACRES	17.92 ACRES
WETLAND PRESERVATION		27.25 ACRES	17.16 ACRES
UPLAND ENHANCEMENT		8.54 ACRES	2.29 ACRES

DRAFT
30% DESIGN SUBMISSION

NEW YORK CITY ECONOMIC DEVELOPMENT CORP.

SAW MILL CREEK PILOT WETLAND MITIGATION BANK
STATEN ISLAND, NEW YORK

KEY PLAN

THE LOUIS BERGER & ASSOC, PC
48 WALL STREET
16TH FLOOR
NEW YORK, NY 10005

DONALD B. STEVENS
N.J. PROFESSIONAL ENGINEER
N.J. P.E. LIC. NO. 46185
CERTIFICATE OF AUTHORIZATION
24GA27933700

	APPROVALS			
DRAWN BY: MH	APPROVED BY:	TITLE	DATE	PROJECT NO. 2001984
CHECKED BY: SA				SHEET 3 OF 8
SCALE:				DWG. NO.
DATE: AUGUST 2013				

FILE NAME: 2_KEY MAP.dwg

PLOT TIME: 2013-09-30 13:38:22:22

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Figure 4: Proposed site plan (EDC 2013).

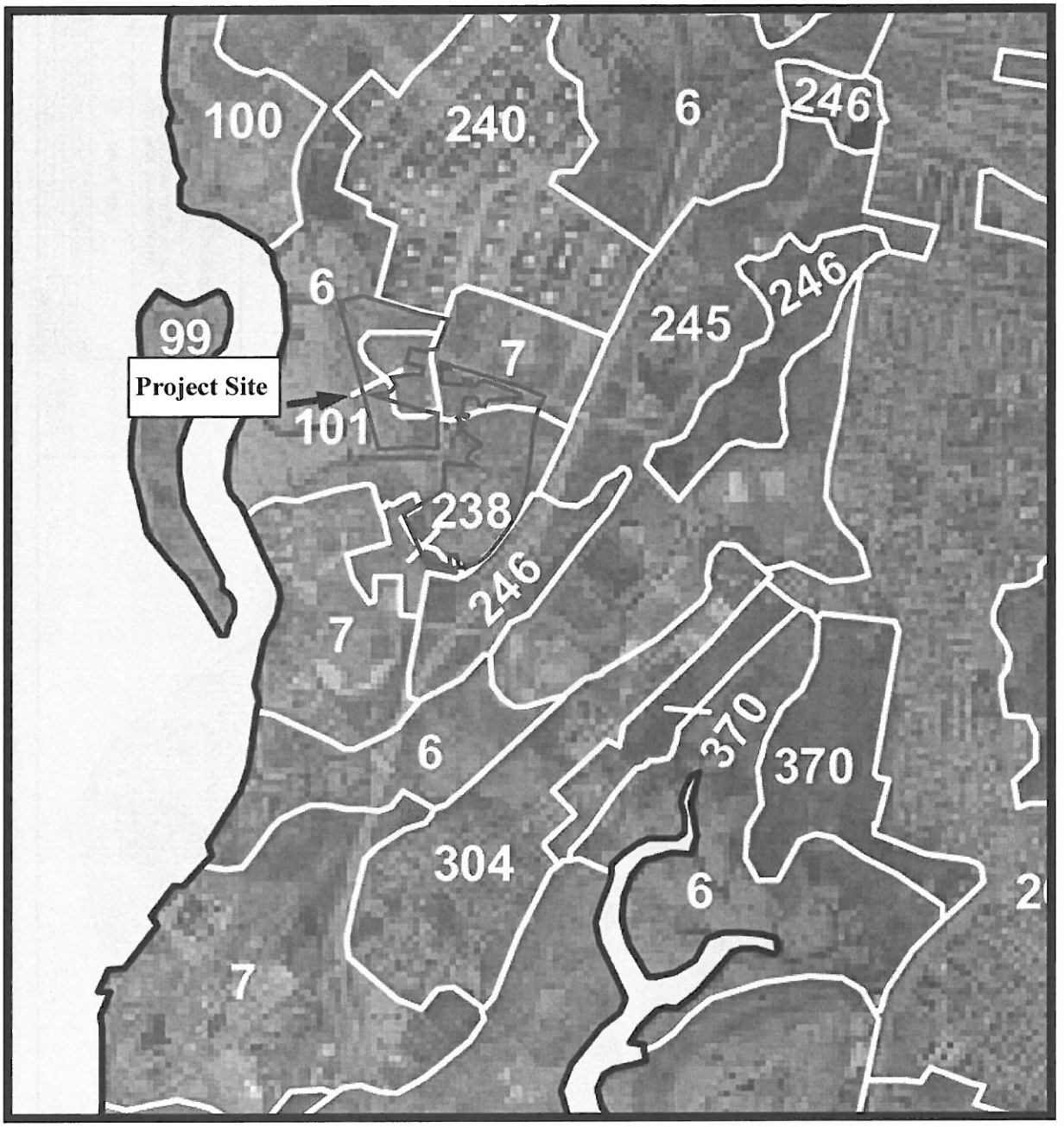

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Figure 5: Project site on *New York City Reconnaissance Soil Survey* (USDA 2006).

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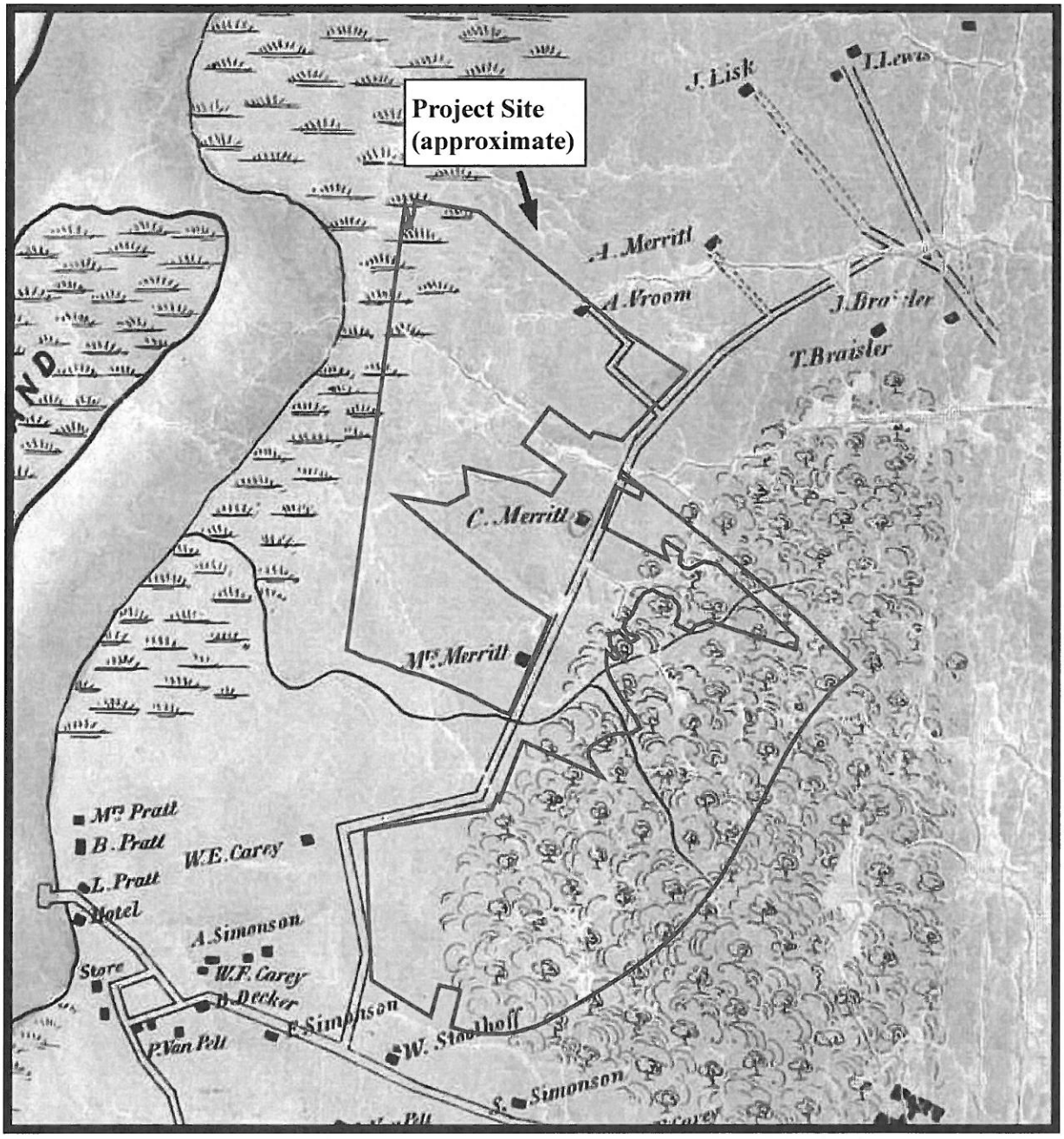

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Figure 6: Project site on *Map of Staten Island or Richmond County* (Butler 1853).

0 500 1000 1500 2000 2500 FEET

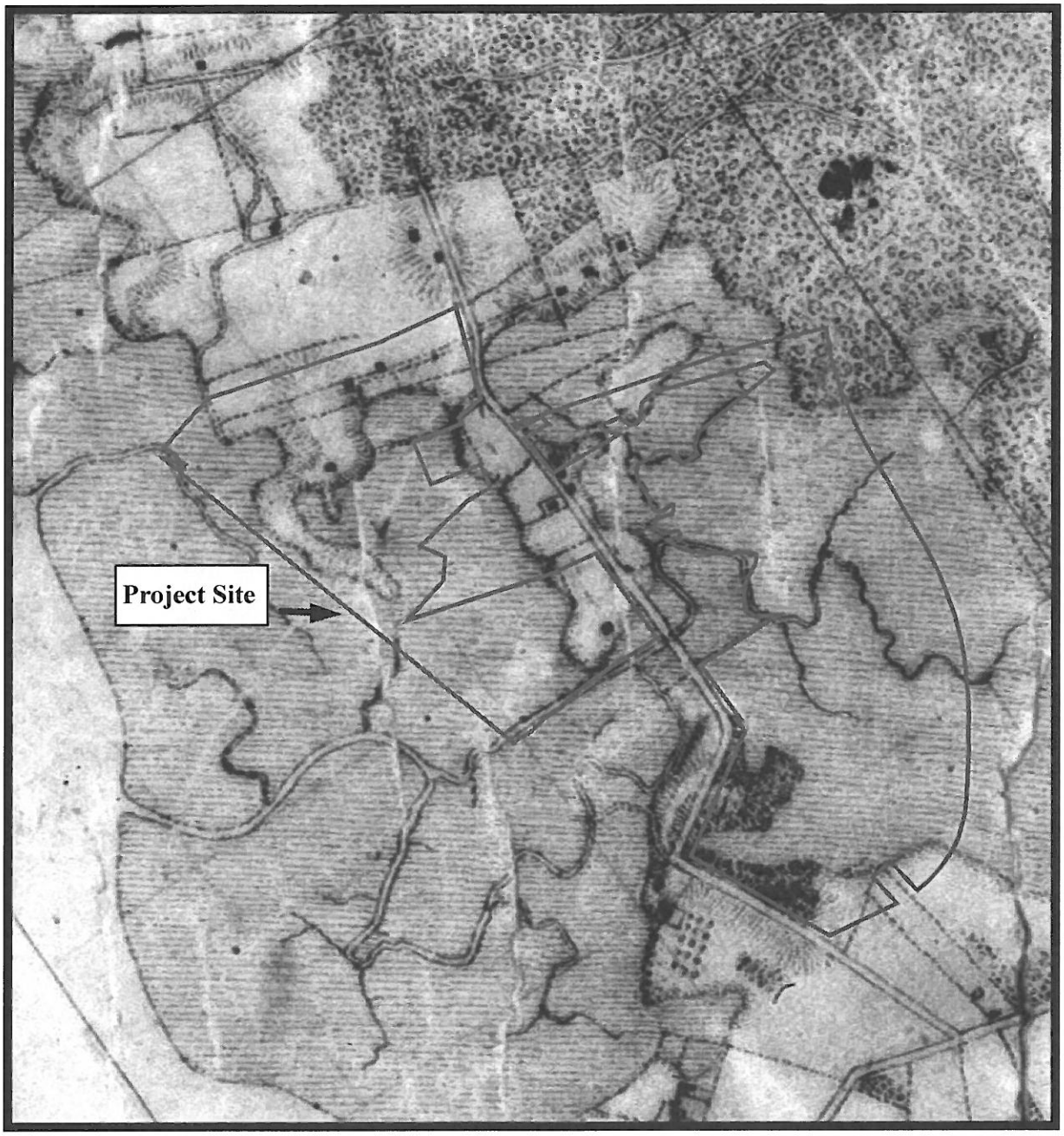

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Figure 7: Project site on *Northwest Part of Staten Island and Bergen Point* (Whiting and Dorr 1857).

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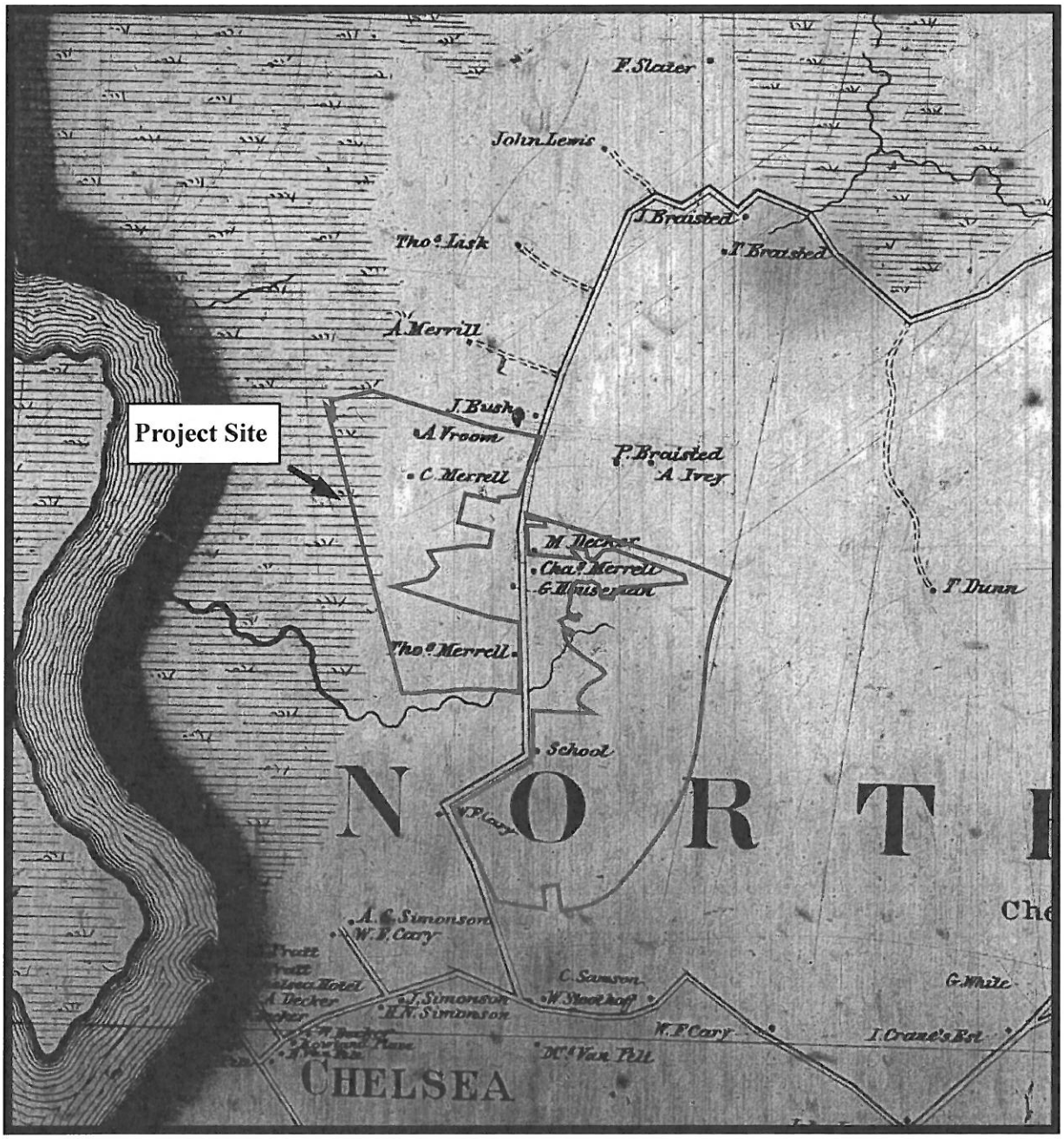

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Figure 8: Project site on *Map of Staten Island, Richmond County, New York* (Walling 1859).

0 500 1000 1500 2000 2500 FEET

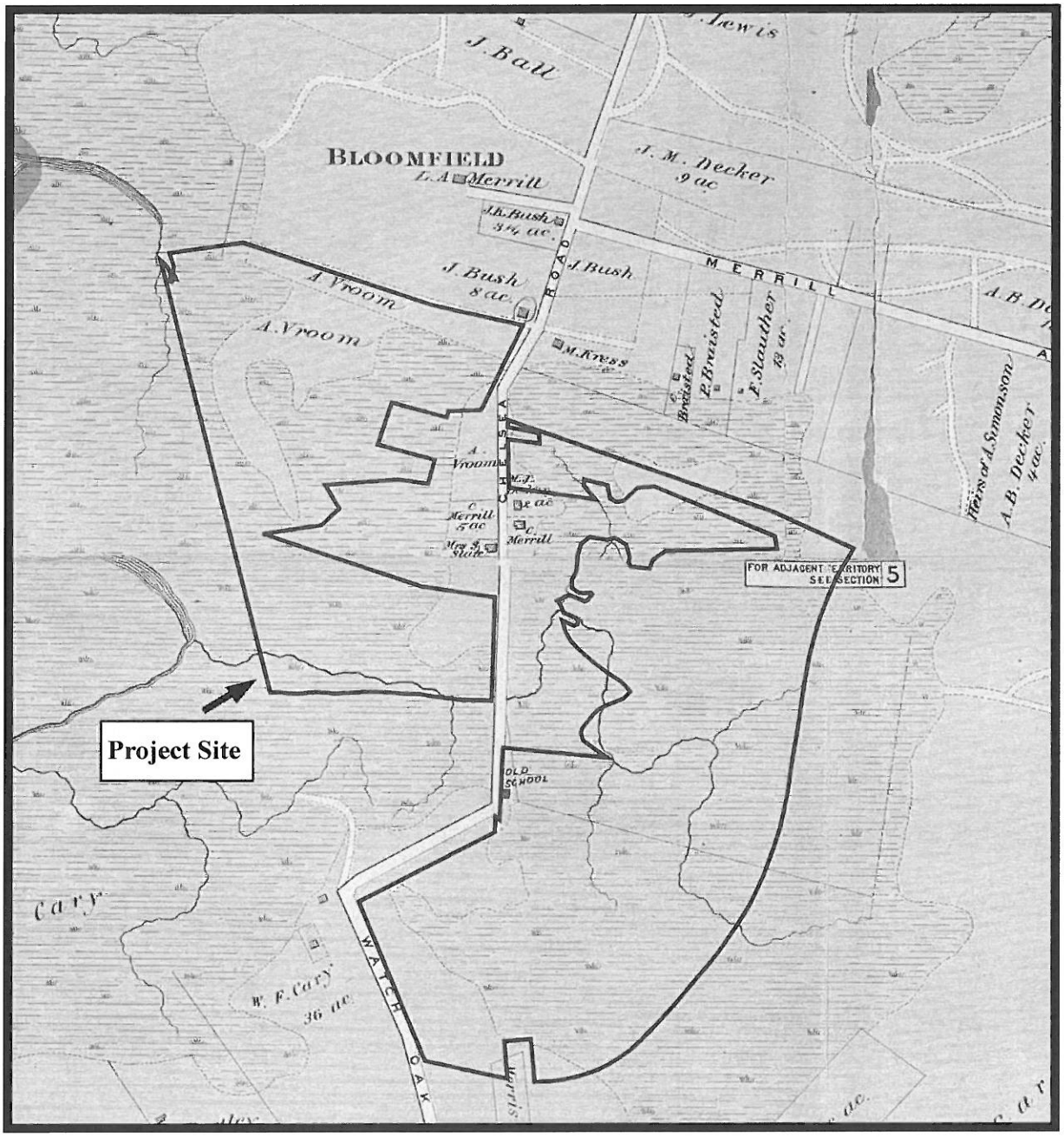

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Figure 9: Project site on *Atlas of Staten Island, Richmond County, New York* (Beers 1874).

0 250 500 750 1000 1250 FEET

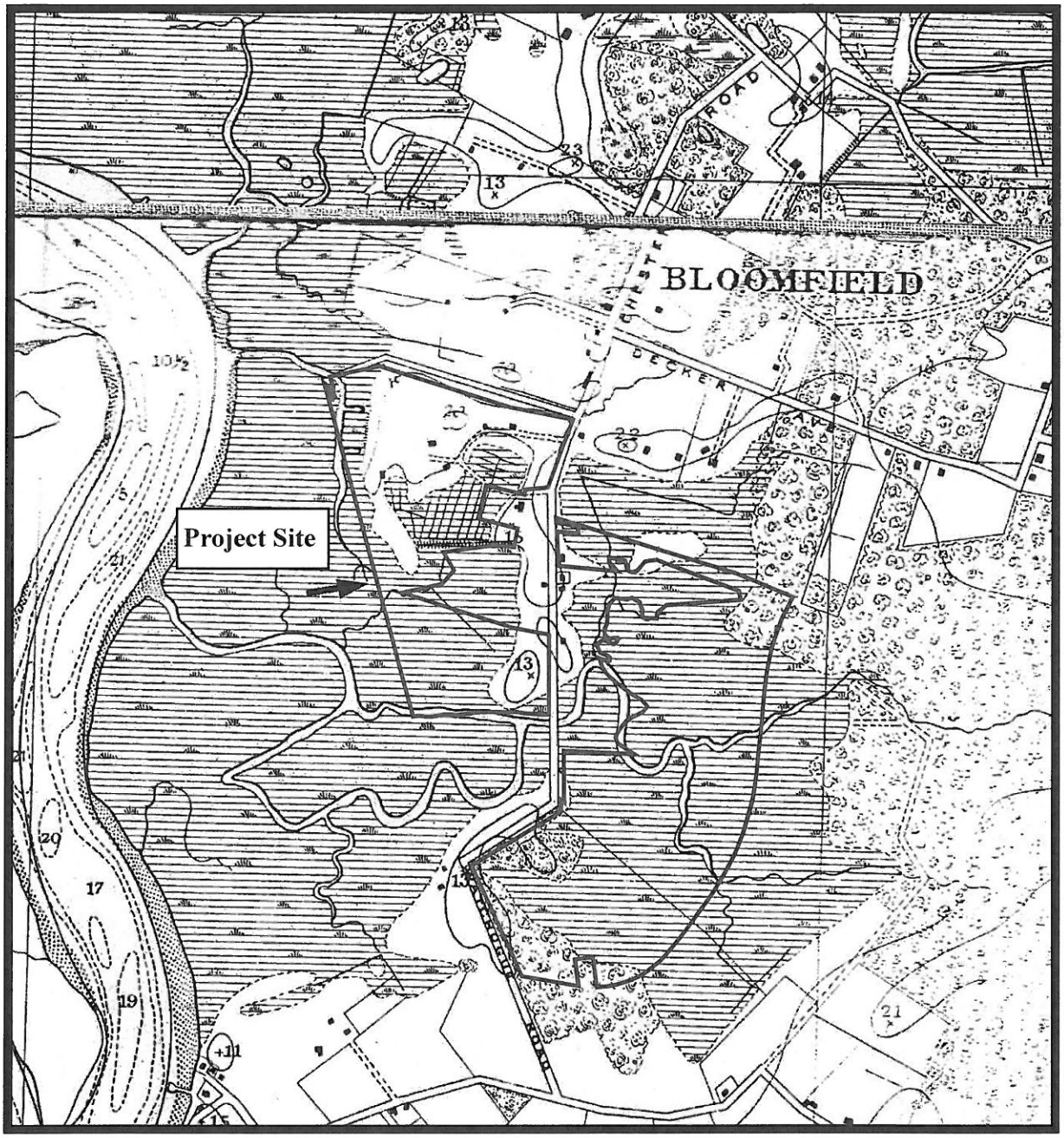

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Figure 10: Project site on *Staten Island, New York* 15 Minute Quadrangle (U.S.G.S. 1890).

0 500 1000 1500 2000 2500 FEET

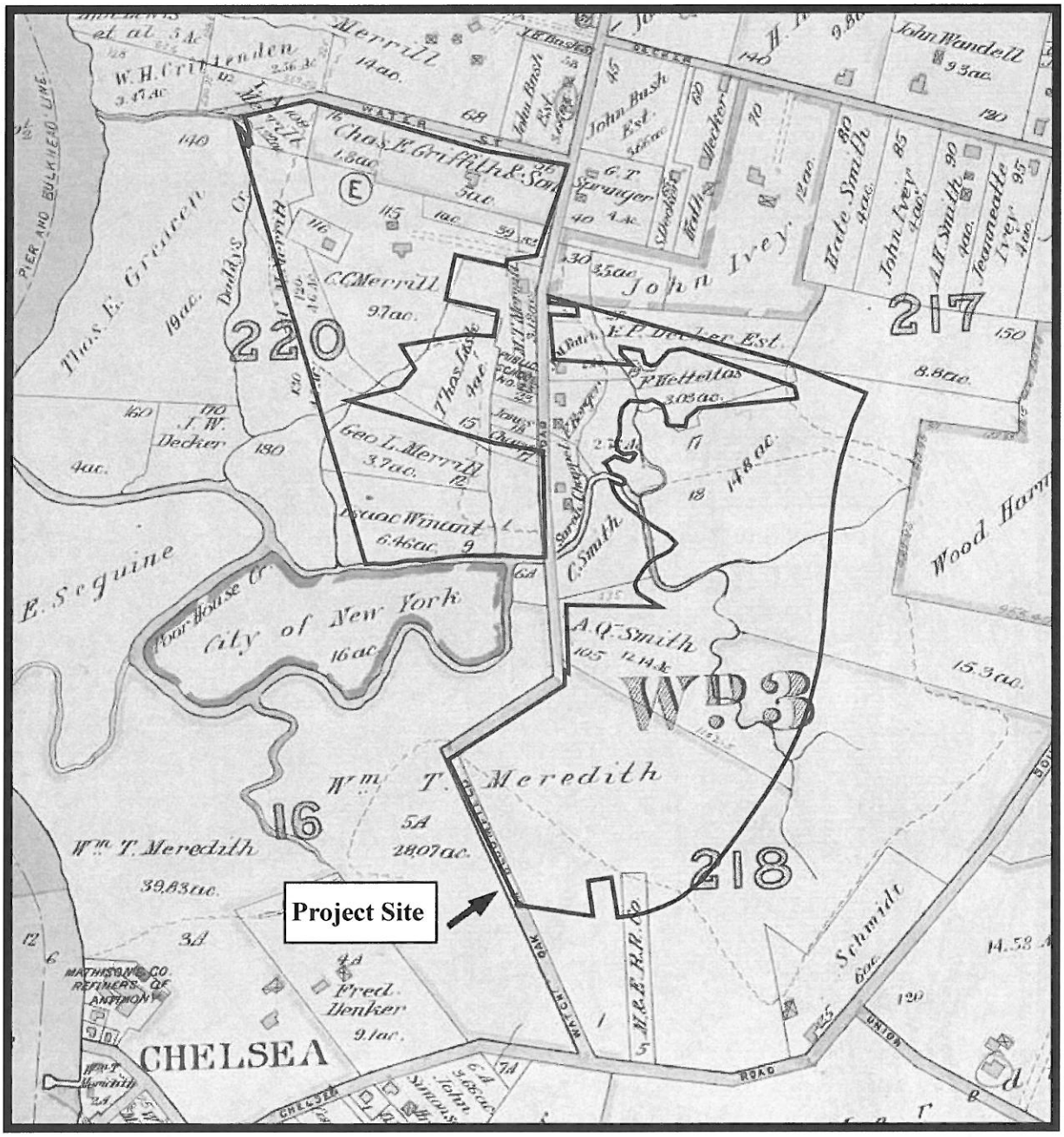

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Figure 11: Project site on *Atlas of the Borough of Richmond, City of New York* (Robinson 1907).

0 400 800 1200 1600 2000 FEET

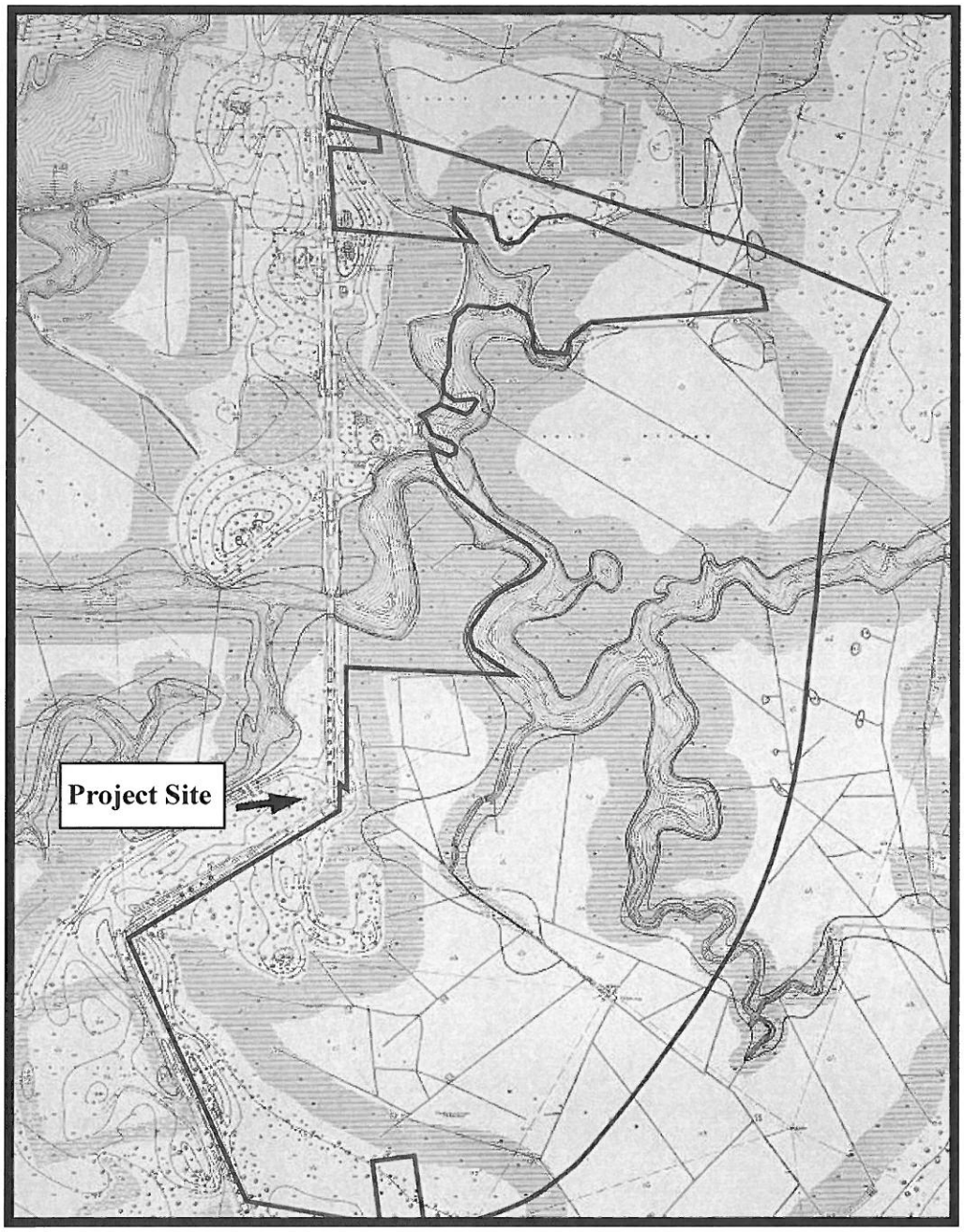

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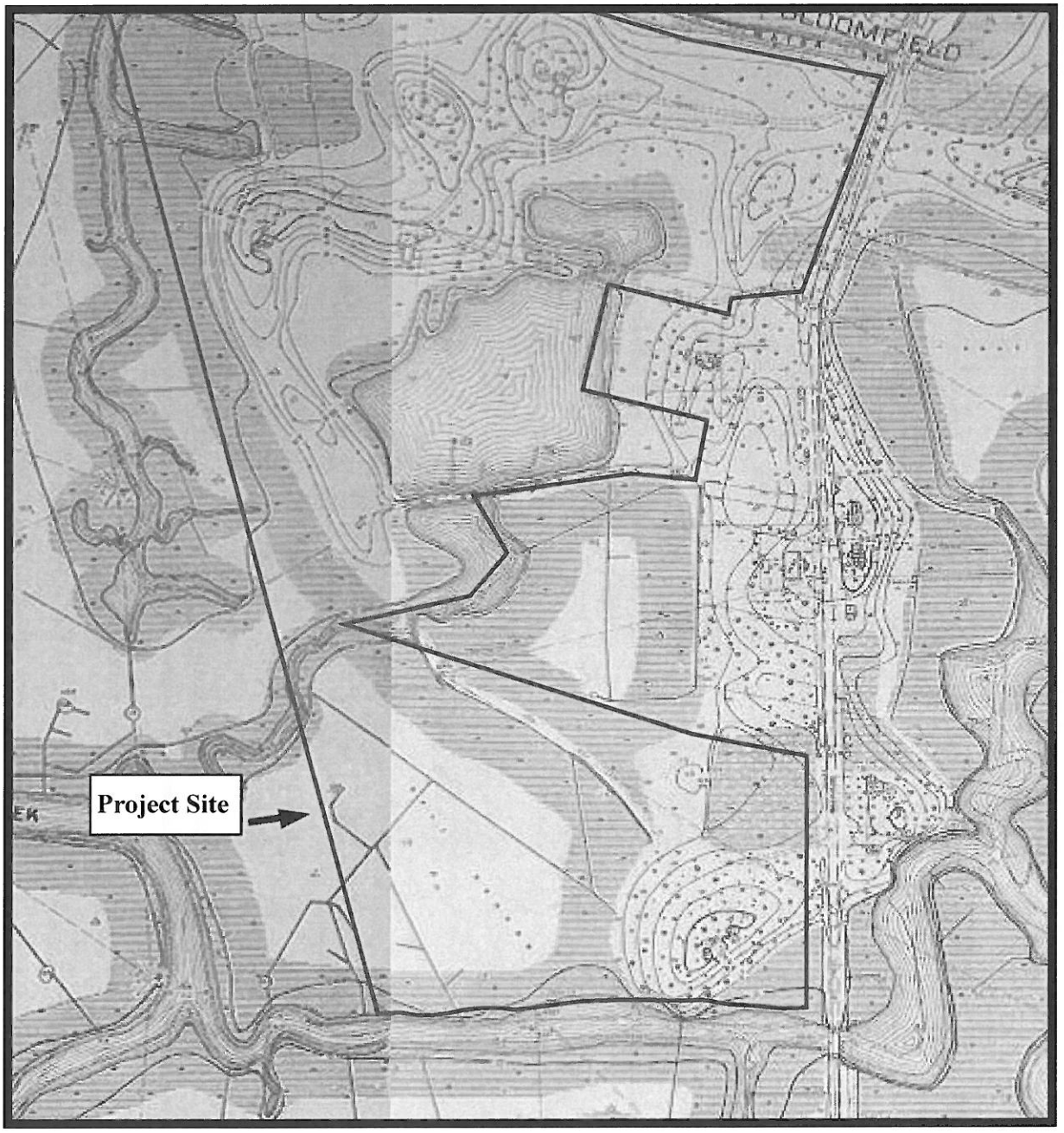
Figure 12a: Eastern portion of project site on *Borough of Richmond Topographical Survey* (Topographical Bureau 1911).

0 200 400 600 800 1000 FEET



Phase IA Archaeological Documentary Study
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Figure 12b: Western portion of project site on *Borough of Richmond Topographical Survey* (Topographical Bureau 1911).

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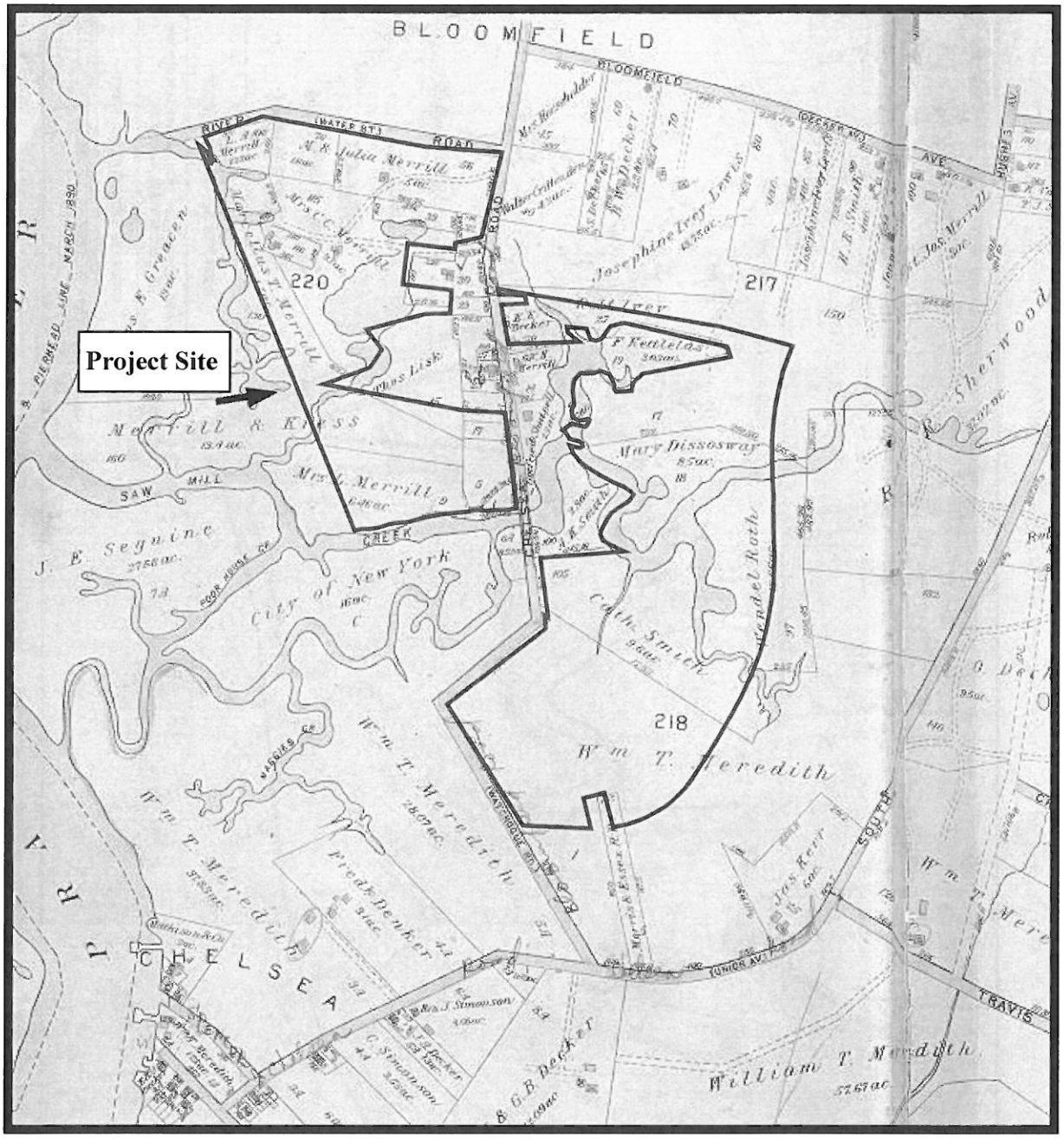

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Figure 13: Project site on *Atlas of the City of New York, Borough of Richmond, Staten Island* (Bromley 1917).

0 400 800 1200 1600 2000 FEET

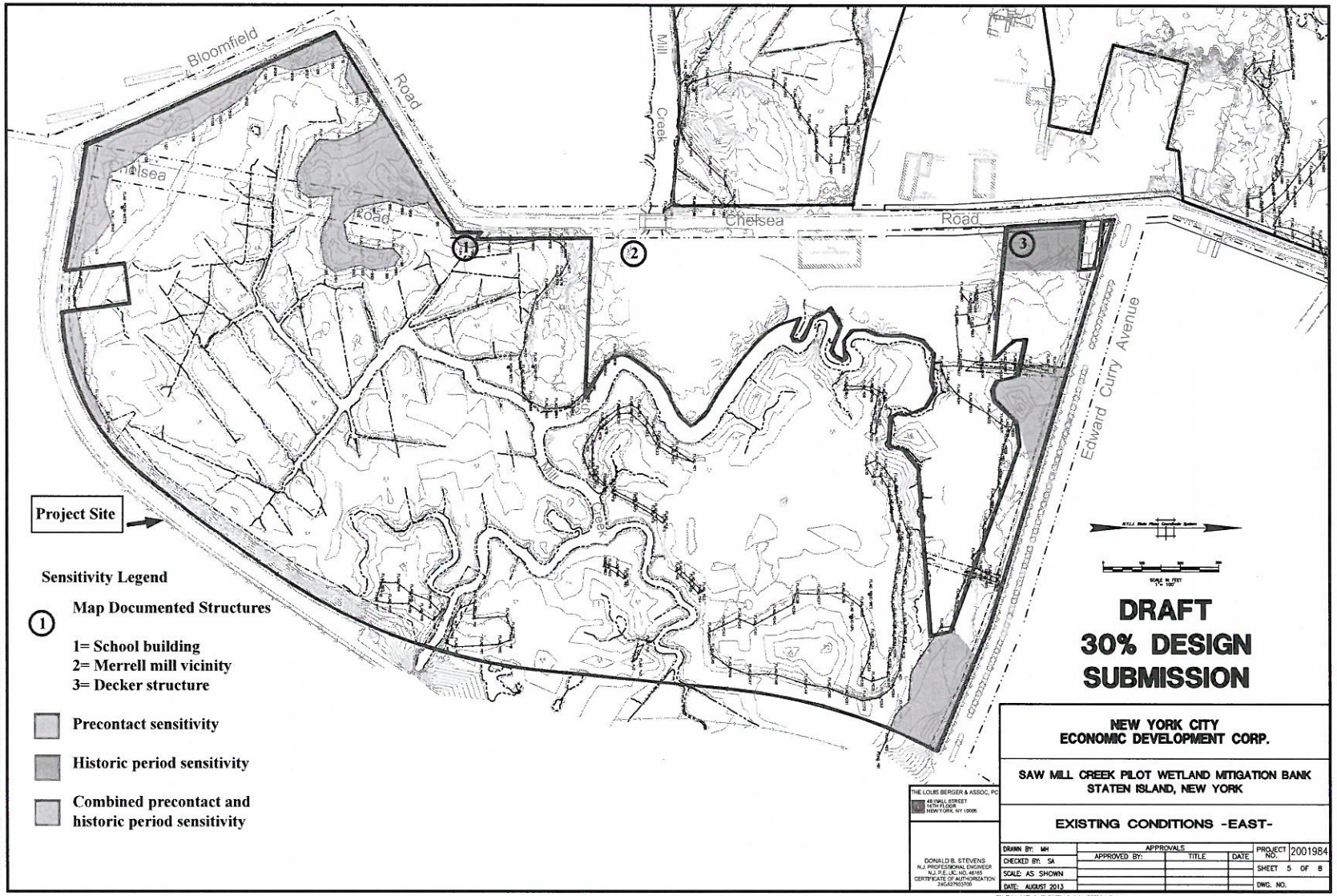


Figure 14a: Eastern portion of project site showing archaeological sensitivity on Existing Conditions East survey (HPI and EDC 2013).

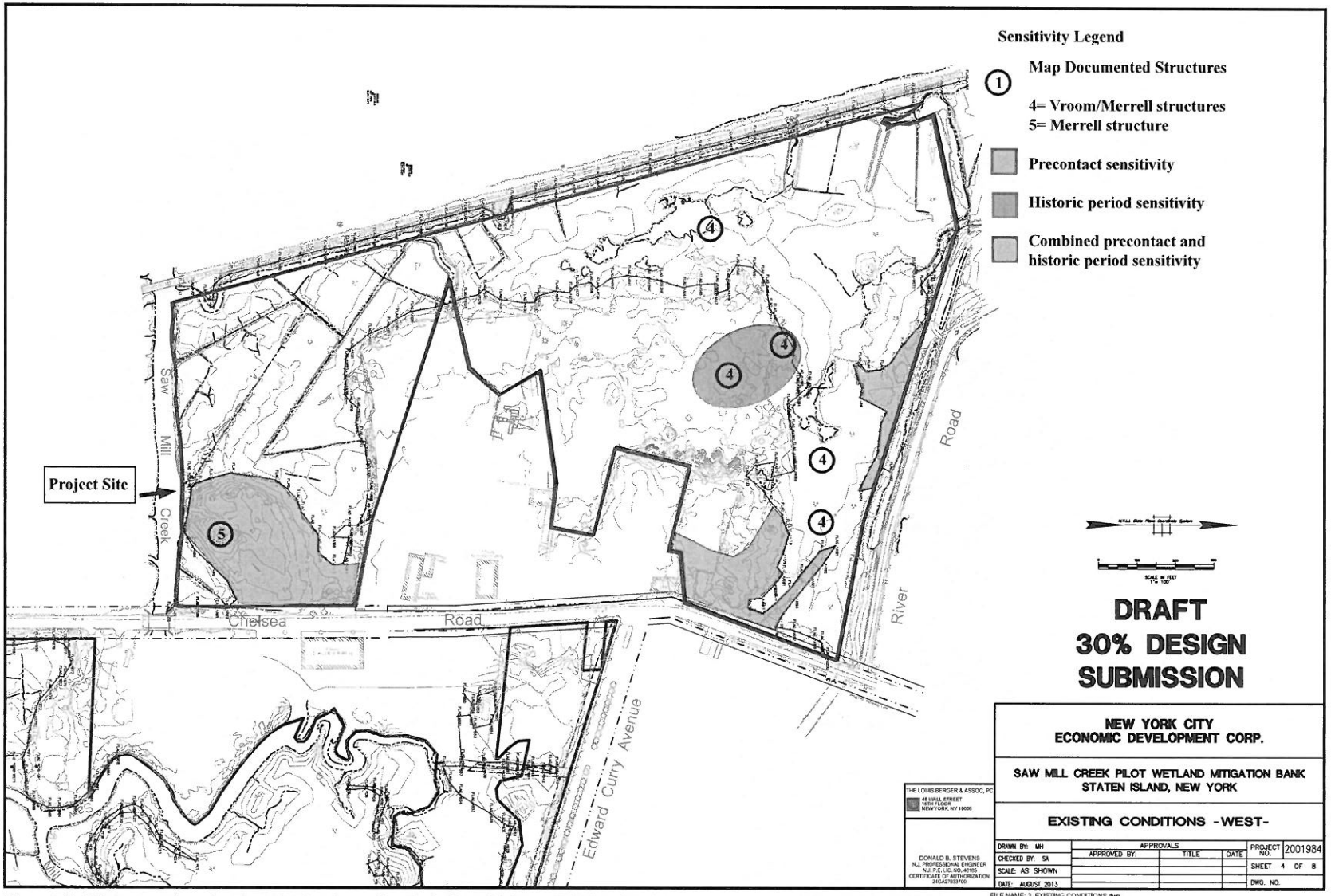


Figure 14b: Western portion of project site showing archaeological sensitivity on Existing Conditions West survey (HPI and EDC 2013).

Photograph 1: Block 1780 showing winding channel of Saw Mill Creek with project site marshlands on Lots 260 and 275 in background. View looking northeast from Chelsea Road.

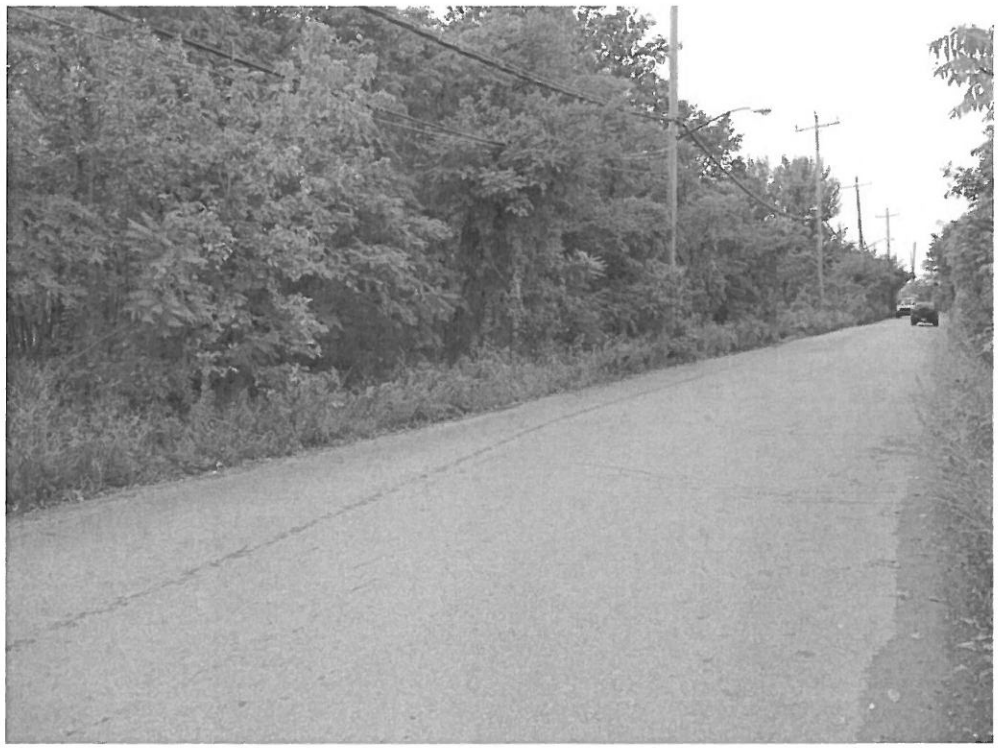
Photograph 2: Block 1780, Lot 1 showing upland area east of Chelsea Road and south of Saw Mill Creek. Area is covered with gravel and weeds and has experienced considerable dumping. View looking east from near Chelsea Road.

Photograph 3: Block 1780, Lot 69 near location of former Decker house. View looking northeast from Chelsea Road.

Photograph 4: Block 1780, Lot 69 showing upland area on south side of Edward Curry Avenue. View looking south.

Photograph 5: Block 1780, Lot 69 showing interior upland area marked by tall trees in background. View looking south from Edward Curry Avenue.

Photograph 6: Block 1780, Lot 1 showing example of marshlands. View looking east with Route 440 in far background.



Photograph 7: Block 1790, Lot 100 on left with Chelsea Road in foreground showing upland area. View looking south.

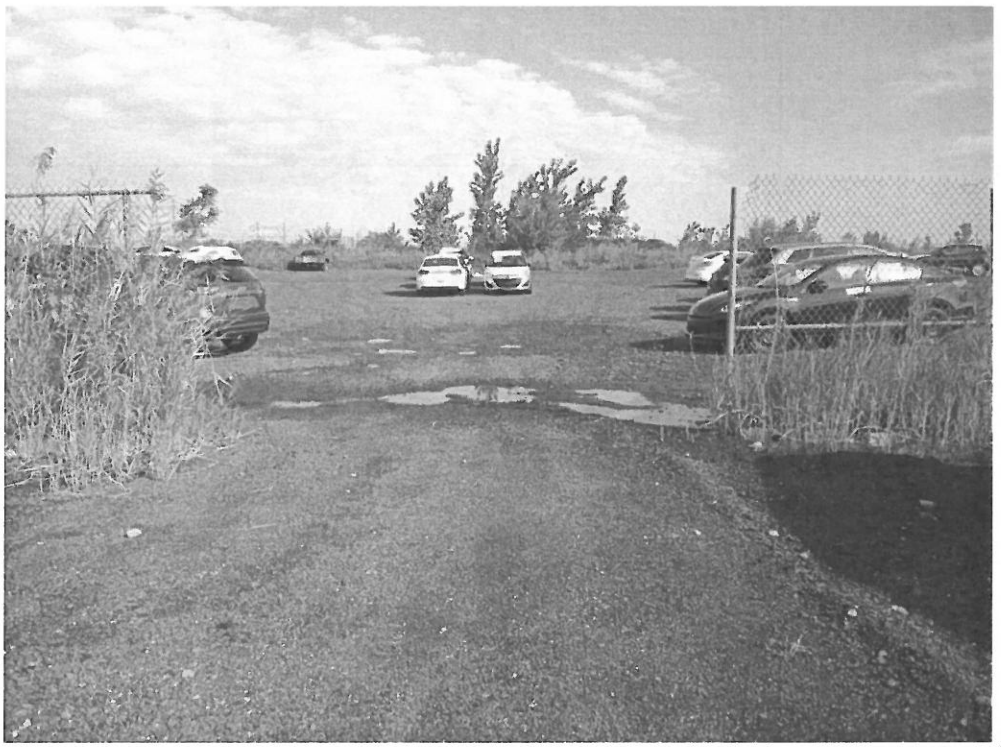
Photograph 8: Block 1790, Lot 100 showing upland area in vicinity of former school building. View looking southeast from Chelsea Road.

Photograph 9: Block 1790, Lot 100 showing marshland. Off ramp to Route 440 is in far background. View looking southeast from Chelsea Road.

Photograph 10: Block 1815, Lot 235 (marshland) and Lot 204 (upland with trees). Saw Mill Creek is on left. View looking northwest from Chelsea Road.

Photograph 11: Block 1815, Lots 150 and 375 showing paved upland area. View looking west from Chelsea Road.

Photograph 12: Block 1815, Lot 85 showing upland area. View looking south from River Road.

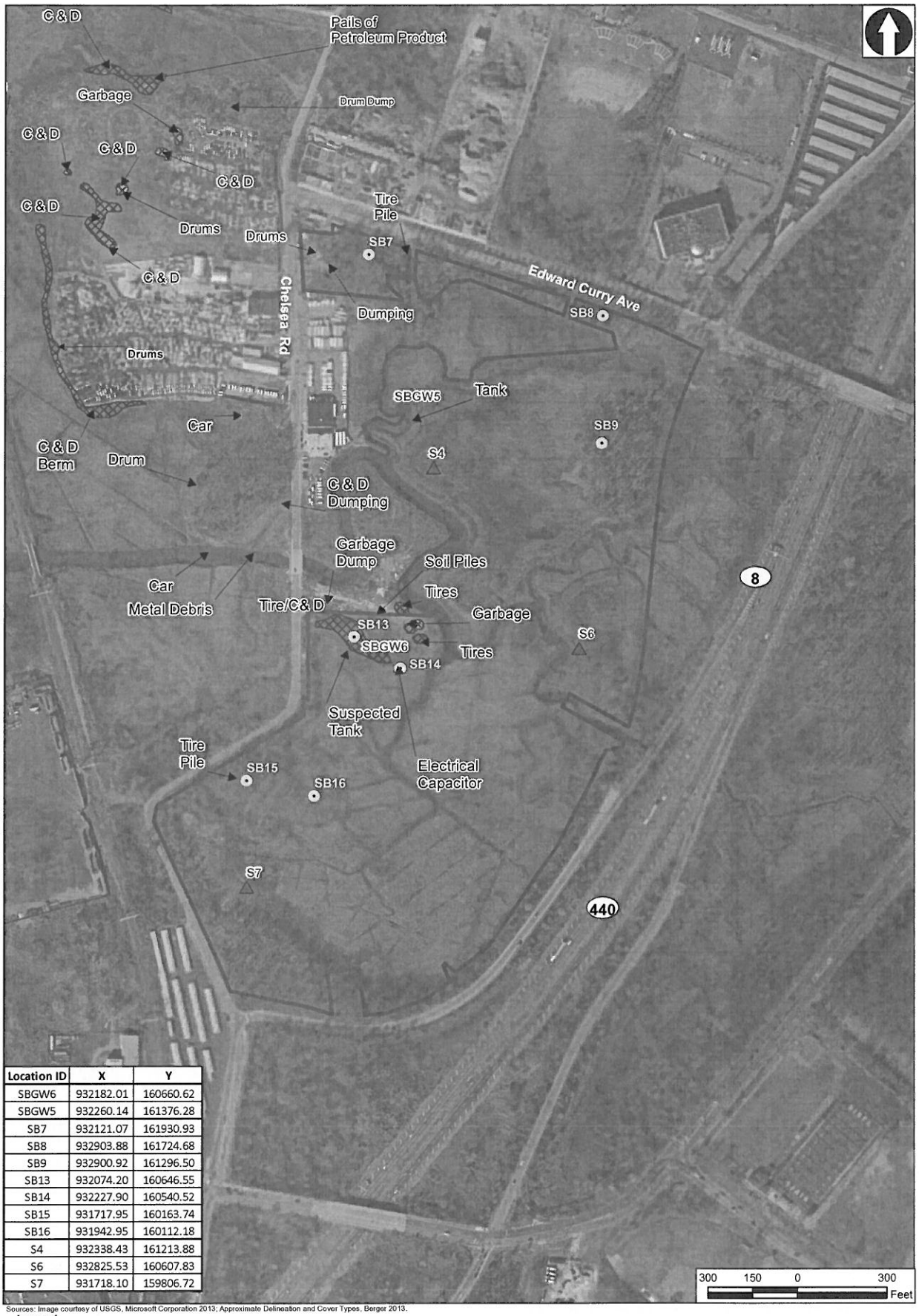


Photograph 13: Block 1815, Lot 300 showing landfilled and paved upland used to store cars. View looking north.

Photograph 14: Block 1815, Lot 300 showing marshlands. Overhead wires on left mark railroad tracks and edge of project site. View looking northwest.

Photograph 15: Block 1815, Lot 251 (foreground) and Lot 235 (background) showing marshlands. View looking south.

APPENDIX A
SOIL BORING DATA



Location ID	X	Y
SBGW6	932182.01	160660.62
SBGW5	932260.14	161376.28
SB7	932121.07	161930.93
SB8	932903.88	161724.68
SB9	932900.92	161296.50
SB13	932074.20	160646.55
SB14	932227.90	160540.52
SB15	931717.95	160163.74
SB16	931942.95	160112.18
S4	932338.43	161213.88
S6	932825.53	160607.83
S7	931718.10	159806.72

Sources: Image courtesy of USGS, Microsoft Corporation 2013; Approximate Delineation and Cover Types, Berger 2013.

Legend

- Eastern Section Boundary
- Remnant Berm
- Approximate Dumping Area
- Soil Boring Location
- Soil Boring/ Groundwater Screening Location
- Sediment Sampling Location

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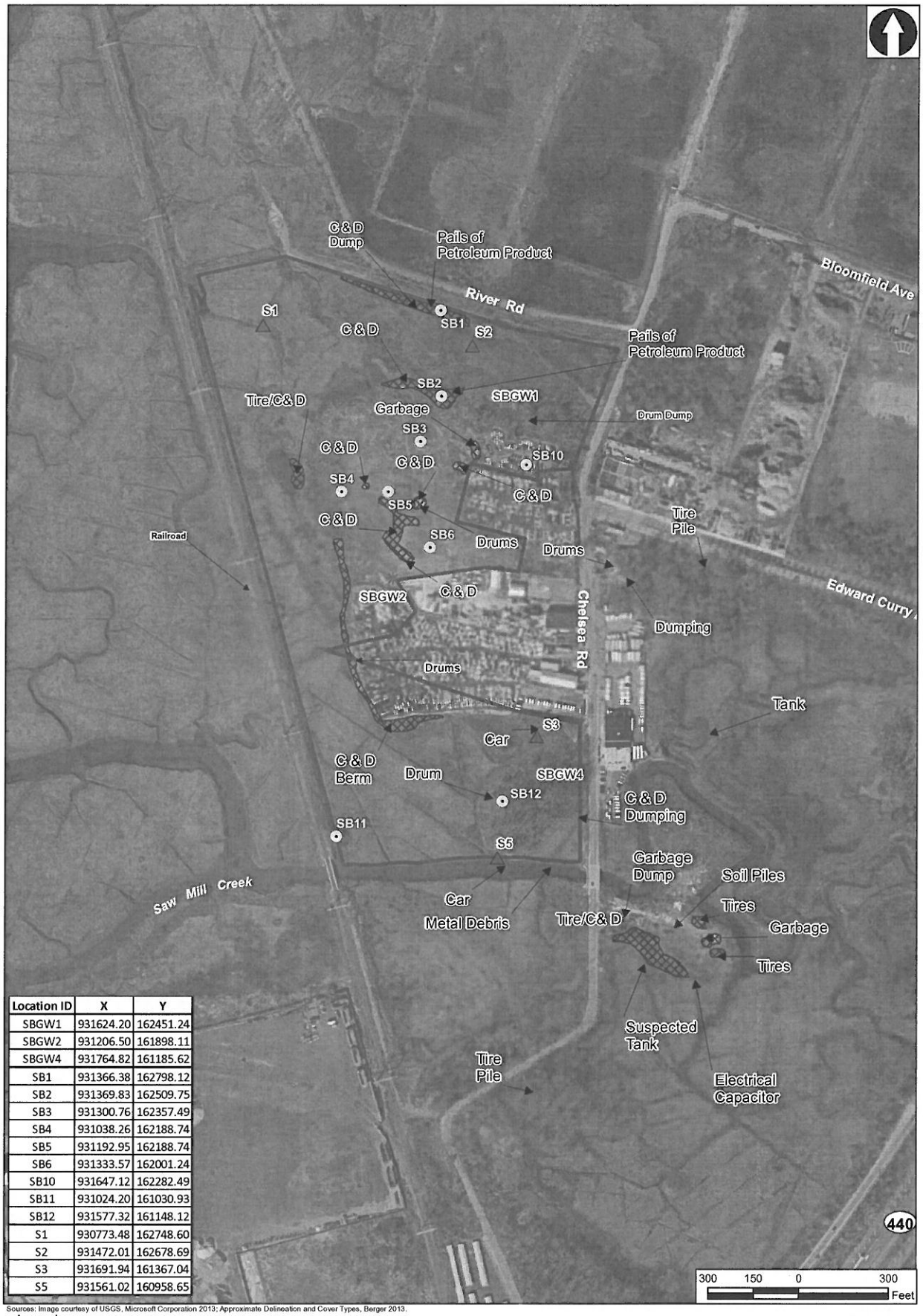
Saw Mill Creek Wetland Mitigation Bank
Staten Island, New York

Boring Location Map - Eastern Section

Louis Berger & Assoc, PC

October 2013

Figure 1A



Location ID	X	Y
SBGW1	931624.20	162451.24
SBGW2	931206.50	161898.11
SBGW4	931764.82	161185.62
SB1	931366.38	162798.12
SB2	931369.83	162509.75
SB3	931300.76	162357.49
SB4	931038.26	162188.74
SB5	931192.95	162188.74
SB6	931333.57	162001.24
SB10	931647.12	162282.49
SB11	931024.20	161030.93
SB12	931577.32	161148.12
S1	930773.48	162748.60
S2	931472.01	162678.69
S3	931691.94	161367.04
S5	931561.02	160958.65

Sources: Image courtesy of USGS, Microsoft Corporation 2013; Approximate Delineation and Cover Types, Berger 2013.

Legend

- Western Section Boundary
- Remnant Berm
- Approximate Dumping Area
- Soil Boring Location
- Soil Boring/ Groundwater Screening Location
- Sediment Sampling Location

NYCEDC
New York City Economic Development Corporation

Saw Mill Creek Wetland Mitigation Bank
Staten Island, New York

Boring Location Map - Western Section

Louis Berger & Assoc, PC

October 2013

Figure 2A

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	**Drilling Log** Page 1 of 1	**BORING NO.:** S1 **WELL NO.:** N/A

CLIENT: New York City Economic and Development Corp.				**PROJECT NO:**	2001984.03
PROJECT: Marshes, Staten Island, New York				**DATE STARTED:**	8/1/2013
DRILLING CONTRACTOR: Louis Berger & Assoc., PC				**DATE FINISHED:**	8/1/2013
DRILLING METHOD: Hand Auger				**DRILLER:**	N/A
BOREHOLE DATA		**WELL DATA**		**INSPECTOR:**	T. Lloyd
Diameter (in):	3	**Completion:**	N/A	**NORTHING (ft):**	N/A
Total Depth (ft):	2.5	**Total Depth (ft):**	N/A	**EASTING (ft):**	N/A
Sampler:	Grab	**Open Hole:**	N/A	**GROUND ELEVATION (ft):**	N/A
Depth to Water (ft):	N/A	**Depth to Water (ft):**	N/A	**TOC ELEVATION (ft):**	N/A
Depth to Rock (ft):	N/A	**Permit No.:**	N/A		

NOTES:

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0 1 2		OL				18.4	Black (N1) organic Clayey SILT, trace fine Sand; saturated.	**Organic Clayey Silt, Sheen and Petrolrum Odor, collected S1B and DUP01 from 2.0 to 2.5 ft bgs.** **End of Boring at 2.5 ft bgs**

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	**Drilling Log** Page 1 of 1	**BORING NO.:** S2 **WELL NO.:** N/A

CLIENT: New York City Economic and Development Corp.				**PROJECT NO:**	2001984.03
PROJECT: Marshes, Staten Island, New York				**DATE STARTED:**	7/31/2013
DRILLING CONTRACTOR: Louis Berger & Assoc., PC				**DATE FINISHED:**	7/31/2013
DRILLING METHOD: Hand Auger				**DRILLER:**	N/A
BOREHOLE DATA		**WELL DATA**		**INSPECTOR:**	T. Lloyd
Diameter (in):	3	**Completion:**	N/A	**NORTHING (ft):**	N/A
Total Depth (ft):	2.5	**Total Depth (ft):**	N/A	**EASTING (ft):**	N/A
Sampler:	Grab	**Open Hole:**	N/A	**GROUND ELEVATION (ft):**	N/A
Depth to Water (ft):	N/A	**Depth to Water (ft):**	N/A	**TOC ELEVATION (ft):**	N/A
Depth to Rock (ft):	N/A	**Permit No.:**	N/A		

NOTES:

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0 1 2		SM				3.4	Black (N1) to dark yellowish brown (10YR4/2) medium to fine SAND and organic Clayey Silt (roots top 6 inches); saturated.	**Clayey Silty Sand, collected S2B from 2.0 to 2.5 ft bgs.** **End of Boring at 2.5 ft bgs**

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	**Drilling Log** Page 1 of 1	**BORING NO.:** S3 **WELL NO.:** N/A

CLIENT: New York City Economic and Development Corp.				**PROJECT NO:**	2001984.03
PROJECT: Marshes, Staten Island, New York				**DATE STARTED:**	7/31/2013
DRILLING CONTRACTOR: Louis Berger & Assoc., PC				**DATE FINISHED:**	7/31/2013
DRILLING METHOD: Hand Auger				**DRILLER:**	N/A
BOREHOLE DATA		**WELL DATA**		**INSPECTOR:**	T. Lloyd
Diameter (in):	3	**Completion:**	N/A	**NORTHING (ft):**	N/A
Total Depth (ft):	2.5	**Total Depth (ft):**	N/A	**EASTING (ft):**	N/A
Sampler:	Grab	**Open Hole:**	N/A	**GROUND ELEVATION (ft):**	N/A
Depth to Water (ft):	N/A	**Depth to Water (ft):**	N/A	**TOC ELEVATION (ft):**	N/A
Depth to Rock (ft):	N/A	**Permit No.:**	N/A		

NOTES:

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0 1 2		SM				< 1	Dark yellowish brown (10YR4/2) medium to fine SAND and organic Silt (roots top 6 inches); saturated.	**Silty Sand, collected S3B from 2.0 to 2.5 ft bgs.** **End of Boring at 2.5 ft bgs**

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	**Drilling Log** Page 1 of 1	**BORING NO.:** S4 **WELL NO.:** N/A

CLIENT: New York City Economic and Development Corp.				**PROJECT NO:**	2001984.03
PROJECT: Marshes, Staten Island, New York				**DATE STARTED:**	8/5/2013
DRILLING CONTRACTOR: Louis Berger & Assoc., PC				**DATE FINISHED:**	8/5/2013
DRILLING METHOD: Hand Auger				**DRILLER:**	N/A
BOREHOLE DATA		**WELL DATA**		**INSPECTOR:**	T. Lloyd
Diameter (in):	3	**Completion:**	N/A	**NORTHING (ft):**	N/A
Total Depth (ft):	2.5	**Total Depth (ft):**	N/A	**EASTING (ft):**	N/A
Sampler:	Grab	**Open Hole:**	N/A	**GROUND ELEVATION (ft):**	N/A
Depth to Water (ft):	N/A	**Depth to Water (ft):**	N/A	**TOC ELEVATION (ft):**	N/A
Depth to Rock (ft):	N/A	**Permit No.:**	N/A		

NOTES:

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0 1 2		CL				< 1	White (N9) to dark yellowish brown (10YR4/2) Silty CLAY, trace fine Sand; saturated.	**Silty Clay, collected sample S4A from 0.0 to 0.5 ft bgs. and collected S4B from 2.0 to 2.5 ft bgs.** **End of Boring at 2.5 ft bgs**

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	**Drilling Log** Page 1 of 1	**BORING NO.:** S5 **WELL NO.:** N/A

CLIENT: New York City Economic and Development Corp.			**PROJECT NO:** 2001984.03
PROJECT: Marshes, Staten Island, New York			**DATE STARTED:** 7/31/2013
DRILLING CONTRACTOR: Louis Berger & Assoc., PC			**DATE FINISHED:** 7/31/2013
DRILLING METHOD: Hand Auger			**DRILLER:** N/A
BOREHOLE DATA	**WELL DATA**		**INSPECTOR:** T. Lloyd
Diameter (in): 3	**Completion:**	N/A	**NORTHING (ft):** N/A
Total Depth (ft): 2.5	**Total Depth (ft):**	N/A	**EASTING (ft):** N/A
Sampler: Grab	**Open Hole:**	N/A	**GROUND ELEVATION (ft):** N/A
Depth to Water (ft): N/A	**Depth to Water (ft):**	N/A	**TOC ELEVATION (ft):** N/A
Depth to Rock (ft): N/A	**Permit No.:**	N/A	

NOTES:

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		SP-SM				< 1	Dark yellowish orange (10YR6/6) coarse to fine SAND, little Silt, trace fine Gravel; saturated.	**Sand, collected sample S5A from 0.0 to 0.5 ft bgs.**
	1								**Collected sample S5B from 2.0 to 2.5 ft bgs.**
	2		SP-SM				< 1	Dark yellowish orange (10YR6/6) to dark yellowish brown (10YR4/2) coarse to fine SAND, little Silt, trace fine Gravel; saturated.	**End of Boring at 2.5 ft bgs**

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	**Drilling Log** Page 1 of 1	**BORING NO.:** S6 **WELL NO.:** N/A

CLIENT: New York City Economic and Development Corp.				**PROJECT NO:**	2001984.03
PROJECT: Marshes, Staten Island, New York				**DATE STARTED:**	8/1/2013
DRILLING CONTRACTOR: Louis Berger & Assoc., PC				**DATE FINISHED:**	8/1/2013
DRILLING METHOD: Hand Auger				**DRILLER:**	N/A
BOREHOLE DATA		**WELL DATA**		**INSPECTOR:**	T. Lloyd
Diameter (in):	3	**Completion:**	N/A	**NORTHING (ft):**	N/A
Total Depth (ft):	2.5	**Total Depth (ft):**	N/A	**EASTING (ft):**	N/A
Sampler:	Grab	**Open Hole:**	N/A	**GROUND ELEVATION (ft):**	N/A
Depth to Water (ft):	N/A	**Depth to Water (ft):**	N/A	**TOC ELEVATION (ft):**	N/A
Depth to Rock (ft):	N/A	**Permit No.:**	N/A		

NOTES:

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0 1 2		OL				< 1	Black (N1) to moderate yellowish brown (10YR5/4) organic Clayey SILT, trace fine Sand (organic, roots); saturated.	**Organic Silt, collected S6A from 0.0 to 0.5 ft bgs. and collected S6B from 2.0 to 2.5 ft bgs.** **End of Boring at 2.5 ft bgs**

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	**Drilling Log** Page 1 of 1	**BORING NO.:** S7 **WELL NO.:** N/A

CLIENT: New York City Economic and Development Corp.				**PROJECT NO:**	2001984.03
PROJECT: Marshes, Staten Island, New York				**DATE STARTED:**	7/31/2013
DRILLING CONTRACTOR: Louis Berger & Assoc., PC				**DATE FINISHED:**	7/31/2013
DRILLING METHOD: Hand Auger				**DRILLER:**	N/A
BOREHOLE DATA		**WELL DATA**		**INSPECTOR:**	T. Lloyd
Diameter (in):	3	**Completion:**	N/A	**NORTHING (ft):**	N/A
Total Depth (ft):	2.5	**Total Depth (ft):**	N/A	**EASTING (ft):**	N/A
Sampler:	Grab	**Open Hole:**	N/A	**GROUND ELEVATION (ft):**	N/A
Depth to Water (ft):	N/A	**Depth to Water (ft):**	N/A	**TOC ELEVATION (ft):**	N/A
Depth to Rock (ft):	N/A	**Permit No.:**	N/A		

NOTES:

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		OL				<1	Black (N1) organic Clayey SILT, trace fine Sand (organic, roots); saturated.	**Organic Clayey Silt, collected sample S7A from 0.0 to 0.5 ft bgs.**
	1								**Collected sample S7B from 2.0 to 2.5 ft bgs**
	2		OL				3.8	Medium gray to dark yellowish orange (10YR6/6) organic Clayey SILT, trace fine Sand (organic, roots); saturated.	**End of Boring at 2.5 ft bgs**

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	**Drilling Log** Page 1 of 1	**BORING NO.:** SB1 **WELL NO.:** N/A

CLIENT: New York City Economic and Development Corp.				**PROJECT NO:**	2001984.03
PROJECT: Marshes, Staten Island, New York				**DATE STARTED:**	7/30/2013
DRILLING CONTRACTOR: Louis Berger & Assoc., PC				**DATE FINISHED:**	7/30/2013
DRILLING METHOD: Hand Auger				**DRILLER:**	N/A
BOREHOLE DATA		**WELL DATA**		**INSPECTOR:**	T. Lloyd
Diameter (in):	3	**Completion:**	N/A	**NORTHING (ft):**	N/A
Total Depth (ft):	0.5	**Total Depth (ft):**	N/A	**EASTING (ft):**	N/A
Sampler:	Grab	**Open Hole:**	N/A	**GROUND ELEVATION (ft):**	N/A
Depth to Water (ft):	N/A	**Depth to Water (ft):**	N/A	**TOC ELEVATION (ft):**	N/A
Depth to Rock (ft):	N/A	**Permit No.:**	N/A		

NOTES:

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		SP				<1	Dark yellowish brown (10YR 4/2) coarse to fine SAND, little Silt, little medium to fine Gravel (fill); moist.	**Sand, collected SB1A from 0.0 to 0.5 ft bgs.** **End of Boring at 0.5 ft bgs.**

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	**Drilling Log** Page 1 of 2	**BORING NO.:** SB2 **WELL NO.:** N/A

CLIENT: New York City Economic and Development Corp.				**PROJECT NO:**	2001984.03
PROJECT: Marshes, Staten Island, New York				**DATE STARTED:**	9/17/2013
DRILLING CONTRACTOR: Zebra Environmental				**DATE FINISHED:**	9/17/2013
DRILLING METHOD: Direct push				**DRILLER:**	L. Cavelleo
BOREHOLE DATA		**WELL DATA**		**INSPECTOR:**	T. Lloyd
Diameter (in):	2	**Completion:**	N/A	**NORTHING (ft):**	N/A
Total Depth (ft):	15.0	**Total Depth (ft):**	N/A	**EASTING (ft):**	N/A
Sampler:	Macrocore	**Open Hole:**	N/A	**GROUND ELEVATION (ft):**	N/A
Depth to Water (ft):	5.5	**Depth to Water (ft):**	N/A	**TOC ELEVATION (ft):**	N/A
Depth to Rock (ft):	N/A	**Permit No.:**	N/A		

NOTES:

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		SP-SM				<1	Dark yellowish brown (10YR4/2) coarse to fine SAND, little fine Gravel, little Silt (30% brick, wood and concrete); moist.	**Sand with fill, collected sample SB2A from 0.0 to 0.5 ft bgs.**
	1								
	2								
	3								
	4								
	5		SP-SM				<1	Dark yellowish brown (10YR4/2) coarse to fine SAND, little fine Gravel, little Silt (30% brick, wood and concrete); saturated.	⧖ **Water Level at 5.5 ft bgs.**
	6								
	7		SP-SM				<1	Dark yellowish orange (10YR6/6) medium to fine SAND, little Clayey Silt; saturated.	**Collected sample SB2B from 6.5 to 7.0 ft bgs., mottled**
	8								

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	PROJECT NO.: 2001984.03	BORING NO.: SB2
	Page 2 of 2	WELL NO.: N/A

Well	Depth	Lith.	USCS	Interval	Rec.	Blows	PID	Description	Remarks
	9 10 11 12 13 14 15		SP-SM				<1	Dark yellowish orange (10YR6/6) to dark yellowish brown (10YR4/2) medium to fine SAND, little Clayey Silt; saturated.	**End of Boring at 15 ft bgs.**

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	**Drilling Log** Page 1 of 2	**BORING NO.:** SB3 **WELL NO.:** N/A

CLIENT: New York City Economic and Development Corp.				**PROJECT NO:**	2001984.03
PROJECT: Marshes, Staten Island, New York				**DATE STARTED:**	9/17/2013
DRILLING CONTRACTOR: Zebra Environmental				**DATE FINISHED:**	9/17/2013
DRILLING METHOD: Direct push				**DRILLER:**	L. Cavelleo
BOREHOLE DATA		**WELL DATA**		**INSPECTOR:**	T. Lloyd
Diameter (in):	2	**Completion:**	N/A	**NORTHING (ft):**	N/A
Total Depth (ft):	15.0	**Total Depth (ft):**	N/A	**EASTING (ft):**	N/A
Sampler:	Macrocore	**Open Hole:**	N/A	**GROUND ELEVATION (ft):**	N/A
Depth to Water (ft):	5.5	**Depth to Water (ft):**	N/A	**TOC ELEVATION (ft):**	N/A
Depth to Rock (ft):	N/A	**Permit No.:**	N/A		

NOTES:

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		SP-SM				<1	Dark yellowish brown (10YR4/2) coarse to fine SAND, little coarse to fine Gravel, little Silt (30% wood and concrete); moist.	**Sand with fill, collected sample SB3A from 0.0 to 0.5 ft bgs.**
	1								
	2								
	3								
	4								
	5		SP-SM				<1	Dark yellowish brown (10YR4/2) coarse to fine SAND, little coarse to fine Gravel, little Silt (30% wood and concrete); saturated.	**Water Level at 5.5 ft bgs.** ▽
	6		SP-SM				<1	Dark yellowish orange (10YR6/6) medium to fine SAND, little Clayey Silt; saturated.	**Collected sample SB3B and DUP02 from 5.5 to 6.0 ft bgs.**
	7								
	8								

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	PROJECT NO.: 2001984.03	BORING NO.: SB3
	Page 2 of 2	WELL NO.: N/A

Well	Depth	Lith.	USCS	Interval	Rec.	Blows	PID	Description	Remarks
	9 10 11 12 13 14 15		SP-SM				<1	Dark yellowish orange (10YR6/6) medium to fine SAND, little Clayey Silt; saturated.	**End of Boring at 15 ft bgs.**

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	**Drilling Log** Page 1 of 2	**BORING NO.:** SB4 **WELL NO.:** N/A

CLIENT: New York City Economic and Development Corp.				**PROJECT NO:**	2001984.03
PROJECT: Marshes, Staten Island, New York				**DATE STARTED:**	9/17/2013
DRILLING CONTRACTOR: Zebra Environmental				**DATE FINISHED:**	9/17/2013
DRILLING METHOD: Direct push				**DRILLER:**	L. Cavelleo
BOREHOLE DATA		**WELL DATA**		**INSPECTOR:**	T. Lloyd
Diameter (in):	2	**Completion:**	N/A	**NORTHING (ft):**	N/A
Total Depth (ft):	10.0	**Total Depth (ft):**	N/A	**EASTING (ft):**	N/A
Sampler:	Macrocore	**Open Hole:**	N/A	**GROUND ELEVATION (ft):**	N/A
Depth to Water (ft):	1	**Depth to Water (ft):**	N/A	**TOC ELEVATION (ft):**	N/A
Depth to Rock (ft):	N/A	**Permit No.:**	N/A		

NOTES:

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		SP-SM				<1	Dark yellowish brown (10YR4/2) coarse to fine SAND, little Silt (30% wood, brick, fiber glass and tile flooring); moist.	**Sand with fill, collected sample SB4A from 0.0 to 0.5 ft bgs.**
	1		SM				<1	Dark yellowish orange (10YR6/6) medium to fine SAND, some Silt; saturated.	**Silty Sand** **Water Level at 1.0 ft bgs.**
	2								
	3								**Collected sample SB4B from 2.5 to 3.0 ft bgs.**
	4								
	5		SM				<1	Dark yellowish orange (10YR6/6) medium to fine SAND, some Silt; saturated.	

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	PROJECT NO.: 2001984.03	BORING NO.: SB4
	Page 2 of 2	WELL NO.: N/A

Well	Depth	Lith.	USCS	Interval	Rec.	Blows	PID	Description	Remarks
	6								
	7								
	8								
	9								End of Boring at 10 ft bgs.
	10								

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	**Drilling Log** Page 1 of 2	**BORING NO.:** SB5 **WELL NO.:** N/A

CLIENT: New York City Economic and Development Corp.				**PROJECT NO:**	2001984.03
PROJECT: Marshes, Staten Island, New York				**DATE STARTED:**	9/17/2013
DRILLING CONTRACTOR: Zebra Environmental				**DATE FINISHED:**	9/17/2013
DRILLING METHOD: Direct push				**DRILLER:**	L. Cavelleo
BOREHOLE DATA		**WELL DATA**		**INSPECTOR:**	T. Lloyd
Diameter (in):	2	**Completion:**	N/A	**NORTHING (ft):**	N/A
Total Depth (ft):	15.0	**Total Depth (ft):**	N/A	**EASTING (ft):**	N/A
Sampler:	Macrocore	**Open Hole:**	N/A	**GROUND ELEVATION (ft):**	N/A
Depth to Water (ft):	5.0	**Depth to Water (ft):**	N/A	**TOC ELEVATION (ft):**	N/A
Depth to Rock (ft):	N/A	**Permit No.:**	N/A		

NOTES:

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		SP-SM				61	Dark yellowish brown (10YR4/2) coarse to fine SAND and coarse to fine Gravel, little Silt (70% schist block, brick and concrete); saturated.	**Gravelly Sand with fill, collected sample SB5A from 4.0 to 4.5 ft bgs.**
	1								
	2								
	3								
	4								
	5		SP-SM				13	Dark yellowish brown (10YR4/2) coarse to fine SAND and coarse to fine Gravel, little Silt (70% schist block, brick and concrete); saturated.	▽ **Water Level at 5.0 ft bgs.**
	6		SM				<1	Dark yellowish orange (10YR6/6) medium to fine SAND, some Silt; saturated.	**Silty Sand, collected sample SB5B from 5.5 to 6.0**

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	PROJECT NO.: 2001984.03	BORING NO.: SB5
	Page 2 of 2	WELL NO.: N/A

Well	Depth	Lith.	USCS	Interval	Rec.	Blows	PID	Description	Remarks
									ft bgs.
	7								
	8								
	9								
	10		SM				<1	Dark yellowish orange (10YR6/6) medium to fine SAND, some Silt; saturated.	
	11								
	12								
	13								
	14								
	15								End of Boring at 15 ft bgs.

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	**Drilling Log** Page 1 of 2	**BORING NO.:** SB6 **WELL NO.:** N/A

CLIENT: New York City Economic and Development Corp.				**PROJECT NO:**	2001984.03
PROJECT: Marshes, Staten Island, New York				**DATE STARTED:**	9/17/2013
DRILLING CONTRACTOR: Zebra Environmental				**DATE FINISHED:**	9/17/2013
DRILLING METHOD: Direct push				**DRILLER:**	L. Cavelleo
BOREHOLE DATA		**WELL DATA**		**INSPECTOR:**	T. Lloyd
Diameter (in):	2	**Completion:**	N/A	**NORTHING (ft):**	N/A
Total Depth (ft):	10.0	**Total Depth (ft):**	N/A	**EASTING (ft):**	N/A
Sampler:	Macrocore	**Open Hole:**	N/A	**GROUND ELEVATION (ft):**	N/A
Depth to Water (ft):	5.2	**Depth to Water (ft):**	N/A	**TOC ELEVATION (ft):**	N/A
Depth to Rock (ft):	N/A	**Permit No.:**	N/A		

NOTES:

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		SP-SM				<1	Black (N1) to white (N9) coarse to fine SAND and coarse to fine Gravel, little Silt (60% brick and concrete); moist.	**Gravelly Sand with fill, collected sample SB6A from 2.0 to 2.5 ft bgs.**
	1								
	2								
	3								
	4								
	5		SP				5.2	Black (N1) to greenish black (5GY2/1) coarse to fine SAND, little fine Gravel (60% wood and concrete); saturated.	**Sand with fill ▽ Water Level at 5.2 ft bgs.**

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	PROJECT NO.: 2001984.03	BORING NO.: SB6
	Page 2 of 2	WELL NO.: N/A

Well	Depth	Lith.	USCS	Interval	Rec.	Blows	PID	Description	Remarks
	6								
	7		ML				<1	Greenish black (5GY2/1) organic Clayey SILT (organic, roots); saturated.	**Organic Clayey Silt, collected sample SB6B from 7.0 to 7.5 ft bgs.**
	8		SP-SM				<1	Greenish black (5GY2/1) medium to fine SAND, little Silt (organic, roots); saturated.	**Sand**
	9								
	10								**End of Boring at 10 ft bgs.**

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	**Drilling Log** Page 1 of 2	**BORING NO.:** SB7 **WELL NO.:** N/A

CLIENT: New York City Economic and Development Corp.			**PROJECT NO:** 2001984.03
PROJECT: Marshes, Staten Island, New York			**DATE STARTED:** 8/5/2013
DRILLING CONTRACTOR: Louis Berger & Assoc., PC			**DATE FINISHED:** 8/5/2013
DRILLING METHOD: Hand Auger			**DRILLER:** N/A
BOREHOLE DATA	**WELL DATA**		**INSPECTOR:** T. Lloyd
Diameter (in): 3	**Completion:**	N/A	**NORTHING (ft):** N/A
Total Depth (ft): 5.5	**Total Depth (ft):**	N/A	**EASTING (ft):** N/A
Sampler: Grab	**Open Hole:**	N/A	**GROUND ELEVATION (ft):** N/A
Depth to Water (ft): 4.0	**Depth to Water (ft):**	N/A	**TOC ELEVATION (ft):** N/A
Depth to Rock (ft): N/A	**Permit No.:**	N/A	

NOTES:

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		ML				<1	Dark yellowish brown (10YR4/2) SILT and medium to fine Sand; Moist.	**Sandy Silt**
	1		SP-SM				<1	Dark yellowish brown (10YR4/2) coarse to fine SAND, little Silt, little fine Gravel (80% brick, concrete, glass, metal and porcelain); saturated.	**Sand with fill, collected sample SB7A from 2.0 to 2.5 ft bgs.**
	2								

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	PROJECT NO.: 2001984.03	BORING NO.: SB7
	Page 2 of 2	WELL NO.: N/A

Well	Depth	Lith.	USCS	Interval	Rec.	Blows	PID	Description	Remarks
	3								
	4								▽ Water Level at 4 ft bgs.
			OL				<1	Dark yellowish brown (10YR4/2) to greenish black (5GY2/1) organic Silty CLAY, trace fine Sand (organic, roots); saturated.	**Organic Silty Clay, collected sample SB7B from 4.5 to 5.0 ft bgs.**
	5								**End of Boring at 5.0 ft bgs.**

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	**Drilling Log** Page 1 of 2	**BORING NO.:** SB8 **WELL NO.:** N/A

CLIENT: New York City Economic and Development Corp.				**PROJECT NO:**	2001984.03
PROJECT: Marshes, Staten Island, New York				**DATE STARTED:**	8/5/2013
DRILLING CONTRACTOR: Louis Berger & Assoc., PC				**DATE FINISHED:**	8/5/2013
DRILLING METHOD: Hand Auger				**DRILLER:**	N/A
BOREHOLE DATA		**WELL DATA**		**INSPECTOR:**	T. Lloyd
Diameter (in):	3	**Completion:**	N/A	**NORTHING (ft):**	N/A
Total Depth (ft):	5.5	**Total Depth (ft):**	N/A	**EASTING (ft):**	N/A
Sampler:	Grab	**Open Hole:**	N/A	**GROUND ELEVATION (ft):**	N/A
Depth to Water (ft):	4.5	**Depth to Water (ft):**	N/A	**TOC ELEVATION (ft):**	N/A
Depth to Rock (ft):	N/A	**Permit No.:**	N/A		

NOTES:

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0 1 2		SP-SM				<1	White to black (N9-N1), dark yellowish brown (10YR4/2) coarse to fine SAND, little coarse to fine Gravel, little Silt (90% wood, brick, fabric, coal, glass and metal); moist.	**Sand with fill, collected sample SB8A from 2.0 to 2.5 ft bgs.**

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	PROJECT NO.: 2001984.03	BORING NO.: SB8
	Page 2 of 2	WELL NO.: N/A

Well	Depth	Lith.	USCS	Interval	Rec.	Blows	PID	Description	Remarks
	3								
	4								⧖ Water Level at 4.5 ft bgs
	5		OL				<1	Dark yellowish brown (10YR4/2) to greenish black (5GY2/1) organic Silty CLAY, trace fine Sand (organic, roots); saturated.	**Organic Silty Clay, collected sample SB8 from 5.0 to 5.5 ft bgs.** **End of Boring at 5.5 ft bgs**

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	**Drilling Log** Page 1 of 1	**BORING NO.:** SB9 **WELL NO.:** N/A

CLIENT: New York City Economic and Development Corp.			**PROJECT NO:** 2001984.03
PROJECT: Marshes, Staten Island, New York			**DATE STARTED:** 8/5/2013
DRILLING CONTRACTOR: Louis Berger & Assoc., PC			**DATE FINISHED:** 8/5/2013
DRILLING METHOD: Hand Auger			**DRILLER:** N/A
BOREHOLE DATA	**WELL DATA**		**INSPECTOR:** T. Lloyd
Diameter (in): 3	**Completion:** N/A		**NORTHING (ft):** N/A
Total Depth (ft): 2.5	**Total Depth (ft):** N/A		**EASTING (ft):** N/A
Sampler: Grab	**Open Hole:** N/A		**GROUND ELEVATION (ft):** N/A
Depth to Water (ft): N/A	**Depth to Water (ft):** N/A		**TOC ELEVATION (ft):** N/A
Depth to Rock (ft): N/A	**Permit No.:** N/A		

NOTES:

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		SP-SM				<1	Dark yellowish brown (10YR4/2) medium to fine SAND, little Silt (few roots); moist.	**Sand, collected sample SB9A from 0.0 to 0.5 ft bgs.**
	1								**End of Boring at 2.5 ft bgs.**
	2		OL				<1	White (N9) to greenish black (5GY2/1) organic Silty CLAY, trace fine Sand (organic, roots); wet.	**Organic Silty Clay,collected sample SB9B from 2.0 to 2.5 ft bgs.**

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	**Drilling Log** Page 1 of 2	**BORING NO.:** SB10 **WELL NO.:** N/A

CLIENT: New York City Economic and Development Corp.				**PROJECT NO:**	2001984.03
PROJECT: Marshes, Staten Island, New York				**DATE STARTED:**	9/17/2013
DRILLING CONTRACTOR: Zebra Environmental				**DATE FINISHED:**	9/17/2013
DRILLING METHOD: Direct push				**DRILLER:**	L. Cavelleo
BOREHOLE DATA		**WELL DATA**		**INSPECTOR:**	T. Lloyd
Diameter (in):	2	**Completion:**	N/A	**NORTHING (ft):**	N/A
Total Depth (ft):	10.0	**Total Depth (ft):**	N/A	**EASTING (ft):**	N/A
Sampler:	Macrocore	**Open Hole:**	N/A	**GROUND ELEVATION (ft):**	N/A
Depth to Water (ft):	5.0	**Depth to Water (ft):**	N/A	**TOC ELEVATION (ft):**	N/A
Depth to Rock (ft):	N/A	**Permit No.:**	N/A		

NOTES:

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		SP-SM				<1	Dark yellowish brown (10YR4/2) coarse to fine SAND, little coarse to fine Gravel, little Silt (40% brick, wood and concrete); moist.	**Sand, collected sample SB10A from 1.5 to 2.0 ft bgs.**
	1								
	2								
	3								
	4								**Water Level at 5.0 ft bgs.** ▽
	5		SM				<1	Dark yellowish brown (10YR4/2) to dark yellowish orange (10YR6/6) medium to fine SAND, some Silt; saturated.	**Silty Sand, collected sample SB10B from 5.0 to 5.5 ft bgs.**
	6								

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	PROJECT NO.: 2001984.03	BORING NO.: SB10
	Page 2 of 2	WELL NO.: N/A

Well	Depth	Lith.	USCS	Interval	Rec.	Blows	PID	Description	Remarks
	7 8 9 10								End of Boring at 10 ft bgs.

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	**Drilling Log** Page 1 of 1	**BORING NO.:** SB11 **WELL NO.:** N/A

CLIENT: New York City Economic and Development Corp.				**PROJECT NO:**	2001984.03
PROJECT: Marshes, Staten Island, New York				**DATE STARTED:**	7/31/2013
DRILLING CONTRACTOR: Louis Berger & Assoc., PC				**DATE FINISHED:**	7/31/2013
DRILLING METHOD: Hand Auger				**DRILLER:**	N/A
BOREHOLE DATA		**WELL DATA**		**INSPECTOR:**	T. Lloyd
Diameter (in):	3	**Completion:**	N/A	**NORTHING (ft):**	N/A
Total Depth (ft):	3.5	**Total Depth (ft):**	N/A	**EASTING (ft):**	N/A
Sampler:	Grab	**Open Hole:**	N/A	**GROUND ELEVATION (ft):**	N/A
Depth to Water (ft):	N/A	**Depth to Water (ft):**	N/A	**TOC ELEVATION (ft):**	N/A
Depth to Rock (ft):	N/A	**Permit No.:**	N/A		

NOTES:

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		SP-SM				<1	Dark yellowish brown (10YR4/2) coarse to fine SAND, little Silt, little coarse to fine Gravel (30% metal and glass); saturated.	**Sand with fill, collected sample SB11A from 0.0 to 0.5 ft bgs.**
	1								
	2								**Organic Clayey SILT, collected sample SB11B from 3.0 to 3.5 ft bgs.**
	3		OL				<1	Black (N1) organic Clayey SILT, trace fine Sand (organic, roots); saturated.	**End of Boring at 3.5 ft bgs.**

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	**Drilling Log** Page 1 of 1	**BORING NO.:** SB12 **WELL NO.:** N/A

CLIENT: New York City Economic and Development Corp.				**PROJECT NO:**	2001984.03
PROJECT: Marshes, Staten Island, New York				**DATE STARTED:**	8/1/2013
DRILLING CONTRACTOR: Louis Berger & Assoc., PC				**DATE FINISHED:**	8/1/2013
DRILLING METHOD: Hand Auger				**DRILLER:**	N/A
BOREHOLE DATA		**WELL DATA**		**INSPECTOR:**	T. Lloyd
Diameter (in):	3	**Completion:**	N/A	**NORTHING (ft):**	N/A
Total Depth (ft):	7.5	**Total Depth (ft):**	N/A	**EASTING (ft):**	N/A
Sampler:	Grab	**Open Hole:**	N/A	**GROUND ELEVATION (ft):**	N/A
Depth to Water (ft):	6	**Depth to Water (ft):**	N/A	**TOC ELEVATION (ft):**	N/A
Depth to Rock (ft):	N/A	**Permit No.:**	N/A		

NOTES:

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0 1 2 3 4 5 6 7		SP-SM				< 1	Dark yellowish brown (10YR4/2) medium to fine SAND, little Silt (organic, roots); saturated.	**Silty Sand, collected SB12A from 0.0 to 0.5 ft bgs. and collected SB12B from 7.0 to 7.5 ft bgs.** ▽ **Water Level at 6 ft bgs.** **End of Boring at 7.5 ft bgs.**

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	**Drilling Log** Page 1 of 1	**BORING NO.:** SB13 **WELL NO.:** N/A

CLIENT: New York City Economic and Development Corp.				**PROJECT NO:**	2001984.03
PROJECT: Marshes, Staten Island, New York				**DATE STARTED:**	8/26/2013
DRILLING CONTRACTOR: Louis Berger & Assoc., PC				**DATE FINISHED:**	8/26/2013
DRILLING METHOD: Hand Auger				**DRILLER:**	N/A
BOREHOLE DATA		**WELL DATA**		**INSPECTOR:**	T. Lloyd
Diameter (in):	3	**Completion:**	N/A	**NORTHING (ft):**	N/A
Total Depth (ft):	2.5	**Total Depth (ft):**	N/A	**EASTING (ft):**	N/A
Sampler:	Grab	**Open Hole:**	N/A	**GROUND ELEVATION (ft):**	N/A
Depth to Water (ft):	N/A	**Depth to Water (ft):**	N/A	**TOC ELEVATION (ft):**	N/A
Depth to Rock (ft):	N/A	**Permit No.:**	N/A		

NOTES:

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		SP-SM				< 1	Moderate yellowish brown (10YR5/4) coarse to fine SAND, little Silt, little fine Gravel (60% metal, cloth, brick and concrete); moist.	**Sand with fill, collected sample SB13A from 0.0 to 0.5 ft bgs.**
	1		OL				< 1	Dark yellowish brown (10YR4/2) to greenish black (5GY2/1) organic Clayey SILT (organic, roots); saturated.	**Organic Silt, collected sample SB13B from 1.5 to 2.0 ft bgs.** **End of Boring at 2.0 ft bgs.**
	2								

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	**Drilling Log** Page 1 of 1	**BORING NO.:** SB14 **WELL NO.:** N/A

CLIENT: New York City Economic and Development Corp.				**PROJECT NO:**	2001984.03
PROJECT: Marshes, Staten Island, New York				**DATE STARTED:**	8/26/2013
DRILLING CONTRACTOR: Louis Berger & Assoc., PC				**DATE FINISHED:**	8/26/2013
DRILLING METHOD: Hand Auger				**DRILLER:**	N/A
BOREHOLE DATA		**WELL DATA**		**INSPECTOR:**	T. Lloyd
Diameter (in):	3	**Completion:**	N/A	**NORTHING (ft):**	N/A
Total Depth (ft):	2.5	**Total Depth (ft):**	N/A	**EASTING (ft):**	N/A
Sampler:	Grab	**Open Hole:**	N/A	**GROUND ELEVATION (ft):**	N/A
Depth to Water (ft):	0.5	**Depth to Water (ft):**	N/A	**TOC ELEVATION (ft):**	N/A
Depth to Rock (ft):	N/A	**Permit No.:**	N/A		

NOTES:

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0 1 2		OL				1	Dark yellowish brown (10YR4/2) to greenish black (5GY2/1) organic Clayey SILT (organic, roots); saturated.	**Organic Silt, collected Sample SB14A from 0.0 to 0.5 ft bgs. and collected sample SB14B from 2.0 to 2.5 ft bgs. Water Level at 0.5 ft bgs.** **End of Boring at 2.5 ft bgs.**

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	**Drilling Log** Page 1 of 1	**BORING NO.:** SB15 **WELL NO.:** N/A

CLIENT: New York City Economic and Development Corp.				**PROJECT NO:**	2001984.03
PROJECT: Marshes, Staten Island, New York				**DATE STARTED:**	8/26/2013
DRILLING CONTRACTOR: Louis Berger & Assoc., PC				**DATE FINISHED:**	8/26/2013
DRILLING METHOD: Hand Auger				**DRILLER:**	N/A
BOREHOLE DATA		**WELL DATA**		**INSPECTOR:**	T. Lloyd
Diameter (in):	3	**Completion:**	N/A	**NORTHING (ft):**	N/A
Total Depth (ft):	8.0	**Total Depth (ft):**	N/A	**EASTING (ft):**	N/A
Sampler:	Grab	**Open Hole:**	N/A	**GROUND ELEVATION (ft):**	N/A
Depth to Water (ft):	4.5	**Depth to Water (ft):**	N/A	**TOC ELEVATION (ft):**	N/A
Depth to Rock (ft):	N/A	**Permit No.:**	N/A		

NOTES:

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0 1 2 3 4 5 6 7 8		SP-SM				<1	Dark yellowish orange (10YR6/6) coarse to fine SAND, little Silt; saturated.	**Sand, collected sample SB15A from 1.0 to 1.5 ft bgs. and collected sample SB15B from 7.5 to 8.0 ft bgs.** **Water Level at 4.5 ft bgs.** **End of Boring at 8.0 ft bgs.**

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	**Drilling Log** Page 1 of 1	**BORING NO.:** SB16 **WELL NO.:** N/A

CLIENT: New York City Economic and Development Corp.			**PROJECT NO:** 2001984.03
PROJECT: Marshes, Staten Island, New York			**DATE STARTED:** 8/26/2013
DRILLING CONTRACTOR: Louis Berger & Assoc., PC			**DATE FINISHED:** 8/26/2013
DRILLING METHOD: Hand Auger			**DRILLER:** N/A
BOREHOLE DATA	**WELL DATA**		**INSPECTOR:** T. Lloyd
Diameter (in): 3	**Completion:** N/A		**NORTHING (ft):** N/A
Total Depth (ft): 7.5	**Total Depth (ft):** N/A		**EASTING (ft):** N/A
Sampler: Grab	**Open Hole:** N/A		**GROUND ELEVATION (ft):** N/A
Depth to Water (ft): 2.5	**Depth to Water (ft):** N/A		**TOC ELEVATION (ft):** N/A
Depth to Rock (ft): N/A	**Permit No.:** N/A		

NOTES:

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		SP-SM				<1	Dark yellowish orange (10YR6/6) coarse to fine SAND, little Silt; saturated.	**Sand, collected sample SB16A from 0.0 to 0.5 ft bgs.**
	1								
	2								**Water Level at 2.5 ft bgs.**
	3								
	4								
	5								**Collected sample SB16B from 7.0 to 7.5 ft bgs.**
	6								**End of Boring at 7.5 ft bgs.**
	7		CL				1	Dark yellowish orange (10YR6/6) to medium gray (N5) Silty CLAY, little fine Sand (mottled); saturated.	**Silty Clay**

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	**Drilling Log** Page 1 of 2	**BORING NO.:** SBGW1 **WELL NO.:** N/A

CLIENT: New York City Economic and Development Corp.				**PROJECT NO:**	2001984.03
PROJECT: Marshes, Staten Island, New York				**DATE STARTED:**	9/17/2013
DRILLING CONTRACTOR: Zebra Environmental				**DATE FINISHED:**	9/17/2013
DRILLING METHOD: Hand Auger				**DRILLER:**	L. Cavelleo
BOREHOLE DATA		**WELL DATA**		**INSPECTOR:**	T. Lloyd
Diameter (in):	3	**Completion:**	N/A	**NORTHING (ft):**	N/A
Total Depth (ft):	4.5	**Total Depth (ft):**	N/A	**EASTING (ft):**	N/A
Sampler:	Grab	**Open Hole:**	N/A	**GROUND ELEVATION (ft):**	N/A
Depth to Water (ft):	N/A	**Depth to Water (ft):**	N/A	**TOC ELEVATION (ft):**	N/A
Depth to Rock (ft):	N/A	**Permit No.:**	N/A		

NOTES:

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		SM				<1	Dark yellowish brown (10YR4/2) medium to fine SAND and Silt; moist.	**Silty Sand**
	1		SP-SM				<1	Dusky yellowish brown (10YR2/2) medium to fine SAND, little Silt (60% plastic, metal, glass and rope); moist.	**Sand, collected sample SBGW1A from 0.0 to 0.5 ft bgs.**
	2								

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	PROJECT NO.: 2001984.03	BORING NO.: SBGW1
	Page 2 of 2	WELL NO.: N/A

Well	Depth	Lith.	USCS	Interval	Rec.	Blows	PID	Description	Remarks
	3								**End of Boring at 4.5 ft bgs.**
	4		SM				<1	Dark yellowish brown (10YR4/2) to dark yellowish orange (10YR6/6) medium to fine SAND, some Silt; wet.	**Silty Sand, collected sample SBGW1B from 4.0 to 4.5 ft bgs.**

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	**Drilling Log** Page 1 of 4	**BORING NO.:** SBGW2 **WELL NO.:** N/A

CLIENT: New York City Economic and Development Corp.				**PROJECT NO:**	2001984.03
PROJECT: Marshes, Staten Island, New York				**DATE STARTED:**	9/17/2013
DRILLING CONTRACTOR: Zebra Environmental				**DATE FINISHED:**	9/17/2013
DRILLING METHOD: Direct push				**DRILLER:**	L. Cavelleo
BOREHOLE DATA		**WELL DATA**		**INSPECTOR:**	T. Lloyd
Diameter (in):	2	**Completion:**	N/A	**NORTHING (ft):**	N/A
Total Depth (ft):	15.0	**Total Depth (ft):**	N/A	**EASTING (ft):**	N/A
Sampler:	Macrocore	**Open Hole:**	N/A	**GROUND ELEVATION (ft):**	N/A
Depth to Water (ft):	4.52	**Depth to Water (ft):**	N/A	**TOC ELEVATION (ft):**	N/A
Depth to Rock (ft):	N/A	**Permit No.:**	N/A		

NOTES: Collected groundwater sample from TWP at a total depth of 10 feet bgs.

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0 1 2 3		SP-SM				41.6	Dark yellowish brown (10YR4/2) coarse to fine SAND, little fine Gravel, little Silt (60% brick, wood, metal, plywood and concrete); moist .	**Sand with fill, collected sample SBGW2A from 3.5 to 4.0 ft bgs.**

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	PROJECT NO.: 2001984.03	BORING NO.: SBGW2
	Page 2 of 4	WELL NO.: N/A

Well	Depth	Lith.	USCS	Interval	Rec.	Blows	PID	Description	Remarks
	4								▽ Water Level at 4.52 ft bgs.
	5		SP-SM				4.1	Dark yellowish brown (10YR4/2) coarse to fine SAND, little fine Gravel, little Silt (60% brick, wood, metal, plywood and concrete); saturated.	
	6								
	7								
			OL				<1	Greenish black (5GY2/1) organic Clayey SILT (organic, roots); saturated.	**Organic Clayey Silt**
	8		SP-SM				<1	Greenish black (5GY2/1) to dark yellowish orange (10YR6/6) medium to fine SAND, little Clayey Silt; saturated.	**Sand, collected sample SBGW2B form 7.3 to 7.8 ft bgs., mottled**

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	PROJECT NO.: 2001984.03	BORING NO.: SBGW2
	Page 3 of 4	WELL NO.: N/A

Well	Depth	Lith.	USCS	Interval	Rec.	Blows	PID	Description	Remarks
	9								
	10		SP-SM				<1	Dark yellowish orange (10YR6/6) medium to fine SAND, little Clayey Silt; saturated.	**Mottled**
	11								
	12								
	13								
	14								

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	PROJECT NO.: 2001984.03	BORING NO.: SBGW2
	Page 4 of 4	WELL NO.: N/A

Well	Depth	Lith.	USCS	Interval	Rec.	Blows	PID	Description	Remarks
	15								**End of Boring at 15 ft bgs.**

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	**Drilling Log** Page 1 of 2	**BORING NO.:** SBGW4 **WELL NO.:** N/A

CLIENT: New York City Economic and Development Corp.				**PROJECT NO:**	2001984.03
PROJECT: Marshes, Staten Island, New York				**DATE STARTED:**	8/2/2013
DRILLING CONTRACTOR: Louis Berger & Assoc., PC				**DATE FINISHED:**	8/2/2013
DRILLING METHOD: Hand Auger				**DRILLER:**	N/A
BOREHOLE DATA		**WELL DATA**		**INSPECTOR:**	T. Lloyd
Diameter (in):	3	**Completion:**	N/A	**NORTHING (ft):**	N/A
Total Depth (ft):	8.5	**Total Depth (ft):**	N/A	**EASTING (ft):**	N/A
Sampler:	Grab	**Open Hole:**	N/A	**GROUND ELEVATION (ft):**	N/A
Depth to Water (ft):	5.1	**Depth to Water (ft):**	N/A	**TOC ELEVATION (ft):**	N/A
Depth to Rock (ft):	N/A	**Permit No.:**	N/A		

NOTES: Collected groundwater sample from TWP at a total depth of 8.5 feet bgs.

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		ML				< 1	Dark yellowish brown (10YR4/2) SILT and medium to fine Sand; Moist.	**Silt**
	1		SP-SM				< 1	Dark yellowish orange (10YR6/6) medium to fine SAND, little Silt; saturated.	**Silty Sand, , collected sample SBGW4A from 0.0 to 0.5 ft bgs. and sample SBGW4B from 8.0 to 8.5 ft bgs.**
	2								
	3								

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	PROJECT NO.: 2001984.03	BORING NO.: SBGW4
	Page 2 of 2	WELL NO.: N/A

Well	Depth	Lith.	USCS	Interval	Rec.	Blows	PID	Description	Remarks
	4								
	5								▽ Water Level at 5.1 ft bgs
	6								
	7								
	8								End of Boring at 8 ft bgs

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	**Drilling Log** Page 1 of 1	**BORING NO.:** SBGW5 **WELL NO.:** N/A

CLIENT: New York City Economic and Development Corp.				**PROJECT NO:**	2001984.03
PROJECT: Marshes, Staten Island, New York				**DATE STARTED:**	8/2/2013
DRILLING CONTRACTOR: Louis Berger & Assoc., PC				**DATE FINISHED:**	8/2/2013
DRILLING METHOD: Hand Auger				**DRILLER:**	N/A
BOREHOLE DATA		**WELL DATA**		**INSPECTOR:**	T. Lloyd
Diameter (in):	3	**Completion:**	N/A	**NORTHING (ft):**	N/A
Total Depth (ft):	2.5	**Total Depth (ft):**	N/A	**EASTING (ft):**	N/A
Sampler:	Grab	**Open Hole:**	N/A	**GROUND ELEVATION (ft):**	N/A
Depth to Water (ft):	1	**Depth to Water (ft):**	N/A	**TOC ELEVATION (ft):**	N/A
Depth to Rock (ft):	N/A	**Permit No.:**	N/A		

NOTES: Collected groundwater sample from TWP at total depth of 2.5 feet bgs.

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		OL				< 1	Black (N1) organic Clayey SILT, little fine Sand (organic, roots); saturated.	**Organic Silt, collected SBGW5A from 0.0 to 0.5 ft bgs. and colected SBGW5B from 2.0 to 2.5 ft bgs.**
	1								**Water Level at 1 ft bgs.**
	2								**End of Boring at 2.5 ft bgs.**

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	**Drilling Log** Page 1 of 2	**BORING NO.:** SBGW6 **WELL NO.:** N/A

CLIENT: New York City Economic and Development Corp.				**PROJECT NO:**	2001984.03
PROJECT: Marshes, Staten Island, New York				**DATE STARTED:**	9/17/2013
DRILLING CONTRACTOR: Zebra Environmental				**DATE FINISHED:**	9/17/2013
DRILLING METHOD: Direct push				**DRILLER:**	L. Cavelleo
BOREHOLE DATA		**WELL DATA**		**INSPECTOR:**	T. Lloyd
Diameter (in):	2	**Completion:**	N/A	**NORTHING (ft):**	N/A
Total Depth (ft):	10.0	**Total Depth (ft):**	N/A	**EASTING (ft):**	N/A
Sampler:	Macrocore	**Open Hole:**	N/A	**GROUND ELEVATION (ft):**	N/A
Depth to Water (ft):	3.2	**Depth to Water (ft):**	N/A	**TOC ELEVATION (ft):**	N/A
Depth to Rock (ft):	N/A	**Permit No.:**	N/A		

NOTES: Collected groundwater sample from TWP at a total depth of 10 feet bgs

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		SP				14.5	Moderate yellowish brown (10YR5/4) coarse to fine SAND, little medim to fine Gravel (40% brick, wood, concrete); moist.	**Sand with fill, collected sample SBGW6A from 1.5 to 2.0 ft bgs.**
	1								
	2								
	3		ML				<1	Black (N1) Clayey SILT (20% wood); saturated.	**Clayey Silt with fill** **Water Level at 3.2 ft bgs.**
	4								
	5		OL				8.6	Greenish black (5GY2/1) organic Clayey SILT (organic, roots); saturated.	**Collected sample SBGW6B from 5.0 to 5.5 ft bgs.**
	6								
	7								

Louis Berger & Assoc., PC 48 Wall St. 16th Floor New York, NY 10005	PROJECT NO.: 2001984.03	BORING NO.: SBGW6
	Page 2 of 2	WELL NO.: N/A

Well	Depth	Lith.	USCS	Interval	Rec.	Blows	PID	Description	Remarks
	8		SP-SM				<1	Dark yellowish brown (10YR4/2) medium to fine SAND, little Silt; saturated.	**Sand**
	9								**End of Boring at 10 ft bgs.**
	10								

APPENDIX B
LOT OWNERSHIP INFORMATION

The Mitigation and Restoration Strategies for Habitat and Ecological Sustainability (MARSHES) Initiative

Saw Mill Creek Pilot Wetland Mitigation Bank
Staten Island, New York

PROSPECTUS

Submitted to:
The Interagency Review Team (IRT)
U.S. Army Corps of Engineers, Chair
New York, New York
Application Number NAN-2013-00259-EHA

Submitted by:
New York City Economic Development Corporation
New York, New York

NYCEDC
New York City Economic Development Corporation

Prepared by:
Louis Berger & Assoc, PC
New York, New York
In association with
Mogensen Mitigation, Inc.

October 2013

Excerpt, pages 5-6

V. A. OWNERSHIP

The NYCEDC on behalf of the City of New York has the right to establish a wetland mitigation bank on the subject property (see Exhibit A, Bank Location Map) and to act as the Sponsor. The Sponsor has developed a conceptual plan to preserve and restore wetland habitat and a small portion of upland habitat on a portion of this property. Title to the property is held by New York City and will remain in New York City's name after the Bank is established. The project area is comprised of 20 parcels as summarized in Table 1 and consists mainly of undeveloped tidal marsh and upland areas with some areas of fill and development from adjoining parcels. The parcels are owned by the City of New York and managed by either the NYC Department of Parks and Recreation, NYC Transit (through a Master Leaser) or NYCEDC, on behalf of the Department of Small Business Services. The exact acreage of these parcels, as well as the location of any existing easements, is currently being surveyed by a NY state-licensed surveyor.

Table 1. Project Area Parcel Summary

Block	Lots
1780	1, 69, 210, 260, 275, and 300
1790	100
1815	74, 75, 85, 125, 135, 150, 204, 220, 235, 251, 300, 325, and 375

Owner Contact Information: City of New York, City Hall, 250 Broadway, New York, NY 10007; Phone: 212-788-3000; Fax: (212) 618-8898; e-mail: KAxt@nycedc.com

Sponsor Contact Information: New York City Economic Development Corporation, Attn: Katie Axt; 110 William Street, New York, NY 10037; Phone: 212-312-3730; Fax: 212- 618-8898; e-mail: KAxt@nycedc.com