HISTORICAL PERSPECTIVES INC.

New York City Department of Environmental Protection
Staten Island Bluebelt, Mid-Island of Staten Island's South Shore

South Beach Watershed
Phase IA Archaeological Documentary Study

OPRHP No. 10PRO2085

LPC No. 07DEP063R

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Prepared For:

AKRF
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and

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March 2011

MANAGEMENT SUMMARY

SHPO Project Review Number (if available): **10PRO2085**

Involved State and Federal Agencies: **DEP**

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

Location Information
- Location: **Multiple locations, South Beach Watershed.**
- Minor Civil Division: **08501, Staten Island**
- County: **Richmond**

Survey Area
- Length: **varies**
- Width: **varies**
- Number of Acres Surveyed: **Total footprint of BMPs is ca. 44 acres**

USGS 7.5 Minute Quadrangle Map: **The Narrows**

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**

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 Dawn Louise Brown, Historical Perspectives, Inc.**

Date of Report: **March 2011**

EXECUTIVE SUMMARY

The New York City Department of Environmental Protection (DEP) has developed a drainage plan for the storm water management of the South Beach Watershed in Staten Island, New York. The South Beach Watershed is approximately 1,267 acres in size and generally defined by Medford Road, Fingerboard Road, Narrows Road and the Staten Island Expressway to the north, Lily Pond Road to the east, Burgher and Seaview Avenues to the west and Lower Bay to the south. The proposed storm water management plan is composed of storm sewers to collect runoff and Best Management Practices (BMPs) at the points where runoff discharges into existing wetlands. A new outfall connecting the BMPs to Lower Bay is proposed at McLaughlin Street, and two existing outfalls are proposed to be supplemented with new barrels (13 to 15 feet in width) placed adjacent to the existing barrels. These existing outfalls are located at Ocean Breeze Park and Sand Lane. The location of the overall watershed, the five proposed BMP locations, and the new and existing outfalls within the watershed are shown in Figures 1-2. The individual BMPs are further shown in Figures 3a-c and 4a-c. Figures 3a-c represent the most conservative estimate of BMP footprint areas, whereas Figures 4a-c are, in some cases, more tightly restricted to proposed impact areas. For this report, the more conservative BMP footprints as shown in Figures 3a-c were the ones that were studied and are presented on subsequent figures. The BMPs proposed for the watershed are listed in the following table.

South Beach BMP Descriptions						
BMP	**Size in Acres (acres)**	**Location**	**Drainage Area in Acres (acres)**	**Description**	**Function / Objective**	**Ownership / Jurisdiction**
SBE-1A: Quintard Street	18.6	Northeast of Quintard Avenue ROW, between Father Capodanno Boulevard and Patterson Avenue	586.0	Extended Detention Wetland	Stormwater detention and water quality enhancement	DEP Bluebelt/DPR
SBE-1B: Sand Lane	23.0	Northwest of Father Capodanno Boulevard, between Sand Lane and McLaughlin Street	384.0	Extended Detention Wetland	Stormwater detention and water quality enhancement	DEP Bluebelt
SBE-1C: McLaughlin Street (DEP)	0.6	Southeast of end of McLaughlin Street	1.5	Extended Detention Wetland	Stormwater detention, water quality enhancement and new ocean outfall	DEP Bluebelt
SBE-2A: Windermere Road	0.2	East of Windermere Road, between West Fingerboard Road and Clove Road	60.0	Outfall and Forebay (Cameron's Lake)	Velocity attenuation and sediment capture	DEP Bluebelt
SBE-2B: Allendale Road	0.2	West of Allendale Road, between West Fingerboard Road and Beverly Road	1.3	Outfall and Forebay (Cameron's Lake)	Velocity attenuation and sediment capture	DEP Bluebelt
SBE-2C: Normalee Road	0.2	Normalee Road ROW, between end of Normalee Road and Allendale Road	65.0	Micropool Outlet/Riser Box (Cameron's Lake)	Improved conveyance and sediment capture	DEP Bluebelt
SBE-3: Whitney Woods	1.2	Intersection of Whitney Avenue and Woodlawn Avenue ROW's	10.8	Extended Detention Wetland	Stormwater detention and perimeter treatment	DEP Bluebelt

BMP installations, both within and outside of streetbeds and right-of-ways, will include below-grade impacts. Since the proposed project is located in New York City and subject to both City Environmental Quality Review (CEQR) and the State Environmental Quality Review Act (SEQRA), impact assessment guidance from the *New York City Environmental Quality Review Technical Guidance Manual* (CEQR Technical Manual 2010) will be used in the preparation of an environmental review. The environmental review process, including an evaluation of archaeological sensitivity by the New York City Landmarks Preservation Commission (LPC) and the New York State Office of Parks, Recreation and Historic Preservation (OPRHP) was initiated in 2010 for the South Beach Watershed, as well as two additional Mid-Island watersheds, Oakwood Beach and New Creek. As a function of the standard coordination for a Draft Environmental Impact Statement, both the LPC and OPRHP requested a research based study (known as a Phase IA Archaeological Documentary Study), to fully assess the archaeological sensitivity of the impact areas of the three watersheds: Oakwood Beach, New Creek and South Beach (4/14/10 and 4/29/10, respectively).

Historical Perspectives, Inc. (HPI) has been contracted by AKRF to complete the requested Phase IA Archaeological Documentary Study for the South Beach Watershed and BMP sites. This study was prepared to comply with the standards of the OPRHP and the LPC (New York Archaeological Council 1994; NYSOPRHP 2005; LPC 2002; CEQR 2010). 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. The Area of Potential Effect (APE) is defined as the area that could be affected by project development. Since project plans have not been finalized as of this writing, the APE includes the entire footprint of each proposed BMP site and the proposed outfall sites. Typically, the BMP final designs will restrict actual construction impacts to more limited areas. However, this comprehensive approach provides the most instructive input for planning purposes. The total South Beach Watershed area also is addressed in terms of general history and archaeological sensitivity.

The Phase IA study concluded that the proposed BMP SBE-2C site has a moderate precontact archaeological sensitivity within the portion of the proposed BMP footprint on firm ground along the shore of Cameron's Lake. The remaining proposed BMPs contain no precontact archaeological sensitivity. None of the proposed BMP locations contain historic period archaeological sensitivity. Assessment of both precontact and historic period archaeological sensitivity for the South Beach Watershed as a whole was undertaken at a general level, but disturbance across the watershed obviously varies according to the level of development and earthmoving that has occurred at any given spot, and would need to be assessed on an individual basis according to site-specific conditions. At this time, there are no additional proposed BMPs defined for the South Beach Watershed; any further consideration of new sites as part of this project would need to be addressed separately.

Based on these conclusions, HPI recommends that a program of Phase IB archaeological testing be conducted on that portion of the proposed BMP SBE-2C site on firm ground designated as having a moderate archaeological sensitivity for precontact resources, as shown in Figure 11, if this area will experience subsurface impacts as part of the BMP construction. All archaeological testing should be conducted according to applicable archaeological standards (New York Archaeological Council 1994, NYSOPRHP 2005; LPC 2002; CEQR 2010). Professional archaeologists, with an understanding of and experience in urban archaeological excavation techniques, would be required to be part of the archaeological team. No further archaeological investigations are recommended for proposed BMP sites SBE-1A, SBE-1B, SBE-1C, SBE-2A, SBE-2B, or SBE-3, or for the proposed outfall sites.

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I. INTRODUCTION

DEP has developed a drainage plan for the storm water management of the South Beach Watershed in Staten Island, New York. The South Beach Watershed is generally defined by Medford Road, Fingerboard Road, Narrows Road and the Staten Island Expressway to the north, Lily Pond Road to the east, Burgher and Seaview Avenues to the west and Lower Bay to the south. It is approximately 1,267 acres in size. The proposed storm water management plan is composed of storm sewers to collect runoff and Best Management Practices (BMPs) at the points where runoff discharges into existing wetlands. A new outfall connecting the BMPs to Lower Bay is proposed at McLaughlin Street, and two existing outfalls are proposed to be supplemented with new barrels (13 to 15 feet in width) placed adjacent to the existing barrels. These existing outfalls are located at Ocean Breeze Park and Sand Lane. The location of the overall watershed, the five proposed BMP locations, and the new and existing outfalls within the watershed are shown in Figures 1-2. The individual BMPs are further shown in Figures 3a-c and 4a-c. Figures 3a-c represent the most conservative estimate of BMP footprint areas, whereas Figures 4a-c are, in some cases, more tightly restricted to proposed impact areas. For this report, the more conservative BMP footprints as shown in Figures 3a-c were the ones that were studied and are presented on subsequent figures. The BMPs proposed for the watershed are listed in the following table.

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Historical Perspectives, Inc. (HPI) has been contracted by AKRF to complete the requested Phase IA Archaeological Documentary Study for the South Beach Watershed and BMP sites. This study was prepared to comply with the standards of the OPRHP and the LPC (New York Archaeological Council 1994; NYSOPRHP 2005; LPC 2002; CEQR 2010). 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. The HPI project team consisted of Julie Abell Horn, M.A., R.P.A., who undertook the majority of the research, and wrote the majority of the report; Dawn Louise Brown, who conducted the site visits and wrote portions of the report, and Cece Saunders, M.A., R.P.A. who assisted with the research, managed the project, and provided editorial and interpretive assistance.

The Area of Potential Effect (APE) is defined as the area that could be affected by project development. Since project plans have not been finalized as of this writing, the APE includes the entire footprint of each BMP site. Typically, the BMP final designs will restrict actual construction impacts to more limited areas. However, this comprehensive approach provides the most instructive input for planning purposes. The total South Beach Watershed area also is addressed in terms of general history and archaeological sensitivity.

II. METHODOLOGY

This study entails review of various resources. Because the proposed BMP sites consist of land that was undeveloped during the nineteenth century, many standard resources normally consulted to meet LPC standards were not necessary, as described below.

- 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.
- Historic maps and aerial photographs were reviewed at the New York Public Library, the Staten Island Historical Society, the Staten Island Museum, the Staten Island Topographical Bureau, and using various online websites. These maps and photographs provided an overview of the changing shoreline, the topography, and a chronology of land usage and ownership. While all maps and photographs that were consulted for this report are cited, due to the volume of materials, only a selection of these images is presented in this report.
- Deeds, tax assessment records, federal census records, and city directories, which are standard resources consulted as part of a documentary study, were not reviewed for this project because the proposed BMP sites were not developed during the nineteenth century.
- There are no Department of Building records for most of the proposed BMP locations because these sites do not contain buildings.
- Information about previously recorded archaeological sites and surveys in the area was compiled from data available at the NYSOPRHP, which includes data files from the New York State Museum (NYSM), and the LPC.
- DEP, Hazen and Sawyer, and AKRF provided various survey maps and site data for the property, including block and lot listings for each proposed BMP. Most of the proposed BMPs have been assigned block and lot numbers by the City of New York. There are no visible distinctions between these block and lots within

the undeveloped acreage and the city's numbering system has minimal utility for this study. A table that lists the block and lots included in each BMP is provided as Appendix A.

- DEP also provided a Phase II environmental study for BMP SBE-1, which includes soil borings. The soil borings are included as Appendix B. No Phase II environmental studies were available for BMP SBE-2A, BMP SBE-2B, BMP SBE-2C, or BMP SBE-3.
- AKRF provided project descriptions. Text generated by AKRF is included within various sections of this report.
- Last, site visits to the proposed BMPs were conducted by Dawn Louise Brown of HPI on December 6-7, 2010 to assess any obvious or unrecorded subsurface disturbance (Photographs 1-12; Figures 4a-c).

III. CURRENT CONDITIONS AND ENVIRONMENTAL SETTING

The following text discusses the Current Conditions and Environmental Setting for the watershed as a whole, and individually by BMP locations.

A. Current Conditions

South Beach Watershed Area

South Beach Watershed is the easternmost of the three Mid-Island Watersheds. This watershed, which is adjacent to and east of the New Creek Watershed, occupies about 1,267 acres. It is generally bounded by Medford Road, Fingerboard Road, Narrows Road and the Staten Island Expressway to the north, Lily Pond Road to the east, Burgher and Seaview Avenues to the west and Lower Bay to the south. Most of this watershed is developed with low-density residential uses or open space with the exception of the Hylan Boulevard commercial corridor. Reflecting the built condition, zoning districts in this watershed are predominantly R3-1, R3-X, and R3-2A. The Staten Island Railway runs east to west through the northern portion of the watershed.

Surface water features in this watershed include Brady's Pond and Cameron's Lake in the upper reaches of the watershed just south of the Staten Island Expressway. Brady's Pond is privately owned while Cameron's Lake is owned by DEP as part of the Bluebelt. Whitney Woods is a small wooded site, west of Cameron's Lake, where stormwater collects. This property is in the process of being acquired with funds from elected officials for inclusion in the Bluebelt. The main assemblage of Bluebelt properties is in the lower watershed where 40.1 acres of wetlands are vested or in the process of being vested as City-owned Bluebelt properties. These Bluebelt lands are generally bounded by Quintard Street on the west, Father Capodanno Boulevard on the South, Sand Lane on the east, and various streets on the north. Some of these wetland properties are also under the jurisdiction of the New York City Department of Parks and Recreation (DPR). There is a tide-gate controlled outlet to Lower Bay from Sand Lane. Other outfalls to Lower Bay, draining the watershed, are at Lily Pond Avenue and at Ocean Breeze Park between Quintard Street and Seaview Avenue.

BMP SBE 1A

The proposed site of BMP SBE-1A is bounded by Quintard Street and Ocean Breeze Park to the southwest, Father Capodanno Boulevard (and BMP SBE-1C) to the southeast, south of which is the Lower Bay shoreline which is also parkland, part of the Franklin Delano Roosevelt Boardwalk and Beach. The proposed BMP site is also bordered by McLaughlin and Vulcan Streets to the northeast (as well as the rear yard of residential properties fronting on Pearsall Street, and Patterson Avenue), and Lava Street and Agnes Place to the northwest. This proposed BMP site is dominated by *phragmites*, which is a common reed associated with disturbed wetland landforms but has some areas of open water and a small forested area near Patterson Avenue. There is a raised and filled area in the northwestern corner, but otherwise the proposed BMP site is level. The eastern side of proposed SBE-1A is located along the former Southfield Beach Railroad right-of-way. These tracks formerly extended along the shoreline, parallel to Father Capodanno Boulevard, to Midland Beach. Today the area is covered with vegetation and no evidence of former tracks or railroad features could be seen. No obvious disturbance could be viewed from the Ocean Breeze Park vantage point (Photograph 1). However, a portion along the edge of the proposed BMP site, south of Vulcan Street, appeared disturbed with mounding and large amounts of debris (Photograph 2).

BMP SBE-1B

The proposed site of BMP SBE-1B is bounded by McLaughlin Street to the southwest, and Father Capodanno Boulevard (and SBE-1C) to the southeast—south of which is the Lower Bay shoreline which is also parkland, part of the Franklin Delano Roosevelt Boardwalk and Beach. To the northeast, the site is bounded by the rear yards of residential properties fronting on Quincy Avenue, Oceanside Avenue and Sand Lane. To the northwest, the site abuts the rear yards and streets of Lansing Place, Wentworth Avenue and Andrews Street to the northwest. This proposed BMP site is dominated by *phragmites*, which is a common reed associated with disturbed wetland landforms, with some areas of open water and trees around the perimeter, with fill material, two ponds, and little topographical variation. The eastern side of the proposed site of SBE-1B is located along the former Southfield Beach Railroad right-of-way. These tracks formerly extended along the shoreline, parallel to Father Capodanno Boulevard, to Midland Beach. Today the area is covered with vegetation and no evidence of former tracks or railroad features could be seen. No obvious disturbance could be viewed through the thick *phragmites* (Photograph 3). However, a portion along the edge of the proposed BMP site, south of Quincy Street, appeared disturbed with mounding and large amounts of debris (Photograph 4). It is likely the section along Father Capodanno Boulevard also is disturbed from roadway construction (Photograph 5).

BMP SBE-1C

The proposed site of BMP SBE-1C is located on property already acquired by DEP Bluebelt purposes, on property under the jurisdiction of DPR, and on property to be acquired for DEP Bluebelt purposes. The BMP site is located at the south end of the built segment of McLaughlin Street (Photograph 6). It is bordered to the north by wetlands associated with the proposed site of SBE-1B, to the east and south by commercial/residential properties, and to the west by McLaughlin Street, residential properties and wetlands associated with the proposed site of SBE-1A. It lies on level ground and no water is visible. This proposed BMP site is dominated by *phragmites*, which is a common reed associated with disturbed wetland landforms. The proposed site of SBE-1C is located along the former Southfield Beach Railroad right-of-way. These tracks formerly extended along the shoreline, parallel to Father Capodanno Boulevard, to Midland Beach. Today the area is covered with vegetation and no evidence of former tracks or railroad features could be seen.

BMP SBE-2A

The proposed site of BMP SBE-2A is located along the western shore of Cameron's Lake, a naturally formed pond in a residential neighborhood. It is accessed by Windermere Road, and bordered to the north by the pond and residential properties, to the east by the pond, to the south by the majority of the pond, and to the west by Windermere Road. The proposed site of SBE-2A is situated along the sloped western bank of the pond (Photograph 7). This bank appears enhanced with rock to halt erosion that may undercut the roadbed of Windermere Road. Several deciduous trees as well as brush have grown on this bank. The proposed BMP location appears to be disturbed from construction of Windermere Road.

BMP SBE-2B

The proposed site of BMP SBE-2B is located along the eastern shore of Cameron's Lake off of Allendale Road, at an existing outfall draining stormwater into the lake. A small storm sewer pipe is currently situated at this location and drains a number of catch basins in Allendale Road. The proposed BMP site is bordered to the north and south by residential properties, to the east by Allendale Road, and to the west by the pond. The proposed site of SBE-2B is situated along the sloped eastern bank of the pond (Photograph 8). Several deciduous trees as well as brush have grown on this bank. The presence of the existing storm sewer pipe as well as the adjacent Allendale Road construction indicates that the proposed BMP site is disturbed. Fill may have been placed along this bank to provide a barrier between the water source and the road bed of Allendale Road (Photograph 9).

BMP SBE-2C

The proposed site of BMP SBE-2C is located at the southern end of Cameron's Lake. It is accessed by Normalee Road, and bordered to the north by the pond, to the east by residential properties and a section of abandoned road, to the south by residential properties, and to the west by Normalee Road. The proposed site of SBE-2B is situated

along the southern bank of the pond (Photograph 10). This bank appears to be more gently sloped and level than the other proposed BMPs at Cameron's Lake. Several deciduous trees as well as brush have grown on this bank. Disturbance to this proposed BMP site appears relatively low, although ground cover obscured visual inspection of the soils.

BMP SBE-3

The proposed site of BMP SBE-3 is located on property, known as Whitney Woods, which is situated at the intersection of Woodlawn Avenue and Whitney Avenue, two mapped but unbuilt streets. The parcel is characterized by wet areas of the invasive Japanese Knotweed north of Whitney Avenue and a mature woodland south of Whitney Avenue. There are small areas of *phragmites* and cattails. Standing water is visible from Whitney Avenue (Photograph 11). Mounding, large rocks and debris are visible from Woodlawn Avenue (Photograph 12). This proposed BMP site appears to be located along a section of Whitney Road that was partially constructed in the first decades of the twentieth century and then abandoned, causing disturbance to the natural landform.

New and Supplemental Outfalls

The proposed new outfall would be located near McLaughlin Street, and would connect BMP SBE-1C with the Lower Bay. The outfall would be constructed in a proposed sewer easement to be acquired within the streetbed of Father Capodanno Boulevard and on waterfront property owned by the City of New York. The outfall is proposed to be constructed under the tidal creek and berm and before daylighting on the sandy beach. The alignment of this proposed new outfall would traverse marshland, the roadbed of Father Capodanno Boulevard, parking areas east of the roadway, the Franklin D. Roosevelt Boardwalk, and the beach.

The two proposed supplemental outfalls would be located adjacent to existing outfalls at Ocean Breeze Park and Sand Lane. The alignments of these outfalls would traverse similar conditions as the proposed new outfall, described above.

B. Topography and Hydrology

The following discussion outlines the topography and hydrology for the overall South Beach Watershed, and for the individual proposed BMPs and outfalls. Of note, topographic maps on Staten Island use several different elevation datums. Borough of Richmond Datum is 3.192 feet above the U.S.C.S. Sandy Hook Datum, and is the datum used on the series of 1911 Borough of Richmond Topographical maps cited below and shown as Figures 10a-b). Modern survey maps (Figures 4a-c) use the NAVD Datum, which is 2.112 feet higher than the Borough of Richmond Datum. Thus, the difference between elevations on these two sets of maps is approximately 2 feet. When elevations are noted in the discussion, below, the appropriate datum is given in parentheses.

South Beach Watershed Area

The South Beach Watershed covers about 2.1 square miles. The upper portion of the watershed is dominated by Staten Island's terminal moraine ridge, with elevations well over 100 feet above sea level. No open stream corridors remain in the watershed, though remnant channels exist in several locations. Instead, the existing surface water features of the watershed are composed of two upland ponds, Brady's Pond and Cameron's Lake, and a large downstream wetland with another pond that is in the process of being acquired by DEP. A portion of the watershed is at very low elevation, within five feet or less of mean high tide in some areas, specifically the vicinity of Olympia Boulevard and McLaughlin Street.

BMP SBE-1A

The proposed site of BMP SBE-1A is located on level, marshy terrain, generally at or just above sea level, with a branch of New Creek running along its southeastern edge. Comparison of historic topographical maps (e.g. U.S.C.S. 1856 [Figure 6], Bien and Vermeule 1891 [Figure 9], Borough of Richmond 1911 [Figure 10a]) shows that the proposed BMP site has been primarily marshland at least since the nineteenth century. This marshland extends along the shoreline of South Beach. The topographical map from 1911 (Figure 10a) shows that there was a small hummock of land that rose about two feet above the level of the marshland at the northwestern corner of the

proposed BMP site, in the area near the intersection of what is now Vulcan Street and Mallory Avenue. Today's landscape, as shown in Figure 4a, indicates unnatural topography, including mounds of soil, that is indicative of grading and filling at this end of the proposed BMP site.

BMP SBE-1B

The proposed site of BMP SBE-1B is located on level, marshy terrain, generally at or just above sea level, with a branch of New Creek running along its southeastern edge. Comparison of historic topographical maps (e.g. U.S.C.S. 1856 [Figure 6], Bien and Vermeule 1891 [Figure 9], Borough of Richmond 1911 [Figure 10a]) shows that the proposed BMP site has been primarily marshland at least since the nineteenth century. This marshland extends along the shoreline of South Beach. The topographical map from 1911 (Figure 10a) shows that there were no obvious hummocks of land within the footprint of this BMP. As shown in Figure 4a, today there are areas of the proposed BMP site that have been clearly graded and filled, particularly on the northeastern end of the proposed BMP site.

BMP SBE-1C

The proposed site of BMP SBE-1C is located on level, marshy terrain, generally at or just above sea level, with a branch of New Creek running along its southeastern edge. Comparison of historic topographical maps (e.g. U.S.C.S. 1856 [Figure 6], Bien and Vermeule 1891 [Figure 9], Borough of Richmond 1911 [Figure 10a]) shows that the proposed BMP site has been primarily marshland at least since the nineteenth century. This marshland extends along the shoreline of South Beach. The topographical map from 1911 (Figure 10a) shows that there were no obvious hummocks of land within the footprint of this proposed BMP site.

BMP SBE-2A

The proposed site of BMP SBE-2A is located in an area that historic maps (e.g. U.S.C.S. 1856 [Figure 6], Bien and Vermeule 1891 [Figure 9], Borough of Richmond 1911 [Figure 10b]) consistently show as on the western shore of and within Cameron's Lake, a naturally occurring pond. According to Figure 4b, elevations along the shoreline of the lake at this proposed BMP site range from approximately 88-96 feet (NAVD).

BMP SBE-2B

The proposed site of BMP SBE-2B is located in an area that historic maps (e.g. U.S.C.S. 1856 [Figure 6], Bien and Vermeule 1891 [Figure 9], Borough of Richmond 1911 [Figure 10b]) consistently show as on the eastern shore of Cameron's Lake, a naturally occurring pond. According to Figure 4b, elevations along the shoreline of the lake at this proposed BMP site range from approximately 88-96 feet (NAVD).

BMP SBE-2C

The proposed site of BMP SBE-2C is located in an area that historic maps (e.g. U.S.C.S. 1856 [Figure 6], Bien and Vermeule 1891 [Figure 9], Borough of Richmond 1911 [Figure 10b]) consistently show as on the southern shore of Cameron's Lake, a naturally occurring pond. According to Figure 4b, the elevation at this proposed BMP site is approximately 88 feet (NAVD).

BMP SBE-3

The proposed site of BMP SBE-3 is located in an area that historic maps (e.g. U.S.C.S. 1856 [Figure 6], Bien and Vermeule 1891 [Figure 9], Borough of Richmond 1911 [Figure 10b]) show as either a low lying or marshy area. According to Figure 4c, elevations at this proposed BMP site range from approximately 88-94 feet (NAVD).

New and Supplemental Outfalls

The proposed new outfall and the proposed supplemental outfalls are all located in an area that has historically been marshland and sandy beach, generally at or just above sea level. Comparison of historic topographical maps (e.g.

U.S.C.S. 1856 [Figure 6], Bien and Vermeule 1891 [Figure 9], Borough of Richmond 1911 [Figure 10a]) shows that these proposed locations were marshland and sandy beach since at least the nineteenth century.

C. Geology

The majority of the South Beach Watershed sits within the inner lowland subprovince of the Coastal Plain Province. As described by Boesch (after Wolfe 1977 and Isachsen et al. 1991),

> Generally this province is a broad, low-lying land form that slopes gently towards the Atlantic Ocean. The inner lowland subprovince consists of generally level to gently undulating terrain that is between 20 and 50 feet in elevation. Most of the inner Coastal Plain is underlain with gently southeastward dipping, unconsolidated marine and fluvial deposits of clay, silt, sand, and gravel of Late Cretaceous and Tertiary age. Large areas are also covered with interglacial fluvial deposits of Quaternary age. The Piedmont Lowlands and the portion of the inner Coastal Plain present on Staten Island, were greatly affected by the Wisconsin glaciation. Glacial drift covers most of these areas north of the terminal moraine of the Wisconsin glaciation. The inner Coastal Plain, in particular, is not much more than a ridge of glacial and glacial outwash sediments that almost completely overly [sic] the Cretaceous and Tertiary layers. The moraine extents [sic] northward roughly from Perth Amboy along the Atlantic shore line (routes of van Duzer Street, Richmond Road, and Amboy Road run, approximately, along the front [or southern] edge of the moraine) crossing the Narrows to Brooklyn where it becomes the Ronkonkoma moraine (Boesch 1994: 3).

The terminal moraine is located along the northwestern edge of the South Beach Watershed, and accounts for the steep topography northwest of Richmond Road.

D. Soils

Figure 5 illustrates the location of the overall South Beach Watershed, as well as the proposed BMP locations, on the soil survey map for New York City. The following text discusses soil characteristics for the watershed as a whole, and individually by proposed BMP locations.

South Beach Watershed Area

Soils mapped for the overall South Beach Watershed area can be roughly divided into three groups: land areas closest to the shoreline on the southeast, those lands within the interior section and generally southeast of Hylan Boulevard and south of Sand Lane, and the land areas north and west of the interior area, in the upland portion of the watershed.

The soils that are mapped closest to the shoreline consist primarily of natural swamps, tidal marshes, or water, as well as low lying areas, which have been filled to various degrees. Soils here include Ipswich-Pawcatuck-Matunuck mucky peats (6), Laguardia-Ebbets-Pavement & buildings complex (8), Bigapple-Fortress complex (99), and Pavement & buildings, wet substratum-Laguardia-Ebbets complex, 0 to 8 percent slopes (101).

The soils that are mapped within the interior section of the watershed area consist of soils formed over glacial outwash and glacial till. Soils here include Pavement & buildings-Flatbush-Branford complex (274), and Laguardia-Ebbets-Pavement & buildings complex, 0 to 8 percent slopes (8).

The soils that are mapped within the upland portion of the watershed consist of soils formed over glacial till plains, hills, or moraines. Soils here include Pavement & buildings, till substratum (2), Greenbelt-Cheshire-Pavement & buildings complex (314), Pavement & buildings-Greenbelt-Cheshire complex (324), and Pavement & buildings-Wotalf-Todthill complex (348).

BMP SBE-1A

The entire footprint of the proposed BMP SBE-1A site is mapped as Ipswich-Pawcatuck-Matunuck mucky peats, 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 2005:11).

The different soil series that make up this mapping unit are further described in the table, below.

Name	Soil Horizon Depth	Color	Texture, Inclusions	Slope %	Drainage	Landform
Ipswich Series	*Oe1* 0-20 in *Oe2* 20-40 in *Oa* 40-72 in	10YR 4/3 2.5Y 3/2 5Y 4/1	Mucky peat Mucky peat Mucky peat	0	Very poorly	Tidal marsh
Pawcatuck Series	*Oe1* 0-8 in *Oe2* 8-24 in *2C* 24-72 in	5Y 3/1 2.5Y 4/1 N 4/	Mucky peat Mucky peat LoSa	0	Very poorly	Tidal marsh
Matunuck Series	*Oe* 0-8 in *C1* 8-72 in	10YR 2/1 2.5Y 4/1	Mucky peat Sa	0	Very poorly	Tidal marsh

Key: Soils: Lo-Loam, Sa-Sand

In 2006 Louis Berger Associates (LBA) conducted a Remedial Investigation (RI) report in the area now known as proposed BMP SBE-1A, BMP SBE-1B, and BMP SBE-1C, but which was then unnamed. The site they investigated was slightly larger than the present proposed BMP footprints, and extended to the edges of the streets bordering the proposed BMP. The RI report was a follow up study to a Phase I Environmental Site Assessment (ESA) conducted by Metcalf and Eddy (M&E) in 2005 and a Phase II Environmental Site Assessment (ESA) prepared by LBA in 2006. Neither the Phase I or Phase II ESA reports were provided, but the RI report summarized their content:

> In November of 2005, LBA performed a Phase II Environmental Site Assessment (ESA) to investigate potential environmental impacts to the Site. Forty-one (41) "High" and "Moderate" risk sites were identified in the Modified Phase I ESA prepared by Metcalf and Eddy (M&E) in February 2005.
>
> The Phase II ESA determined that the approximate perimeter of the Site is generally covered with two (2) to fifteen (15) feet of fill, comprised of a matrix of silty, gravelly sand. Generally, the fill is located around the site perimeter adjacent to adjoining developed areas of South Beach, and in "paper streets" that traverse the site. The "paper streets" are indicated on the figures but were not built, and in some areas are dirt roads. A considerable amount of partially buried debris (brick, concrete, wood, and automobiles) was also identified in the areas investigated. The fill and debris are underlain by peat or sand in the project area (LBA 2007:5).

One of the RI tasks was to delineate the extent of the fill in areas of potential hazardous soil and where wetlands violations may have occurred. DEP identified areas for contamination testing; these included Block 3407, Lot 1; Block 3491, Lots 8, 15 and 19; Block 3422, Lot 1; and Block 3500, Lots 13, 50, and 82. The latter two blocks are within the proposed site of BMP SBE-1A. In total, 31 soil borings and nine test pits were completed; these logs are included as Appendix B. Results of the studies are presented below.

Block 3422, Lot 1

> Composite soil borings were collected from the nine (9) boring locations within Block 3422, Lot 1, identified as SB-01 through SB-09. The water table was observed at a depth between zero and thirteen (13) feet bgs [below ground surface]. Fill material was observed at the surface to a depth between two (2) and twelve (12) feet bgs (LBA 2007:13).

The soil boring logs (Appendix B) indicate that some of the soil borings had natural soils beneath the fill, but in all cases the natural soil was at or beneath the water table, suggesting that this area either was naturally wetland, and/or that any natural soils above the water table no longer exist.

Block 3500, Lots 13, 50, and 82

> A total of four (4) test pits were performed in Block 3600, Lots 13, 50, and 82, identified as TP-15, TP-19, TP-20, and TP-27. The remaining eleven (11) locations that were proposed in this area were not accessible due to wet site conditions. Fill material was observed at the surface to a depth of one (1) foot bgs (LBA 2007:14-15).

The test pit logs (Appendix B) indicate that beneath the fill was peaty sand, suggesting that this area was naturally wetland.

Comparison of the soil boring and test pit data with the U.S.D.A. mapped soils for the BMP indicates little to no difference in the two sets of data.

BMP SBE-1B

The entire footprint of the proposed BMP SBE-1B site is mapped as Ipswich-Pawcatuck-Matunuck mucky peats, 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 2005:11).

The different soil series that make up this mapping unit are further described in the table, below.

Name	Soil Horizon Depth	Color	Texture, Inclusions	Slope %	Drainage	Landform
Ipswich Series	*Oe1* 0-20 in *Oe2* 20-40 in *Oa* 40-72 in	10YR 4/3 2.5Y 3/2 5Y 4/1	Mucky peat Mucky peat Mucky peat	0	Very poorly	Tidal marsh
Pawcatuck Series	*Oe1* 0-8 in *Oe2* 8-24 in *2C* 24-72 in	5Y 3/1 2.5Y 4/1 N 4/	Mucky peat Mucky peat LoSa	0	Very poorly	Tidal marsh
Matunuck Series	*Oe* 0-8 in *C1* 8-72 in	10YR 2/1 2.5Y 4/1	Mucky peat Sa	0	Very poorly	Tidal marsh

Key: Soils: Lo-Loam, Sa-Sand

The LBA RI did not include any soil borings or test pits for this small proposed BMP footprint, although it is likely that subsurface conditions are similar to those described above for adjacent Block 3500, Lot 50.

BMP SBE-1C

The majority of the proposed site of BMP SBE-1C footprint is mapped as Ipswich-Pawcatuck-Matunuck mucky peats, 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 2005:11).

A smaller area on the northeastern side of the proposed BMP footprint is mapped as Bigapple-Fortress complex, 0 to 8 percent slopes, described as:

> Nearly level to gently sloping areas that have been filled with sandy dredged materials; a mixture of well drained and moderately well drained anthropogenic soils; located along coastal waterways (USDA 2005:15).

The different soil series that make up these mapping units are further described in the table, below.

Name	**Soil Horizon Depth**	**Color**	**Texture, Inclusions**	**Slope %**	**Drainage**	**Landform**
Ipswich Series	*Oe1* 0-20 in *Oe2* 20-40 in *Oa* 40-72 in	10YR 4/3 2.5Y 3/2 5Y 4/1	Mucky peat Mucky peat Mucky peat	0	Very poorly	Tidal marsh
Pawcatuck Series	*Oe1* 0-8 in *Oe2* 8-24 in *2C* 24-72 in	5Y 3/1 2.5Y 4/1 N 4/	Mucky peat Mucky peat LoSa	0	Very poorly	Tidal marsh
Matunuck Series	*Oe* 0-8 in *C1* 8-72 in	10YR 2/1 2.5Y 4/1	Mucky peat Sa	0	Very poorly	Tidal marsh
Bigapple Series	*A* 0-3 in *E* 3-8 in *Bw* 8-20 in *C1* 20-28 in *C2* 28-80 in	10YR 4/2 10YR 5/3 10YR 5/4 10YR 6/4 10YR 5/2	FiSa FiSa StrSa StrSa StrSa	0-8	Well	Anthropogenic fill mounds and plains near coastal waterways
Fortress Series	*A* 0-8 in *Bw* 8-12 in *C1* 12-48 in *C2* 48-65 in	2.5Y 5/2 2.5Y 5/6 2.5Y 7/2 5Y 5/2	Sa Sa Sa Sa	0-8	Moderately well	Anthropogenic fill mounds and plains near coastal waterways

Key: Soils: Lo-Loam, Sa-Sand
Other Str-Stratified, Fi-Fine

As described above for proposed BMP SBE-1A, in 2006 LBA conducted an RI report in the area now known as proposed BMP SBE-1A, BMP SBE-1B, and BMP SBE-1C, but which was then unnamed. The site they investigated was slightly larger than the present proposed BMPs footprint, and extended to the edges of the streets bordering the proposed BMP. The RI report was a follow up study to a Phase I ESA conducted by Metcalf and Eddy (M&E) in 2005 and a Phase II ESA prepared by LBA in 2006. Neither the Phase I or Phase II ESA reports were provided, but the RI report summarized their content:

> In November of 2005, LBA performed a Phase II Environmental Site Assessment (ESA) to investigate potential environmental impacts to the Site. Forty-one (41) "High" and "Moderate" risk sites were identified in the Modified Phase I ESA prepared by Metcalf and Eddy (M&E) in February 2005.
>
> The Phase II ESA determined that the approximate perimeter of the Site is generally covered with two (2) to fifteen (15) feet of fill, comprised of a matrix of silty, gravelly sand. Generally, the fill is located around the site perimeter adjacent to adjoining developed areas of South Beach, and in "paper streets" that traverse the site. The "paper streets" are indicated on the figures but were not built, and in some areas are dirt roads. A considerable amount of partially buried debris (brick, concrete, wood, and automobiles) was also identified in the areas investigated. The fill and debris are underlain by peat or sand in the project area (LBA 2007:5).

One of the RI tasks was to delineate the extent of the fill in areas of potential hazardous soil and where wetlands violations may have occurred. DEP identified areas for testing; these included Block 3407, Lot 1; Block 3491, Lots 8, 15 and 19; Block 3422, Lot 1; and Block 3500, Lots 13, 50, and 82. The first two blocks are within proposed BMP SBE-1C. In total, 31 soil borings and nine test pits were completed; these logs are included as Appendix B. Results of the studies are presented below.

Block 3407, Lot 1

> Composite soil samples were collected from the fourteen (14) boring locations within Block 3407, Lot 1, identified as SB-19 through SB-32 (with the exception of SB-27, which was under water and inaccessible). The water table was observed at the surface to a depth of between two (2) and ten (10) feet bgs (LBA 2007:14).

Block 3491, Lot 8

> Composite soil samples were collected from the two (2) boring locations within Block 3491, Lot 8, identified as SB-33 and SB-34. The water table was observed at a depth of between two (2) and four (4) feet bgs. Fill material was observed at the surface to a depth between two (2) and four (4) feet bgs (LBA 2007:15).

Block 3491, Lots 15 and 19

> Composite soil samples were collected from the nine (9) boring locations within Block 3491, Lots 15 and 19, identified as SB-10 through SB-18 (with the exception of SB-10 and SB-12, which resulted in no recovery). The water table was observed at a depth of between zero and eight (8) feet bgs. Fill material was observed at the surface to a depth between two (2) and eight (8) feet bgs (LBA 2007: 13).

In all cases, the soil boring logs (Appendix B) indicate that while some of the soil borings had natural soils beneath the fill, in all cases the natural soil was at or beneath the water table, suggesting that this area either was naturally wetland, and/or that any natural soils above the water table no longer exist.

BMP SBE-2A, SBE-2B, SBE-2C, and SBE-3

One soil type is mapped for the proposed site of BMP SBE-2A, SBE-2B, SBE-2C, and SBE-3. This is Greenbelt-Cheshire-Pavement & buildings complex, 0 to 8 percent slopes, described as:

> Nearly level to gently sloping areas of till plains and moraines that have been partially filled with natural soil materials, mostly for residential use; a mixture of anthropogenic soils and red till soils, with 15 to 49 percent of the surface covered by impervious pavement and buildings; located in eastern Staten Island (U.S.D.A. 2005:21).

The different soil series found within the BMPs are further described in the table, below.

Name	**Soil Horizon Depth**	**Color**	**Texture, Inclusions**	**Slope %**	**Drainage**	**Landform**
Greenbelt Series	*A* 0-3 in *Bw* 3-13 in *C* 13-57 in *Ab* 57-58 in *Bwb* 58-65 in	7.5YR 4/4 5YR 4/6 2.5YR 4/4 7.5YR 3/2 5YR 4/6	Lo Lo GrlLo Lo Lo	0-8	Well	Anthropogenic urban fill plains
Cheshire Series	*A* 0-2 in *Bw1* 2-5 in *Bw2* 5-10 in *Bw3* 10-28 in *C* 28-60 in	7.5YR 3/2 5YR 4/3 5YR 4/6 2.5YR 4/4 2.5YR 3/4	Lo Lo FiSaLo Lo GrlSaLo	0-8	Well	Till plains, hills, and moraines

Key: Soils: Lo-Loam, Sa-Sand
Other Grl-Gravelly, Fi-Fine

No soil borings were conducted at any of these proposed BMPs.

New and Supplemental Outfalls

The alignments of the proposed new and supplemental outfalls have two mapping units. The inland side is mapped as Bigapple-Fortress complex, 0 to 8 percent slopes, described as:

> Nearly level to gently sloping areas that have been filled with sandy dredged materials; a mixture of well drained and moderately well drained anthropogenic soils; located along coastal waterways (U.S.D.A. 2005:12).

The shoreline is mapped as Beaches, described as:

> Nearly level to gently sloping areas of sand or sand and gravel adjacent to the Atlantic Ocean, inundated by saltwater twice each day at high tide. Frequently reworked by wave and wind action, these areas do not support vegetation (U.S.D.A. 2005:11).

The different soil series are further described in the table, below.

Name	Soil Horizon Depth	Color	Texture, Inclusions	Slope %	Drainage	Landform
Bigapple Series	*A* 0-3 in *E* 3-8 in *Bw* 8-20 in *C1* 20-28 in *C2* 28-60 in	10YR 4/2 10YR 5/3 10YR 5/4 10YR 6/4 10YR 5/2	FiSa FiSa StrSa StrSa StrSa	0-8	Well	Anthropogenic fill areas near coastal waterways
Fortress Series	*A* 0-3 in *Bw* 8-20 in *C1* 20-28 in *C2* 28-60 in	2.5Y 5/2 2.5Y 5/6 2.5Y 7/2 5Y 5/2	Sa Sa Sa Sa	0-8	Moderately well	Anthropogenic fill areas near coastal waterways

Key: Soils: Lo-Loam, Sa-Sand
Other Grl-Gravelly, Fi-Fine, Str-Stratified

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 1994). 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 1994). 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. One isolated fluted point was reportedly found in the Great Kills Park area.

During the 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 1994). 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, there are some significant Early Archaic component sites from this period, including the Old Place, Hollowell, Charleston Beach, Wards Point, Travis, and Richmond Hill sites (Ritchie and Funk 1971; Boesch 1994).

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 and Wards Point sites (Boesch 1994).

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, Old Place, and Arlington Avenue sites (Boesch 1994).

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, Pottery Farm, Wards Point, and Travis sites (Boesch 1994).

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. One such site, dating to the Middle Woodland period and including net and fabric impressed pottery, was recently discovered within DEP Bluebelt property overlooking Lemon Creek and was excavated in 2009 and 2010 (HPI 2009a, 2009b, 2010a, 2010b).

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 17th 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 1994; HPI 1996).

B. Previously Recorded Archaeological Sites and Surveys

Records on file at the OPRHP and the New York State Museum (NYSM) as well as the Boesch (1994) *Archaeological and Sensitivity Assessment of Staten Island, New York* indicate that there have been a number of both precontact period archaeological sites and historic period archaeological sites documented within the South Beach Watershed. They are listed in the table, below. 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. Some sites have had different numbers and names applied to them over time; all known appellations are listed in the first column.

Site # and Name	Location	Time Period	Site Type
08501.000027 Old Town Oude Dorp	Southern corner of Fort Wadsworth Reservation, beach area, includes NYSM 750, below	Precontact (Archaic-Woodland), Dutch (1641+)	Precontact and Dutch settlement site
Boesch 104 STD-C	Near Old Town railroad station	Unknown	Unknown
NYSM 750 Walton-Stillwell Boesch 76	Southern corner of Fort Wadsworth Reservation, beach area	Dutch (1670+), unknown precontact	Historic house remains and aboriginal refuse pit/house
NYSM 8479	Area east of Grasmere Lake (Brady's Pond)	Unknown precontact	Camp
NYSM 8478	Large, vaguely shaped area on both sides of Staten Island Expressway in Arrochar and Grasmere neighborhoods	Unknown precontact	Traces of occupation
NYSM 8477	Area near intersection of Hylan Boulevard and Steuben Street	Unknown precontact	Camp
NYSM 4611 Boesch 75	Area roughly bounded by Fort Wadsworth, Robin Road, Major Road, and Sand Lane	Unknown precontact, possible Woodland	Camp, shell middens
Boesch 103 STD-C Clifton	Tompkins Avenue and Staten Island Railroad	Woodland	Unknown
Boesch 108 Brady's Pond Grasmere	West side of Brady's Pond (Grasmere Lake)	Woodland	Camp
Boesch 111 STD-25-4	Shoreline of South Beach between lines of Sand Lane and Vulcan Street	Unknown precontact	Unknown
Boesch K STD-GA Garretsin's	Area roughly bounded by Richmond Road, Staten Island Railroad, Raritan Avenue and Dongan Hills Avenue	Unknown precontact	Unknown

There also have been a number of precontact and historic period archaeological sites recorded within one mile of the watershed boundaries, listed in the following table.

Site # and Name	Location	Time Period	Site Type
08501.000007 Fountain-Moquin House	Fort Wadsworth	Woodland Period, 1790-1907	House site with precontact component
Boesch 98 STD-VM Vanderbilt Mausoleum	Moravian Cemetery	Unknown precontact	Unknown
NYSM 7813	Large area near Clove Lake	Unknown precontact	Traces of occupation
NYSM 8480	Large area within Moravian Cemetery and Richmond County Country Club	Unknown precontact	Traces of occupation

Site # and Name	Location	Time Period	Site Type
Boesch 30 STD-TODT	Todt Hill	Unknown precontact	Unknown
Boesch 36 STD 24-4	Fort Wadsworth	Unknown precontact	Unknown
Boesch 45 Van-Deventer Fountain House	Fort Wadsworth	Middle-Late Woodland	Camp
Boesch 87 Midland Beach	Midland Beach	Unknown precontact	Unknown
Boesch 100 STD-RB Rosebank	Bay Street and Hylan Boulevard	Unknown precontact	Unknown
Boesch M STD-OT Ocean Terrace	South of Ocean Terrace near Basket Willow Swamp	Unknown precontact	Unknown

Several of the archaeological sites are located in close proximity to or overlapping the proposed BMP and outfall locations.

- There have been a number of precontact sites recorded near the proposed site of BMP SBE-1 and the proposed outfalls, including sites along the shoreline just southeast of the proposed BMP and within upland landforms northwest of the proposed BMP. No known precontact sites have been recorded within natural wetlands in this area, however.
- There have been a number of precontact sites recorded adjacent to Grasmere Lake, or Brady's Pond, just north of the proposed site of BMP SBE-2. NYSM Site 8473, which is mapped as a large and presumably imprecise area, overlaps this proposed BMP. NYSM Site 8477 is located just south of proposed BMP SBE-2.

In addition to the previously documented archaeological sites, there have been a number of archaeological surveys conducted within the overall watershed boundaries and within a one mile radius of the watershed, submitted to both the NYSOPRHP and the LPC. Several studies addressed beachfront resources along the south shore of Staten Island and South Beach (Lipson et al. 1978, JMA 1978, U.S.A.C.O.E. 1994, Panamerican Consultants 2005). The Panamerican 2005 study included large portions of the proposed site of BMP SBE-1, which at the time was labeled Pond 3. The report concluded that wetland areas were not sensitive for archaeological resources, and only recommended testing for any raised landforms within or adjacent to the pond. The Panamerica 2005 study also included field testing of areas on both sides of Father Capodanno Boulevard in the vicinity of the proposed outfalls. No archaeological sites were recorded in this area, and only a minor amount of historic artifacts were found in shovel tests, which were concluded to be not significant, A Phase I Archaeological study also was performed on Block 3500, Lot 34, immediately southeast of proposed BMP SBE-1A, but no archaeological resources were discovered during the field testing (Pickman 2008).

Additional archaeological resources studies have been conducted within a one mile radius of the South Beach Watershed, including several that extended along adjacent shoreline areas, and others located at Fort Wadsworth (Salwen et al. 1984; LBA 1985, 1990; NPS 1994). A large parcel just south of Seaview Avenue near Patterson Avenue and another parcel on Olympia Boulevard near Graham Boulevard also were investigated (Pickman 2006, 2007). No archaeological sites, other than those noted in the above table, have been recorded as a result of these surveys within the South Beach Watershed.

C. Historic Period Summary

South Beach Watershed Area

The South Beach Watershed includes the neighborhood of Oude Dorp, or Old Town, which was established near the shoreline southwest of what is now Fort Wadsworth along Old Town Road (now Olympia Boulevard) in the 1660s, and was the earliest historic period settlement within the watershed. Settlement later moved inland, to an area near

the original St. Mary's Cemetery on what is now Quintard Road (Leng and Davis 1930). Early roads within the watershed included Old Town Road, Richmond Road, and Fingerboard Road. Revolutionary War era maps, such as the 1780-1783 Anglo-Hessian Map, the 1781 Taylor and Skinner map, and McMillen's *A Map of Staten Island During the Revolution, 1775-1783* (1933) shows that at this time there was only sparse settlement within the overall watershed with structures located along or branching off from these major roads.

Mid nineteenth-century maps show that development in the watershed progressed slowly through 1860. The 1844 U.S.C.S. map shows that most of the watershed was still farmland or woodland, with only minimal development along major roads. The 1856 U.S.C.S. map (Figure 6) and the 1860 Walling map (Figure 7) confirm the lack of interior development within the watershed, with settlement concentrated along the major arteries. These maps also show the route of the Staten Island Railroad, which officially began service in 1860 from Clifton to Tottenville (Leng and Delavan 1924). The 1872 Dripps map (Figure 8) and the 1874 Beers map show that while creation of the railroad through the watershed had some impact on development, for the most part land continued to be divided into large parcels owned by a relatively small pool of residents, and that there continued to be few new roads or settlement clusters constructed within the area. The 1891 Bien and Vermeule map (Figure 9) shows conditions in the watershed just prior to consolidation with New York City, and indicates that while some additional roads had been built, much of the area was still sparsely developed.

Development within the South Beach Watershed increased after 1898, when Staten Island became part of New York City. In 1896 the Staten Island Electric Railroad Company had extended tracks from Clifton to South Beach, and in 1902 a connector railroad line, known as the Southfield Beach Railroad, opened along the shoreline from the South Beach Station to Midland Beach (Leng and Davis 1930). Beach communities, including hotels, cottages, and amusement areas were built along the South Beach shoreline during this period. The 1907 Robinson map and the 1917 Bromley map show that new cluster developments were planned as a city grid was projected over the area. However, many of these city streets remained paper roads well into the twentieth century. Aerial photographs show that it was not until the second half of the twentieth century that much of the South Beach Watershed area was more fully developed.

BMP SBE-1A, 1B, and 1C and Proposed Outfalls

A review of historic maps indicates that the proposed sites of BMP SBE-1A, 1B, and 1C have been primarily undeveloped marshland over time, and the proposed outfall locations have been marshland and beach. Eighteenth-century maps (Anglo-Hessian 1780-1783, Taylor and Skinner 1783, McMillen 1933) all show the area southeast of Old Town Road (now Olympia Boulevard in this area) and south of Sand Lane as undeveloped and marshy. What is now a branch of New Creek was once called Old Creek, and originally had an outlet near Fort Wadsworth. The line of this creek is shown running along the shoreline of what is now South Beach, at the southeastern boundary of the proposed BMPs. Marshlands are shown surrounding this creek, and the proposed sites of BMP SBE-1A, 1B, and 1C fall within this area.

By the mid-nineteenth century, maps had become more precise. The 1856 U.S.C.S. map (Figure 6) in particular shows that the proposed sites of BMP SBE-1A, 1B, and 1C were primarily marshland, but that there were also an area of slightly higher ground at the northwest corner of proposed BMP SBE-1A, at the approximate intersection of modern day Vulcan Street and Pearsall Street. The proposed outfall locations spanned the marshland and the beach. The 1860 Walling map (Figure 7) indicates the proposed sites of the BMPs and the outfalls were still completely undeveloped. Similar conditions are shown on the 1872 Dripps map (Figure 8) and the 1874 Beers map, both of which indicate that the proposed sites of the BMPs and the sites of the proposed outfalls were owned by Dwight Townsend. The 1874 map showed the same area of slightly higher ground at the northwest corner of the proposed site of BMP SBE-1A, as well as an unimproved roadway leading through the marshland from Old Town Road (then labeled an extension of Fingerboard Road) to the shore. The 1887 Beers map update showed much of the same information as the 1874 map, other than a change in ownership: the proposed sites of the BMPs and the outfalls were now attributed to "Hodges."

Topographical maps made in the 1890s (Bien and Vermeule 1891 [Figure 9]) further show that the proposed sites of BMP SBE-1A, 1B, and 1C, like most of the marshy areas in the region, were crossed by a series of drainage ditches that channeled water into the natural creeks of the area. These maps also showed the general locations of raised land, or hummocks, within and adjacent to the marshes. The same area of raised land from earlier maps is shown at

the northwest corner of the proposed site of BMP SBE-1A on the 1891 map. The proposed outfall locations spanned the marshes and the beach, crossing a roadway that passed along the shoreline. The 1911 Borough of Richmond Topographical Survey map (Figure 10a), which remains one of the most detailed series of maps made of Staten Island to date, gives remarkable clarity concerning the topographical features within the proposed sites of BMP SBE-1A, 1B, and 1C, as well as the proposed outfall sites. The area along the northwestern side of the proposed site of BMP SBE-1A is shown to be raised above the marshland, and the drainage ditches are clearly shown within the marshy areas. Both the creek and the newly built railroad lines are shown as well, although there are no structures shown in any of the proposed BMP footprints. The proposed outfalls are shown crossing the marshes, Seaside Boulevard, and a boardwalk along the shoreline. However, the proposed outfall sites were not located in areas covered by any beachfront structures.

Atlases made during the first decades of the twentieth century (e.g. Robinson 1907, Bromley 1917) show the routes of the Staten Island Electric Railroad, which terminated at a station just north of the proposed site of BMP SBE-1B, and the Southfield Beach Railroad, which ran through the shoreward side of all three of the proposed BMPs. In 1907, land surrounding the railroad tracks was attributed to the Staten Island Beach Land and Improvement Company, and land within the remainder of the proposed BMP footprints was attributed to the Heirs of Mrs. A.F. Cameron. By 1917, land ownership within the proposed BMPs had begun to be divided between additional individuals. By this time as well, Seaside Boulevard had been laid out, along the route of what is now Father Capodanno Boulevard, and small beach houses had been built along the western side of the roadway, several of which fell within the present footprint of the proposed site of BMP SBE-1B. The 1917 Bromley map, as well as the 1937 Sanborn map, show that the entire shoreline of South Beach, just east of the proposed BMP footprints, was teeming with beachfront structures, including hotels, bath houses, and amusement rides by this time. The proposed BMPs, themselves, however, showed no development other than the structures along Seaside Boulevard and the railroad tracks. The proposed new outfall location, as well, does not appear to be within an area that was developed with large structures on the 1917 Bromley map or the 1937 Sanborn map. The proposed supplemental outfall locations may cross areas where former structures were situated.

During the second quarter of the twentieth century, the first concerted development in the vicinity of the proposed site of BMP SBE-1A, 1B, and 1C began to occur. The 1924 New York City Bureau of Engineering aerial photograph shows that by this time, roads had begun to extend south from Olympia Boulevard, including Wentworth Avenue, Andrews Street, McLaughlin Street, and Pearsall Street, terminating at the approximate western limits of the proposed site of BMP SBE-1A and 1B. Some structures had been built along these roads, although no new structures were shown within the BMP footprints. The 1937 Sanborn map, however, showed that some of these streets had been extended into the proposed BMP footprints, and that there were several small houses that had been built on them. The proposed site of BMP SBE-1A had a house on Block 3413, off of Vulcan Street, which was shown to be open but unpaved, and the proposed site of BMP-SBE-1B had a house on Block 3414, off of Andrew Street. There were also a cluster of houses on Block 3500, at the corner of Vulcan Street and Seaside Boulevard, which were immediately adjacent to the footprint of the proposed site of BMP SBE-1A. Little to no change was shown on the 1951 Sanborn map update. Aerial photographs (1966 and 1980) from the second half of the twentieth century (available on www.historicaerials.com) show that over time the few structures within the proposed BMP footprints were demolished, the railroad tracks were abandoned and wetlands were allowed to reclaim much of the area. The beachfront attractions in the vicinity of the proposed outfall locations also had been demolished by the second half of the twentieth century.

BMP SBE-2A, 2B, and 2C

The proposed sites of BMPs SBE-2A, 2B, and 2C are located around the edges of Cameron's Lake, which is a glacially carved pond located on land once owned by the Cameron family. Leng and Davis (1930) note that the Cameron home, located on the Fingerboard Road well to the east of the proposed BMPs, was in a park-like setting, and the pond used for ice skating in the winter. Other names for the pond were Van Wagenen's Pond and Woodside Lake. The Fingerboard Road was one of the area's earliest roads, dating to about 1705 (Leng and Davis 1930) and is shown on eighteenth-century maps (Anglo-Hessian 1780-1783, Taylor and Skinner 1783, McMillen 1933). Cameron's Lake, although presumably in existence, did not appear on these early maps, however.

The first historic map to indicate Cameron's Lake was the 1856 U.S.C.S. map (Figure 6), which indicates a similar shape for the pond as is known today, suggesting that there has been relatively little change in its boundaries over

time. Other nineteenth-century maps, such as the 1860 Walling map (Figure 7) and the 1872 Dripps map (Figure 8) do not locate the pond as accurately or indicate its name. Both the 1874 and 1887 Beers maps label the pond Woodside Lake. The 1887 map clarifies that the land surrounding the pond was still owned by the Cameron family. None of these maps indicate any development surrounding the pond. Topographical maps made in the 1890s (Bien and Vermeule 1891 [Figure 9]), as well as the 1911 Borough of Richmond Topographical Survey map (Figure 10b), show the placement of the lake south of the Fingerboard Road, surrounded by undeveloped land. The 1907 Robinson map and the 1917 Bromley map show similar conditions, and note that the property still remained in the Cameron family. The 1924 New York City Bureau of Engineering aerial photograph indicates that the area surrounding the lake remained wooded and undeveloped.

By the 1930s, the first streets had begun to be laid out surrounding Cameron's Lake. The 1937 Sanborn map shows that Clove, Windermere, Allendale, and Normalee Roads were all in place by this time, and a few houses had been built on Clove, Allendale, and Normalee Roads, in proximity to the lake. An additional house had been built on Allendale Road by the 1951 Sanborn update, but otherwise there was little change shown. Aerial photographs (1966 and 1980) from the second half of the twentieth century (available on www.historicaerials.com) show that over time additional houses have been built on streets surrounding the lake.

BMP SBE-3

The proposed site of BMP SBE-3 is located in an area that appears to have remained undeveloped for most of its history. None of the historic maps from the eighteenth century through the nineteenth century show any development on this parcel (Anglo-Hessian 1780-1783, Taylor and Skinner 1783, McMillen 1933, U.S.C.S. 1856 [Figure 6], Walling 1860 [Figure 7], Dripps 1872 [Figure 8], Beers 1874, 1887, Bien and Vermeule 1891 map [Figure 9]). Most of the maps give little details as to the site-specific conditions of the proposed BMP, although the 1891 Bien and Vermuele map (Figure 9) does note that this area was marshy.

During the early twentieth century, the first structures were built in the proposed BMP vicinity, on the south side of the Fingerboard Road, and on the east side of Marie Street. The Fingerboard Road had been laid out since the early eighteenth century, but Marie Street appears to date to the early twentieth century. Whitney Avenue, which passes through the middle of the proposed BMP, was laid out by the early twentieth century as well. It appears on the 1907 Robinson map, the 1911 Borough of Richmond topographical map (Figure 10b), and the 1917 Bromley map. The 1911 map shows that the proposed BMP footprint included the roadbed of Whitney Avenue, a low-lying marshy area, and a more level landform south of Whitney Avenue. The 1924 aerial photograph confirms that other than the Whitney Avenue roadbed, the proposed BMP remained devoid of structures at this time. The 1937 and 1951 Sanborn maps indicate that Whitney Avenue was "not opened" in the proposed BMP footprint area and the remainder of the proposed BMP was still undeveloped. Aerial photographs from 1966, 1980, and 2004 (available on www.historicaerials.com) show that the proposed BMP has remained undeveloped and wooded.

V. CONCLUSIONS

A. Precontact Archaeological Sensitivity and Disturbance Record

From what is known of precontact period settlement patterns on Staten Island, most habitation and processing sites are found in sheltered, elevated sites close to wetland features, major waterways, and with nearby sources of fresh water. The following discussion addresses the general precontact archaeological sensitivity for the South Beach Watershed and site-specific sensitivity for each of the proposed BMP locations.

South Beach Watershed Area

The South Beach Watershed has had several precontact archaeological sites recorded within its boundaries, generally concentrated in areas closest to natural water features. However, much of the watershed has never been systematically surveyed for precontact archaeological resources and so survival of as of yet undiscovered sites is unknown. Boesch (1994), in his study of precontact archaeological sensitivity for Staten Island, has assigned a high archaeological sensitivity to areas of the watershed surrounding Grasmere Lake, Cameron's Lake, and several other discrete locations, and a moderate sensitivity to areas north of Hylan Boulevard and Sand Lane, and west of

Richmond Road. Boesch assigns no, or low precontact archaeological sensitivity in the remaining areas of the watershed.

Boesch's study of precontact archaeological sensitivity does not take into account the level of ground disturbance in any given location, which may have destroyed or compromised the integrity of any extant precontact archaeological resources. Disturbance across the South Beach Watershed obviously varies according to the level of development and earthmoving that has occurred at any given spot, and would need to be assessed on an individual basis according to site-specific conditions. At this time, there are no additional BMPs defined for the South Beach Watershed; any further consideration of new sites as part of this project would need to be addressed separately.

BMP SBE-1A

The proposed site of BMP SBE-1A is in an area that the NYSOPRHP GIS indicates is sensitive for archaeological resources, based on proximity to previously recorded sites, but that the Boesch (1994) study says has no precontact archaeological sensitivity. The Panamerican Phase I study that included this proposed BMP concluded that wetland areas were not sensitive for archaeological resources, and only recommended testing for any raised landforms within or adjacent to the ponds. HPI concurs with this assessment.

Based on review of historic maps (e.g. Borough of Richmond 1911 [Figure 10a]), it appears that the only portion of the proposed site of BMP SBE-1A that once contained naturally raised landforms, or hummocks, overlooking the wetlands, was the portion at the approximate intersection of Vulcan Avenue and Mallory Avenue. However, review of the soil borings within this proposed BMP (LBA 2007), coupled with the modern topographical map (Figure 4a) and the site visit results, suggests that natural soils above the water table in this particular area have been disturbed from grading and filling, and therefore this area is no longer sensitive for precontact archaeological resources.

BMP SBE-1B

The proposed site of BMP SBE-1B also is in an area that the NYSOPRHP GIS indicates is sensitive for archaeological resources, based on proximity to previously recorded sites, but that the Boesch (1994) study says has no precontact archaeological sensitivity. The Panamerican Phase I study that included this proposed BMP concluded that wetland areas were not sensitive for archaeological resources, and only recommended testing for any raised landforms within or adjacent to the ponds. HPI concurs with this assessment.

Based on review of historic maps (e.g. Borough of Richmond 1911 [Figure 10a]), it appears that the proposed site of BMP SBE-1B was within wetlands and there were no raised landforms, or hummocks, within its footprint, other than the raised track bed for the railroad that was built in the early twentieth century. Therefore, HPI concludes that this proposed BMP does not possess precontact archaeological sensitivity.

BMP SBE-1C

The proposed site of BMP SBE-1C is also in an area that the NYSOPRHP GIS indicates is sensitive for archaeological resources, based on proximity to previously recorded sites, but that the Boesch (1994) study says has no precontact archaeological sensitivity. The Panamerican Phase I study that included this proposed BMP concluded that wetland areas were not sensitive for archaeological resources, and only recommended testing for any raised landforms within or adjacent to the ponds. HPI concurs with this assessment.

Based on review of historic maps (e.g. Borough of Richmond 1911 [Figure 10a]), it appears this proposed BMP was within wetlands and there were no raised landforms, or hummocks, within its footprint, other than the raised track bed for the railroad that was built in the early twentieth century. Therefore, HPI concludes that this proposed BMP does not possess precontact archaeological sensitivity.

Proposed Outfall Sites

The proposed new outfall site is located just east of the proposed site of BMP SBE-1C and the proposed supplemental outfalls are located within Ocean Breeze Park and along the line of Sand Lane, adjacent to existing outfalls. These locations are an area that the NYSOPRHP GIS indicates is sensitive for archaeological resources,

based on proximity to previously recorded sites. However, the Boesch (1994) study concluded that the proposed outfall sites have no precontact archaeological sensitivity. The Panamerican Phase I study that included portions of the proposed outfall locations concluded from field testing that there were no archaeological sites within this area.

BMP SBE-2A

The proposed site of BMP SBE-2A is in an area that both the NYSOPRHP GIS and the Boesch (1994) study indicate has a high sensitivity for precontact archaeological resources. Several precontact sites have been recorded in close proximity to this location, and the proposed BMP is located on the banks of and partially within a natural lake. However, the portion of the proposed BMP on firm ground is quite sloped, and appears disturbed from nearby road construction. Therefore, HPI concludes that this proposed BMP does not possess precontact archaeological sensitivity.

BMP SBE-2B

The proposed site of BMP SBE-2B is also in an area that both the NYSOPRHP GIS and the Boesch (1994) study indicate has a high sensitivity for precontact archaeological resources. Several precontact sites have been recorded in close proximity to this location, and the proposed BMP is located on the banks of and partially within a natural lake. However, the portion of the proposed BMP on firm ground is sloped, and appears disturbed from nearby storm sewer and road construction. Therefore, HPI concludes that this proposed BMP does not possess precontact archaeological sensitivity.

BMP SBE-2C

The proposed site of BMP SBE-2C is also in an area that both the NYSOPRHP GIS and the Boesch (1994) study indicate has a high sensitivity for precontact archaeological resources. Several precontact sites have been recorded in close proximity to this location, and the proposed BMP is located on the banks of and partially within a natural lake. The portion of the proposed BMP on firm ground appears relatively level, has well drained soils, and appears to be relatively undisturbed, although ground cover at the time of the field survey made confirmation difficult. Based on the unknown degree of disturbance here, HPI concludes that the portion of this proposed BMP on firm ground has a moderate precontact archaeological sensitivity, as shown on Figure 11. The portion of the proposed BMP within the water has minimal sensitivity.

BMP SBE-3

The proposed site of BMP SBE-3 is in an area that the NYSOPRHP GIS indicates is sensitive for archaeological resources, based on proximity to previously recorded sites, but that the Boesch (1994) study says has no precontact archaeological sensitivity. Based on review of historic maps (e.g. Bien and Vermeule 1891 [Figure 9]; Borough of Richmond 1911 [Figure 10a]), in its natural state this proposed BMP had a low-lying and probably marshy landform. The field visit confirmed some wetlands vegetation, suggesting the area is still poorly drained. Heavy disturbance to the ground surface was evident during the field visit as well. Based on these factors, HPI concludes that this proposed BMP does not possess precontact archaeological sensitivity.

B. Historic Period Archaeological Sensitivity and Disturbance Record

South Beach Watershed

The South Beach Watershed has had few historic period archaeological resources recorded within its boundaries, the exception being the resources associated with Oude Dorp located near the southwestern edge of Fort Wadsworth. However, much of the watershed has never been systematically surveyed for historic period archaeological resources and so survival of as of yet undiscovered sites is unknown. Historic period archaeological sites are most likely to be found in proximity to early roadways, such as Old Town Road, Richmond Road, and Fingerboard Road, and in areas where historic maps show development. It is less likely that historic period archaeological resources would be found in areas that were not settled during the historic era. The possibility that any such sites have survived is dependent on the level of disturbance to the potential resources. Disturbance across the South Beach

Watershed obviously varies according to the level of development and earthmoving that has occurred at any given spot, and would need to be assessed on an individual basis according to site-specific conditions.

BMP SBE-1A, SBE-1B, and SBE-1C

The proposed sites of these BMPs have never had any historic period development within or immediately adjacent to their boundaries. HPI concludes that these proposed BMPs possess no historic period archaeological sensitivity.

Proposed Outfall Sites

The proposed outfall sites cross areas that were developed with roadways and a boardwalk during the late nineteenth and twentieth centuries. The proposed new outfall area appears to have never had any significant structures. The proposed supplemental outfalls may traverse areas that contained twentieth-century structures. The beachfront development in this general area dated to the early to mid-twentieth century. Field testing of this area by Panamerican in 2005 determined that there were no intact archaeological resources here. HPI therefore concludes that the proposed outfall corridors possess no historic period archaeological sensitivity.

BMP SBE-2A, SBE-2B, and SBE-2C

The proposed sites of these BMPs have never had any historic period development within or immediately adjacent to their boundaries. HPI concludes that these proposed BMPs possess no historic period archaeological sensitivity.

BMP SBE-3

The proposed site of this BMP has never had any historic period development within or immediately adjacent to its boundaries. HPI concludes that this proposed BMP possesses no historic period archaeological sensitivity.

VI. RECOMMENDATIONS

Based on these conclusions, HPI recommends that a program of Phase IB archaeological testing be conducted on the portion of the proposed site BMP SBE-2C on firm ground designated as having a moderate archaeological sensitivity for precontact resources, as shown in Figure 11, if this area will experience subsurface impacts as part of the BMP construction. All archaeological testing should be conducted according to applicable archaeological standards (New York Archaeological Council 1994, NYSOPRHP 2005; LPC 2002; CEQR 2010). Professional archaeologists, with an understanding of and experience in urban archaeological excavation techniques, would be required to be part of the archaeological team.

No further archaeological investigations are recommended for the proposed sites of BMP SBE-1A, SBE-1B, SBE-1C, SBE-2A, SBE-2B, or SBE-3, or for the proposed outfall sites.

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11.4.10

Figure 1: South Beach Watershed and BMP Locations.

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Staten Island Bluebelt, Mid-Island of Staten Island's South Shore
South Beach Watershed
Phase IA Archaeological Documentary Study

Figure 2: South Beach Watershed and BMP Locations on *The Narrows, N.Y.-N.J.* 7.5 Minute Topographic Quadrangle (U.S.G.S. 1981).

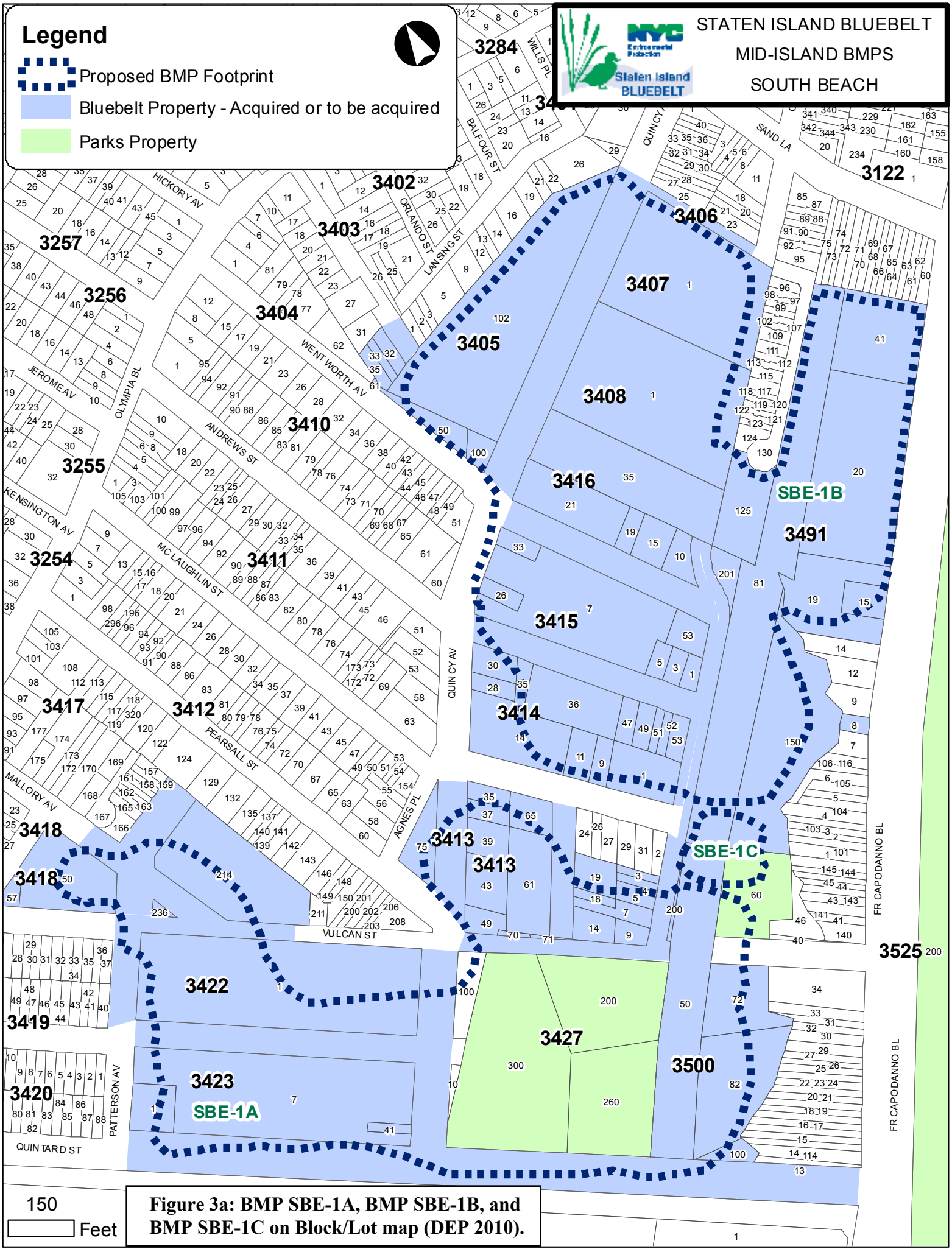


Figure 3a: BMP SBE-1A, BMP SBE-1B, and BMP SBE-1C on Block/Lot map (DEP 2010).

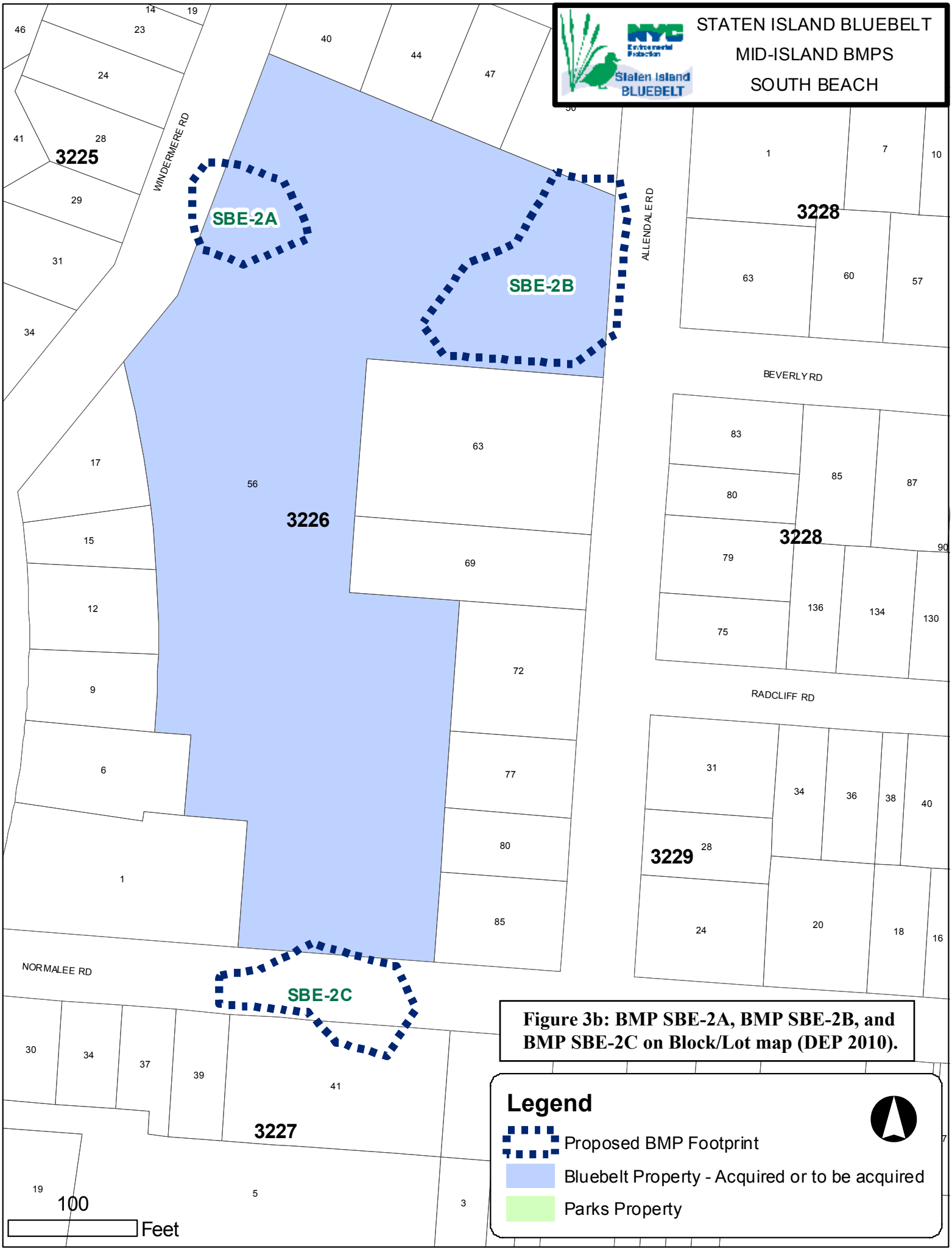


Figure 3b: BMP SBE-2A, BMP SBE-2B, and BMP SBE-2C on Block/Lot map (DEP 2010).

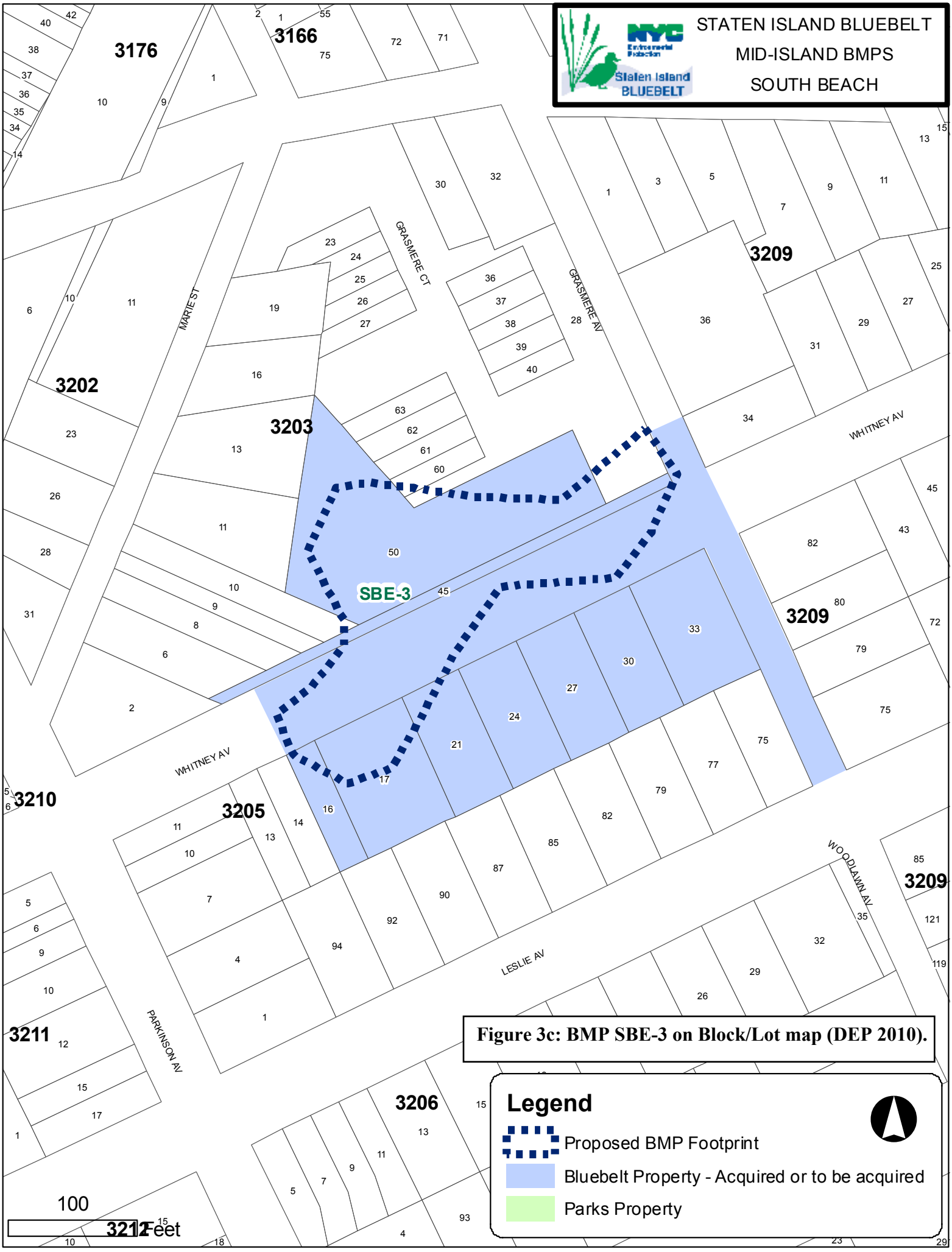


Figure 3c: BMP SBE-3 on Block/Lot map (DEP 2010).

Area of Disturbance
South Beach
SBE-1A, B, and C

Legend

- Contour Lines (NAVD)
- Roads
- Structures
- BMP Area of Disturbance
- Streams

SBE-1A

SBE-1B

SBE-1C

1 Photographs and orientations

Existing outfall

New outfall

Existing outfall

0 125 250 500 Feet

N

Figure 4a: BMP SBE-1A, SBE-1B. and SBE-1C Locations and Photographs on Existing Conditions Map (Hazen and Sawyer 2011).

Figure 4b: BMP SBE-2A, SBE-2B. and SBE-2C Locations and Photographs on Existing Conditions Map (Hazen and Sawyer 2011).

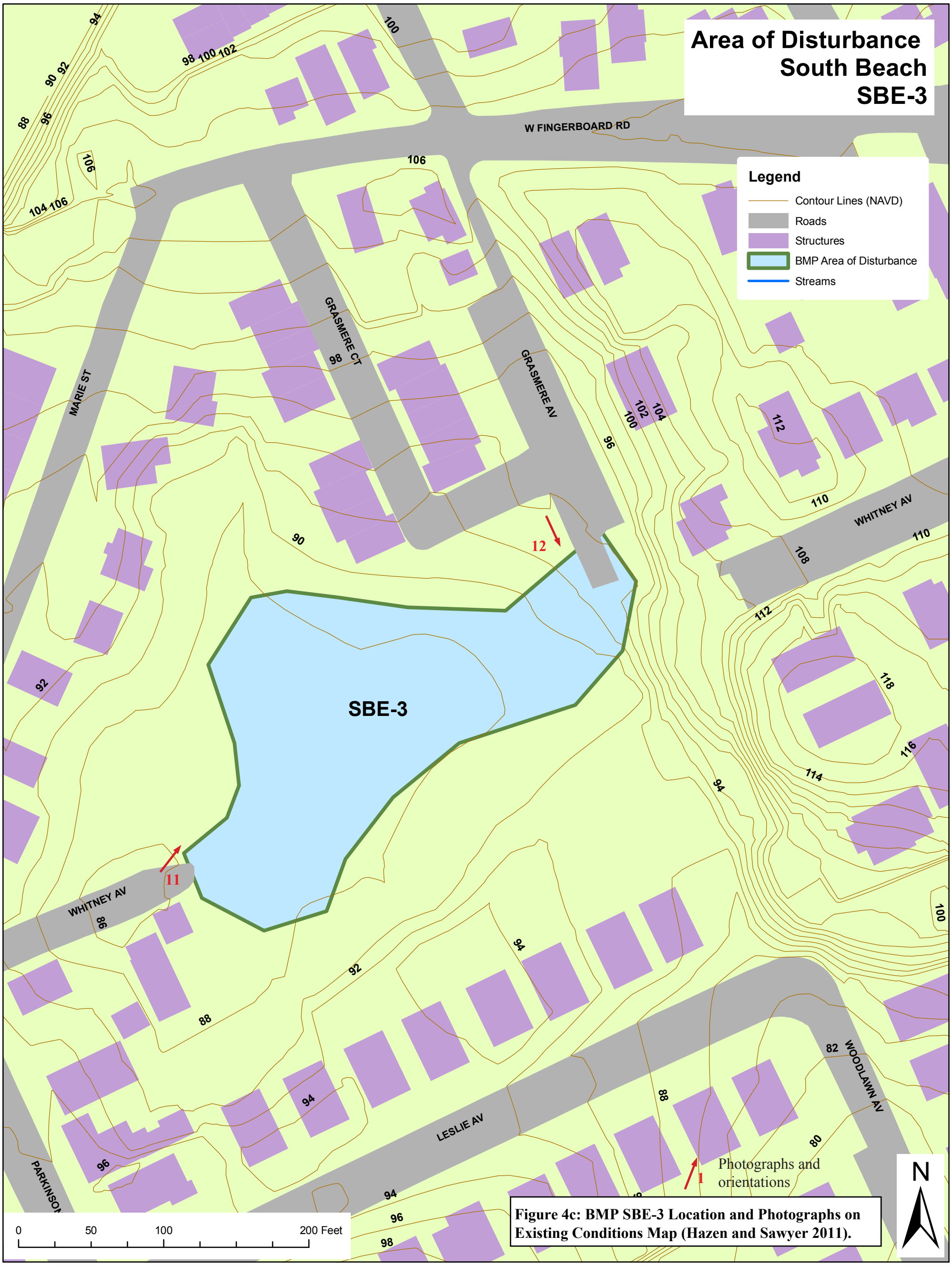
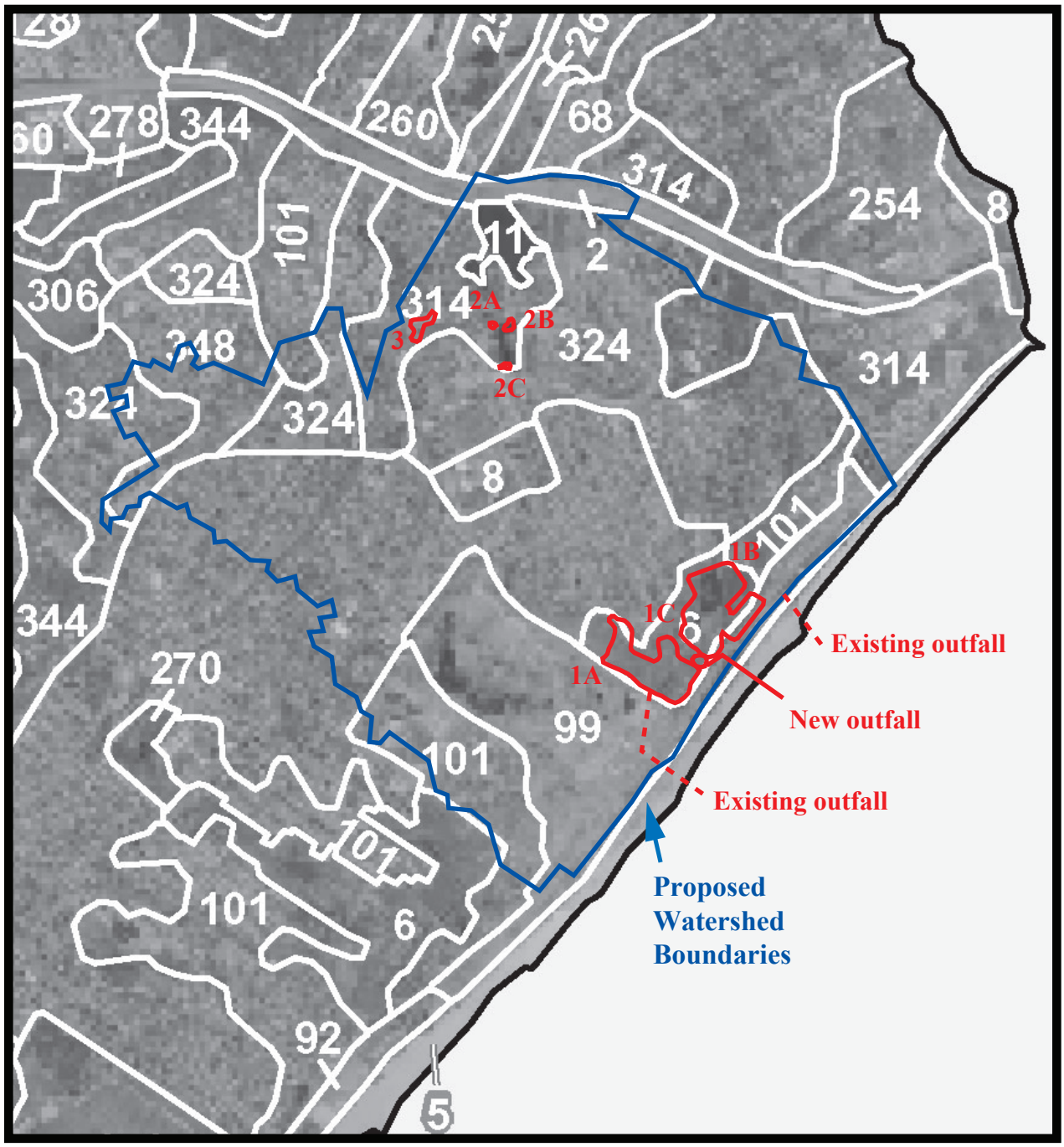


Figure 4c: BMP SBE-3 Location and Photographs on Existing Conditions Map (Hazen and Sawyer 2011).



New York City Department of Environmental Protection
Staten Island Bluebelt, Mid-Island of Staten Island's South Shore
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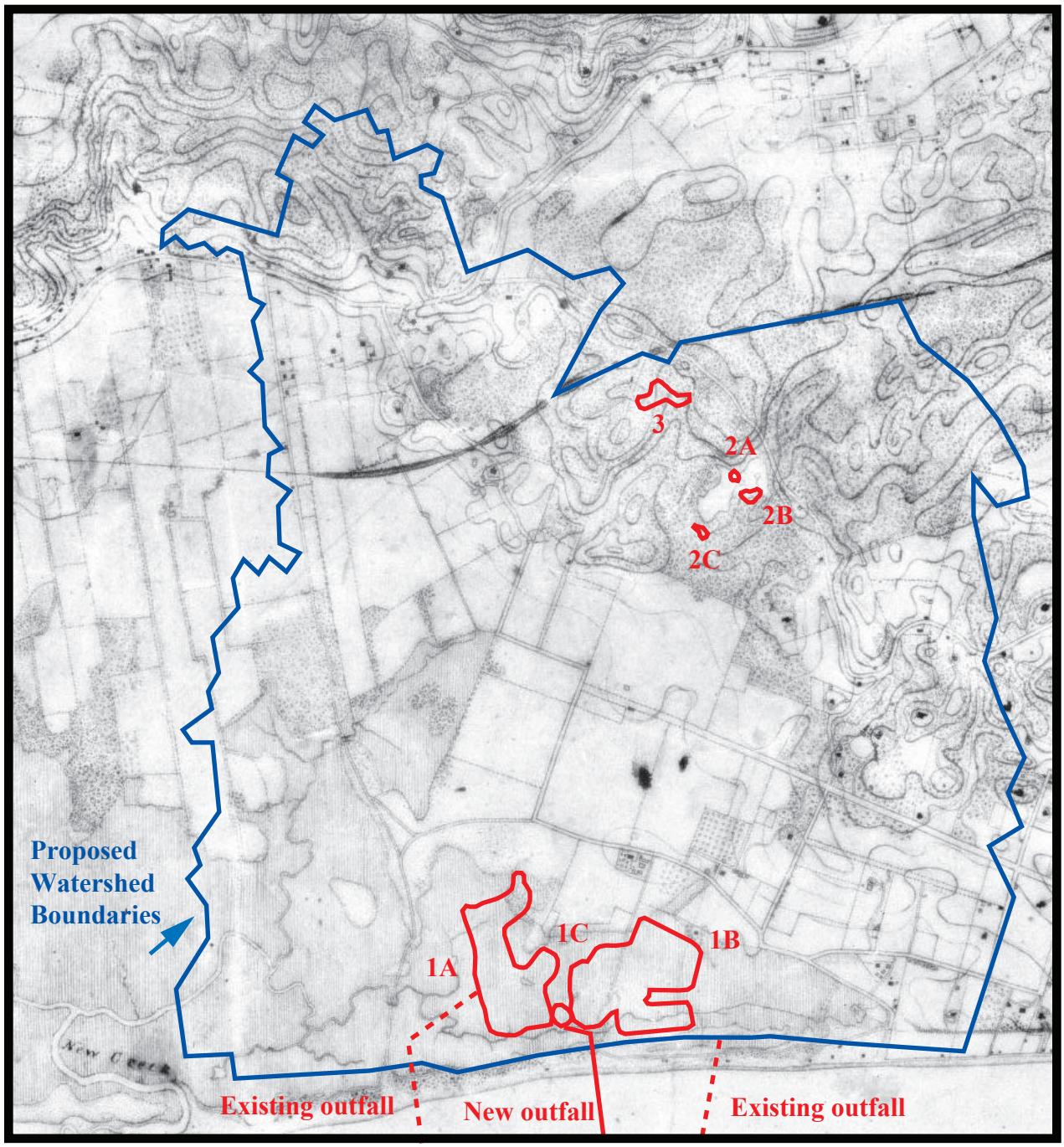
Phase IA Archaeological Documentary Study

N

Figure 5: South Beach Watershed and BMP Locations on *New York City Reconnaissance Soil Survey* (U.S.D.A. 2005).

0 2000 3000 4000 5000 6000 FEET



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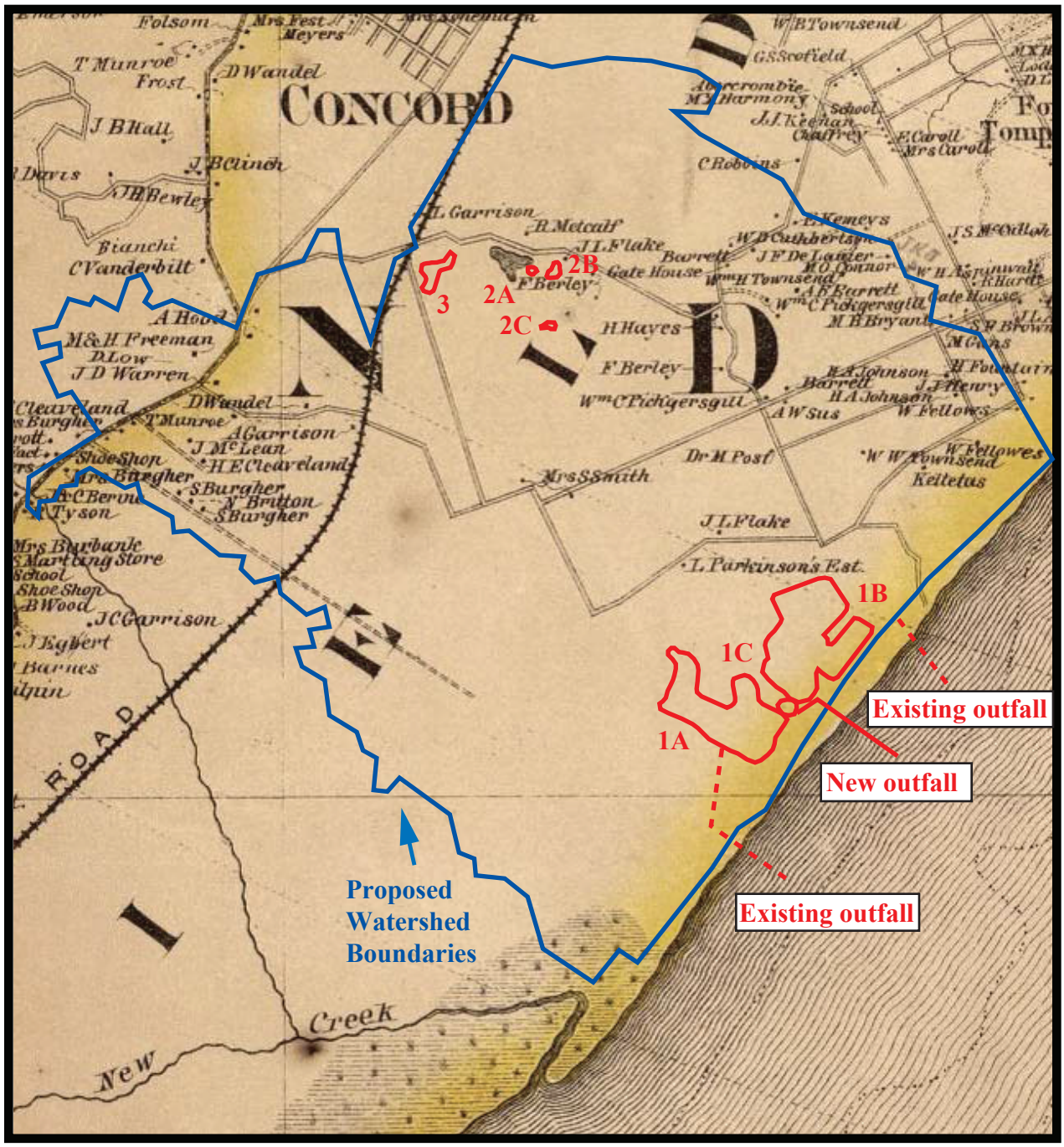
South Beach Watershed
Phase IA Archaeological Documentary Study

Figure 6: South Beach Watershed and BMP Locations on *Staten Island From New Brighton to Great Kills* (U.S.C.S. 1856).



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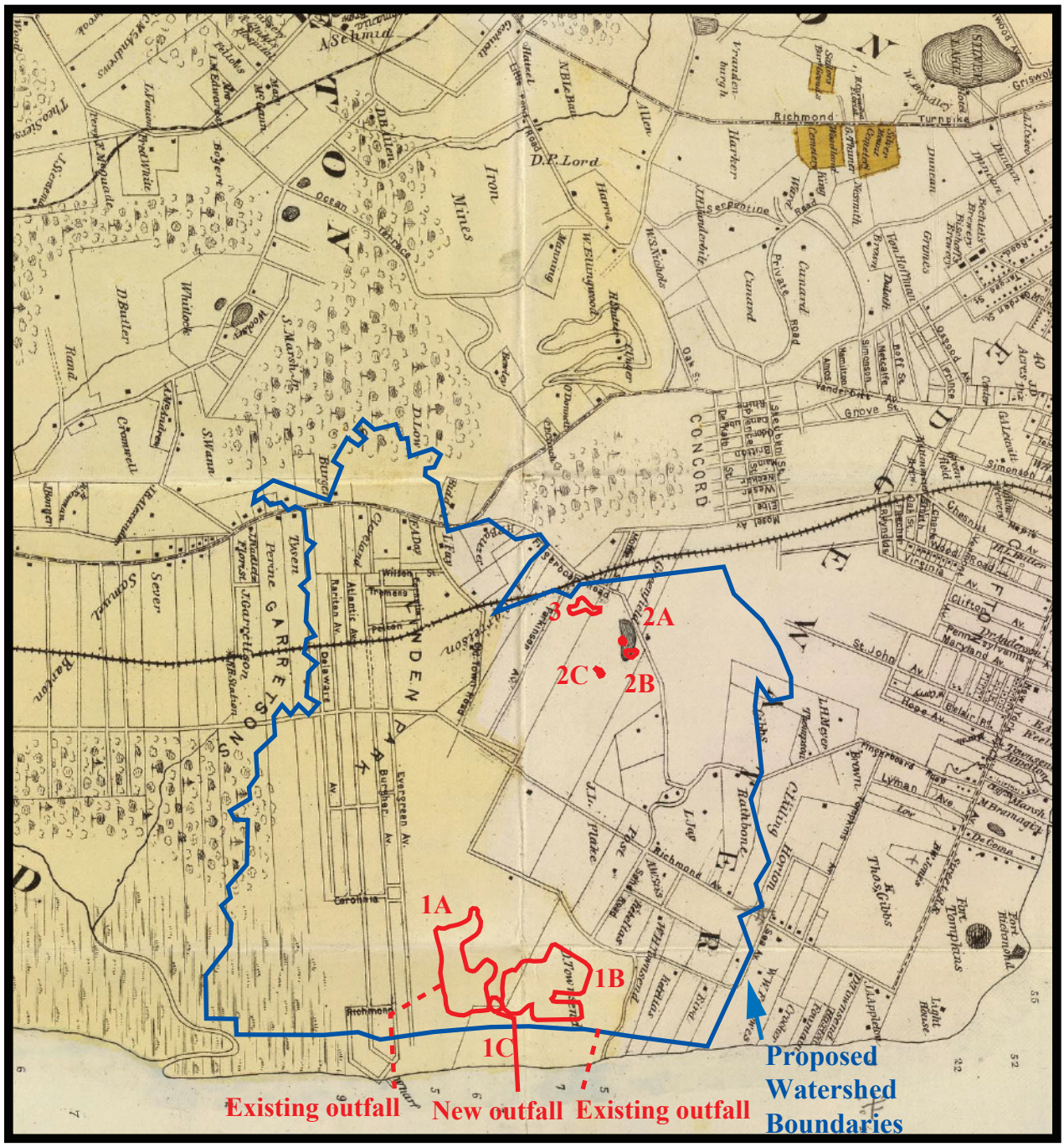
Staten Island Bluebelt, Mid-Island of Staten Island's South Shore
South Beach Watershed
Phase IA Archaeological Documentary Study

N

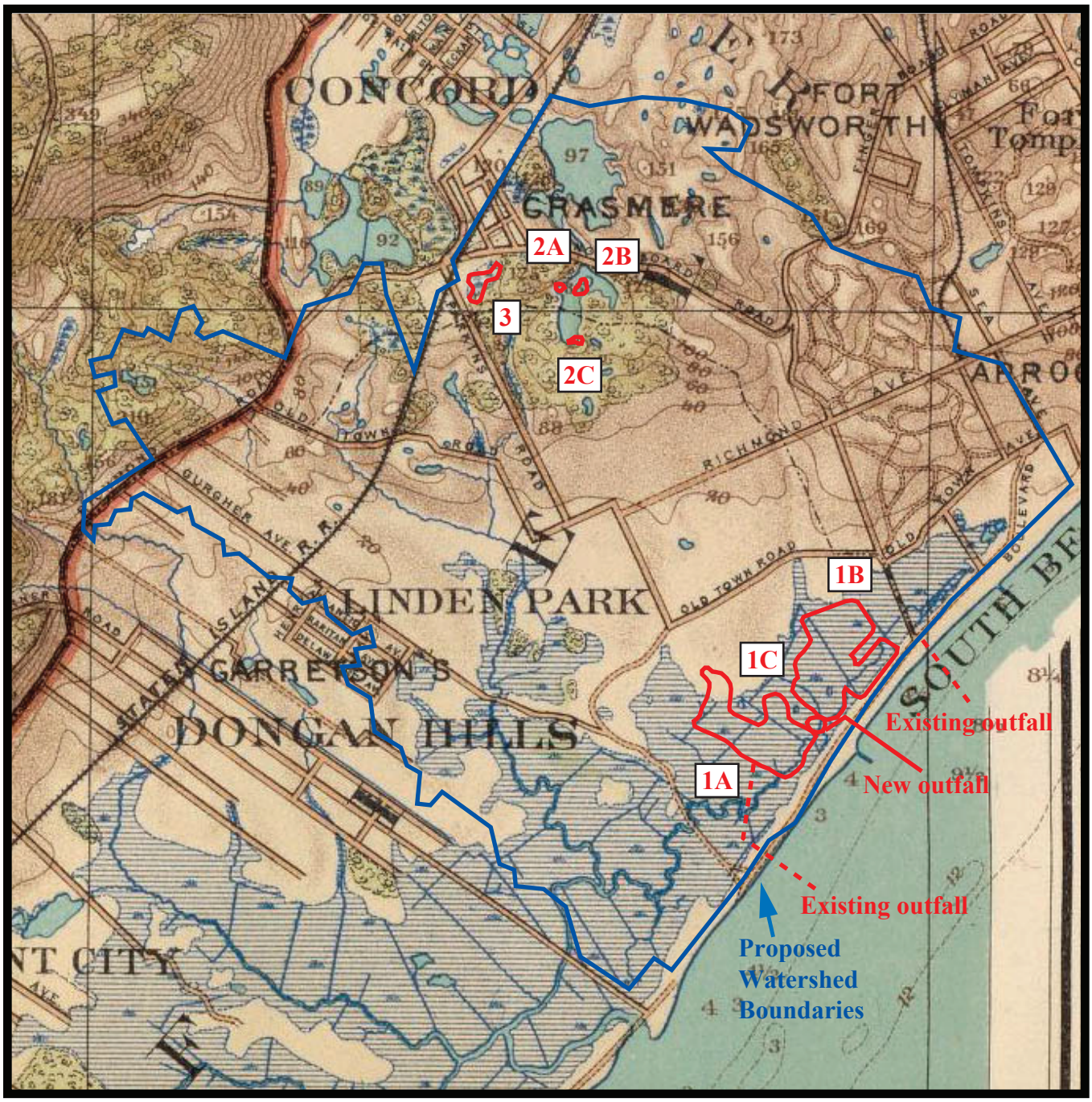
Figure 7: South Beach Watershed and BMP Locations on *Map of the City Of New-York and Its Environs from Actual Surveys* (Walling 1860).

0 1000 2000 3000 4000 5000 FEET



New York City Department of Environmental Protection
Staten Island Bluebelt, Mid-Island of Staten Island's South Shore
South Beach Watershed
Phase IA Archaeological Documentary Study

Figure 8: South Beach Watershed and BMP Locations on *Map of Staten Island, Richmond County, New York* (Dripps 1872).



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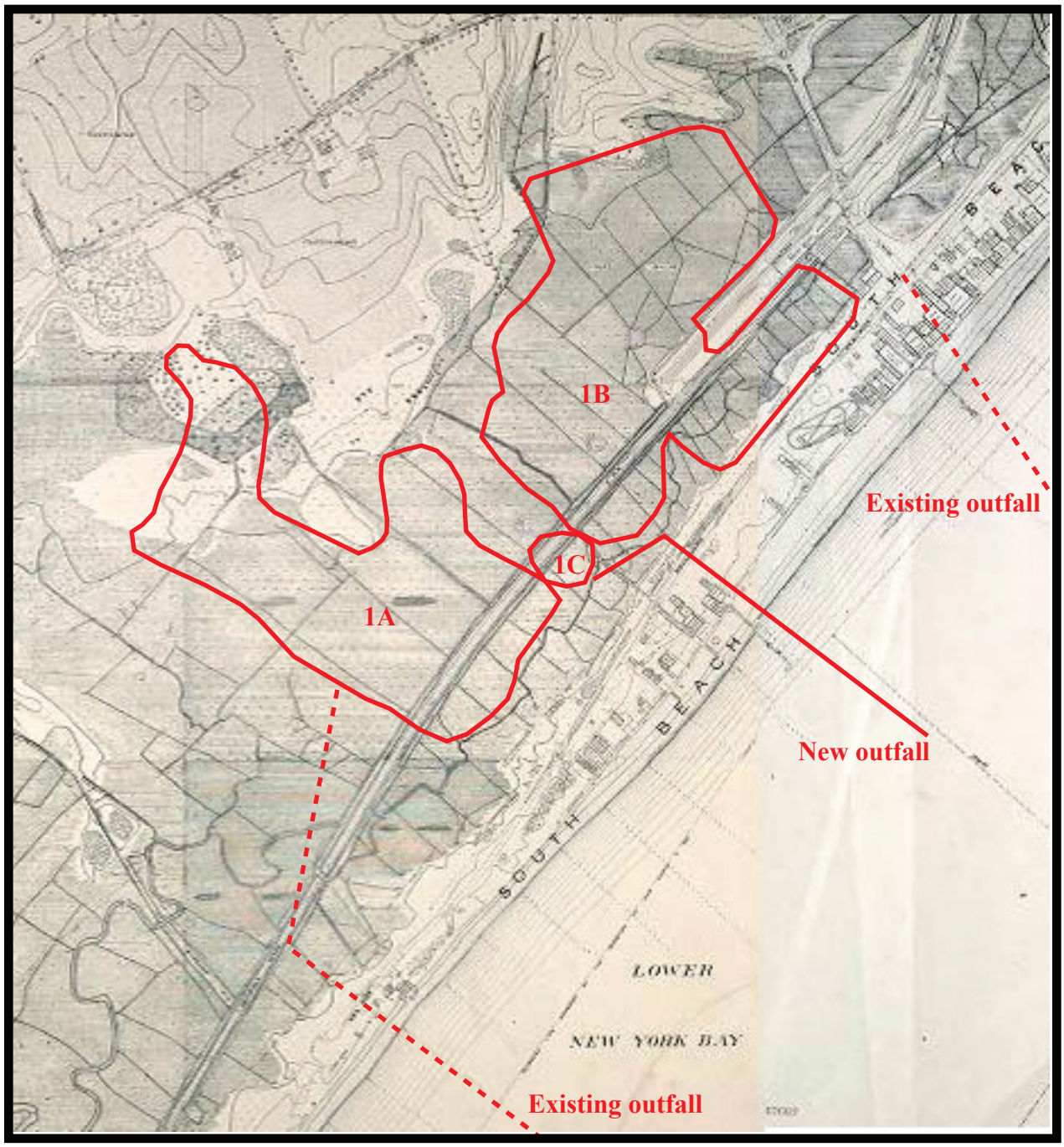
Staten Island Bluebelt, Mid-Island of Staten Island's South Shore
South Beach Watershed
Phase IA Archaeological Documentary Study

Figure 9: South Beach Watershed and BMP Locations on *Atlas of the Metropolitan District and adjacent country...* (Bien and Vermuele 1891).

0 1000 2000 3000 4000 5000 FEET



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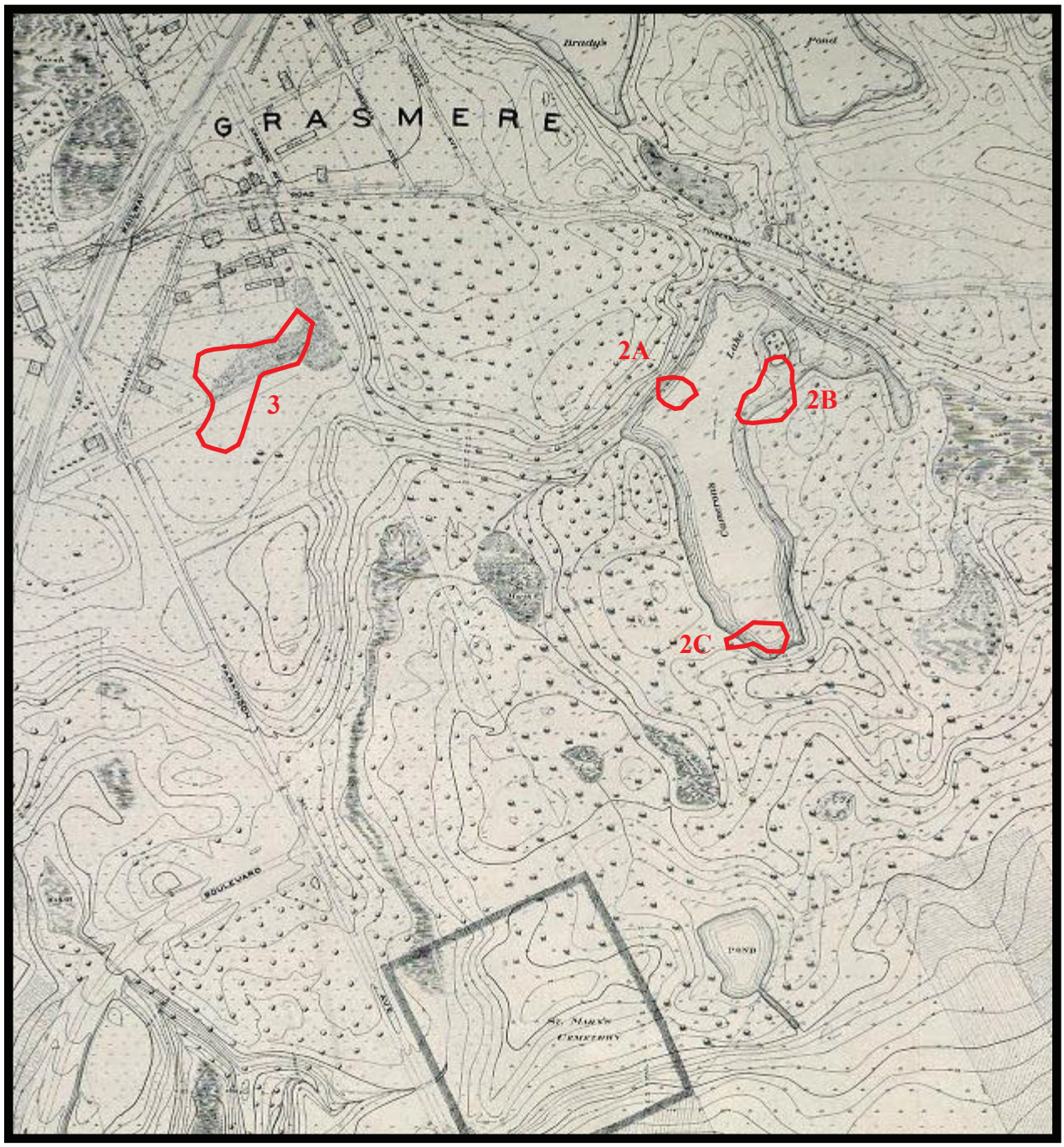
South Beach Watershed
Phase IA Archaeological Documentary Study

N

Figure 10a: BMP SBE-1A, BMP SBE-1B and BMP SBE-1C on *Borough of Richmond Topographical Survey*, Sheets 49 and 50 (Borough of Richmond 1911).

0 200 400 600 800 1000 FEET



New York City Department of Environmental Protection
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N

Figure 10b: BMP SBE-2A, BMP SBE 2B, BMP SBE 2C and BMP SBE 3 on *Borough of Richmond Topographical Survey*, Sheet 41 (Borough of Richmond 1911).

0 200 400 600 800 1000 FEET

Figure 11: BMP SBE-2C showing area of archaeological sensitivity (Hazen and Sawyer 2011).

Photograph 1: SBE-1A, from Ocean Breeze Park, view to the northeast.

Photograph 2: SBE-1A, Vulcan Street, view to the south.

Photograph 3: SBE-1B, McLaughlin Street, view to the east.

Photograph 4: SBE-1B, Quincy Avenue, view to the south.

Photograph 5: SBE-1B, Father Capodanno Boulevard, view to the northwest.

Photograph 6: SBE-1C, view to the east.

Photograph 7: SBE-2A, view to the south.

Photograph 8: SBE-2B, view to the northwest.

Photograph 9: SBE-2B, view to the northwest.

Photograph 10: SBE-2C, view to the southeast.

Photograph 11: SBE-3, from Whitney Avenue, view to the northeast.

Photograph 12: SBE-3, from Woodlawn Avenue, view to the south.

Appendix A: Block and Lot Data

BMP	Block	Lots
SBE-1	3404	32, 33, 35, 50
SBE-1	3405	100, 102
SBE-1	3407	1
SBE-1	3408	1
SBE-1	3413	3, 4, 5, 7, 9, 14, 18, 19, 35, 37, 39, 43, 49, 61, 65, 70, 71, 75
SBE-1	3414	1, 9, 11, 14, 30, 35, 36, 47, 49, 51, 52, 53
SBE-1	3415	1, 3, 5, 7, 26, 33, 53
SBE-1	3416	10, 15, 19, ,21, 35
SBE-1	3417	214, 236
SBE-1	3418	50
SBE-1	3422	1
SBE-1	3423	1, 7, 41
SBE-1	3427	10, 100, 200, 260, 300
SBE-1	3491	15, 19, 20, 41, 81, 125, 150, 201
SBE-1	3500	50, 60, 72, 82, 100, 200
SBE-2	3226	50, 56
SBE-2	3227	41
SBE-3	3203	10, 28, 45, 50
SBE-3	3205	16, 17, 21, 24, 27, 30, 33

APPENDIX B: SOIL BORINGS FOR BMP SBE-1

Delineate Extent of Fill if Contaminants test as Hazardous

Delineate Extent of Fill (wetlands violation occurred)

No delineations or tests are required

0 100 200 Feet

Date Prepared: September 14, 2006
Source: NYC Map and 2001 aerial photography

SOIL BORING LOCATION

SOIL BORING LOCATION & TEMPORARY WELL POINT LOCATION

Bluebelt project boundary

Delineate extent of fill if tests as hazardous

Delineate extent of fill

Delineate extent of fill

Delineate extent of fill

Delineate extent of fill if tests as hazardous

PATTERSON

PATTERSON AVE

MAL

PEARSALL ST

MC LAUGHLIN ST

ANDREWS ST

WENTWORTH AV

OLYMPIA BL

SOUTH BEACH

LANSING ST

BALFOUR

WILLS PL

AGNES PL

QUINCY AVE

REYNAUD ST

VULCAN ST

QUINTARD ST

OCEANSIDE AVE

SANDA

FR CAPODANNO BLVD

3355 3417 3422 3423 3427 3413 3414 3418 3415 3416 3411 3410 3405 3408 3407 3406 3500 3491 3300

TP-01 TP-02 TP-03 TP-04 TP-05 TP-06 TP-07 TP-08 TP-09 TP-10 TP-11 TP-12 TP-13 TP-14 TP-15 TP-16 TP-17 TP-18 TP-19 TP-20 TP-21 TP-22 TP-23 TP-24 TP-25 TP-26 TP-27 TP-28 TP-29 TP-30 TP-31

SB-01 SB-02 SB-03 SB-04 SB-05 SB-06 SB-07 SB-08 SB-09 SB-10 SB-11 SB-12 SB-13 SB-14 SB-15 SB-16 SB-17 SB-18 SB-19 SB-20 SB-21 SB-22 SB-23 SB-24 SB-25/TWP-01 SB-26 SB-27 SB-28 SB-29/TWP-02 SB-30/TWP-03 SB-31 SB-32

NEW YORK CITY DEPARTMENT OF DESIGN + CONSTRUCTION

Louis Berger & Assoc., PC

DDC PROJECT NO. BEGS2006004 WOL NO. PENDING

SOIL BORING LOCATION PLAN

REMEDIAL INVESTIGATION
SOUTH BEACH BLUEBELT
STATEN ISLAND, NY

SCALE: 1" = 200' | DATE: 12/04/06 | FIGURE: 2

N:\NYCCAD\CADDTEMP\DDCNY--2006\JG--8594--SOUTH BEACH BLUEBELT\FIG.2 SITE PLAN.dwg Dec 04, 2006

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Drilling Log** Page 1 of 2	**BORING NO.:** SB-01 **WELL NO.:** N/A

CLIENT: New York City Department of Design and Construction	**PROJECT NO:** JG-8594
PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)	**DATE STARTED:** 12/15/2006
DRILLING CONTRACTOR: Aquifer Drilling and Testing	**DATE FINISHED:** 12/15/2006
DRILLING METHOD: Hollow Stem Auger	**DRILLER:** G. Rivera
	INSPECTOR: J. Ganz

BOREHOLE DATA		**WELL DATA**		
Diameter (in):	4	**Completion:**	N/A	**NORTHING:** N/A
Total Depth (ft):	11.50	**Total Depth (ft):**	N/A	**EASTING:** N/A
Sampler:	Split Spoon	**Screen Length (ft) /Slot (in):**	N/A	**GROUND ELEVATION:** N/A
Depth to Water (ft):	11.50	**Depth to Water (ft):**	N/A	**TOC ELEVATION:** N/A
Depth to Rock (ft):	N/A	**Permit No.:**	N/A	

NOTES: Composite sample SB-01 collected from 0-11.50 ft bgs

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		FILL			4	<1	Dusky yellowish brown (10YR2/2) medium to fine SAND, little Silt (roots, grass); moist.	Sand (Fill)
						6			
	1					2			
						2			
	2		FILL			60	<1	Dusky yellowish brown (10YR2/2) medium to fine SAND, trace Silt; moist.	
			FILL			11	<1	Light gray (N7) medium to fine GRAVEL, some medium to fine Sand (debris - concrete), moist.	Sandy Gravel (Fill)
	3		FILL			35	<1	Moderate yellowish brown (10YR5/4) medium to fine SAND, trace Silt, trace fine Gravel; moist.	Sand (Fill)
								Moderate yellowish brown (10YR5/4) medium to fine SAND	
						4			
	5					5			
						5			
	6								

Louis Berger and Assoc., P.C. 199 Water Street New York, NY 10038	PROJECT NO.: JG-8594	BORING NO.: SB-01
	Page 2 of 2	WELL NO.: N/A

Well	Depth	Lith.	USCS	Interval	Rec.	Blows	PID	Description	Remarks
			FILL			5	<1	Moderate yellowish brown (10YR5/4) medium to fine SAND, trace Silt; moist.	
						8			
	7					13			
	8		FILL			2		No Recovery	
						3			
	9					2			
						3			
	10		FILL			15	<1	Moderate yellowish brown (10YR5/4) medium to fine SAND, trace Silt (debris - concrete); wet.	
						17			**End of Boring at 11.5 ft.**
	11					100			**Water at 11.5 ft bgs** ▽

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Drilling Log** Page 1 of 2	**BORING NO.:** SB-02 **WELL NO.:** N/A

CLIENT: New York City Department of Design and Construction			**PROJECT NO:** JG-8594
PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)			**DATE STARTED:** 12/16/2006
DRILLING CONTRACTOR: Aquifer Drilling and Testing			**DATE FINISHED:** 12/16/2006
DRILLING METHOD: Hollow Stem Auger			**DRILLER:** G. Rivera
BOREHOLE DATA	**WELL DATA**		**INSPECTOR:** J. Ganz
Diameter (in): 4	**Completion:** N/A		**NORTHING:** N/A
Total Depth (ft): 12.00	**Total Depth (ft):** N/A		**EASTING:** N/A
Sampler: Split Spoon	**Screen Length (ft) /Slot (in):** N/A		**GROUND ELEVATION:** N/A
Depth to Water (ft): 10.00	**Depth to Water (ft):** N/A		**TOC ELEVATION:** N/A
Depth to Rock (ft): N/A	**Permit No.:** N/A		

NOTES: Composite sample SB-02 collected from 0-12.00 ft bgs

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		FILL			1	<1	Dusky yellowish brown (10YR2/2) medium to fine SAND, trace Silt (roots); moist.	**Sand (Fill)**
						1			
	1					1			
						1			
	2		FILL			5	<1	Moderate yellowish brown (10YR5/4) medium to fine SAND, trace Silt, trace fine Gravel; moist.	
						4			
	3					6			
	4								
	5					12			
						11			
						5			
	6								

Louis Berger and Assoc., P.C. 199 Water Street New York, NY 10038	PROJECT NO.: JG-8594	BORING NO.: SB-02
	Page 2 of 2	WELL NO.: N/A

Well	Depth	Lith.	USCS	Interval	Rec.	Blows	PID	Description	Remarks
			FILL			5	<1	Very pale orange (10YR8/2) medium to fine SAND, trace Silt, and medium to fine Gravel (debris - brick, wood, concrete); moist.	**Gravelly Sand (Fill)**
						5			
	7					7			
						3			
	8		FILL			4	<1	Moderate yellowish brown (10YR5/4) medium to fine SAND, trace Silt, trace fine Gravel; wet.	**Sand (Fill)**
						4			
	9					5			
						5			**Water at 10 ft bgs** ▽
	10		FILL			10	<1	Dark yellowish brown (10YR4/2) medium to fine SAND, little Silt, trace fine Gravel (debris - brick); saturated.	
						11			
	11					14			
						11			**End of Boring at 12 ft.**
	12								

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Drilling Log** Page 1 of 1	**BORING NO.:** SB-03 **WELL NO.:** N/A

CLIENT: New York City Department of Design and Construction		**PROJECT NO:** JG-8594
PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)		**DATE STARTED:** 12/16/2006
DRILLING CONTRACTOR: Aquifer Drilling and Testing		**DATE FINISHED:** 12/16/2006
DRILLING METHOD: Hollow Stem Auger		**DRILLER:** G. Rivera
BOREHOLE DATA	**WELL DATA**	**INSPECTOR:** J. Ganz
Diameter (in): 4	**Completion:** N/A	**NORTHING:** N/A
Total Depth (ft): 4.00	**Total Depth (ft):** N/A	**EASTING:** N/A
Sampler: Split Spoon	**Screen Length (ft) /Slot (in):** N/A	**GROUND ELEVATION:** N/A
Depth to Water (ft): 0.00	**Depth to Water (ft):** N/A	**TOC ELEVATION:** N/A
Depth to Rock (ft): N/A	**Permit No.:** N/A	

NOTES: Composite sample SB-03 collected from 0-4 ft bgs

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		SP			1	<1	Dusky yellowish brown (10YR2/2) medium to fine SAND, trace Silt; saturated.	**Sand, Water reached at surface**
	1					1			
						1			
						1			
	2		SP			0	<1	Dusky yellowish brown (10YR2/2) medium to fine SAND, trace Silt; saturated.	
						0			
	3					0			End of Boring at 3 ft
	4								

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Drilling Log** Page 1 of 2	**BORING NO.:** SB-04 **WELL NO.:** N/A

CLIENT: New York City Department of Design and Construction			**PROJECT NO:** JG-8594
PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)			**DATE STARTED:** 12/15/2006
DRILLING CONTRACTOR: Aquifer Drilling and Testing			**DATE FINISHED:** 12/15/2006
DRILLING METHOD: Hollow Stem Auger			**DRILLER:** G. Rivera
BOREHOLE DATA	**WELL DATA**		**INSPECTOR:** J. Ganz
Diameter (in): 4	**Completion:** N/A		**NORTHING:** N/A
Total Depth (ft): 8.00	**Total Depth (ft):** N/A		**EASTING:** N/A
Sampler: Split Spoon	**Screen Length (ft) /Slot (in):** N/A		**GROUND ELEVATION:** N/A
Depth to Water (ft): 6.00	**Depth to Water (ft):** N/A		**TOC ELEVATION:** N/A
Depth to Rock (ft): N/A	**Permit No.:** N/A		

NOTES: Composite sample SB-04 collected from 0-8.00 ft bgs

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		FILL			1 2	<1	Dusky yellowish brown (10YR2/2) medium to fine SAND, little Silt (roots, grass); moist.	Sand (Fill)
	1					2 5			
	2		FILL			3	<1	Dusky yellowish brown (10YR2/2) wood; moist.	Wood (Fill)
	3					3 3			
	4					3		Moderate yellowish brown (10YR5/4) medium to fine SAND,	Sand (Fill)
	5					3 2			
	6								Water at 6 ft bgs ▽

Louis Berger and Assoc., P.C. 199 Water Street New York, NY 10038	PROJECT NO.: JG-8594	BORING NO.: SB-04
	Page 2 of 2	WELL NO.: N/A

Well	Depth	Lith.	USCS	Interval	Rec.	Blows	PID	Description	Remarks
	7		SP			3 50	<1	Dark yellowish brown (10YR4/2) medium to fine SAND, trace Silt; saturated.	Sand End of Boring at 8 ft.
	8								

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Drilling Log** Page 1 of 1	**BORING NO.:** SB-05 **WELL NO.:** N/A

CLIENT: New York City Department of Design and Construction		**PROJECT NO:** JG-8594
PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)		**DATE STARTED:** 12/14/2006
DRILLING CONTRACTOR: Aquifer Drilling and Testing		**DATE FINISHED:** 12/14/2006
DRILLING METHOD: Hollow Stem Auger		**DRILLER:** G. Rivera
BOREHOLE DATA	**WELL DATA**	**INSPECTOR:** J. Ganz
Diameter (in): 4	**Completion:** N/A	**NORTHING:** N/A
Total Depth (ft): 6.00	**Total Depth (ft):** N/A	**EASTING:** N/A
Sampler: Split Spoon	**Screen Length (ft) /Slot (in):** N/A	**GROUND ELEVATION:** N/A
Depth to Water (ft): 4.00	**Depth to Water (ft):** N/A	**TOC ELEVATION:** N/A
Depth to Rock (ft): N/A	**Permit No.:** N/A	

NOTES: Composite sample SB-05 collected from 0-6.00 ft bgs

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		FILL			1	<1	Grayish black (N2) medium to fine SAND, trace Silt (roots); moist.	**Sand (Fill)**
			FILL				<1		
						1		Moderate yellowish brown (10YR5/4) medium to fine SAND, little Silt; moist.	
	1					1			
						2			
	2		FILL			4	<1	Dusky yellowish brown (10YR2/2) medium to fine SAND, trace Silt (roots); moist.	
			FILL			3	<1	Moderate brown (5YR4/4) medium to fine SAND, trace Silt; moist.	
	3					4			
	4								
	5					5			
						5			
						4			End of Boring at 6 ft.
	6								

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Drilling Log** Page 1 of 1	**BORING NO.:** SB-06 **WELL NO.:** N/A

CLIENT: New York City Department of Design and Construction	**PROJECT NO:** JG-8594
PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)	**DATE STARTED:** 12/14/2006
DRILLING CONTRACTOR: Aquifer Drilling and Testing	**DATE FINISHED:** 12/14/2006
DRILLING METHOD: Hollow Stem Auger	**DRILLER:** G. Rivera
	INSPECTOR: J. Ganz
	NORTHING: N/A
	EASTING: N/A
	GROUND ELEVATION: N/A
	TOC ELEVATION: N/A

BOREHOLE DATA		**WELL DATA**	
Diameter (in):	4	**Completion:**	N/A
Total Depth (ft):	4.00	**Total Depth (ft):**	N/A
Sampler:	Split Spoon	**Screen Length (ft) /Slot (in):**	N/A
Depth to Water (ft):	0.00	**Depth to Water (ft):**	N/A
Depth to Rock (ft):	N/A	**Permit No.:**	N/A

NOTES: Composite sample SB-06 collected from 0-4.00 ft bgs

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		?			0 0 0 0		No Recovery	Water reached at surface
	1								
	2		SP			1 2 3	<1	Dark yellowish brown (10YR4/2) medium to fine SAND, trace Silt; saturated.	Sand
	3								
	4								

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Drilling Log** Page 1 of 2	**BORING NO.:** SB-07 **WELL NO.:** N/A

CLIENT: New York City Department of Design and Construction	**PROJECT NO:** JG-8594
PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)	**DATE STARTED:** 12/14/2006
DRILLING CONTRACTOR: Aquifer Drilling and Testing	**DATE FINISHED:** 12/14/2006
DRILLING METHOD: Hollow Stem Auger	**DRILLER:** G. Rivera
	INSPECTOR: J. Ganz
	NORTHING: N/A
	EASTING: N/A
	GROUND ELEVATION: N/A
	TOC ELEVATION: N/A

BOREHOLE DATA		**WELL DATA**	
Diameter (in):	4	**Completion:**	N/A
Total Depth (ft):	8.00	**Total Depth (ft):**	N/A
Sampler:	Split Spoon	**Screen Length (ft) /Slot (in):**	N/A
Depth to Water (ft):	6.00	**Depth to Water (ft):**	N/A
Depth to Rock (ft):	N/A	**Permit No.:**	N/A

NOTES: Composite sample SB-07 collected from 0-8.00 ft bgs

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		FILL			3 5	<1	Dusky yellowish brown (10YR2/2) medium to fine SAND, little Silt, trace fine Gravel (debris - brick); moist.	Sand (Fill)
	1					4 7			
	2		FILL			8 8	<1	Moderate yellowish brown (10YR5/4) medium to fine SAND, trace Silt, little coarse to medium Gravel (debris - concrete, brick); moist.	
	3					5			
	4					4			Sandy Gravel
	5					5 7			Water at 6 ft bgs ▽
	6								

Louis Berger and Assoc., P.C. 199 Water Street New York, NY 10038	PROJECT NO.: JG-8594	BORING NO.: SB-07
	Page 2 of 2	WELL NO.: N/A

Well	Depth	Lith.	USCS	Interval	Rec.	Blows	PID	Description	Remarks
						13	<1	No Recovery	
						3			
	7					3			
						3			End of Boring at 8 ft.
	8								

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Drilling Log** Page 1 of 1	**BORING NO.:** SB-08 **WELL NO.:** N/A

CLIENT: New York City Department of Design and Construction			**PROJECT NO:** JG-8594
PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)			**DATE STARTED:** 12/14/2006
DRILLING CONTRACTOR: Aquifer Drilling and Testing			**DATE FINISHED:** 12/14/2006
DRILLING METHOD: Hollow Stem Auger			**DRILLER:** G. Rivera
BOREHOLE DATA	**WELL DATA**		**INSPECTOR:** J. Ganz
Diameter (in): 4	**Completion:** N/A		**NORTHING:** N/A
Total Depth (ft): 4.00	**Total Depth (ft):** N/A		**EASTING:** N/A
Sampler: Split Spoon	**Screen Length (ft) /Slot (in):** N/A		**GROUND ELEVATION:** N/A
Depth to Water (ft): 3.00	**Depth to Water (ft):** N/A		**TOC ELEVATION:** N/A
Depth to Rock (ft): N/A	**Permit No.:** N/A		

NOTES: Composite sample SB-08 collected from 0-4.00 ft bgs

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		FILL			1	<1	Dusky yellowish brown (10YR2/2) medium to fine SAND, trace Silt (roots); moist.	**Sand (Fill)**
			FILL				<1		
						1		Moderate yellowish brown (10YR5/4) medium to fine SAND, trace Silt (roots); moist.	
	1		FILL			2	<1	Dark yellowish orange (10YR6/6) medium to fine SAND, trace Silt, trace fine Gravel; wet.	
						3			
	2		FILL			1	<1	Moderate yellowish brown (10YR5/4) medium to fine SAND, trace Silt, trace fine Gravel; wet.	
						2			**Water at 3 ft bgs** ▽
	3		FILL			4	<1	Moderate brown (5YR4/4) medium to fine SAND, trace Silt;	
								[illegible]	End of Boring
	4								

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Drilling Log** Page 1 of 1	**BORING NO.:** SB-09 **WELL NO.:** N/A

CLIENT: New York City Department of Design and Construction		**PROJECT NO:** JG-8594
PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)		**DATE STARTED:** 12/14/2006
DRILLING CONTRACTOR: Aquifer Drilling and Testing		**DATE FINISHED:** 12/14/2006
DRILLING METHOD: Hollow Stem Auger		**DRILLER:** G. Rivera
BOREHOLE DATA	**WELL DATA**	**INSPECTOR:** J. Ganz
Diameter (in): 4	**Completion:** N/A	**NORTHING:** N/A
Total Depth (ft): 4.00	**Total Depth (ft):** N/A	**EASTING:** N/A
Sampler: Split Spoon	**Screen Length (ft) /Slot (in):** N/A	**GROUND ELEVATION:** N/A
Depth to Water (ft): 0.00	**Depth to Water (ft):** N/A	**TOC ELEVATION:** N/A
Depth to Rock (ft): N/A	**Permit No.:** N/A	

NOTES: Collected composite sample SB-09 from 0-4.00 ft bgs

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		SP			0 0 0 1		Moderate brown (5YR4/4) medium to coarse SAND, moist	**Water reached at surface**
	2		SP			1 2 5	<1	Dark yellowish brown (10YR4/2) medium to fine SAND, trace Silt; saturated.	Sand
	4								

Louis Berger & Assoc., P.C.
199 Water Street
New York, NY 10038

Drilling Log

BORING NO.:	SB-10
WELL NO.:	N/A
CLIENT:	New York City Department of Design and Construction
PROJECT:	South Beach Bluebelt Remedial Investigation (BEGS2005013)
DRILLING CONTRACTOR:	Aquifer Drilling and Testing
DRILLING METHOD:	Hollow Stem Auger
PROJECT NO:	JG-8594
DATE STARTED:	12/8/2006
DATE FINISHED:	12/8/2006
DRILLER:	G. Rivera
INSPECTOR:	J. Ganz
NORTHING:	N/A
EASTING:	N/A
GROUND ELEVATION:	N/A
TOC ELEVATION:	N/A

BOREHOLE DATA		WELL DATA	
Diameter (in):	4	**Completion:**	N/A
Total Depth (ft):	2.00	**Total Depth (ft):**	N/A
Sampler:	Split Spoon	**Screen Length (ft) /Slot (in):**	N/A
Depth to Water (ft):	0.00	**Depth to Water (ft):**	N/A
Depth to Rock (ft):	N/A	**Permit No.:**	N/A

NOTES: No sample collected from SB-10

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		OL/OH			2	<1	Brownish black (5YR2/1) PEAT; saturated.	**Peat, Water reached at surface**
						1			
	1					1			
						1			**End of Boring at 2 ft.**
	2								

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Drilling Log** Page 1 of 1	**BORING NO.:** SB-11 **WELL NO.:** N/A

CLIENT: New York City Department of Design and Construction			**PROJECT NO:** JG-8594
PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)			**DATE STARTED:** 12/8/2006
DRILLING CONTRACTOR: Aquifer Drilling and Testing			**DATE FINISHED:** 12/8/2006
DRILLING METHOD: Hollow Stem Auger			**DRILLER:** G. Rivera
BOREHOLE DATA	**WELL DATA**		**INSPECTOR:** J. Ganz
Diameter (in): 4	**Completion:** N/A		**NORTHING:** N/A
Total Depth (ft): 6.00	**Total Depth (ft):** N/A		**EASTING:** N/A
Sampler: Split Spoon	**Screen Length (ft) /Slot (in):** N/A		**GROUND ELEVATION:** N/A
Depth to Water (ft): 2.00	**Depth to Water (ft):** N/A		**TOC ELEVATION:** N/A
Depth to Rock (ft): N/A	**Permit No.:** N/A		

NOTES: Composite sample SB-11 collected from 0-6.00 ft bgs

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		FILL			9	<1	Dusky yellowish brown (10YR2/2) medium to fine SAND, little Silt (roots); moist. Light gray (N7) medium to fine SAND, and medium to fine Gravel (debris - concrete): dry.	**Sand (Fill), Gravelly Sand (Fill)**
						7	<1		
	1					3			
						1			**Water at 2 ft bgs** ▽
	2		FILL			1		No Recovery	
						0			
	3					0			
						0			**End of Boring at 6 ft.**
	6								

Louis Berger & Assoc., P.C.
199 Water Street
New York, NY 10038

Drilling Log

Page 1 of 1

BORING NO.:	SB-12A
WELL NO.:	N/A
PROJECT NO:	JG-8594
DATE STARTED:	12/8/2006
DATE FINISHED:	12/8/2006
DRILLER:	G. Rivera
INSPECTOR:	J. Ganz
NORTHING:	N/A
EASTING:	N/A
GROUND ELEVATION:	N/A
TOC ELEVATION:	N/A

CLIENT: New York City Department of Design and Construction

PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)

ILLING CONTRACTOR: Aquifer Drilling and Testing

DRILLING METHOD: Hollow Stem Auger

BOREHOLE DATA		WELL DATA	
Diameter (in):	4	**Completion:**	N/A
Total Depth (ft):	2.00	**Total Depth (ft):**	N/A
Sampler:	Split Spoon	**Screen Length (ft) /Slot (in):**	N/A
Depth to Water (ft):	0.00	**Depth to Water (ft):**	N/A
Depth to Rock (ft):	N/A	**Permit No.:**	N/A

NOTES: No sample collected from SB-12A

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		OL/OH			4	<1	Brownish black (5YR2/1) PEAT; saturated.	**Peat, Water reached at surface**
						5			
	1					8			
						4			**End of Boring at 2 ft.**
	2								

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Drilling Log** Page 1 of 1	**BORING NO.:** SB-12B **WELL NO.:** N/A

CLIENT: New York City Department of Design and Construction			**PROJECT NO:** JG-8594
PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)			**DATE STARTED:** 12/8/2006
DRILLING CONTRACTOR: Aquifer Drilling and Testing			**DATE FINISHED:** 12/8/2006
DRILLING METHOD: Hollow Stem Auger			**DRILLER:** G. Rivera
BOREHOLE DATA	**WELL DATA**		**INSPECTOR:** J. Ganz
Diameter (in): 4	**Completion:** N/A		**NORTHING:** N/A
Total Depth (ft): 2.00	**Total Depth (ft):** N/A		**EASTING:** N/A
Sampler: Split Spoon	**Screen Length (ft) /Slot (in):** N/A		**GROUND ELEVATION:** N/A
Depth to Water (ft): 0.00	**Depth to Water (ft):** N/A		**TOC ELEVATION:** N/A
Depth to Rock (ft): N/A	**Permit No.:** N/A		

NOTES: No sample collected from SB-12B

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		OL/OH			7	<1	Brownish black (5YR2/1) PEAT; saturated.	**Peat, Water reached at surface**
						4			
	1					5			
						4			**End of Boring at 2 ft.**
	2								

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Drilling Log** Page 1 of 1	**BORING NO.:** SB-12C **WELL NO.:** N/A

CLIENT: New York City Department of Design and Construction		**PROJECT NO:** JG-8594
PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)		**DATE STARTED:** 12/8/2006
DRILLING CONTRACTOR: Aquifer Drilling and Testing		**DATE FINISHED:** 12/8/2006
DRILLING METHOD: Hollow Stem Auger		**DRILLER:** G. Rivera
BOREHOLE DATA	**WELL DATA**	**INSPECTOR:** J. Ganz
Diameter (in): 4	**Completion:** N/A	**NORTHING:** N/A
Total Depth (ft): 2.00	**Total Depth (ft):** N/A	**EASTING:** N/A
Sampler: Split Spoon	**Screen Length (ft) /Slot (in):** N/A	**GROUND ELEVATION:** N/A
Depth to Water (ft): 0.00	**Depth to Water (ft):** N/A	**TOC ELEVATION:** N/A
Depth to Rock (ft): N/A	**Permit No.:** N/A	

NOTES: No sample collected from SB-12C

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		OL/OH			5	<1	Brownish black (5YR2/1) PEAT; saturated.	**Peat, Water reached at surface**
						4			
	1					5			
						4			**End of Boring at 2 ft.**
	2								

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Drilling Log** Page 1 of 1	**BORING NO.:** SB-13 **WELL NO.:** N/A

CLIENT: New York City Department of Design and Construction			**PROJECT NO:** JG-8594
PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)			**DATE STARTED:** 12/8/2006
DRILLING CONTRACTOR: Aquifer Drilling and Testing			**DATE FINISHED:** 12/8/2006
DRILLING METHOD: Hollow Stem Auger			**DRILLER:** G. Rivera
BOREHOLE DATA	**WELL DATA**		**INSPECTOR:** J. Ganz
Diameter (in): 4	**Completion:** N/A		**NORTHING:** N/A
Total Depth (ft): 4.00	**Total Depth (ft):** N/A		**EASTING:** N/A
Sampler: Split Spoon	**Screen Length (ft) /Slot (in):** N/A		**GROUND ELEVATION:** N/A
Depth to Water (ft): 0.00	**Depth to Water (ft):** N/A		**TOC ELEVATION:** N/A
Depth to Rock (ft): N/A	**Permit No.:** N/A		

NOTES: Composite sample SB-13 collected from 0-4.00 ft bgs

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		SP-SM			7	<1	Dusky yellowish brown (10YR2/2) medium to fine SAND, little Silt (roots); saturated.	**Sand, Water reached at surface**
						7			
			SP				<1	Olive gray (5Y3/2) medium to fine SAND, trace Silt; saturated.	
	1					2			
						1			
	2		SP			3	<1	Olive black (5Y2/1) coarse to fine SAND; saturated.	**Petroleum staining**
						2			
	3					2			

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Drilling Log** Page 1 of 1	**BORING NO.:** SB-14 **WELL NO.:** N/A

CLIENT: New York City Department of Design and Construction			**PROJECT NO:** JG-8594
PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)			**DATE STARTED:** 12/8/2006
DRILLING CONTRACTOR: Aquifer Drilling and Testing			**DATE FINISHED:** 12/8/2006
DRILLING METHOD: Hollow Stem Auger			**DRILLER:** G. Rivera
BOREHOLE DATA	**WELL DATA**		**INSPECTOR:** J. Ganz
Diameter (in): 4	**Completion:** N/A		**NORTHING:** N/A
Total Depth (ft): 4.00	**Total Depth (ft):** N/A		**EASTING:** N/A
Sampler: Split Spoon	**Screen Length (ft) /Slot (in):** N/A		**GROUND ELEVATION:** N/A
Depth to Water (ft): 0.00	**Depth to Water (ft):** N/A		**TOC ELEVATION:** N/A
Depth to Rock (ft): N/A	**Permit No.:** N/A		

NOTES: Composite sample SB-14 collected from 0-4.00 ft bgs

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		SP-SM			1	<1	Dusky yellowish brown (10YR2/2) medium to fine SAND, little Silt (roots); saturated.	**Sand, Water reached at surface**
						9			
	1					7			
						4			
	2		SP-SM			9		No Recovery	
						14			
	3					2			
	4								

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Drilling Log** Page 1 of 1	**BORING NO.:** SB-15 **WELL NO.:** N/A

CLIENT: New York City Department of Design and Construction		**PROJECT NO:** JG-8594
PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)		**DATE STARTED:** 12/8/2006
DRILLING CONTRACTOR: Aquifer Drilling and Testing		**DATE FINISHED:** 12/8/2006
DRILLING METHOD: Hollow Stem Auger		**DRILLER:** G. Rivera
BOREHOLE DATA	**WELL DATA**	**INSPECTOR:** J. Ganz
Diameter (in): 4	**Completion:** N/A	**NORTHING:** N/A
Total Depth (ft): 6.00	**Total Depth (ft):** N/A	**EASTING:** N/A
Sampler: Split Spoon	**Screen Length (ft) /Slot (in):** N/A	**GROUND ELEVATION:** N/A
Depth to Water (ft): 0.8	**Depth to Water (ft):** N/A	**TOC ELEVATION:** N/A
Depth to Rock (ft): N/A	**Permit No.:** N/A	

NOTES: Composite sample SB-15 collected from 0-6.00 ft bgs

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		FILL			0	<1	Dusky yellowish brown (10YR2/2) medium to fine SAND, little Silt (roots); moist.	**Sand (Fill)**
						0			**Water at 0.8 ft bgs** ⧖
	1		FILL			3	<1	Dark gray (N3) medium to fine SAND, trace Silt; wet.	
						2			
	2		FILL			2	<1	Dusky yellowish brown (10YR2/2) medium to fine SAND; saturated.	
						2			
	3					0			
	4					0			
	5					0			
						0			End of Boring at 6 ft.
	6								

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Drilling Log** Page 1 of 2	**BORING NO.:** SB-16 **WELL NO.:** N/A

CLIENT: New York City Department of Design and Construction			**PROJECT NO:** JG-8594
PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)			**DATE STARTED:** 12/6/2006
DRILLING CONTRACTOR: Aquifer Drilling and Testing			**DATE FINISHED:** 12/6/2006
DRILLING METHOD: Hollow Stem Auger			**DRILLER:** G. Rivera
BOREHOLE DATA	**WELL DATA**		**INSPECTOR:** J. Ganz
Diameter (in): 4	**Completion:** N/A		**NORTHING:** N/A
Total Depth (ft): 14.00	**Total Depth (ft):** N/A		**EASTING:** N/A
Sampler: Split Spoon	**Screen Length (ft) /Slot (in):** N/A		**GROUND ELEVATION:** N/A
Depth to Water (ft): 8.00	**Depth to Water (ft):** N/A		**TOC ELEVATION:** N/A
Depth to Rock (ft): N/A	**Permit No.:** N/A		

NOTES: Composite sample SB-16 collected from 0-14.00 ft bgs

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		FILL			15	<1	Dusky yellowish brown (10YR2/2) medium to fine SAND, little Silt (organics - grass, roots; 5% fill material - brick, concrete); moist.	Sand (Fill)
						18			
			FILL				<1	Light gray (N7) coarse to medium GRAVEL, little medium to fine Sand (100% fill material - concrete); dry.	Gravel (Fill)
	1					20			
						16			
	2		FILL			20	<1	Light gray (N7) coarse to medium GRAVEL, little medium to fine Sand (100% fill material - concrete); dry.	
						8			
			Fill				<1	Moderate brown (5YR4/4) medium to fine SAND, trace Silt; moist.	Sand (Fill)
	3					6			
	4								
						9			
	5		FILL				<1	Dark yellowish orange (10YR6/6) medium to fine SAND, trace Silt; moist.	
						5			
						15			
	6								

Louis Berger and Assoc., P.C. 199 Water Street New York, NY 10038	PROJECT NO.: JG-8594	BORING NO.: SB-16
	Page 2 of 2	WELL NO.: N/A

Well	Depth	Lith.	USCS	Interval	Rec.	Blows	PID	Description	Remarks
			FILL			15	<1	Dark yellowish brown (10YR4/2) medium to fine SAND, trace Silt; moist.	
			FILL			9	<1	Moderate brown (5YR3/4) medium to fine SAND, little Silt, trace coarse Gravel (3% fill material - brick); moist.	
	7					3			
						5			Water at 8 ft bgs ⧖
	8		FILL			6	<1	Moderate yellowish brown (10YR5/4) medium to fine SAND; wet.	
						4			
	9					4			
						4			
	10		SP			4	<1	Dark yellowish brown (10YR4/2) medium to fine SAND; saturated.	Sand
						4			
	11					2			
						4			
	12		SP			3	<1	Dark yellowish brown (10YR4/2) medium to fine SAND; saturated.	
						1			
						1			
						2			End of Boring at 14 ft.
	14								

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Drilling Log** Page 1 of 2	**BORING NO.:** SB-17 **WELL NO.:** N/A

CLIENT: New York City Department of Design and Construction		**PROJECT NO:** JG-8594
PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)		**DATE STARTED:** 12/6/2006
DRILLING CONTRACTOR: Aquifer Drilling and Testing		**DATE FINISHED:** 12/6/2006
DRILLING METHOD: Hollow Stem Auger		**DRILLER:** G. Rivera
BOREHOLE DATA	**WELL DATA**	**INSPECTOR:** J. Ganz
Diameter (in): 4	**Completion:** N/A	**NORTHING:** N/A
Total Depth (ft): 10.00	**Total Depth (ft):** N/A	**EASTING:** N/A
Sampler: Split Spoon	**Screen Length (ft) /Slot (in):** N/A	**GROUND ELEVATION:** N/A
Depth to Water (ft): 6.5	**Depth to Water (ft):** N/A	**TOC ELEVATION:** N/A
Depth to Rock (ft): N/A	**Permit No.:** N/A	

NOTES: Composite sample SB-17 collected from 0-10.00 ft bgs

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		FILL			5	<1	Dusky yellowish brown (10YR2/2) medium to fine SAND, little Silt (grass, roots); moist.	Sand (Fill)
			FILL			8	<1	Moderate brown (5YR4/4) medium to fine SAND, trace Silt (roots); moist.	
	1					5			
						10			
	2		FILL			3	<1	White (N9) medium to fine GRAVEL, some coarse to fine Sand (100% fill material - concrete); dry.	Sandy Gravel (Fill)
			FILL			3	<1	Moderate brown (5YR4/4) medium to fine SAND, trace Silt; moist.	Sand (Fill)
	3					5			
	5		FILL			10	<1	Light gray (N7) coarse to medium GRAVEL, little medium to fine Sand (100% fill material - concrete); dry.	Gravel (Fill)
						50			
	6								

Louis Berger and Assoc., P.C. 199 Water Street New York, NY 10038	PROJECT NO.: JG-8594	BORING NO.: SB-17
	Page 2 of 2	WELL NO.: N/A

Well	Depth	Lith.	USCS	Interval	Rec.	Blows	PID	Description	Remarks
			FILL			8	<1	Moderate brown (5YR4/4) medium to fine SAND, little Silt; moist.	**Sand (Fill)** ⊻
			SP			8	<1	Dusky yellowish brown (10YR2/2) medium to fine SAND; wet.	**Sand Water at 6.5 ft bgs**
	7					11			
						8			
	8		SP			9	<1	Dusky yellowish brown (10YR2/2) medium to fine SAND, trace Silt; saturated.	
						11			
	9					8			
						8			**End of Boring at 10 ft.**
	10								

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Drilling Log** Page 1 of 2	**BORING NO.:** SB-18 **WELL NO.:** N/A

CLIENT: New York City Department of Design and Construction			**PROJECT NO:** JG-8594
PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)			**DATE STARTED:** 12/6/2006
DRILLING CONTRACTOR: Aquifer Drilling and Testing			**DATE FINISHED:** 12/6/2006
DRILLING METHOD: Hollow Stem Auger			**DRILLER:** G. Rivera
BOREHOLE DATA	**WELL DATA**		**INSPECTOR:** J. Ganz
Diameter (in): 4	**Completion:** N/A		**NORTHING:** N/A
Total Depth (ft): 10.00	**Total Depth (ft):** N/A		**EASTING:** N/A
Sampler: Split Spoon	**Screen Length (ft) /Slot (in):** N/A		**GROUND ELEVATION:** N/A
Depth to Water (ft): 7.00	**Depth to Water (ft):** N/A		**TOC ELEVATION:** N/A
Depth to Rock (ft): N/A	**Permit No.:** N/A		

NOTES: Composite sample SB-18 collected from 0-10.00 ft bgs

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		SP			8	<1	Dusky yellowish brown (10YR2/2) medium to fine SAND (grass and roots); moist.	Sand (Fill)
						4			
	1					4			
						5			
	2		SP			6	<1	Moderate brown (5YR3/4) medium to fine SAND, trace Silt (roots); moist.	
						7			
	3					7			
	4					11		metal can); moist	
	5					8			
						7			
	6								

Louis Berger and Assoc., P.C. 199 Water Street New York, NY 10038	PROJECT NO.: JG-8594	BORING NO.: SB-18
	Page 2 of 2	WELL NO.: N/A

Well	Depth	Lith.	USCS	Interval	Rec.	Blows	PID	Description	Remarks
	7		SP			8 8 7 6	<1	Moderate yellowish brown (10YR5/4) medium to fine SAND; wet.	**Water at 7 ft bgs** ▽
	8 9 10		SP			5 7 5 4	<1	Dark yellowish brown (10YR4/2) medium to fine SAND, trace Silt; saturated.	**Sand** **End of Boring at 10 ft.**

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Drilling Log** Page 1 of 2	**BORING NO.:** SB-19 **WELL NO.:** N/A

CLIENT: New York City Department of Design and Construction			**PROJECT NO:** JG-8594
PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)			**DATE STARTED:** 12/13/2006
DRILLING CONTRACTOR: Aquifer Drilling and Testing			**DATE FINISHED:** 12/13/2006
DRILLING METHOD: Hollow Stem Auger			**DRILLER:** G. Rivera
BOREHOLE DATA	**WELL DATA**		**INSPECTOR:** J. Ganz
Diameter (in): 4	**Completion:** N/A		**NORTHING:** N/A
Total Depth (ft): 8.00	**Total Depth (ft):** N/A		**EASTING:** N/A
Sampler: Split Spoon	**Screen Length (ft) /Slot (in):** N/A		**GROUND ELEVATION:** N/A
Depth to Water (ft): 6.00	**Depth to Water (ft):** N/A		**TOC ELEVATION:** N/A
Depth to Rock (ft): N/A	**Permit No.:** N/A		

NOTES: Composite sample SB-19 collected from 0-8.00 ft bgs

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		FILL			4 9	<1	Dusky yellowish brown (10YR2/2) medium to fine SAND, little Silt, little medium to fine Gravel (roots, grass); moist.	**Sand (Fill)**
	1					9 6			
	2		FILL			5	<1	Dusky yellowish brown (10YR2/2) medium to fine SAND, trace Silt (roots); moist.	
			FILL			39	<1	Grayish black (N2) medium to fine GRAVEL, little medium to fine Sand; moist. Grayish orange pink (5YR7/2) medium to fine SAND, trace Silt, little medium to fine Gravel (debris - concrete); dry.	Gravel (Fill), **Sand (Fill)**
	3					6			
	5					3 5 5			Water at 6 ft bgs ▽
	6								

Louis Berger and Assoc., P.C. 199 Water Street New York, NY 10038	PROJECT NO.: JG-8594	BORING NO.: SB-19
	Page 2 of 2	WELL NO.: N/A

Well	Depth	Lith.	USCS	Interval	Rec.	Blows	PID	Description	Remarks
	7		FILL			3 5 4 5	<1	Dark yellowish brown (10YR4/2) medium to fine SAND, and medium to fine Gravel; saturated.	**Gravelly Sand (Fill)** **End of Boring at 8 ft.**
	8								

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Drilling Log** Page 1 of 2	**BORING NO.:** SB-20 **WELL NO.:** N/A

CLIENT: New York City Department of Design and Construction		**PROJECT NO:** JG-8594
PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)		**DATE STARTED:** 12/13/2006
DRILLING CONTRACTOR: Aquifer Drilling and Testing		**DATE FINISHED:** 12/13/2006
DRILLING METHOD: Hollow Stem Auger		**DRILLER:** G. Rivera
BOREHOLE DATA	**WELL DATA**	**INSPECTOR:** J. Ganz
Diameter (in): 4	**Completion:** N/A	**NORTHING:** N/A
Total Depth (ft): 8.00	**Total Depth (ft):** N/A	**EASTING:** N/A
Sampler: Split Spoon	**Screen Length (ft) /Slot (in):** N/A	**GROUND ELEVATION:** N/A
Depth to Water (ft): 6.00	**Depth to Water (ft):** N/A	**TOC ELEVATION:** N/A
Depth to Rock (ft): N/A	**Permit No.:** N/A	

NOTES: Composite sample SB-20 collected from 0-8.00 ft bgs

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		FILL			2	<1	Dusky yellowish brown (10YR2/2), moderate brown (5YR4/4) medium to fine SAND, little Silt, trace coarse to fine Gravel (debris - brick); moist.	**Sand (Fill)**
						2			
	1					8			
						13			
	2		FILL			5	<1	Moderate brown (5YR4/4) medium to fine SAND, trace Silt, trace medium to fine Gravel (debris - brick); moist.	
						11			
	3		FILL			40	<1	Light gray (N7) concrete; moist.	Concrete
	4								Sand (Fill)
	5					6			
						6			
						8			Water at 6 ft bgs
	6								

Louis Berger and Assoc., P.C. 199 Water Street New York, NY 10038	PROJECT NO.: JG-8594	BORING NO.: SB-20
	Page 2 of 2	WELL NO.: N/A

Well	Depth	Lith.	USCS	Interval	Rec.	Blows	PID	Description	Remarks
	7		SP			2 3 2 4	<1	Dark yellowish brown (10YR4/2) medium to fine SAND, trace Silt, trace medium to fine Gravel; saturated.	**Sand** **End of Boring at 8 ft.**
	8								

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Drilling Log** Page 1 of 2	**BORING NO.:** SB-21 **WELL NO.:** N/A

CLIENT: New York City Department of Design and Construction			**PROJECT NO:** JG-8594
PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)			**DATE STARTED:** 12/11/2006
DRILLING CONTRACTOR: Aquifer Drilling and Testing			**DATE FINISHED:** 12/11/2006
DRILLING METHOD: Hollow Stem Auger			**DRILLER:** G. Rivera
BOREHOLE DATA	**WELL DATA**		**INSPECTOR:** J. Ganz
Diameter (in): 4	**Completion:** N/A		**NORTHING:** N/A
Total Depth (ft): 8.00	**Total Depth (ft):** N/A		**EASTING:** N/A
Sampler: Split Spoon	**Screen Length (ft) /Slot (in):** N/A		**GROUND ELEVATION:** N/A
Depth to Water (ft): 4.00	**Depth to Water (ft):** N/A		**TOC ELEVATION:** N/A
Depth to Rock (ft): N/A	**Permit No.:** N/A		

NOTES: Composite sample SB-21 collected from 0-8.00 ft bgs

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		FILL			4 8	<1	Dark yellowish brown (10YR4/2) medium to fine SAND, little Silt (roots, debris - brick); moist.	Sand (Fill)
	1					7 7			
	2		FILL			15	<1	Dark yellowish brown (10YR4/2) medium to fine SAND, little Silt (debris - brick); moist.	
			FILL			17	<1	Medium gray (N5) coarse to medium GRAVEL, some medium to fine Sand; moist.	Sandy Gravel (Fill)
	3					8			
	5		FILL			9 5 5	<1	Dusky yellowish brown (10YR2/2) medium to fine SAND, little Silt; wet.	Sand (Fill), Petroleum odor
	6								

Louis Berger and Assoc., P.C. 199 Water Street New York, NY 10038	PROJECT NO.: JG-8594	BORING NO.: SB-21
	Page 2 of 2	WELL NO.: N/A

Well	Depth	Lith.	USCS	Interval	Rec.	Blows	PID	Description	Remarks
			SP-SM			6	<1	Dusky yellowish brown (10YR2/2) medium to fine SAND, little Silt; saturated.	**Sand**
						8			
	7		SP			6	<1	Dark yellowish brown (10YR4/2) medium to fine SAND, trace Silt; saturated.	
						7			**End of Boring at 8 ft.**
	8								

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Drilling Log** Page 1 of 2	**BORING NO.:** SB-22 **WELL NO.:** N/A

CLIENT: New York City Department of Design and Construction	**PROJECT NO:** JG-8594
PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005 013)	**DATE STARTED:** 12/13/2006
DRILLING CONTRACTOR: Aquifer Drilling and Testing	**DATE FINISHED:** 12/13/2006
DRILLING METHOD: Hollow Stem Auger	**DRILLER:** G. Rivera
	INSPECTOR: J. Ganz

BOREHOLE DATA		**WELL DATA**		
Diameter (in):	4	**Completion:**	N/A	**NORTHING:** N/A
Total Depth (ft):	8.00	**Total Depth (ft):**	N/A	**EASTING:** N/A
Sampler:	Split Spoon	**Screen Length (ft) /Slot (in):**	N/A	**GROUND ELEVATION:** N/A
Depth to Water (ft):	6.00	**Depth to Water (ft):**	N/A	**TOC ELEVATION:** N/A
Depth to Rock (ft):	N/A	**Permit No.:**	N/A	

NOTES: Composite sample SB-22 collected from 0-8.00 ft bgs

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		FILL			3 5	<1	Dusky yellowish brown (10YR2/2) medium to fine SAND, little Silt (roots); moist.	Sand (Fill)
	1					8 3			
	2		FILL			6 9	<1	Moderate brown (5YR4/4) medium to fine SAND, trace Silt (debris - brick); moist.	
	3					8			
	5					5 6			Water at 6 ft bgs ▽
	6					8			

Louis Berger and Assoc., P.C. 199 Water Street New York, NY 10038	PROJECT NO.: JG-8594	BORING NO.: SB-22
	Page 2 of 2	WELL NO.: N/A

Well	Depth	Lith.	USCS	Interval	Rec.	Blows	PID	Description	Remarks
	7		FILL			3 4 6	<1	Moderate brown (5YR4/4) medium to fine SAND, little Silt; saturated.	
	8		OL/OH			2	<1	Grayish black (N2) PEAT; saturated.	**Peat** **End of Boring at 8 ft.**

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Drilling Log** Page 1 of 2	**BORING NO.:** SB-23 **WELL NO.:** N/A

CLIENT: New York City Department of Design and Construction	**PROJECT NO:** JG-8594
PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)	**DATE STARTED:** 12/13/2006
DRILLING CONTRACTOR: Aquifer Drilling and Testing	**DATE FINISHED:** 12/13/2006
DRILLING METHOD: Hollow Stem Auger	**DRILLER:** G. Rivera
BOREHOLE DATA / **WELL DATA**	**INSPECTOR:** J. Ganz
Diameter (in): 4 / **Completion:** N/A	**NORTHING:** N/A
Total Depth (ft): 10.00 / **Total Depth (ft):** N/A	**EASTING:** N/A
Sampler: Split Spoon / **Screen Length (ft) /Slot (in):** N/A	**GROUND ELEVATION:** N/A
Depth to Water (ft): 8.00 / **Depth to Water (ft):** N/A	**TOC ELEVATION:** N/A
Depth to Rock (ft): N/A / **Permit No.:** N/A	

NOTES: Composite sample SB-23 collected from 0-10.00 ft bgs

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		FILL			2 6	<1	Dusky yellowish brown (10YR2/2) medium to fine SAND, little Silt (roots, grass); moist.	Sand (Fill)
	1		FILL			22 14	<1	Moderate brown (5YR4/4) medium to fine SAND, trace Silt, trace coarse to fine Gravel; moist.	
	2		FILL			25 15	<1	Grayish brown (5YR3/2) wood; moist.	Wood (Fill)
	3					20			
	5		FILL			22 16 14	<1	Moderate reddish brown (10R4/6) coarse to fine GRAVEL, little medium to fine Sand (debris - brick); moist.	Gravel (Fill)
	6								

Louis Berger and Assoc., P.C. 199 Water Street New York, NY 10038	PROJECT NO.: JG-8594	BORING NO.: SB-23
	Page 2 of 2	WELL NO.: N/A

Well	Depth	Lith.	USCS	Interval	Rec.	Blows	PID	Description	Remarks
	7		FILL			8 6 8 10	<1	Dark yellowish brown (10YR4/2) medium to fine SAND, little Silt, trace fine Gravel; wet.	**Sand (Fill)** **Water at 8 ft bgs**
	8		FILL			3 45	<1	Grayish brown (5YR3/2) medium to fine SAND, little Silt; saturated.	⧖ **Petroleum odor**
	9		FILL			15 17	<1	Light gray (N7) concrete; saturated.	**Concrete** **End of Boring at 10 ft.**
	10								

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Drilling Log** Page 1 of 2	**BORING NO.:** SB-24 **WELL NO.:** N/A

CLIENT: New York City Department of Design and Construction	**PROJECT NO:** JG-8594
PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)	**DATE STARTED:** 12/11/2006
DRILLING CONTRACTOR: Aquifer Drilling and Testing	**DATE FINISHED:** 12/11/2006
DRILLING METHOD: Hollow Stem Auger	**DRILLER:** G. Rivera
BOREHOLE DATA / **WELL DATA**	**INSPECTOR:** J. Ganz
Diameter (in): 4 / **Completion:** N/A	**NORTHING:** N/A
Total Depth (ft): 8.00 / **Total Depth (ft):** N/A	**EASTING:** N/A
Sampler: Split Spoon / **Screen Length (ft) /Slot (in):** N/A	**GROUND ELEVATION:** N/A
Depth to Water (ft): 6.00 / **Depth to Water (ft):** N/A	**TOC ELEVATION:** N/A
Depth to Rock (ft): N/A / **Permit No.:** N/A	

NOTES: Composite sample SB-24 collected from 0-8.00 ft bgs

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		FILL			15 13	<1	Dark yellowish brown (10YR4/2) medium to fine SAND, little Silt, trace coarse Gravel (roots, grass); moist.	**Sand (Fill)**
	1					8 3			
	2		FILL			15 17	<1	Moderate brown (5YR4/4) medium to fine SAND, little Silt, little coarse to medium Gravel (debris - concrete, brick, wood); moist.	
	3					15			
	4								
	5		FILL			19 9 7	<1	Dark yellowish brown (10YR4/2) fine SAND, and Silt (debris - brick, concrete, wood); wet.	Silty Sand (Fill) Water at 6 ft bgs ▽
	6								

Louis Berger and Assoc., P.C. 199 Water Street New York, NY 10038	PROJECT NO.: JG-8594	BORING NO.: SB-24
	Page 2 of 2	WELL NO.: N/A

Well	Depth	Lith.	USCS	Interval	Rec.	Blows	PID	Description	Remarks
	7		SP			40 28 9 6	<1	Dark yellowish brown (10YR4/2) medium to fine SAND; saturated.	**Sand** **End of Boring at 8 ft.**
	8								

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Drilling Log** Page 1 of 1	**BORING NO.:** SB-25 **WELL NO.:** TWP-01

CLIENT: New York City Department of Design and Construction	**PROJECT NO:** JG-8594
PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)	**DATE STARTED:** 12/13/2006
DRILLING CONTRACTOR: Aquifer Drilling and Testing	**DATE FINISHED:** 12/13/2006
DRILLING METHOD: Hollow Stem Auger	**DRILLER:** G. Rivera
	INSPECTOR: J. Ganz
	NORTHING: N/A
	EASTING: N/A
	GROUND ELEVATION: N/A
	TOC ELEVATION: N/A

BOREHOLE DATA		**WELL DATA**	
Diameter (in):	4	**Completion:**	N/A
Total Depth (ft):	4.00	**Total Depth (ft):**	N/A
Sampler:	Split Spoon	**Screen Length (ft) /Slot (in):**	N/A
Depth to Water (ft):	2.00	**Depth to Water (ft):**	N/A
Depth to Rock (ft):	N/A	**Permit No.:**	N/A

NOTES: Composite sample SB-25 collected from 0-4.00 ft bgs

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		FILL			2 2 1 2	<1	Dusky yellowish brown (10YR2/2) medium to fine SAND, little Silt (roots, grass); moist.	**Sand (Fill)** **Water at 2 ft bgs**
	2		SP			1 1 2	<1	Moderate brown (5YR4/4) medium to fine SAND, trace Silt, trace medium to fine Gravel (roots); saturated.	**Sand**
	3								

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Drilling Log** Page 1 of 2	**BORING NO.:** SB-26 **WELL NO.:** N/A

CLIENT: New York City Department of Design and Construction			**PROJECT NO:** JG-8594
PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)			**DATE STARTED:** 12/11/2006
DRILLING CONTRACTOR: Aquifer Drilling and Testing			**DATE FINISHED:** 12/11/2006
DRILLING METHOD: Hollow Stem Auger			**DRILLER:** G. Rivera
BOREHOLE DATA	**WELL DATA**		**INSPECTOR:** J. Ganz
Diameter (in): 4	**Completion:** N/A		**NORTHING:** N/A
Total Depth (ft): 10.00	**Total Depth (ft):** N/A		**EASTING:** N/A
Sampler: Split Spoon	**Screen Length (ft) /Slot (in):** N/A		**GROUND ELEVATION:** N/A
Depth to Water (ft): 6.00	**Depth to Water (ft):** N/A		**TOC ELEVATION:** N/A
Depth to Rock (ft): N/A	**Permit No.:** N/A		

NOTES: Composite sample SB-26 collected from 0-10.00 ft bgs

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		FILL			3 2 3 1	<1	Dark yellowish brown (10YR4/2) medium to fine SAND, little Silt (roots, grass); moist.	**Sand (Fill)**
	2		FILL			9 10 15	<1	Dark yellowish brown (10YR4/2) medium to fine SAND, some Silt; moist.	**Silty Sand (Fill)**
	4								
	5					2 10 5		and coarse to fine Gravel (debris - brick, concrete); moist	**(Fill)**
	6								Water at 6ft bgs ▽

Louis Berger and Assoc., P.C. 199 Water Street New York, NY 10038	PROJECT NO.: JG-8594	BORING NO.: SB-26
	Page 2 of 2	WELL NO.: N/A

Well	Depth	Lith.	USCS	Interval	Rec.	Blows	PID	Description	Remarks
			FILL			15 12 4 3	<1 <1	Medium yellowish brown (10YR5/4) medium to fine SAND, little Silt; wet. Dusky brown (5YR2/2) wood; wet.	**Sand (Fill), Wood (Fill)**
	7								
	8		SP			3 2	<1	Dark yellowish brown (10YR4/2) coarse to fine SAND, trace Silt; saturated.	**Sand**
	9		OL/OH			3 4	<1	Dusky yellowish brown (10YR2/2) PEAT; saturated.	**Peat** **End of Boring at 10 ft.**
	10								

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Drilling Log** Page 1 of 1	**BORING NO.:** SB-28 **WELL NO.:** N/A

CLIENT: New York City Department of Design and Construction	**PROJECT NO:** JG-8594
PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)	**DATE STARTED:** 12/12/2006
DRILLING CONTRACTOR: Aquifer Drilling and Testing	**DATE FINISHED:** 12/12/2006
DRILLING METHOD: Hollow Stem Auger	**DRILLER:** G. Rivera
BOREHOLE DATA / **WELL DATA**	**INSPECTOR:** J. Ganz
Diameter (in): 4 / **Completion:** N/A	**NORTHING:** N/A
Total Depth (ft): 6.00 / **Total Depth (ft):** N/A	**EASTING:** N/A
Sampler: Split Spoon / **Screen Length (ft) /Slot (in):** N/A	**GROUND ELEVATION:** N/A
Depth to Water (ft): 2.00 / **Depth to Water (ft):** N/A	**TOC ELEVATION:** N/A
Depth to Rock (ft): N/A / **Permit No.:** N/A	

NOTES: Composite sample SB-28 collected from 0-6.00 ft bgs

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		FILL			16	<1	Dusky yellowish brown (10YR2/2) medium to fine SAND, trace Silt; moist. Dusky brown (5YR2/2) wood; moist.	**Sand (Fill), Wood (Fill)**
	1					100	<1		
			FILL			1	<1	Dusky yellowish brown (10YR2/2) medium to fine SAND, trace Silt, trace medium to fine Gravel (debris - brick, wood, concrete); moist.	**Sand (Fill)**
	2		FILL			3	<1	Dusky yellowish brown (10YR2/2) medium to fine SAND, trace Silt (debris - wood); wet.	**Water at 2 ft bgs**
						2			
	3					2			
	4								
			Organic			2		Grayish black (N2) PEAT; saturated.	Peat
	5					4			
						1			End of Boring at 6 ft.
	6								

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Drilling Log** Page 1 of 2	**BORING NO.:** SB-29 **WELL NO.:** TWP-02

CLIENT: New York City Department of Design and Construction		**PROJECT NO:** JG-8594
PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)		**DATE STARTED:** 12/12/2006
DRILLING CONTRACTOR: Aquifer Drilling and Testing		**DATE FINISHED:** 12/12/2006
DRILLING METHOD: Hollow Stem Auger		**DRILLER:** G. Rivera
BOREHOLE DATA	**WELL DATA**	**INSPECTOR:** J. Ganz
Diameter (in): 4	**Completion:** N/A	**NORTHING:** N/A
Total Depth (ft): 10.00	**Total Depth (ft):** N/A	**EASTING:** N/A
Sampler: Split Spoon	**Screen Length (ft) /Slot (in):** N/A	**GROUND ELEVATION:** N/A
Depth to Water (ft): 4.00	**Depth to Water (ft):** N/A	**TOC ELEVATION:** N/A
Depth to Rock (ft): N/A	**Permit No.:** N/A	

NOTES: Composite sample SB-29 collected from 0-10.00 ft bgs

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		FILL			3	<1	Moderate brown (5YR4/4) medium to fine SAND, little Silt (grass, roots); moist.	Sand (Fill)
						3			
	1					1			
						2			
	2		FILL			10	<1	Dusky yellowish brown (10YR2/2) medium to fine SAND, trace Silt, trace medium Gravel; moist.	
						8			
	3					3			
	4								
	5		FILL			1	<1	Light gray (N7) medium to fine GRAVEL, some medium to fine Sand (debris - concrete); dry.	Sandy Gravel (Fill)
						50			
						50			
	6								

Louis Berger and Assoc., P.C. 199 Water Street New York, NY 10038	PROJECT NO.: JG-8594	BORING NO.: SB-29
	Page 2 of 2	WELL NO.: TWP-02

Well	Depth	Lith.	USCS	Interval	Rec.	Blows	PID	Description	Remarks
			FILL			5 3	<1	Olive black (5Y2/1) medium to fine SAND, little coarse to medium Gravel; saturated.	**Sand (Fill)**
	7					10 7			
	8		FILL			1 1	<1	Olive black (5Y2/1) medium to fine SAND, little coarse to medium Gravel (debris - brick); saturated.	
	9					2 1			**End of Boring at 10 ft.**
	10		OL/OH				<1	Olive black (5Y2/1) PEAT; saturated.	**Peat**

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Drilling Log** Page 1 of 1	**BORING NO.:** SB-30 **WELL NO.:** TWP-03

CLIENT: New York City Department of Design and Construction	**PROJECT NO:** JG-8594
PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)	**DATE STARTED:** 12/12/2006
DRILLING CONTRACTOR: Aquifer Drilling and Testing	**DATE FINISHED:** 12/12/2006
DRILLING METHOD: Hollow Stem Auger	**DRILLER:** G. Rivera
	INSPECTOR: J. Ganz
	NORTHING: N/A
	EASTING: N/A
	GROUND ELEVATION: N/A
	TOC ELEVATION: N/A

BOREHOLE DATA		WELL DATA	
Diameter (in):	4	**Completion:**	N/A
Total Depth (ft):	4.00	**Total Depth (ft):**	N/A
Sampler:	Split Spoon	**Screen Length (ft) /Slot (in):**	N/A
Depth to Water (ft):	2.00	**Depth to Water (ft):**	N/A
Depth to Rock (ft):	N/A	**Permit No.:**	N/A

NOTES: Composite sample SB-30 collected from 0-4.00 ft bgs

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		FILL			1	<1	Grayish brown (5YR3/2) medium to fine SAND, trace Silt (roots); moist.	Sand (Fill)
						2			
	1					1			
						3			Water at 2 ft bgs ⊻
	2					2	<1		
			FILL				<1	Grayish brown (5YR3/2) medium to fine SAND, trace Silt, trace fine Gravel; wet. Olive black (5Y2/1) medium to fine SAND, trace Silt, some medium to fine Gravel (debris - wood); saturated.	Gravelly Sand (Fill)
						1			
	3					3			

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Drilling Log** Page 1 of 1	**BORING NO.:** SB-31 **WELL NO.:** N/A

CLIENT: New York City Department of Design and Construction		**PROJECT NO:** JG-8594
PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)		**DATE STARTED:** 12/13/2006
DRILLING CONTRACTOR: Aquifer Drilling and Testing		**DATE FINISHED:** 12/13/2006
DRILLING METHOD: Hollow Stem Auger		**DRILLER:** G. Rivera
BOREHOLE DATA	**WELL DATA**	**INSPECTOR:** J. Ganz
Diameter (in): 4	**Completion:** N/A	**NORTHING:** N/A
Total Depth (ft): 6.00	**Total Depth (ft):** N/A	**EASTING:** N/A
Sampler: Split Spoon	**Screen Length (ft) /Slot (in):** N/A	**GROUND ELEVATION:** N/A
Depth to Water (ft): 4.00	**Depth to Water (ft):** N/A	**TOC ELEVATION:** N/A
Depth to Rock (ft): N/A	**Permit No.:** N/A	

NOTES: Composite sample SB-31 collected from 0-6.00 ft bgs

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		FILL			1 1	<1	Dark yellowish brown (10YR4/2) medium to fine SAND, little Silt (roots, grass); moist.	Sand (Fill)
	1					2 2			
	2		FILL			13	<1	Dark yellowish brown (10YR4/2) medium to fine SAND, trace Silt, trace medium to fine Gravel; moist.	
			FILL			23	<1	Moderate brown (5YR4/4) medium to fine SAND, trace Silt; moist.	
	3					18			
	4								
	5					4 8			
	6					2			End of Boring at 6 ft.

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Drilling Log** Page 1 of 1	**BORING NO.:** SB-32 **WELL NO.:** N/A

CLIENT: New York City Department of Design and Construction			**PROJECT NO:** JG-8594
PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)			**DATE STARTED:** 12/13/2006
DRILLING CONTRACTOR: Aquifer Drilling and Testing			**DATE FINISHED:** 12/13/2006
DRILLING METHOD: Hollow Stem Auger			**DRILLER:** G. Rivera
BOREHOLE DATA	**WELL DATA**		**INSPECTOR:** J. Ganz
Diameter (in): 4	**Completion:** N/A		**NORTHING:** N/A
Total Depth (ft): 6.00	**Total Depth (ft):** N/A		**EASTING:** N/A
Sampler: Split Spoon	**Screen Length (ft) /Slot (in):** N/A		**GROUND ELEVATION:** N/A
Depth to Water (ft): 4.00	**Depth to Water (ft):** N/A		**TOC ELEVATION:** N/A
Depth to Rock (ft): N/A	**Permit No.:** N/A		

NOTES: Composite sample SB-32 collected from 0-6.00 ft bgs

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		FILL			4	<1	Dusky yellowish brown (10YR2/2) medium to fine SAND, trace Silt (roots, grass); moist.	Sand (Fill)
						5			
	1					4			
						4			
	2		FILL			13	<1	Light gray (N7) concrete; moist.	Concrete
						25			
	3					62			
	4								
	5					9			
						7			
						3			End of Boring at 6 ft.
	6								

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Drilling Log** Page 1 of 1	**BORING NO.:** SB-33 **WELL NO.:** N/A

CLIENT: New York City Department of Design and Construction			**PROJECT NO:** JG-8594
PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)			**DATE STARTED:** 12/11/2006
DRILLING CONTRACTOR: Aquifer Drilling and Testing			**DATE FINISHED:** 12/11/2006
DRILLING METHOD: Hollow Stem Auger			**DRILLER:** G. Rivera
BOREHOLE DATA	**WELL DATA**		**INSPECTOR:** J. Ganz
Diameter (in): 4	**Completion:** N/A		**NORTHING:** N/A
Total Depth (ft): 4.00	**Total Depth (ft):** N/A		**EASTING:** N/A
Sampler: Split Spoon	**Screen Length (ft) /Slot (in):** N/A		**GROUND ELEVATION:** N/A
Depth to Water (ft): 2.00	**Depth to Water (ft):** N/A		**TOC ELEVATION:** N/A
Depth to Rock (ft): N/A	**Permit No.:** N/A		

NOTES: Composite sample SB-33 collected from 0-3.00 ft bgs

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		FILL			1 1 1 1	<1	Dark yellowish brown (10YR4/2) medium to fine SAND, little Silt (roots); moist.	Sand (Fill) Water at 2 ft bgs
	2		SP-SM			1 1	<1	Moderate brown (5YR4/4) medium to fine SAND, little Silt; wet.	Sand
	3		SP			2	<1	Dark yellowish brown (10YR4/2) medium to fine SAND, trace Silt; saturated.	
	4								

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Drilling Log** Page 1 of 1	**BORING NO.:** SB-34 **WELL NO.:** N/A

CLIENT: New York City Department of Design and Construction	**PROJECT NO:** JG-8594
PROJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)	**DATE STARTED:** 12/11/2006
DRILLING CONTRACTOR: Aquifer Drilling and Testing	**DATE FINISHED:** 12/11/2006
DRILLING METHOD: Hollow Stem Auger	**DRILLER:** G. Rivera
BOREHOLE DATA / **WELL DATA**	**INSPECTOR:** J. Ganz
Diameter (in): 4 / **Completion:** N/A	**NORTHING:** N/A
Total Depth (ft): 6.00 / **Total Depth (ft):** N/A	**EASTING:** N/A
Sampler: Split Spoon / **Screen Length (ft) /Slot (in):** N/A	**GROUND ELEVATION:** N/A
Depth to Water (ft): 4.00 / **Depth to Water (ft):** N/A	**TOC ELEVATION:** N/A
Depth to Rock (ft): N/A / **Permit No.:** N/A	

NOTES: Collected composite sample SB-34 from 0-6.00 ft bgs

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		FILL			0	<1	Dusky yellowish brown (10YR2/2) medium to fine SAND, little Silt (roots, grass); moist.	**Sand (Fill)**
						0			
	1					1			
						1			
	2		FILL			1	<1	Dusky yellowish brown (10YR2/2) medium to fine SAND, little Silt (roots); moist.	
			FILL				<1		
						1		Light brown (5YR5/6) medium to fine SAND, little Silt; moist.	
	3					1			
			SP			4	<1	Dark yellowish brown (10YR4/2) medium to fine SAND, trace Silt; saturated.	Sand
	5					5			
						6			End of Boring at 6 ft.
	6								

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Excavation Log**	TEST PIT NO.: TP-04 Page 1 of 1

CLIENT: New York City Department of Design and Construction		**PROJECT NO:**	JG-8548
OJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)		**DATE STARTED:**	12/11/2006
EXCAVATION CONTRACTOR: Aquifer Drilling and Testing		**DATE FINISHED:**	12/11/2006
EXCAVATOR: Rubber Tire Backhoe		**OPERATOR:**	J. Brown
EXCAVATION DATA	**BACKFILL DATA**	**INSPECTOR:**	J. Lacanale
Length (ft): 5	**Material:** Excavated Fill	**NORTHING:**	N/A
Width (ft): 2	**Compaction:** Tamping	**EASTING:**	N/A
Depth (ft): 4.00	**Lifts (ft):** 2	**GROUND ELEVATION (ft):**	N/A
Depth to Water (ft): N/A	**Restoration:** Native Material		
Depth to Rock (ft): N/A			

NOTES:

Lithology	USCS	Depth (ft)	PID (ppm)	Description	Remarks
	FILL	0	<1.0	Dusky yellowish brown (10YR2/2) - Dark yellowish brown (10YR4/2) coarse to fine SAND, some coarse to fine Gravel (Fill Material - Concrete and Brick debris); dry.	**Gravelly Sand (Fill)**
		1			
		2			
					Peat
					Bottom of Pit at 4 ft.

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Excavation Log**	TEST PIT NO.: TP-08 Page 1 of 1

CLIENT: New York City Department of Design and Construction			**PROJECT NO:** JG-8548
.OJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)			**DATE STARTED:** 12/11/2006
EXCAVATION CONTRACTOR: Aquifer Drilling and Testing			**DATE FINISHED:** 12/11/2006
EXCAVATOR: Rubber Tire Backhoe			**OPERATOR:** J. Brown
EXCAVATION DATA		**BACKFILL DATA**	**INSPECTOR:** J. Lacanale
Length (ft):	5	**Material:** Excavated Fill	**NORTHING:** N/A
Width (ft):	2	**Compaction:** Tamping	**EASTING:** N/A
Depth (ft):	4.00	**Lifts (ft):** 2	**GROUND ELEVATION (ft):** N/A
Depth to Water (ft):	N/A	**Restoration:** Native Material	
Depth to Rock (ft):	N/A		

NOTES:

Lithology	USCS	Depth (ft)	PID (ppm)	Description	Remarks
	FILL	0	<1.0	Light brown (5YR5/6) - moderate yellowish brown (10YR5/4) Coarse to fine SAND, some coarse to fine Gravel (Fill Material - Concrete and brick Debris); Wet at 4'.	**Gravelly Sand (Fill)**
		1			
		2			
					Bottom of Pit at 4 ft.

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Excavation Log**	TEST PIT NO.: TP-10 Page 1 of 1

CLIENT: New York City Department of Design and Construction		**PROJECT NO:**	JG-8548
OJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)		**DATE STARTED:**	12/11/2006
EXCAVATION CONTRACTOR: Aquifer Drilling and Testing		**DATE FINISHED:**	12/11/2006
EXCAVATOR: Rubber Tire Backhoe		**OPERATOR:**	J. Brown
EXCAVATION DATA	**BACKFILL DATA**	**INSPECTOR:**	J. Lacanale
Length (ft): 5	**Material:** Excavated Fill	**NORTHING:**	N/A
Width (ft): 5	**Compaction:** Tamping	**EASTING:**	N/A
Depth (ft): 4.00	**Lifts (ft):** 2	**GROUND ELEVATION (ft):**	N/A
Depth to Water (ft): N/A	**Restoration:** Native Material		
Depth to Rock (ft): N/A			

NOTES:

Lithology	USCS	Depth (ft)	PID (ppm)	Description	Remarks
	FILL	0	<1.0	Dusky brown (5YR2/2) coarse to fine SAND, some Peat, little medium to fine Gravel; wet.	**Peaty Sand (Fill)**
	FILL	1	<1.0	Pale brown (5YR5/2) - moderate yellowish brown (10YR5/4) coarse to fine SAND, trace Peat, some coarse to fine Gravel; wet.	**Gravelly Sand (Fill)**
		2			
					Bottom of Pit at 4 ft

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Excavation Log**	TEST PIT NO.: TP-12 Page 1 of 1

CLIENT: New York City Department of Design and Construction			**PROJECT NO:** JG-8548
OJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)			**DATE STARTED:** 12/11/2006
EXCAVATION CONTRACTOR: Aquifer Drilling and Testing			**DATE FINISHED:** 12/11/2006
EXCAVATOR: Rubber Tire Backhoe			**OPERATOR:** J. Brown
EXCAVATION DATA	**BACKFILL DATA**		**INSPECTOR:** J. Lacanale
Length (ft): 5	**Material:** Excavated Fill		**NORTHING:** N/A
Width (ft): 2	**Compaction:** Tamping		**EASTING:** N/A
Depth (ft): 4.00	**Lifts (ft):** 2		**GROUND ELEVATION (ft):** N/A
Depth to Water (ft): N/A	**Restoration:** Native Material		
Depth to Rock (ft): N/A			

NOTES:

Lithology	USCS	Depth (ft)	PID (ppm)	Description	Remarks
	SM	0	<1.0	Grayish black (N2) coarse to fine SAND, some Peat; wet.	**Peaty Sand**
		1			
		2			
					Bottom of Pit at 4 ft.

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Excavation Log**	**TEST PIT NO.:** TP-14 Page 1 of 1

CLIENT: New York City Department of Design and Construction			**PROJECT NO:** JG-8548
OJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)			**DATE STARTED:** 12/11/2006
EXCAVATION CONTRACTOR: Aquifer Drilling and Testing			**DATE FINISHED:** 12/11/2006
EXCAVATOR: Rubber Tire Backhoe			**OPERATOR:** J. Brown
EXCAVATION DATA		**BACKFILL DATA**	**INSPECTOR:** J. Lacanale
Length (ft):	5	**Material:** Excavated Fill	**NORTHING:** N/A
Width (ft):	2	**Compaction:** Tamping	**EASTING:** N/A
Depth (ft):	4.00	**Lifts (ft):** 2	**GROUND ELEVATION (ft):** N/A
Depth to Water (ft):	N/A	**Restoration:** Native Material	
Depth to Rock (ft):	N/A		

NOTES:

Lithology	USCS	Depth (ft)	PID (ppm)	Description	Remarks
	OL/OH	0	<1.0	Dark Gray (N3) PEAT, some coarse to fine Sand; dry.	**Sandy Peat**
		1			
		2			
				[illegible]	Sand
					Bottom of Pit at 4 ft.

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Excavation Log**	TEST PIT NO.: TP-15 Page 1 of 1

CLIENT: New York City Department of Design and Construction			**PROJECT NO:** JG-8548
OJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)			**DATE STARTED:** 12/11/2006
EXCAVATION CONTRACTOR: Aquifer Drilling and Testing			**DATE FINISHED:** 12/11/2006
EXCAVATOR: Rubber Tire Backhoe			**OPERATOR:** J. Brown
EXCAVATION DATA	**BACKFILL DATA**		**INSPECTOR:** J. Lacanale
Length (ft): 5	**Material:** Excavated Fill		**NORTHING:** N/A
Width (ft): 2	**Compaction:** Tamping		**EASTING:** N/A
Depth (ft): 3.00	**Lifts (ft):** 2		**GROUND ELEVATION (ft):** N/A
Depth to Water (ft): N/A	**Restoration:** Native Material		
Depth to Rock (ft): N/A			

NOTES:

Lithology	USCS	Depth (ft)	PID (ppm)	Description	Remarks
	SM	0 1 2	<1.0	Grayish black (N2) - dark yellowish brown (10YR4/2) coarse to fine SAND, some Peat.	**Peaty Sand** Bottom of Pit at 3 ft.

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Excavation Log**	TEST PIT NO.: TP-19 Page 1 of 1

CLIENT: New York City Department of Design and Construction			**PROJECT NO:** JG-8548
OJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)			**DATE STARTED:** 12/11/2006
EXCAVATION CONTRACTOR: Aquifer Drilling and Testing			**DATE FINISHED:** 12/11/2006
EXCAVATOR: Rubber Tire Backhoe			**OPERATOR:** J. Brown
EXCAVATION DATA		**BACKFILL DATA**	**INSPECTOR:** J. Lacanale
Length (ft):	5	**Material:** Excavated Fill	**NORTHING:** N/A
Width (ft):	2	**Compaction:** Tamping	**EASTING:** N/A
Depth (ft):	4.00	**Lifts (ft):** 2	**GROUND ELEVATION (ft):** N/A
Depth to Water (ft):	N/A	**Restoration:** Native Material	
Depth to Rock (ft):	N/A		

NOTES:

Lithology	USCS	Depth (ft)	PID (ppm)	Description	Remarks
	FILL	0	< 1.0	Grayish black (N2) coarse to fine SAND, some coarse to fine Gravel, some Peat; wet.	GravellyPeatySand(Fill)
	SP-SM	1	< 1.0	Grayish black (N2) coarse to fine SAND, little Silt, some Peat; wet.	Peaty Sand
		2			
					Bottom of Pit at 4 ft.

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Excavation Log**	TEST PIT NO.: TP-20 Page 1 of 1

CLIENT: New York City Department of Design and Construction		**PROJECT NO:**	JG-8548
OJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)		**DATE STARTED:**	12/11/2006
EXCAVATION CONTRACTOR: Aquifer Drilling and Testing		**DATE FINISHED:**	12/11/2006
EXCAVATOR: Rubber Tire Backhoe		**OPERATOR:**	J. Brown
EXCAVATION DATA	**BACKFILL DATA**	**INSPECTOR:**	J. Lacanale
Length (ft): 5	**Material:** Excavated Fill	**NORTHING:**	N/A
Width (ft): 2	**Compaction:** Tamping	**EASTING:**	N/A
Depth (ft): 4.00	**Lifts (ft):** 2	**GROUND ELEVATION (ft):**	N/A
Depth to Water (ft): N/A	**Restoration:** Native Material		
Depth to Rock (ft): N/A			

NOTES:

Lithology	USCS	Depth (ft)	PID (ppm)	Description	Remarks
	SM	0	<1.0	Grayish black (N2) - dark yellowish brown (10YR4/2) coarse to fine SAND, some Peat; wet.	**Peaty Sand**
		1			
		2			
					Bottom of Pit at 3 ft.

Louis Berger & Assoc., P.C. 199 Water Street New York, NY 10038	**Excavation Log**	TEST PIT NO.: TP-27 Page 1 of 1

CLIENT: New York City Department of Design and Construction			**PROJECT NO:** JG-8548
OJECT: South Beach Bluebelt Remedial Investigation (BEGS2005013)			**DATE STARTED:** 12/11/2006
EXCAVATION CONTRACTOR: Aquifer Drilling and Testing			**DATE FINISHED:** 12/11/2006
EXCAVATOR: Rubber Tire Backhoe			**OPERATOR:** J. Brown
EXCAVATION DATA	**BACKFILL DATA**		**INSPECTOR:** J. Lacanale
Length (ft): 5	**Material:** Excavated Fill		**NORTHING:** N/A
Width (ft): 2	**Compaction:** Tamping		**EASTING:** N/A
Depth (ft): 5.00	**Lifts (ft):** 2		**GROUND ELEVATION (ft):** N/A
Depth to Water (ft): N/A	**Restoration:** Native Material		
Depth to Rock (ft): N/A			

NOTES:

Lithology	USCS	Depth (ft)	PID (ppm)	Description	Remarks
	SM	0	<1.0	Grayish black (N2) - dark yellowish brown (10YR4/2) coarse to fine SAND, some Peat; wet.	**Peaty Sand**
		1			
		2			
					Bottom of Pit at 5 ft.
		5			