# HISTORICAL PERSPECTIVES INC.



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

OPRHP No. 10PRO2085

LPC No. 07DEP063R

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LPC No. 07DEP063R

Prepared For:

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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, Oakwood Beach Watershed.

Minor Civil Division: 08501, Staten Island

County: Richmond

Survey Area

Length: varies Width: varies

Number of Acres Surveyed: Total footprint of five BMPs is ca. 89 acres

USGS 7.5 Minute Quadrangle Map: Arthur Kill and 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 Oakwood Beach Watershed in Staten Island, New York. The Oakwood Beach Watershed is approximately 1,329 acres in size and generally defined by Great Kills Park (part of the Gateway National Recreation Area) and Tanglewood Drive to the west, Cotter Avenue to the north, New Dorp Lane to the east, and Lower Bay to the south. A portion of the Oakwood Beach drainage area, west of the Willowbrook Parkway rightof-way, is tributary to the Oakwood Beach Bluebelt, but outside the area of the proposed drainage plan amendments. The Oakwood Beach drainage area and the tributary to the Oakwood Beach Bluebelt are shown on Figure 1. For the purposes of this study, only the main drainage area, referred to in this report as the Oakwood Beach Watershed, will be addressed. 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 the wetlands. A new outfall connecting the BMPs to Lower Bay is proposed at BMP OB-1, and two existing outfalls are proposed to be supplemented with new barrels (5 to 8 feet in width) placed adjacent to the existing barrels. These existing outfalls are located at Tysens Lane and Ebbitts Street. 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-d. Figures 3a-c represent the most conservative estimate of BMP footprint areas, whereas Figures 4a-d are, in some cases, more tightly restricted to proposed impact areas. For this report, the more conservative BMP footprints as shown on 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.

Oakwood Bea	Oakwood Beach BMP Descriptions						
ВМР	Size (ac)	Location	Drainage Area (ac)	Description	Function / Objective	Ownership / Jurisdiction	
OB-1: Kissam Avenue	28.2	Southeast of Mill Road, between Kissam Avenue and Fox Lane	66.4	Extended Detention Wetland	Stormwater detention, water quality enhancement and wetland enhancement	DEP Bluebelt / NYC Department of Parks and Recreation (DPR) Parkland	
OB-2: Tysens Lane	27.9	Northeast of Kissam Avenue, southwest of end of Milton Avenue	455.0	Extended Detention Wetland	Stormwater detention, water quality enhancement and wetland enhancement	DPR Parkland	
OB-3: Riga Street	28.3	Southwest of Aviston Avenue, between Riga Street and Brook Avenue	263.6	Extended Detention Wetland, forebays at sewer discharges	Stormwater detention, water quality enhancement and wetland enhancement	DEP Bluebelt	
OB-4: Ithaca Street	1.4	Unbuilt Adelaide Avenue Right-of- Way between Hylan Boulevard and Falcon Avenue	182.8	Pocket wetland at Hylan Blvd outfall and forebays at other sewer discharges with Stream Stabilization	Velocity attenuation, improved conveyance and stream corridor restoration	DEP Bluebelt	
OB-5: North Railroad Avenue	3.2	Willowbrook Parkway Right-of- Way at Staten Island Railroad viaduct	25.4	Stormwater Basin Retrofit and Channel Restoration	Stormwater detention, velocity attenuation, improved conveyance and stream corridor restoration	NYSDOT/ DPR	

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. 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 Oakwood 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 sensitive input for planning purposes. The total Oakwood Beach Watershed area also is addressed in terms of general history and archaeological sensitivity.

The Phase IA study concluded that the proposed BMP OB-2 site contains a discrete area of precontact archaeological sensitivity. The remaining portions of this proposed BMP, as well as all of the proposed BMP OB-1, BMP OB-3, BMP OB-4, and BMP OB-5 sites contain no precontact archaeological sensitivity. None of the proposed BMP locations contain historic period archaeological sensitivity. The Phase IA study also concluded that the supplemental Tysens Lane outfall, within the undeveloped land between Roma Avenue and Cedar Grove Avenue, contains precontact archaeological sensitivity. The remainder of the supplemental Tysens Lane outfall corridor, as well as the proposed new outfall at BMP OB-1 and the supplemental Ebbitts Street outfall contain no precontact archaeological sensitivity. None of the proposed new or supplemental outfall locations contain historic period archaeological sensitivity. Assessment of both precontact and historic period archaeological sensitivity for the Oakwood 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 Oakwood 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 OB-2 site designated as having a high archaeological sensitivity for precontact resources, as shown in Figure 11, if this area will experience subsurface impacts as part of the BMP construction. HPI also recommends that a program of Phase IB archaeological testing be conducted in the proposed location of the supplemental outfall at Tysens Lane, within the undeveloped land between Roma Avenue and Cedar Grove Avenue. 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 remainder of the proposed site of BMP OB-2, and all of the proposed sites of BMP OB-1, BMP OB-3, BMP OB-4, and BMP OB-5. Last, no further archaeological investigations are recommended for the remaining sections of the proposed new and supplemental outfalls.

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# I. INTRODUCTION

DEP has developed a drainage plan for the storm water management of the Oakwood Beach Watershed in Staten Island, New York. The Oakwood Beach Watershed is approximately 1,329 acres in size and generally defined by Great Kills Park (part of the Gateway National Recreation Area) and Tanglewood Drive to the west, Cotter Avenue to the north, New Dorp Lane to the east, and Lower Bay to the south. A portion of the Oakwood Beach drainage area, west of the Willowbrook Parkway right-of-way, is tributary to the Oakwood Beach Bluebelt, but outside the area of the proposed drainage plan amendments. The Oakwood Beach drainage area and the tributary to the Oakwood Beach Bluebelt are shown on Figure 1. For the purposes of this study, only the main drainage area, referred to in this report as the Oakwood Beach Watershed, will be addressed. 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 the wetlands. A new outfall connecting the BMPs to Lower Bay is proposed at BMP OB-1, and two existing outfalls are proposed to be supplemented with new barrels (5 to 8 feet in width) placed adjacent to the existing barrels. These existing outfalls are located at Tysens Lane and Ebbitts Street. The location of the overall watershed, the five proposed BMP locations, and the proposed 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-d. Figures 3a-c represent the most conservative estimate of BMP footprint areas, whereas Figures 4a-d 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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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 sensitive input for planning purposes. The total Oakwood 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 proposed BMP (BMP OB-3 and BMP OB-4 are listed as BMP OB-3) is provided as Appendix A.
- DEP also provided Phase II environmental studies for the proposed sites of BMP OB-1 and BMP OB-3/4, which include soil borings. The soil borings are included as Appendices B and C. No Phase II environmental studies were available for the proposed sites of BMP OB-2 or BMP OB-5.

- AKRF provided project descriptions. Text generated by AKRF is included within various sections of this
  report.
- Last, site visits to the proposed sites of the BMPs were conducted by Dawn Louise Brown of HPI on December 6-7, 2010 to assess any obvious or unrecorded subsurface disturbance (Photographs 1-14; 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

#### Oakwood Beach Watershed Area

As noted in the Introduction, the Oakwood Beach Watershed is generally defined by Great Kills Park (part of the Gateway National Recreation Area) and Tanglewood Drive to the west, Cotter Avenue to the north, New Dorp Lane to the east, and Lower Bay to the south. It is approximately 1,329 acres in size and there are about 60.9 acres of DEP Bluebelt property (including both Bluebelt lands that have been acquired and the lands to be acquired). The Bluebelt properties are located primarily in the lower elevations of the watershed, south of Hylan Boulevard and north and east of DEP's Oakwood Beach Wastewater Treatment Plant (WWTP). There is also substantial DPR parkland in the watershed particularly along the waterfront and including a large wetland parcel situated between Kissam Avenue and Tysens Lane which is part of the City's Great Kills Park, covering the Lower Bay shoreline along the watershed. In addition, DPR manages the mapped (but unbuilt) segment of the Willowbrook Parkway right-of-way which extends across the watershed south to Hylan Boulevard. Because the parkway right-of-way remains on the official City map, the New York State Department of Transportation (NYSDOT) has jurisdiction over the right-of way as well. The Staten Island Railway runs east to west across the northern portion of the watershed along land under the jurisdiction of the Metropolitan Transportation Authority (MTA). A railway line crosses the parkway right-of-way in the vicinity of the intersection of North Railroad and Riedel Avenues.

Land uses within the watershed are predominantly residential and open space with commercial uses along the major thoroughfares, such as Hylan Boulevard. Reflecting this land use pattern, most of this watershed is zoned for low-density residential uses with commercial zoning districts mapped principally along the Boulevard. In the northwestern portion of the watershed, one area is also within the Staten Island Special Natural Area District (NA-1) while another is covered by the Special South Richmond Development District (SSRDD). Those two special zoning districts are zoning overlay districts, so designated to manage development and protect natural resources such as wetlands, woods and natural topographic features.

# BMP OB-1

The proposed site of BMP OB-1 would be located on City property that includes Bluebelt lands (to be acquired) as well as some land currently under the jurisdiction of the DPR. The proposed BMP site is bounded approximately by Kissam Avenue to the east, Fox Lane to the west, Mill Road to the north, and the Lower Bay shoreline (which is DPR parkland, part of the City's Great Kills Park) to the south. It lies on level ground, the wetlands are low-lying and slow moving water is visible. This proposed BMP site is dominated by *phragmites*, which is a common reed associated with disturbed wetland landforms.

The edges of the wetlands along Fox Lane are being used for parking by residents (Photograph 1). A portion along the edge of the proposed BMP site, south of Old Mill Road appeared disturbed with mounding and large amounts of debris (Photograph 2). No obvious disturbance could be viewed from the Oakwood Beach vantage point (Photograph 3). However, at the end of Kissam Road is a large raised manhole (Photograph 4).

# BMP OB-2

The proposed site of BMP OB-2, measuring approximately 27.9 acres, is immediately adjacent to Oakwood Beach. BMP OB-2 would be located on DPR property that is bounded approximately by Mill Road to the north (and the

rear yards of the developed properties fronting on Mill Road), residential properties to the east (and the rear yards of the developed properties primarily fronting on Tysens Lane, Milton Avenue, and Roberts Drive), and residential properties to the west (and the rear yards of properties that front along Kissam Avenue). The southern boundary is the City parkland property line (part of Great Kills Park). It lies on level ground, the wetlands are low-lying and slow moving water is visible. This proposed BMP is dominated by *phragmites*, which is a common reed associated with disturbed wetland landforms. An area rising several feet above the marshland extends into the northern side of the proposed BMP from Old Mill Road, and contains non-wetland vegetation.

No obvious disturbance could be viewed from the Oakwood Beach vantage point (Photograph 5). The edges of the wetlands along Kissam Ave. are relatively undisturbed, although there was evidence of a recent brush fire (Photograph 6). However, a portion of this area is used for the dumping of debris and cars. The view from Hett Avenue also appears undisturbed (Photograph 7). However, at the end of Milton Avenue there appears to be a raised berm to contain the wetlands, revealing construction that may have disturbed the edges of the wetlands (Photograph 8). Construction debris was also present at this location.

# **BMP OB-3**

The proposed site of BMP OB-3, measuring approximately 28.3 acres, is immediately adjacent to Great Kills Park. BMP OB-3 would be located on Bluebelt property, some of which is in the process of being acquired for DEP Bluebelt purposes. The site is bounded by residential properties to the northwest (the rear yards of the developed properties fronting on Brook Avenue and Grayson Avenue), Aviston Street to the northeast, residential properties to the southeast (to the rear yards of properties that front along Lynn Street, Amherst Street, Riga Street), and the western boundary is Great Kills Park, part of Gateway National Recreation Area. The proposed BMP site is on level ground, the wetlands are low-lying and water is not visible. This proposed BMP is dominated by *phragmites*, which is a common reed associated with disturbed wetland landforms.

No obvious disturbance could be viewed from Riga Street, however, residents have utilized dry areas to park cars (Photograph 9). The edges of the wetlands along Grayson Street have some disturbance with mounding and the dumping of debris (Photograph 10).

# BMP OB-4

The proposed site of BMP OB-4, measuring approximately 1.4 acres, is bounded by Hylan Boulevard to the north and extends south along the mapped, but unbuilt, Adelaide Avenue right-of-way to Falcon Avenue where the straight man-made drainage ditch makes a 90-degree turn west. To the east lie residential/commercial properties associated with Hylan Boulevard and Medina Street. The proposed site of BMP OB-3 and residential properties lie to the south. More residential properties and Ithaca Street are located to the west. This proposed BMP has no visible water and no wetlands vegetation. There is a man-made drainage ditch containing considerable debris, deciduous trees, and brush. It is in a highly developed neighborhood.

The proposed site of BMP OB-4 is heavily disturbed with mounding and debris readily visible (Photograph 11). Large chunks of asphalt are evident, too. A manhole cover indicates underground utilities or drainage control feature.

#### BMP OB-5

The proposed site of BMP OB-5, measuring approximately 3.2 acres, is located on property within the Willowbrook Parkway right-of-way (which is land under the jurisdiction of DPR and the New York State Department Transportation [NYSDOT]) and bounded by residential properties to the east and west, stretching from Savoy Street in the north to the existing stream in the right-of-way to the south. The parkway was never built, and although it remains a mapped right-of-way measuring 200-300 feet in width, DPR has taken over management of the corridor and developed a trail system along its length. The site of the proposed BMP is located within residential neighborhoods and is crossed overhead by the Staten Island Railroad viaduct. The proposed BMP is bordered to the north by Savoy Street, to the east by Currie Avenue and Riedel Avenue, to the south by Hylan Boulevard (a large main thoroughfare), and to the west by Taro Street and Hasbro Street.

The area near the intersection of Currie Avenue and Fairbanks Avenue appears disturbed with mounding and the dumping of debris (Photograph 12). Additionally, the site of the proposed BMP contains a man-made basin that may be a stormwater pond (Photograph 13) at the intersection of Railroad Avenue and Riedel Avenue, and eroded informal and intermittent stream channels, both upstream and downstream of this pond (Photograph 14). There is an informal swale that runs through the property near Fairbanks Avenue, and which turns into a more defined channel that extends to Hylan Boulevard on the south. The proposed BMP is wooded, dominated by deciduous trees and brush.

# **New and Supplemental Outfalls**

The proposed new outfall would be located on the southeast side of BMP OB-1, and would empty into the Lower Bay. The outfall is proposed to be constructed under the tidal creek and berm before daylighting on the sandy beach.

The two proposed supplemental outfalls would be located adjacent to existing outfalls at Tysens Lane and Ebbitts Street. These existing outfalls are located under streetbeds and beaches, with the exception of a section of the Tysens Lane outfall between Roma Avenue and Cedar Park Avenue that is undeveloped and covered in vegetation.

#### B. Topography and Hydrology

The following discussion outlines the topography and hydrology for the overall Oakwood 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-c). Modern survey maps (Figures 4a-d) 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.

#### Oakwood Beach Watershed Area

The Oakwood Beach Watershed contains various topographic features, depending on location. The upper, or northwestern portion of the watershed is dominated by Staten Island's terminal moraine ridge, with elevations near 100 feet above sea level. The lower, or southeastern portion of the watershed is located on a low, flat coastal plain. Several small streams bring runoff towards Lower Bay; these converge into a common outlet channel, which is located near the Oakwood Beach WWTP. A portion of the watershed is at very low elevation—within five feet or less of mean high tide in some areas. This low-lying area is primarily in the vicinity of Mill Road, Fox Lane, Kissam Avenue, and other adjacent streets.

Runoff within the watershed flows south into Lower Bay via three drainage systems. One is the West Branch, which generally originates within the Willowbrook Parkway right-of-way and continues south into Great Kills Park where flows from a stream channel and storm sewer, both in the parkway right-of-way, combine. That combined flow empties into another channel that begins at Hylan Boulevard and then runs west as the West Branch of the lower watershed and eventually empties into Lower Bay near the Oakwood Beach WWTP. Another drainage system is the East Branch which begins in the park property east of Kissam Avenue. This East Branch stream, paralleling the Lower Bay shoreline, flows south and west to a tide gate that is located immediately south of the Oakwood Beach WWTP. This tide gate controls the inflow of tidal waters from Lower Bay, thereby preventing inland flooding during high tide events. Lastly, a smaller subwatershed exists in the central area of the Oakwood Beach Watershed, drained by a wide channel that starts in Hylan Boulevard and the mapped but unbuilt Adelaide Avenue. That channel, obviously man-made because of its straightness and the 90-degree turns, runs in the bed of Adelaide Avenue until it makes one of those turns and runs in the bed of Falcon Avenue. Finally, after another 90degree turn, the straight channel runs along the boundary of Great Kills Park (part of the Gateway National Recreation Area) and links up with the West Branch just north of the WWTP. The upper portion of the Oakwood Beach Watershed borders the Willowbrook Parkway right-of-way which extends for approximately 1.25 miles, between Hylan Boulevard on the south and Richmond Road on the north. The Parkway was never built, and DPR has developed a public trail system that runs the length of this stretch. For most of this length, the right-of-way is

between 200 and 300 feet in width. It is largely vegetated, undeveloped, and crossed only by Amboy Road/Savoy Street and the elevated Staten Island Railroad.

## BMP OB-1

The proposed site of BMP OB-1 is located on level, marshy terrain, 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 the proposed BMP has been primarily marshland at least since the nineteenth century. This marshland extends along the shoreline of Oakwood Beach. Bass Creek, which during the nineteenth century ran from Great Kills to just south of what is now Fox Lane, was the perennial drainage around which these marshlands formed. 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 in the south-central section of the proposed BMP. As shown in Figure 4a, today there are areas of the proposed BMP that have been clearly graded and filled, resulting in unnatural mounded topography rising from the wetlands.

# **BMP OB-2**

The proposed site of BMP OB-2 is located on level, marshy terrain, 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 the proposed BMP has been primarily marshland at least since the nineteenth century. This marshland extends along the shoreline of Oakwood Beach. Bass Creek, which during the nineteenth century ran from Great Kills to just south of what is now Fox Lane, was the perennial drainage around which these marshlands formed. The topographical map from 1911 (Figure 10a) shows that there was a peninsular hummock of land that rose about two feet above the level of the marshland extending into the northern side of the proposed BMP from Old Mill Road. Modern aerial maps, as well as Figure 4b, appear to show that this hummock still exists within the proposed BMP.

#### **BMP OB-3**

The proposed site of BMP OB-3 is located on mostly level ground generally at or just above sea level. The modern U.S.G.S. map (Figure 2) shows that the entire proposed BMP falls within an area mapped as between 0-10 feet 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 10b]) shows that the majority of the proposed BMP has been marshland at least since the nineteenth century. This marshland surrounds a drainage known on historic maps as Mill Creek, which in its natural state ran through the proposed BMP, entering Great Kill to the south. Some portions of the proposed BMP along the eastern and western sides, however, contain areas that were at one time elevated just above the marshland. The topographical map from 1911 (Figure 10b) shows that there were hummocks of land that rose about two feet above the level of the marshland extending from what is now Brook Avenue east into the proposed BMP, and from what is now Riga Street west into the proposed BMP. Modern aerial maps and Figure 4c appear to show that some of this raised topography may still exist within the proposed BMP, although it is unclear to what degree it has been modified from its original state. Figure 4c does show that large areas of the proposed BMP contain unnatural topography that is evidence of earthmoving.

#### **BMP OB-4**

The proposed site of BMP OB-4 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 former marshland, generally at or just above sea level. This marshland is in proximity to a drainage known on historic maps as Mill Creek, which in its natural state ran through adjacent proposed BMP OB-3, entering Great Kill to the south. During the twentieth century, proposed BMP OB-4 was graded and filled, as shown in Figure 4c.

#### BMP OB-5

In its natural state, the proposed site of BMP OB-5 traversed a range of topographic conditions, including mostly level terrain nearest to what is now Hylan Boulevard, to more sloped conditions moving north towards Amboy Road (e.g. U.S.C.S. 1856 [Figure 6], Bien and Vermeule 1891 [Figure 9], Borough of Richmond 1911 [Figure 10c]).

Portions of the proposed BMP near the northern end once exhibited a trough-like topography. As noted in the preceding Current Conditions section, there are several intermittent drainages that run through or cross this proposed BMP, and which have been altered or rerouted in the past to varying degrees. These drainages course southeasterly, ultimately empting into the Mill Creek wetlands southeast of Hylan Boulevard.

During the 1960s, when the site of proposed BMP OB-5 was slated to become a leg of the Willowbrook Parkway, aerial maps show that the entire proposed BMP was cleared of vegetation and the area graded in preparation for the new highway. Comparison of modern topographical maps (e.g. Figures 2 and 4d) with earlier maps (e.g. Borough of Richmond 1911 [Figure 10c]) suggests that there has been considerable land manipulation within this proposed BMP and that the existing topography largely has been artificially created.

#### **New and Supplemental Outfalls**

The proposed new outfall is 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 this proposed location was marshland and sandy beach since at least the nineteenth century.

The proposed supplemental outfalls at Tysens Lane and Ebbitts Street have inland areas that historically were elevated above the surrounding marshland, as shown in Figure 10d. However, comparison with historic topographical maps (e.g. U.S.C.S. 1856 [Figure 6], Bien and Vermeule 1891 [Figure 9], Borough of Richmond 1911 [Figure 10d]) shows that during the mid nineteenth century, the shoreline extended several hundred feet further into the bay, so that the ends of the existing outfalls in Lower Bay are actually in areas that were once on firm ground. Leng and Davis (1930, Vol. 1:24) note that between 1850 and 1881, the shoreline in this area moved inland about 350 feet.

# C. Geology

The majority of the Oakwood 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 just northwest of the Oakwood Beach Watershed, and accounts for the steep topography northwest of Richmond Road.

#### D. Soils

Figure 5 illustrates the location of the overall Oakwood Beach Watershed, as well as the proposed BMP and outfall 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 and outfall locations.

# Oakwood Beach Watershed Area

Soils mapped for the overall Oakwood Beach Watershed area can be roughly divided into three groups: land areas closest to the shoreline and Great Kills on the south, those lands within the interior section and generally southeast of the Staten Island Railroad tracks, and the land areas northwest of the railroad tracks, in the upland portion of the watershed.

The soils that are mapped closest to the shoreline and Great Kills 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, wet substratum complex (7), Bigapple-Fortress complex (99), Pavement & buildings, wet substratum-Laguardia-Ebbets complex, 0 to 8 percent slopes (101), and Gravesend and Oldmill coarse sands (268).

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, outwash substratum (3), Wethersfield-Ludlow-Wilbraham complex (262), Branford-Pompton complex (270), Pavement & buildings-Flatbush-Branford complex (274), and Pavement & buildings-Greenbelt-Cheshire complex (324).

The soils that are mapped within the western or upland portion of the watershed consist of soils formed over glacial till plains, hills, or moraines. Soils here include Pavement & buildings-Foresthills-Wethersfield complex (260), Wethersfield-Ludlow-Wilbraham complex (262), Wethersfield-Foresthills-Pavement & buildings complex (280), and Wotalf-Todthill-Pavement & buildings complex (344).

#### **BMP OB-1**

The entire footprint of proposed BMP OB-1 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	Color	Texture,	Slope	Drainage	Landform
	Depth		Inclusions	%		
Ipswich Series	Oe1 0-20 in	10YR 4/3	Mucky peat	0	Very poorly	Tidal marsh
	Oe2 20-40 in	2.5Y 3/2	Mucky peat			
	Oa 40-72 in	5Y 4/1	Mucky peat			
Pawcatuck	Oe1 0-8 in	5Y 3/1	Mucky peat	0	Very poorly	Tidal marsh
Series	Oe2 8-24 in	2.5Y 4/1	Mucky peat			
	2C 24-72 in	N 4/	LoSa			
Matunuck	Oe 0-8 in	10YR 2/1	Mucky peat	0	Very poorly	Tidal marsh
Series	<i>C1</i> 8-72 in	2.5Y 4/1	Sa			

Key: Soils: Lo-Loam, Sa-Sand

In 2009 Louis Berger Associates (LBA) conducted a Phase II Environmental Site Investigation in the area now known as the proposed site of BMP OB-1, but which was then called "Section B." The site they investigated was slightly larger than the present proposed BMP footprint, and extended to the edges of Fox Lane, Kissam Avenue, and Old Mill Road, except in locations where land was privately owned and contained structures.

As part of the Phase II investigations, a total of 35 soil borings were completed in February 2009. The logs are included as Appendix B. These borings were located on a rough grid spaced over the site. Depth of the borings ranged from 2-10 feet below ground surface (ft bgs), and halted after reaching the bottom of the fill layer, or the peat layer, which was encountered first. The following summary of soil conditions is taken directly from the LBA report.

Non-native fill, generally consisting of yellowish brown, silty sand with some medium to fine gravel was observed along the northwestern and northeastern boundaries of the Site, close to roadways and residential properties. The fill material observed existed from grade to depths ranging from approximately 1-4 ft bgs in borings advanced in these areas (i.e. at B-SB-02, B-SB-03, B-SB-04, and B-SB-08). Below the fill layer, interpreted native soils were observed to consist of clayey silts and peat layers. Mostly native material was observed throughout the remainder of the Site with some areas of surficial debris interspersed throughout. In borings advanced throughout the interior of the Site and closer to the southeastern boundary, lithology was mainly comprised of peat and clayey-silts from ground surface. The depth to water ranged from ground surface to approximately 5 ft bgs in the southwestern portion of the Site (LBA 2009:24-25).

It should be noted that areas described as containing fill in the above paragraph are outside the present proposed BMP footprint, in proximity to developed lots along the south side of Old Mill Road. Additionally, all soils were recorded as either moist or wet, suggesting the continued influence of the tidal marshes on the proposed BMP.

Comparison of the soil boring data with the U.S.D.A. mapped soils for the proposed BMP suggests that there are areas of the proposed BMP along its southwestern side, nearest to Fox Lane, that have slightly raised topography and that do not contain peat. Borings here (B-SB-21, 29, 33, and 34) contained upper strata of sand that may correspond to small hummocks shown on historic maps, and as will be described further in the Historic Period Summary section, below.

#### BMP OB-2

The entire footprint of proposed BMP OB-2 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	Color	Texture,	Slope	Drainage	Landform
	Depth		Inclusions	%		
Ipswich Series	Oe1 0-20 in	10YR 4/3	Mucky peat	0	Very poorly	Tidal marsh
	Oe2 20-40 in	2.5Y 3/2	Mucky peat			
	Oa 40-72 in	5Y 4/1	Mucky peat			
Pawcatuck	Oe1 0-8 in	5Y 3/1	Mucky peat	0	Very poorly	Tidal marsh
Series	Oe2 8-24 in	2.5Y 4/1	Mucky peat			
	2C 24-72 in	N 4/	LoSa			
Matunuck	<i>Oe</i> 0-8 in	10YR 2/1	Mucky peat	0	Very poorly	Tidal marsh
Series	C1 8-72 in	2.5Y 4/1	Sa			

Key: Soils: Lo-Loam, Sa-Sand

Although no soil borings were available for the proposed site of BMP OB-2, it is assumed that subsurface conditions throughout most of the proposed BMP are similar to those described for the proposed site of BMP OB-1, above. Historic maps also show areas with small hummocks of higher ground rising above the wetlands, which likely contain similar conditions as those described for the proposed site of BMP OB-1.

#### BMP OB-3

The majority of the proposed site of BMP OB-3 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 northwestern side of the proposed BMP footprint is mapped as Pavement & buildings, wet substratum-Laguardia-Ebbets complex, 0 to 8 percent slopes, described as:

Nearly level to gently sloping urbanized areas filled with a mixture of natural soil materials and construction debris over swamp, tidal marsh, or water; a mixture of anthropogenic soils which vary in coarse fragment content, with up to 80 percent impervious pavement and buildings covering the surface (USDA 2005:12).

The southern edge of the proposed BMP is mapped as Gravesend and Oldmill coarse sands, 0 to 8 percent slopes, described as:

Nearly level to gently sloping areas of household landfill materials capped by sandy fill of variable thickness (USDA 2005:16).

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

Name	Soil Horizon	Color	Texture,	Slope	Drainage	Landform
	Depth		Inclusions	%		
Ipswich Series	Oe1 0-20 in	10YR 4/3	Mucky peat	0	Very poorly	Tidal marsh
	Oe2 20-40 in	2.5Y 3/2	Mucky peat			
	Oa 40-72 in	5Y 4/1	Mucky peat			
Pawcatuck	Oe1 0-8 in	5Y 3/1	Mucky peat	0	Very poorly	Tidal marsh
Series	Oe2 8-24 in	2.5Y 4/1	Mucky peat			
	2C 24-72 in	N 4/	LoSa			
Matunuck	Oe 0-8 in	10YR 2/1	Mucky peat	0	Very poorly	Tidal marsh
Series	C1 8-72 in	2.5Y 4/1	Sa			
Laguardia	<i>Ap</i> 0-8 in	10YR 4/3	GrlSaLo	0-8	Well	Anthropogenic
Series	Bw 8-26 in	10YR 4/3	VGrlCoSaLo			urban fill
	C 26-79 in	10YR 4/3	VGrlCoSaLo			plains
Ebbets Series	A 0-4 in	10YR 3/2	Lo	0-8	Well	Anthropogenic
	<i>Bw</i> 4-8 in	10YR 4/4	GrlSaLo			urban fill
	C 8-60 in	10YR 4/4	GrlSaLo			plains
Gravesend	A 0-2 in	10YR 3/1	CoSa	0-8	Well	Anthropogenic
Series	<i>Bw</i> 2-8 in	2.5Y 6/4	CoSa			landfills
	<i>C1</i> 8-20 in	2.5Y 5/2	CoSa			
	2C2 20-80 in	2.5Y 3/2	ExtCobCoSa			
Oldmill Series	A 0-2 in	2.5Y 3/2	GrlFiSa	0-8	Well	Anthropogenic
	Bw 2-11 in	2.5Y 6/3	GrlFiSa			landfills
	C1 11-18 in	2.5Y 6/4	GrlFiSa			
	C2 18-33 in	2.5Y 7/6	GrlFiSa			
	2C3 33-65 in	10YR 2/1	ExtCobFiSa			

Key: Soils: Lo-Loam, Sa-Sand

Other Grl-Gravelly, V-Very, Co-Coarse, Ext-Extremely, Cob-Cobbly, Fi-Fine

In 2008 LBA conducted a Phase II Environmental Site Investigation in the areas now known as the proposed site of BMP OB-3 and BMP OB-4, but which was then called "Section A." The site they investigated was slightly larger than the present proposed BMP footprints, and extended to the edges of the residential properties bordering the BMPs on the north, east, and west sides.

As part of the Phase II investigations, a total of 50 soil borings and 12 test pits were completed from January through March of 2008. The logs are included as Appendix C. The borings were located on a rough grid spaced over the site, whereas the test pits were specifically located to test areas suspected of containing fill. Depth of the borings ranged from 8-20 feet ft bgs, and depth of the test pits was approximately 5 ft bgs. The following summary of soil conditions is taken directly from the LBA report.

Non-native fill, generally consisting of silty sand was observed at the north, east, and southeast portions of Section A closest to the residential properties. Native material [soil] was observed at the remainder of Section A with some areas of surficial debris/fill interspersed throughout. The fill material observed existed from grade to depths ranging from approximately 1 foot below ground surface (ft bgs) to 10 ft bgs with the thicker layers observed in the northern portion of Section A (i.e., at A-SB-07, A-SB-08, A-SB-11, and A-SB-16). Fill was generally characterized by a yellowish brown, coarse to fine silty sand, little gravel with various miscellaneous debris throughout; (including brick, concrete, glass, and metal). Directly below the fill layer, interpreted native soil was observed, indicated by gravelly sand and till. Native soil beneath the areas containing fill material was generally characterized by reddish brown coarse to fine sand and some gravel. In the remaining areas where no fill was encountered, native soil was generally characterized as dark brown silty sand up to a depth of approximately 3 ft bgs followed by a clay layer which extended to a depth of approximately 8 ft bgs, underlain by gravelly sand and till. The depth to water ranged from ground surface to approximately 6 ft bgs in the northeastern portion of Section A (LBA 2008:32).

Some of the areas described as containing fill within the proposed site of BMP OB-4, and others are near residential properties on Brook Avenue. Test pits, which were located in the central section of the proposed BMP, in locations where twentieth century aerial photographs showed former roads and structures, also indicated fill. Additionally, all soils were recorded as either moist or wet, suggesting the continued influence of the tidal marshes on the proposed BMP.

Comparison of the soil boring data with the U.S.D.A. mapped soils for the proposed BMP, as well as the twentieth century aerial photographs, suggest that although there were once several natural hummocks within the proposed BMP that rose slightly above the wetlands, today there only may be very small pockets where that natural landform could survive, due to the disturbance from past grading and filling for roads and several structures during the midtwentieth century.

## **BMP OB-4**

There are three soil types mapped for proposed BMP OB-4. The southeastern end 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 central portion is mapped as Pavement & buildings, wet substratum-Laguardia-Ebbets complex, 0 to 8 percent slopes, described as:

Nearly level to gently sloping urbanized areas filled with a mixture of natural soil materials and construction debris over swamp, tidal marsh, or water; a mixture of anthropogenic soils which vary in coarse fragment content, with up to 80 percent impervious pavement and buildings covering the surface (USDA 2005:12).

The northwestern portion is mapped as Pavement & buildings-Flatbush-Branford complex, 0 to 8 percent slopes, described as:

Nearly level to gently sloping urbanized areas of outwash plains that have been cut and filled for residential use; a mixture of anthropogenic soils and red outwash soils, with up to 80 percent

impervious pavement and buildings covering the surface; located in southern Staten Island (USDA 2005:17).

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

Name	Soil Horizon	Color	Texture,	Slope	Drainage	Landform
	Depth		Inclusions	%		
Ipswich Series	Oe1 0-20 in	10YR 4/3	Mucky peat	0	Very poorly	Tidal marsh
	Oe2 20-40 in	2.5Y 3/2	Mucky peat			
	Oa 40-72 in	5Y 4/1	Mucky peat			
Pawcatuck	Oe1 0-8 in	5Y 3/1	Mucky peat	0	Very poorly	Tidal marsh
Series	Oe2 8-24 in	2.5Y 4/1	Mucky peat			
	2C 24-72 in	N 4/	LoSa			
Matunuck	Oe 0-8 in	10YR 2/1	Mucky peat	0	Very poorly	Tidal marsh
Series	C1 8-72 in	2.5Y 4/1	Sa			
Laguardia	<i>Ap</i> 0-8 in	10YR 4/3	GrlSaLo	0-8	Well	Anthropogenic
Series	Bw 8-26 in	10YR 4/3	VGrlCoSaLo			urban fill
	C 26-79 in	10YR 4/3	VGrlCoSaLo			plains
Ebbets Series	A 0-4 in	10YR 3/2	Lo	0-8	Well	Anthropogenic
	Bw 4-8 in	10YR 4/4	GrlSaLo			urban fill
	C 8-60 in	10YR 4/4	GrlSaLo			plains
Gravesend	A 0-2 in	10YR 3/1	CoSa	0-8	Well	Anthropogenic
Series	Bw 2-8 in	2.5Y 6/4	CoSa			landfills
	C1 8-20 in	2.5Y 5/2	CoSa			
	2C2 20-80 in	2.5Y 3/2	ExtCobCoSa			
Oldmill Series	A 0-2 in	2.5Y 3/2	GrlFiSa	0-8	Well	Anthropogenic
	Bw 2-11 in	2.5Y 6/3	GrlFiSa			landfills
	<i>C1</i> 11-18 in	2.5Y 6/4	GrlFiSa			
	C2 18-33 in	2.5Y 7/6	GrlFiSa			
	2C3 33-65 in	10YR 2/1	ExtCobFiSa			
Flatbush Series	A 0-13 in	10YR 3/2	FiSaLo	0-8	Well	Anthropogenic
	<i>Ab</i> 13-21 in	10YR 4/3	SiLo			urban fill
	Bwb 21-50 in	10YR 5/6	SiLo			plains
	2C 50-79 in	10YR 4/6	Sa			
Branford	<i>Ap</i> 0-8 in	10YR 4/2	Lo	0-8	Well	Outwash plains
Series	<i>Bw1</i> 8-16 in	10YR 4/4	Lo			and terraces
	Bw2 16-29 in	7.5YR 4/6	GrlLo			
	BC 29-32 in	7.5YR 4/4	GrlSaLo			
	C 32-72 in	5YR 4/6	SaGrl			

Key: Soils: Lo-Loam, Sa-Sand, Si-Silt

Other Grl-Gravelly, V-Very, Co-Coarse, Ext-Extremely, Cob-Cobbly, Fi-Fine

The proposed site of BMP OB-4 was included in the 2008 LBA Phase II Environmental Site Investigation described for proposed BMP OB-3, above. There were four soil borings located within the proposed BMP OB-4 footprint. These were borings A-SB-06, A-SB-07, A-SB-08, and A-SB-17. The soil boring logs (Appendix C) show a mixture of thick fill and natural soils in this area.

# BMP OB-5

There are two soil types mapped for proposed BMP OB-5. The majority of the proposed BMP is mapped as Wethersfield-Ludlow-Wilbraham complex, 0 to 8 percent slopes, described as:

Nearly level to gently sloping areas of till plains, relatively undisturbed and mostly wooded; a mixture of well drained, moderately well drained, and poorly drained soils developed in red till; located in Staten Island(USDA 2005:16).

The periphery of the proposed BMP is mapped as Pavement & buildings-Foresthills-Wethersfield complex, 0 to 8 percent slopes, described as:

Nearly level to gently sloping areas of urbanized till plains that have been cut and filled for residential use; a mixture of anthropogenic and red till soils, with up to 80 percent impervious pavement and buildings covering the surface; located in Staten Island (USDA 2005:16).

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

Name	Soil Horizon	Color	Texture,	Slope	Drainage	Landform
	Depth		Inclusions	%		
Foresthills	A 0-2 in	10YR 3/2	Lo	0-8	Well	Anthropogenic
Series	Bw 2-15 in	7.5YR 4.4	SiLo			fill areas on
	Ab 15-17 in	10YR 2/1	Lo			urbanized till
	<i>BAb</i> 17-28 in	7.5YR 4/3	Lo			plains
	Bwb 28-42 in	5YR 4/4	Lo			
	Cd 42-60 in	5YR 4/6	Lo			
Wethersfield	A 0-3 in	7.5YR 3/2	Lo	0-8	Well	Till plains and
Series	<i>Bw1</i> 3-13 in	5YR 4/4	Lo			hills
	Bw2 13-27 in	5YR 3/3	GrlLo			
	Cd 27-65 in	2.5YR 4/4	GrlLo			
Ludlow Series	<i>Ap</i> 0-8 in	7.5YR 3/2	SiLo	0-8	Moderately	None given
	<i>Bw1</i> 8-20 in	5YR 4/4	SiLo		well	
	Bw2 20-26 in	5YR 3/4	SiLo			
	<i>Cd</i> 26-65 in	2.5YR 3/4	GrlLo			
Wilbraham	A 0-4 in	10YR 3/1	SiLo	0-8	Poorly	Till plains and
Series	Bw1 4-8 in	5YR 3/3	SiLo			hills
	Bw2 8-20 in	5YR 4/4	SiLo			
	Cd 20-65 in	5YR 3/3	GrlLo			

Key: Soils: Lo-Loam, Sa-Sand, Si-Silt

Other Grl-Gravelly, V-Very, Co-Coarse, Ext-Extremely, Cob-Cobbly, Fi-Fine

No soil borings were available for proposed BMP OB-5.

# **New and Supplemental Outfalls**

The alignment of the proposed new outfall 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 inland portion of the proposed Tysens Lane supplemental outfall is mapped as Pavement & buildings, wet substratum-Laguardia-Ebbets complex, 0 to 8 percent slopes, described as:

Nearly level to gently sloping urbanized areas filled with a mixture of natural soil materials and construction debris over swamp, tidal marsh, or water; a mixture of anthropogenic soils which vary in coarse fragment content, with up to 80 percent impervious pavement and buildings covering the surface (USDA 2005:12).

The portion of the proposed Tysens Lane supplemental outfall closer to Lower Bay 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 terminus of the proposed Tysens Lane supplemental outfall is mapped as Beaches, described above.

The inland portion of the proposed Ebbitts Street supplemental outfall is mapped as Pavement & buildings-Flatbush-Branford complex, 0 to 8 percent slopes, described as:

Nearly level to gently sloping urbanized areas of outwash plains that have been cut and filled for residential use; a mixture of anthropogenic soils and red outwash soils, with up to 80 percent impervious pavement and buildings covering the surface; located in southern Staten Island (USDA 2005:17).

The portion of the proposed Ebbitts Street supplemental outfall closer to Lower Bay is mapped as Pavement & buildings, wet substratum-Laguardia-Ebbets complex, 0 to 8 percent slopes, described above.

The terminus of the proposed Ebbitts Street supplemental outfall is mapped as Beaches, described above.

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

Name	Soil Horizon	Color	Texture,	Slope	Drainage	Landform
	Depth		Inclusions	%		
Ipswich Series	Oe1 0-20 in	10YR 4/3	Mucky peat	0	Very poorly	Tidal marsh
_	Oe2 20-40 in	2.5Y 3/2	Mucky peat			
	Oa 40-72 in	5Y 4/1	Mucky peat			
Pawcatuck	Oe1 0-8 in	5Y 3/1	Mucky peat	0	Very poorly	Tidal marsh
Series	Oe2 8-24 in	2.5Y 4/1	Mucky peat			
	2C 24-72 in	N 4/	LoSa			
Matunuck	<i>Oe</i> 0-8 in	10YR 2/1	Mucky peat	0	Very poorly	Tidal marsh
Series	C1 8-72 in	2.5Y 4/1	Sa			
Laguardia	<i>Ap</i> 0-8 in	10YR 4/3	GrlSaLo	0-8	Well	Anthropogenic
Series	Bw 8-26 in	10YR 4/3	VGrlCoSaLo			urban fill
	C 26-79 in	10YR 4/3	VGrlCoSaLo			plains
Ebbets Series	A 0-4 in	10YR 3/2	Lo	0-8	Well	Anthropogenic
	Bw 4-8 in	10YR 4/4	GrlSaLo			urban fill
	C 8-60 in	10YR 4/4	GrlSaLo			plains
Flatbush Series	A 0-13 in	10YR 3/2	FiSaLo	0-8	Well	Anthropogenic
	<i>Ab</i> 13-21 in	10YR 4/3	SiLo			urban fill
	<i>Bwb</i> 21-50 in	10YR 5/6	SiLo			plains
	2C 50-79 in	10YR 4/6	Sa			
Branford	<i>Ap</i> 0-8 in	10YR 4/2	Lo	0-8	Well	Outwash plains
Series	<i>Bw1</i> 8-16 in	10YR 4/4	Lo			and terraces
	Bw2 16-29 in	7.5YR 4/6	GrlLo			
	BC 29-32 in	7.5YR 4/4	GrlSaLo			
	C 32-72 in	5YR 4/6	SaGrl			

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 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 17<sup>th</sup> 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 Oakwood 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
Boesch F	Amboy Road and Richmond	Unknown	Unknown
STD-Court	Road area	Precontact	
The Courthouse			
Boesch J	Richmond Road area	Unknown	Unknown
STD-OW		Precontact	
Old Wagon Road			
NYSM 8481	Approx. intersection of Guyon	Unknown	Camp
	Ave. and Lynn St.	Precontact	
NYSM 4628	Approx. area between New	Unknown	Traces of occupation
Boesch 60	Dorp Lane, Old Mill Road,	Precontact	
	Tysens Lane and shoreline		
08501.000154	New Dorp Beach shore area	20 <sup>th</sup> -century	Concrete and brick foundation
SI-15			
08501.000153	New Dorp Beach shore area	Mid-20 <sup>th</sup> century	Concrete platform
SI-14			
08501.000129	New Dorp Beach shore area	Mid-20 <sup>th</sup> century	Concrete and brick structure
SI-13			
08501.000155	New Dorp Beach shore area	Mid-20 <sup>th</sup> century	Concrete foundation
SI-16			
08501.000156	Oakwood Beach, near foot of	Mid-20 <sup>th</sup> century	Concrete well
SI-17	Kissam Ave.		
08501.000168	Great Kills Park, Oakwood	Ca. 1709-1723	Grist mill location, no evidence
SI-4	Beach Sewage Treatment Plant		remaining
Lake's Tide Mill	area		_
and Homestead			

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
Boesch 22	Richmond Road area	Early Archaic	Lithic scatters and camps
Richmond Hill			
30-RIC-5-AJA			
Boesch 98	Moravian Cemetery	Unknown precontact	Unknown
STD-VM			
Vanderbilt			
Mausoleum			
Boesch L	Old Mill Road near Forest Hill	Unknown precontact	Unknown
Old Mill Road	Road		
STD-OM	Y	II.1	C1. 11 11 11
NYSM 4617	Large area between Amboy	Unknown precontact	Shell middens, possible camp, no
08501.000166 ACP Rich-27	Road and Hylan Blvd and part of Great Kills Park		evidence remaining
Boesch 83, 86	of Great Kills Fark		
NYSM 8321	Large area south of Arthur Kill	Unknown precontact	Traces of occupation
N 1 SW1 6321	Road near United Hebrew	Clikilowii precontact	Traces of occupation
	Cemetery		
NYSM 8480	Large area within Moravian	Unknown precontact	Traces of occupation
1115111 0 100	Cemetery and Richmond	Chianown precontact	Traces of occupation
	County Country Club		
08501.000158	Miller Field	Pre-1850	Farmhouse complex, no traces
Vanderbilt Estate			evident
SI-1			
08501.000169	Miller Field	Unknown precontact	Isolated cultural remains
08501.000126	Miller Field	Ca. 1919-1920	Stone lined irrigation ditch
SI-8			
08501.000127	Miller Field	Ca. 1921	Concrete building remains
SI-9			
Remains of			
Administration			
Building	2611 771 11	2.5: 1.20th	
08501.000157	Miller Field	Mid-20 <sup>th</sup> century	Concrete foundation
SI-19	M:11 E: 11	C 1607	
08501.000160	Miller Field	Ca. 1687	Cottage location, no evidence
SI-3			remaining
Britton Cottage 08501.000161	Miller Field	Ca. 1665	Early Dutch settlement, no evidence
Niewe Dorp	INTITIES LIEST	Ca. 1003	remaining
08501.000165	Great Kills Harbor	Late precontact-	Camp location, no evidence
STD-GK	Great Kills Harbor	early historic	remaining
Boesch 88		carry motoric	Temaming
08501.000164	Great Kills Park	Unknown precontact	Shell midden and camp
STD-0		2 maio na precontact	and maden and camp
08501.000163	Great Kills Park	Paleo-Indian	Isolated fluted point
Isolated Fluted			r
Point			
roint			

None of the proposed BMP site footprints overlap any of the previously documented archaeological sites in the above tables. However, several of the archaeological sites are located in close proximity to some of the proposed BMP and outfall locations.

- Site 08501.000156 was mapped near the foot of Kissam Avenue, very close to the proposed sites of BMP OB-1 and BMP OB-2.
- Site NYSM 8481 was mapped as only a few blocks from the proposed sites of BMP OB-1, 2, 3, and 4, although its precise location is vague.
- Site NYSM 4629, another imprecisely located site, was mapped as within several blocks of the proposed site of BMP OB-2.
- Site 08501.000164 was mapped as within one or two blocks from the proposed site of BMP OB-5, although with a somewhat imprecise location.
- Several twentieth-century archaeological sites have been recorded on the New Dorp Beach shore area, just north of the Ebbitts Street outfall. These sites represent remains of the former Seaside Hospital located in this area.

What the previously documented archaeological sites do indicate, however, is that in their natural states, at least some of the proposed BMP and outfall locations had similar landforms to areas where precontact archaeological sites were likely to be situated, based on proximity to drainages and wetlands, which would have provided sustenance for Native American occupants.

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 Oakwood Beach (Lipson et al. 1978, JMA 1978, U.S.A.C.O.E. 1994, Panamerican Consultants 2005). These studies were located in close proximity to the proposed sites of BMP OB-1, 2, 3, and 4, and overlapped portions of the proposed new and existing outfall locations. The Panamerica 2005 study also included field testing along the Lower Bay shoreline, and that APE crossed the proposed new and existing outfall locations. No archaeological sites were recorded in proximity to the outfall locations, however,

Additionally, HPI recently completed a Phase IA Archaeological Documentary Study for the Cedar Grove Rehabilitation Project (HPI 2011), which included portions of the Tysens Lane existing outfall footprint and bordered the location of the Ebbitts Street existing outfall. HPI concluded that in its natural state, any areas of the Cedar Grove APE on firm ground and that have not sustained disturbance due to either natural or man-made events would have a high precontact sensitivity and would require archaeological testing if these areas would be impacted by subsurface development. The portion of the Tysens Lane proposed supplemental outfall, located between Roma Avenue and Cedar Grove Avenue, contains similar conditions as those described for the Cedar Grove property.

Finally, one archaeological study was completed for a new post office in New Dorp, near Miller Field (Meadows 1983). Additional archaeological resources studies have been conducted within a one mile radius of the Oakwood Beach Watershed, including several that extended along adjacent shoreline areas, and others located at Miller Field (NPS 1982, Mueller and Linck 1991, Hunter Research 2005). The Oakwood Beach WWTP, located just south of the watershed boundaries in Great Kills Park, has also been subjected to a series of archaeological studies (Pickman and Yamin 1984, Greenhouse Consultants 1990a, 1990b), as have various utility alignments connecting to this plant both within the watershed and within a one mile radius. No archaeological sites, other than those noted in the above table, have been recorded as a result of these surveys within the Oakwood Beach Watershed.

# C. Historic Period Summary

# Oakwood Beach Watershed Area

The Oakwood Beach Watershed includes the neighborhood of New Dorp, which was established near the foot of modern New Dorp Lane in 1671, and was the earliest historic period settlement within the watershed (Leng and Davis 1930). Early roads within the watershed included New Dorp Lane, Amboy Road, Richmond Road, and what is now Old Mill Road, which led from New Dorp Lane to Lake's Mill at the edge of Great Kills. 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 area, with structures located along or branching off from the four 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 Walling map identifies the hamlet of Egbertville at the crossroads of Amboy Road and Richmond Road. 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 Oakwood Beach Watershed increased after 1898, when Staten Island became part of New York City. 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 Oakwood Beach Watershed area was fully developed.

# **BMP OB-1 and Proposed New Outfall**

A review of historic maps indicates that the proposed site of BMP OB-1 and the proposed site of the new outfall have been primarily undeveloped marshland over time. Eighteenth-century maps (Anglo-Hessian 1780-1783, Taylor and Skinner 1783, McMillen 1933) all show the area south of Old Mill Road as undeveloped and marshy. Bass Creek is shown running along the shoreline of what is now Oakwood Beach, and emptying into Great Kills at Crook's Point. Marshlands are shown surrounding this creek, and the proposed sites of BMP OB-1 and the new outfall 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 site of the proposed BMP OB-1and the proposed new outfall were primarily marshland, but that there were also small areas of higher ground within the marshland, and that a roadway crossed through the southwestern side of the proposed BMP, running from Old Mill Road to the waterfront, where there were two structures. This unnamed roadway ran parallel to modern day Fox Lane. The 1860 Walling map (Figure 7) clarifies that the roadway terminated at the "Fish House," which was located right on the beach, approximately 1200 feet southeast of the proposed BMP. This roadway is shown on both the 1872 Dripps map (Figure 8) and the 1874 Beers map. The 1874 Beers map also confirms that there were small areas of higher ground, or hummocks, along this roadway, which were partially within the footprint of the proposed BMP. Presumably the roadway was built to take advantage of these raised hummocks, which anchored the alignment between marshy areas. In 1874, the Beers map indicates that all of proposed BMP OB-1 was owned by H. McRoberts. The proposed outfall location was shown to straddle the marshland and the sandy beach.

Topographical maps made in the 1890s (Bien and Vermeule 1891 [Figure 9]) further show that proposed BMP OB-1, like most of the marshy areas in the region, was 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 hummocks within and adjacent to the marshes, and the roadway leading through the southwestern side of the proposed BMP. Atlases made during the first decades of the twentieth century (e.g. Robinson 1907, Bromley 1917) note that the marshlands were divided into long, narrow lots, which ran from Old Mill Road to the waterfront, and which were owned by various individuals.

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 site of BMP OB-1. The roadway from earlier maps is shown clearly along the southwestern side of the proposed BMP, as are the outlines of the raised hummocks within and adjacent to the proposed BMP, and the

drainage ditches within the marshy areas, many of which appear to mark property boundaries as well. A small finger of the original line of Bass Creek is shown wending through the southeastern side of the proposed BMP.

During the second quarter of the twentieth century, the first concerted development in the vicinity of proposed BMP OB-1 began to occur. The 1924 New York City Bureau of Engineering aerial photograph shows that by this time, both Kissam Avenue and Fox Lane had been laid out, and sporadic structures had been built along them. The aerial photograph also shows that the informal roadway along the southwestern side of the proposed BMP was still in place, and that a second roadway had been laid out just south of Kissam Avenue, running through the opposite side of the proposed BMP from Old Mill Road to the waterfront. The 1937 Sanborn map sheets indicate it was called Prominard or Promenade Avenue, but had not officially opened. The line of this street is still mapped through the proposed BMP, although aerial photographs (1954, 1966, and 1980) from the second half of the twentieth century (available on <a href="www.historicaerials.com">www.historicaerials.com</a>) show that over time this roadway, along with the earlier roadway along the southwestern side of the proposed BMP, was abandoned and wetlands were allowed to reclaim much of the area.

#### **BMP OB-2**

The proposed site of BMP OB-2 is very similar in location and in landform to proposed BMP OB-1, and as such has much of the same history. During the late eighteenth century maps show that it, too, was undeveloped marshland (Anglo-Hessian 1780-1783, Taylor and Skinner 1783, McMillen 1933). The 1856 U.S.C.S. map (Figure 6) illustrates that there was a finger-shaped hummock of land jutting into proposed BMP OB-2 from the northwest, but otherwise the land was completely marshy. The 1860 Walling map (Figure 7), 1872 Dripps map (Figure 8), and 1874 Beers map all show similar conditions, and the 1874 Beers map indicates that this BMP also was part of the parcel owned by H. McRoberts. The 1874 Beers map and the subsequent 1891 Bien and Vermeule map (Figure 9) confirm the same finger-shaped hummock of land extending into the proposed BMP from the northwest.

Twentieth century maps and aerial photographs continue to depict the proposed site of BMP OB-2 as marshland with small areas of raised hummocks. The 1911 Borough of Richmond topographical map (Figure 10a) indicates a similar pattern of drainage ditches coursing through the proposed BMP as in proposed BMP OB-1. The 1907 Robinson map and the 1917 Bromley map both note that ownership, again, was vested primarily in long, narrow strips of land running from Old Mill Road to the waterfront. By 1917, Kissam Avenue had been laid out and a few structures had been built along its route. The 1924 aerial photograph shows that a roadway had been constructed parallel to Kissam Avenue and partially within the southwestern part of the proposed BMP; the 1937 and 1951 Sanborn maps note it as a 40-foot wide unnamed road. Aerial photographs (1954, 1966, and 1980) from the second half of the twentieth century (available on <a href="https://www.historicaerials.com">www.historicaerials.com</a>) show that over time this roadway was abandoned and wetlands were allowed to reclaim much of the area.

#### **BMP OB-3**

The proposed site of BMP OB-3, like proposed BMP OB-1 and OB-2, shares a history of wetland use. Eighteenth-century maps (Anglo-Hessian 1780-1783, Taylor and Skinner 1783, McMillen 1933) show the proposed BMP as undeveloped and situated surrounding a branch of Mill Creek, which emptied into Great Kills to the south. The 1856 U.S.C.S. map (Figure 6) clarifies that although most of the proposed BMP was wetlands, there were several small hummocks of raised land within the proposed BMP, which overlooked the wetlands. These hummocks were located at the terminus of what is now Brook Avenue, as well as at the ends of what are now Lynn Street, Amherst Avenue, and Riga Street. The 1860 Walling map (Figure 7) and the 1872 Dripps map (Figure 8) illustrate the alignment of Mill Creek through the proposed BMP, and show that it continued to be undeveloped. The 1874 Beers map shows that much of the proposed BMP was owned by Mrs. Guyon, a member of the Guyon family for whom Guyon Avenue is named. The Guyon-Clark House, which was one of the earliest structures in the area and stood until 1925 on Guyon Avenue, was located approximately 800 feet from the proposed BMP to the north. The 1874 Beers map and the subsequent 1891 Bien and Vermeule map (Figure 9) confirm the areas of the proposed BMP containing hummocks of land as shown on earlier maps.

Maps and aerial photographs from the first quarter of the twentieth century continue to depict proposed BMP OB-3 as marshland with small areas of raised hummocks. The 1911 Borough of Richmond topographical map (Figure 10b) shows a two-pronged alignment of Mill Creek as well as several large drainage ditches emptying into the creek. Areas surrounding the creek are again shown as hummocks. However, both the 1907 Robinson and the 1917

Bromley maps indicate that at this time, the area between Brook Avenue and Old Mill Road, and including most of proposed BMP OB-3, was proposed as a development called "Oakwood." The 1917 map notes ownership of the area as the Richmond Borough Realty Co. The maps show a grid of paper streets with building lots on them, but no actual structures. Clearly, this development scheme never came to fruition. The 1924 aerial photograph confirms that proposed BMP OB-3 remained devoid of structures at this time.

During the mid-twentieth century, a large drainage ditch was constructed from Hylan Boulevard down the line of Adelaide Avenue (proposed BMP OB-4, described below) to the line of Falcon Avenue, where it made a 90 degree turn and ran straight along the line of Falcon Avenue to the southwestern edge of the BMP, then turned 90 degrees again to rejoin the former channel of Mill Creek. Rerouting a portion of the original water within the proposed BMP and vicinity allowed some of the roadways proposed as part of the city grid in this area to be at least partially built within the proposed BMP during the mid-twentieth century. Aerial photographs from 1954, 1966, and 1980 (available on www.historicaerials.com) show the very distinct new pattern of artificial drainage within the proposed BMP, and the progression of road building along the lines of Amherst Avenue, Lynn Street, Dugdale Street, and portions of several other local roads through the proposed BMP. A structure was located at the intersection of Lynn Street and Merkel Place on the 1954 aerial photograph, which corresponds to one of the small hummocks shown on the earlier maps. The structure may have been short lived, however, as subsequent photographs do not show a structure here. Although some of the roadways proposed for the city grid do appear to have been at least partially constructed, it appears that areas between the roads, which would correspond to individual blocks and lots, generally were not filled in to raise the area up to a standard grade. Aerial photographs from the early twenty-first century (2004, 2006, and 2010) show that over time the roadways were abandoned and wetlands were allowed to reclaim much of the area.

#### **BMP OB-4**

The proposed site of BMP OB-4 also falls within an area that historically was marshland. Eighteenth-century maps (Anglo-Hessian 1780-1783, Taylor and Skinner 1783, McMillen 1933) show the proposed BMP as undeveloped and situated within marshland surrounding a branch of Mill Creek, which emptied into Great Kills to the south. Nineteenth-century maps including the 1856 U.S.C.S. map (Figure 6), the 1860 Walling map (Figure 7) the 1872 Dripps map (Figure 8), and the 1874 Beers map all show this proposed BMP as undeveloped and/or within marshland. Like proposed BMP OB-3 to the south, this proposed BMP fell within land owned in 1874 by Mrs. Guyon, a member of the Guyon family for whom Guyon Avenue is named. The Guyon-Clark House, which was one of the earliest structures in the area and stood until 1925 on Guyon Avenue, was located approximately 400 feet from the proposed BMP to the northeast. The 1891 Bien and Vermeule map (Figure 9) confirms that the proposed BMP was completely within marshland, and had no raised hummocks within it.

Maps and aerial photographs from the first quarter of the twentieth century continue to depict proposed BMP OB-3 as marshland. The 1911 Borough of Richmond topographical map (Figure 10b) shows that the alignment of Adelaide Avenue had been laid out by this time, although it is unclear if a roadway had actually been built or whether this was a drainage ditch. The 1924 aerial photograph shows the line of the street as a drainage ditch, rather than a street, suggesting the 1911 map was depicting this condition. As noted above for proposed BMP OB-3, both the 1907 Robinson and the 1917 Bromley maps show proposed BMP OB-4 as within the development called "Oakwood," which was never fully realized.

As described above, during the mid-twentieth century, a large drainage ditch was constructed from Hylan Boulevard down the line of Adelaide Avenue to the line of Falcon Avenue, where it made a 90 degree turn and ran straight along the line of Falcon Avenue into proposed BMP OB-3. Aerial photographs from 1954, 1966, and 1980 (available on <a href="www.historicaerials.com">www.historicaerials.com</a>) show the very distinct artificial drainage running down the length of Adelaide Avenue to Falcon Avenue within the proposed BMP. After 1980, it appears that the drainage ditch was taken out of use and the proposed BMP became wooded. Although the drainage ditch is still visible within the proposed BMP today, at the time of the site visit there was no water running through it.

#### **BMP OB-5**

The proposed site of BMP OB-5 is a long, narrow strip of land that was condemned by the City of New York for use as a parkway during the 1950s, but the parkway was never built. Before being graded and filled for use as a

roadway, this proposed BMP appears to have been used as farmland or woodland along much of its length. It is shown as undeveloped on the Revolutionary War era maps (Anglo-Hessian 1780-1783, Taylor and Skinner 1783, McMillen 1933) as well as on the mid nineteenth century maps (U.S.C.S. 1856 [Figure 6] and Walling 1860 [Figure 7]). The only development in the vicinity was the line of the Staten Island Railroad, which opened in 1860, and which passed overhead, Amboy Road at the northwestern terminus of the proposed BMP, and a private road running southeast from Amboy Road and through the proposed BMP. The 1872 Dripps map (Figure 8) shows that the private road ran through property attributed to Seguine, and that there was a structure in or adjacent to the proposed BMP near this drive. The 1874 Beers map clarifies that there were several structures here attributed to Mrs. Guyon, who as noted above was a member of the Guyon family for whom Guyon Avenue is named. The structures appear to be off the proposed BMP footprint. The remainder of the proposed BMP was undeveloped. The 1891 Bien and Vermeule map (Figure 9) shows that the proposed BMP was completely within an upland landform.

The 1911 Borough of Richmond topographical map (Figure 10c) shows that the proposed BMP contained a variety of landforms, including more level areas closer to Hylan Boulevard and steeper sections moving northwest. Several drainages are shown traversing the proposed BMP, as described in the Topography and Hydrology section of this report. Finally, the complex of residential structures shown on earlier nineteenth-century maps clearly is shown to be well outside the proposed BMP footprint, confirming that there was no visible nineteenth-century development within this proposed BMP. The 1907 Robinson map and the 1917 Bromley map attribute ownership of the entire proposed BMP and its vicinity, on both sides of Hylan Boulevard and west of the Staten Island Railroad tracks as far west as Amboy Road, to single individuals. Wm. R. Jones is noted as the owner on the 1907 Robinson map and David J. Tysen is shown to be the owner on the 1917 Bromley map. The 1924 aerial photograph again shows no development within the proposed BMP.

Aerial photographs from the mid-twentieth century (available on <a href="www.historicaerials.com">www.historicaerials.com</a>) show a relatively slow pace of development within the proposed BMP OB-5 vicinity. The 1954 aerial photograph indicates little to no development within the proposed BMP footprint. As noted in the Topography and Hydrology section of this report, in the 1960s proposed BMP OB-5 was slated to become a leg of the Willowbrook Parkway; the 1966 aerial photograph shows that the entire proposed BMP was cleared of vegetation and the area graded in preparation for the new highway. It is assumed that there was considerable land manipulation within this proposed BMP and that the existing topography largely was artificially created. Today this area, now wooded, contains a walking trail.

#### **Supplemental Outfalls**

The Tysens Lane and Ebbitts Street proposed supplemental outfall locations are within areas that historically have been largely undeveloped. A review of the historic maps and aerial photographs described above shows that both of these existing roadways date to the middle twentieth century. Tysens Lane terminates at Roma Avenue, with the remaining corridor as a sewer easement only. The portion of the Tysens Lane outfall between Roma Avenue and Cedar Grove Avenue has never been developed, and the portion from Cedar Grove Avenue to the shoreline is part of the Cedar Grove Beach complex, which was first developed in the 1910s (HPI 2011).

# 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 Oakwood Beach Watershed and site-specific sensitivity for each of the proposed BMP and outfall locations.

#### Oakwood Beach Watershed Area

The Oakwood Beach Watershed area 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 nearest Lower Bay and within natural wetlands. He has assigned

a moderate sensitivity to the area between the natural wetlands near the shoreline inland to Hylan Boulevard, and in some areas west of Amboy Road. Boesch has assigned no, or low precontact archaeological sensitivity in most areas of the watershed between Hylan Boulevard and Amboy Road.

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 Oakwood 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 Oakwood Beach Watershed; any further consideration of new sites as part of this project would need to be addressed separately.

# **BMP OB-1 and Proposed New Outfall**

The proposed sites of BMP OB-1 and the new outfall are in an area that both the NYSOPRHP GIS and the Boesch (1994) study indicate has a high sensitivity for precontact archaeological resources. This is undoubtedly because the proposed BMP and outfall are located in proximity to natural water sources, and in fact contains a portion of the Bass Creek drainage as well as surrounding marshland.

Those portions of the proposed BMP footprint that contain raised hummocks of land immediately adjacent to the drainage and wetlands, if not disturbed, have the greatest likelihood of containing precontact archaeological resources. Although there are areas of the proposed BMP along its southeastern side that historic maps show had slightly raised topography, soil borings and twentieth century aerial photographs suggest that most of these areas have been disturbed from past grading and filling. HPI concludes that any precontact archaeological sensitivity once exhibited by this proposed BMP has diminished due to later disturbance. The remaining drainage and wetlands themselves, including the proposed outfall location, are less likely to contain archaeological resources.

#### **BMP OB-2**

The proposed site of BMP OB-2 also is in an area that both the NYSOPRHP GIS and the Boesch (1994) study indicate has a high sensitivity for precontact archaeological resources. Like proposed BMP OB-1, this is undoubtedly because the proposed BMP is located in proximity to natural water sources and contains marshland.

Those portions of the proposed BMP footprint that contain raised hummocks of land immediately adjacent to the drainage and wetlands, if not disturbed, have the greatest likelihood of containing precontact archaeological resources. There is a peninsular hummock of land extending into the northern side of the proposed BMP from Old Mill Road. Although there have not been any soil borings conducted within proposed BMP OB-2, it is assumed that this area could contain natural soils with minimal disturbance. HPI concludes that this naturally elevated portion of the proposed BMP has precontact archaeological sensitivity, as shown in Figure 11. The wetlands themselves are less likely to contain archaeological resources.

# BMP OB-3

The proposed site of BMP OB-3 is in an area that the NYSOPRHP GIS says is sensitive and the Boesch (1994) study says has a moderate sensitivity for precontact archaeological resources. This is undoubtedly because the proposed BMP is located in proximity to natural water sources, and in fact contains a portion of the original Mill Creek drainage as well as surrounding marshland.

Those portions of the proposed BMP footprint that contain raised hummocks of land immediately adjacent to the drainage and wetlands, if not disturbed, have the greatest likelihood of containing precontact archaeological resources. Although there are areas of the proposed BMP along its eastern and western sides that historic maps show had slightly raised topography, soil borings and twentieth century aerial photographs suggest that most of these areas have been disturbed from past grading and filling for construction of former roads and structures in these areas. HPI concludes that any precontact archaeological sensitivity once exhibited by this proposed BMP has diminished due to later disturbance. The remaining drainage and wetlands themselves are less likely to contain archaeological resources.

#### **BMP OB-4**

The proposed site of BMP OB-4 also is in an area that the NYSOPRHP GIS says is sensitive and the Boesch (1994) study says has a moderate sensitivity for precontact archaeological resources. This is undoubtedly because the proposed BMP is located in proximity to natural water sources and in its natural state contained marshland. However, this proposed BMP has been significantly altered from its original condition, the marshlands having been filled and an artificial drainage ditch constructed along its length. HPI concludes that this proposed BMP does not contain any precontact archaeological sensitivity.

#### **BMP OB-5**

The proposed site of BMP OB-5 is in an area that both the NYSOPRHP GIS and the Boesch (1994) study indicate has a high sensitivity for precontact archaeological resources. This is undoubtedly because there are several natural drainages crossing the proposed BMP. However, significant disturbance to the proposed BMP in the 1960s, when the land was slated to become the Willowbrook Parkway and the area was stripped of all vegetation and graded in preparation for the highway, has eliminated any precontact archaeological sensitivity in this area. HPI concludes that this proposed BMP does not contain any precontact archaeological sensitivity.

# **Supplemental Outfalls**

The Tysens Lane and Ebbitts Street proposed supplemental outfall locations are in an area that both the NYSOPRHP GIS and the Boesch (1994) study indicate has a high sensitivity for precontact archaeological resources. However, most of the existing outfall locations have been disturbed from roadway and utility construction and no longer retain this sensitivity. The one area that appears to have never been developed is the portion of the Tysens Lane outfall between Roma Avenue and Cedar Grove Avenue. The proposed supplemental outfall will be placed within an expanded sewer easement here. The existing easement is 15 feet wide and the proposed new easement will be 40 feet wide. Although the proposed supplemental outfall will be located in proximity to the existing outfall, which when constructed would have caused disturbance within the pipe trench surrounding it, the increased width of the proposed new easement suggests that there may be undisturbed areas here that may retain a natural landform. Therefore, HPI concludes that the Tysens Lane supplemental outfall footprint within the undeveloped land between Roma Avenue and Cedar Grove Avenue contains precontact archaeological sensitivity.

# B. Historic Period Archaeological Sensitivity and Disturbance Record

#### Oakwood Beach Watershed Area

The Oakwood Beach Watershed area has had few historic period archaeological resources recorded within its boundaries that date before the twentieth century. 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 New Dorp Lane and Amboy 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 Oakwood 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 OB-1 and Proposed New Outfall**

The proposed sites of BMP OB-1 and the new outfall have never had any historic period development within or adjacent to their boundaries, although a nineteenth-century roadway was located along the southwestern side of the proposed BMP. This roadway led from Old Mill Road to the Oakwood Beach waterfront and may still survive in places, although it could not be seen due to vegetation at the time of the field survey. This roadway, if it is extant, likely would not provide any substantive data and therefore HPI concludes that the site of the proposed BMP and new outfall contain minimal historic period archaeological sensitivity.

#### BMP OB-2

The proposed site of BMP OB-2 has never had any historic period development within or adjacent to its boundaries. HPI concludes that this proposed BMP contains no historic period archaeological sensitivity.

#### **BMP OB-3**

The proposed site of BMP OB-3 has never had any historic period development within or adjacent to its boundaries. HPI concludes that this proposed BMP contains no historic period archaeological sensitivity.

#### **BMP OB-4**

The proposed site of BMP OB-4 has never had any historic period development within or adjacent to its boundaries. HPI concludes that this proposed BMP contains no historic period archaeological sensitivity.

#### **BMP OB-5**

The proposed site of BMP OB-5 appears to have never had any historic period development within its boundaries. Additionally, there was significant disturbance to the area in the 1960s, when the land was slated to become the Willowbrook Parkway and the area was stripped of all vegetation and graded in preparation for the highway. HPI concludes that this proposed BMP contains no historic period archaeological sensitivity.

#### **Supplemental Outfalls**

The proposed supplemental outfall locations along Tysens Lane and Ebbitts Street have never had any historic period development. Both roadways date to the middle twentieth century. Development near the terminus of the Tysens Lane outfall within the Cedar Grove Beach Club complex dates to the 1910s. The recent Phase IA Archaeological Documentary Study of the Cedar Grove Beach project site concluded that there was no historic period archaeological sensitivity for the area in proximity to the outfall (HPI 2011).

#### VI. RECOMMENDATIONS

Based on these conclusions, HPI recommends that a program of Phase IB archaeological testing be conducted on that portion of the proposed BMP OB-2 site designated as having a high archaeological sensitivity for precontact resources, as shown in Figure 11, if this area will experience subsurface impacts as part of the BMP construction. HPI also recommends that a program of Phase IB archaeological testing be conducted in the proposed location of the supplemental outfall at Tysens Lane, within the undeveloped land between Roma Avenue and Cedar Grove Avenue. 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 remainder of the proposed site of BMP OB-2, and for all of the proposed sites of BMP OB-1, BMP OB-3, BMP OB-4, and BMP OB-5, Last, no further archaeological investigations are recommended for the remaining sections of the proposed new and supplemental outfalls.

# VII. REFERENCES

#### Anglo-Hessian Map

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

#### Beers, F.W.

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

#### Bien, Joseph Rudolph and C.C. Vermeule

Atlas of the Metropolitan District and adjacent country comprising the counties of New York, Kings, Richmond, Westchester and part of Queens in the state of New York, the county of Hudson and parts of the counties of Bergen, Passaic, Essex and Union in the state of New Jersey ... From original surveys by J.R. Bien and C.C. Vermeule, the U.S. Coast and Geodetic Survey and the Geological Survey of New Jersey. Published by Julius Bien & Co., New York.

#### Boesch, Eugene J.

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

#### Borough of Richmond

1911 Borough of Richmond, Topographical Survey. New York. On file at the New York Public Library. Individual sheets were published from 1906-1913. 1911 used here for consistency.

#### Brasser, T. J.

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

#### Bromley, G.W.

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

# City Environmental Quality Review (CEQR)

2010 City Environmental Quality Review Technical Manual. City of New York, Mayor's Office of Environmental Coordination. May, 2010.

#### Dripps, M.

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

# Flick, Alexander C.

1933 History of New York, Vol. I. The New York State Historical Association.

#### Greenhouse Consultants, Inc.

- 1990a Archaeological Sensitivity Evaluation For Eight Water Pollution Control Plant Expansions in New York City. For: Stone and Webster Engineering Corporation.
- 1990b Stage 1B Archaeological Survey Of The Oakwood Beach Water Pollution Control Plant Expansion Project, Borough of Staten Island, New York City, Richmond County, New York. For: Stone and Webster Engineering Corporation.

#### Historical Perspectives, Inc. (HPI)

- 1996 Final Report: Phase 3 Archaeological Data Recovery of the P.S. 56 R School Site, Staten Island, New York. Westport, CT.
- 2009a Memorandum: Phase IA Cultural Resources Sensitivity Evaluation Addendum New York City Department of Environmental Protection, South Richmond Drainage Storm Water and Sanitary Drainage Plan, Lemon Creek Drainage Area, Staten Island, New York, Knox Street, BMP LC-16, BMP LC-17, BMP LC-18, and BMP LC-19.
- 2009b Phase IB Archaeological Investigations, New York City Department of Environmental Protection, South Richmond Drainage Storm Water and Sanitary Drainage Plan Lemon Creek Drainage Area, Staten Island, New York, BMP LC-16 and BMP LC-17.
- 2010a Phase II Archaeological Investigations, New York City Department of Environmental Protection, South Richmond Drainage Storm Water and Sanitary Drainage Plan Lemon Creek Drainage Area, Staten Island, New York, BMP LC-16.
- 2010b Lemon Creek Drainage Area, Staten Island, Richmond County, New York, BMP LC-16, Phase III Archaeological Data Recovery.
- 2011 Phase IA Archaeological Documentary Study, Cedar Grove Beach Rehabilitation, Block 4105, Part of Lot 50 and Block 4108, Part of Lot 45, Staten Island, Richmond County, New York.

#### Hunter Research, Inc.

2005 Archaeological Investigations for Proposed Roadway Improvements at Miller Field, Gateway National Recreation Area, Richmond County, Staten Island, New York.

#### John Milner Associates (JMA)

1978 A Cultural Resources Inventory of the Gateway National Recreation Area, New York and New Jersey.

#### Landmarks Preservation Commission (LPC)

2002 Landmarks Preservation Commission Guidelines for Archaeological Work in New York City.

#### Leng, Charles W. and William T. Davis

1930 Staten Island and Its People, A History, 1609-1929. Lewis Historical Publishing Company, Inc., New York.

#### Leng, Charles W. and Edward C. Delavan, Jr.

1924 A Condensed History of Staten Island (Borough of Richmond, New York City). The Staten Island Edison Corporation, Staten Island, New York.

#### Lenik, Edward J.

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

# Lipson, Clara, and John Piet, Michael Alterman, and Kris Egelhof

1978 Phase I Cultural Resources Reconnaissance: Beach Erosion Control and Hurricane Protection Project at Staten Island.

# Louis Berger & Associates, P.C.

- 2008 Final Phase II Site Investigation for Oakwood Beach Section A, Staten Island, New York. Prepared for the New York City Department of Design and Construction Bureau of Environmental and Geotechnical Services.
- 2009 Final Phase II Site Investigation for Oakwood Beach Section B, Staten Island, New York. Prepared for the NYC Department of Design and Construction Bureau of Environmental and Geotechnical Services.

## McMillen, Loring

1933 A Map of Staten Island During the Revolution 1775-1783. Compiled from The Taylor & Skinner Map 1781, Plan No. 31 du Camp Anglo-Hessois dans Staten Island de 1780 a 1782 and The Hessian Map 1777.

#### Meadows, Robert E.

1983 Proposed New Dorp Postal Station Site, Staten Island, New York: Report on the Preliminary Archaeological Investigation.

## Mueller, James W. and Dana C. Linck

1991 Archaeological Testing For Two Miller Field Road Improvements, Gateway National Recreation Area, Staten Island, NY, Gate Package 185. For: US Dept of Interior National Park Service, Denver Center.

### National Park Service (NPS)

1982 Archeological Investigations at Miller Field, Staten Island Unit, Gateway National Recreation Area.

### New York Archaeological Council (NYAC)

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

## New York City Bureau of Engineering

1924 Sectional aerial maps of the City of New York. On file at the New York Public Library.

## New York State Office of Parks, Recreation, and Historic Preservation (NYSOPRHP)

2005 Phase I Archaeological Report Format Requirements.

### Panamerican Consultants, Inc.

2005 Phase I Combined Erosion Control and Storm Damage Protection Feasibility Study, South Shore of Staten Island, Richmond County, New York. Prepared for U.S. Army Corps of Engineers, New York District.

## Pickman, Arnold & Rebecca Yamin

1984 Oakwood Beach Water Pollution Control Project, Phase I Cultural Resources Survey. Hylan Boulevard at Richmond Ave. to Arthur Kill Rd. at Krelscher St. Capital Project WP-136. NYC, Staten Island.

## Ritchie, William A.

1980 The Archaeology of New York State. Revised edition. Harbor Hill Books, Harrison, New York.

### Ritchie, William A. and Robert E. Funk

1971 Evidence For Early Archaic Occupation On Staten Island. *Pennsylvania Archaeologist* 31(3):45-60.

#### Robinson, E.

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

### Ruttenber, E. M.

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

## Sanborn Map Company

1937 Insurance Maps of Staten Island, New York.

1951 Insurance Maps of Staten Island, New York.

## Snow, Dean R.

1980 The Archaeology of New England. Academic Press, New York.

## Taylor, George and A. Skinner

1781 A Map of New York & Staten Island and Part of Long Island.

United States Army Corps of Engineers (U.S.A.C.O.E.)

1994 A Cultural Resource Reconnaissance Study Oakwood Beach, Staten Island, Richmond County, New York.

United States Coast Survey (U.S.C.S.)

1844 Map of New-York Bay And Harbor And The Environs. Washington, D.C.

1856 Staten Island From New Brighton to Great Kills. Washington, D.C.

United States Department of Agriculture (U.S.D.A.)

2005 New York City Reconnaissance Soil Survey. United States Department of Agriculture, Natural Resources Conservation Service, Staten Island, NY. Map updated 2006.

United States Geological Survey (U.S.G.S.)

1981 Arthur Kill, N.J.-N.Y. 7.5 Minute Topographic Quadrangle.

Walling, H.F.

1860 Map of the City Of New-York and Its Environs from Actual Surveys. S.D. Tilden, New York.

Weslager, C. A.

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



Figure 1: Oakwood Beach Watershed and BMP Locations.

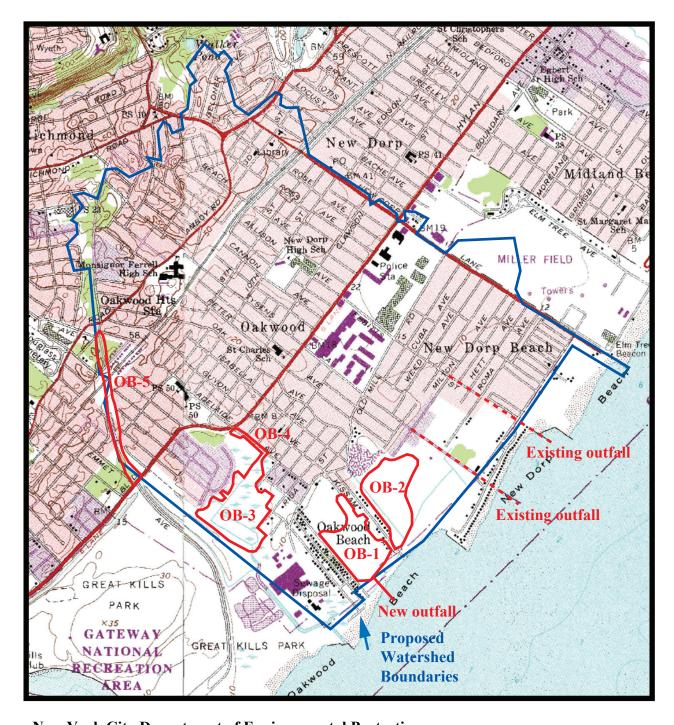
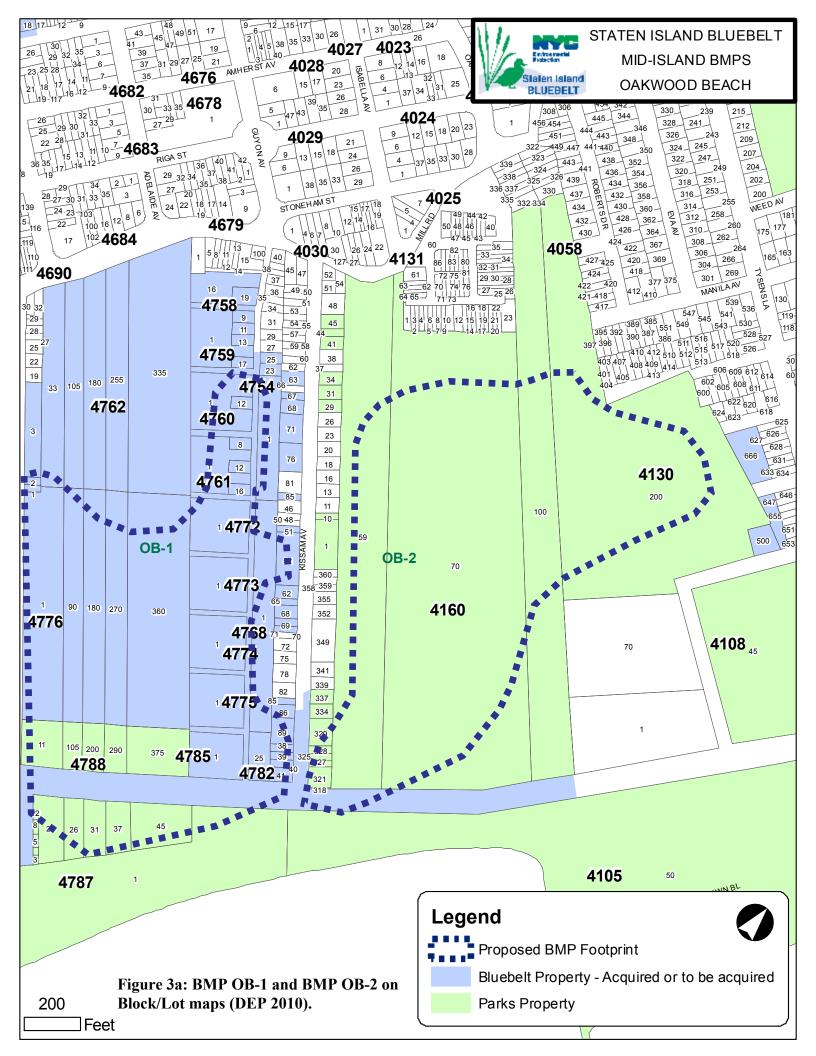
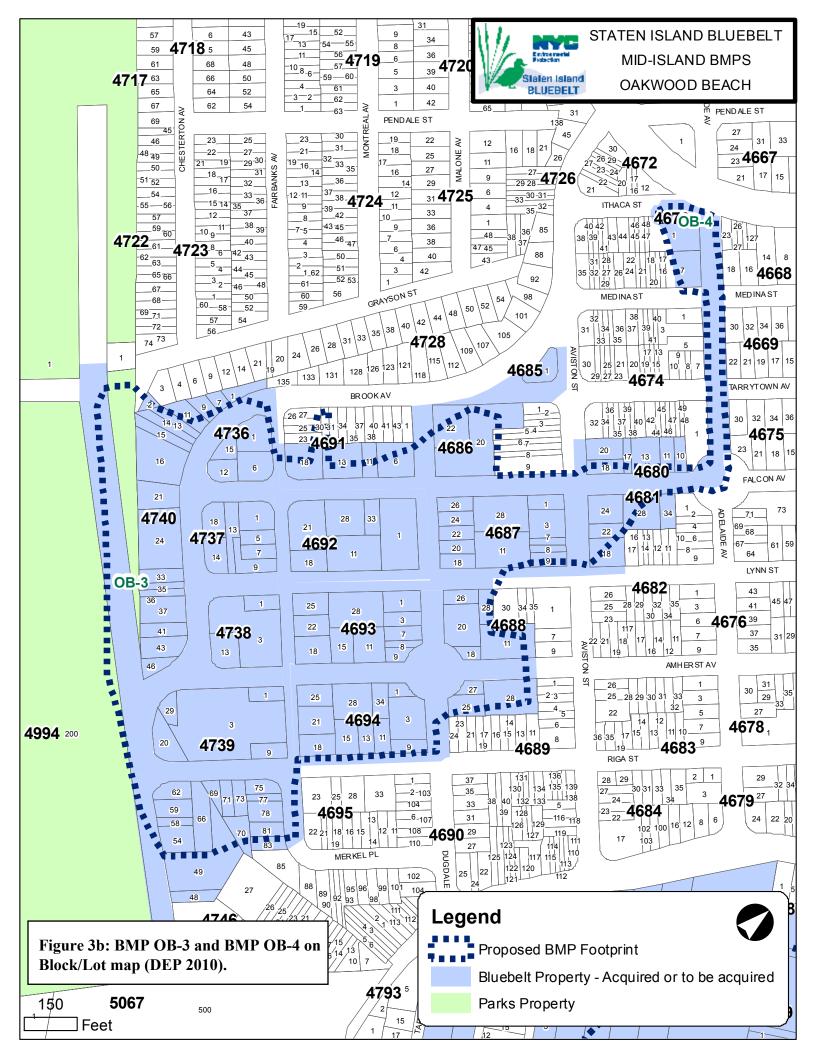


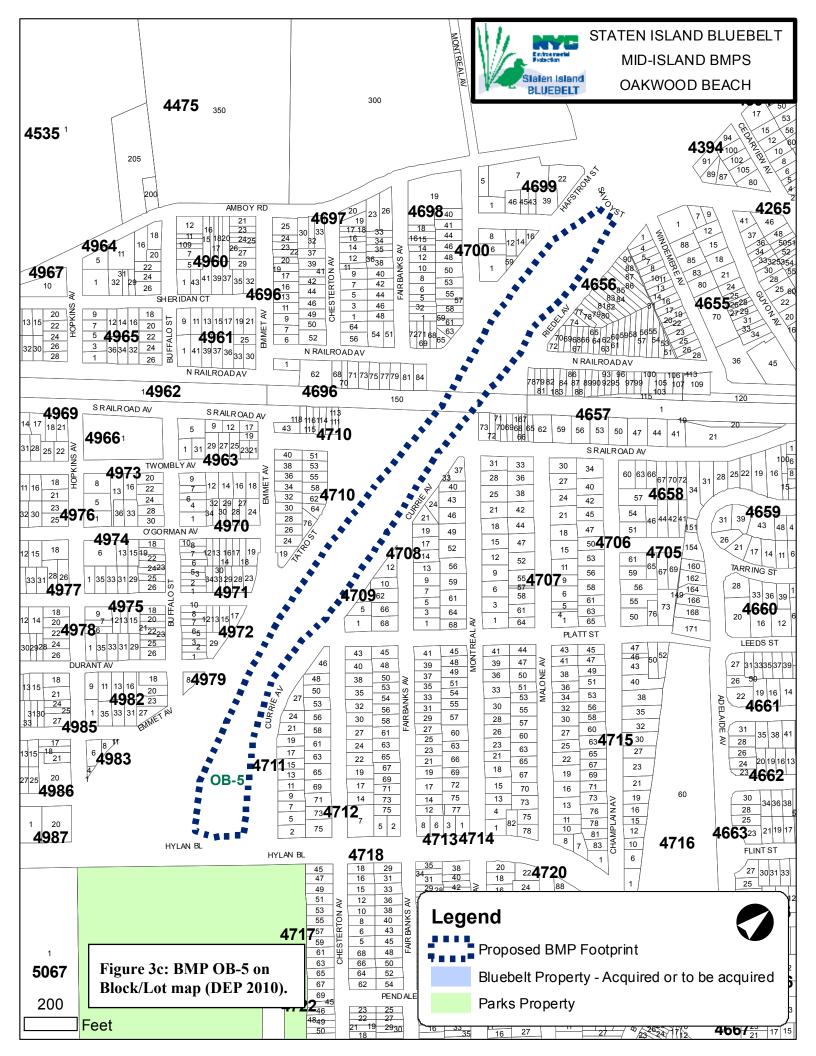


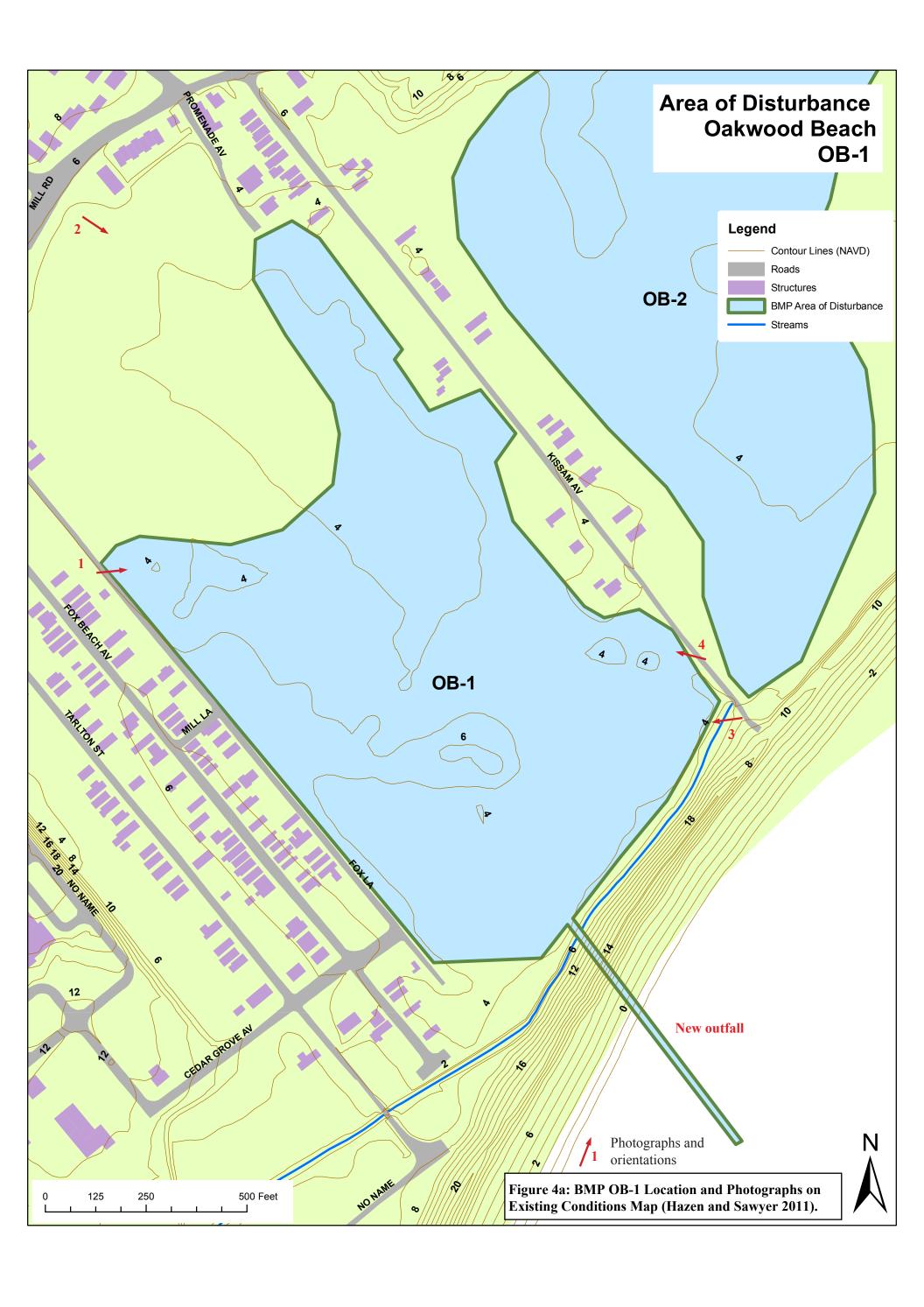
Figure 2: Oakwood Beach Watershed and BMP Locations on *Arthur Kill, N.Y.-N.J.* and *The Narrows, N.Y.-N.J.* 7.5 Minute Topographic Quadrangles (U.S.G.S. 1981).

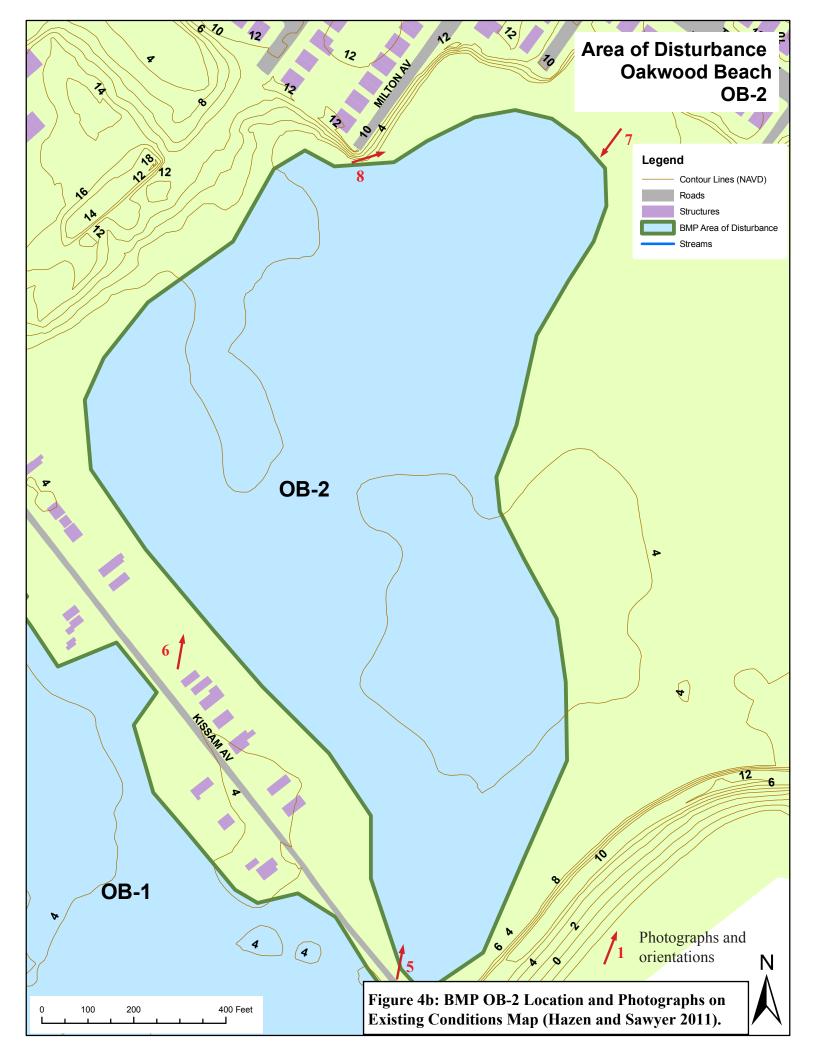
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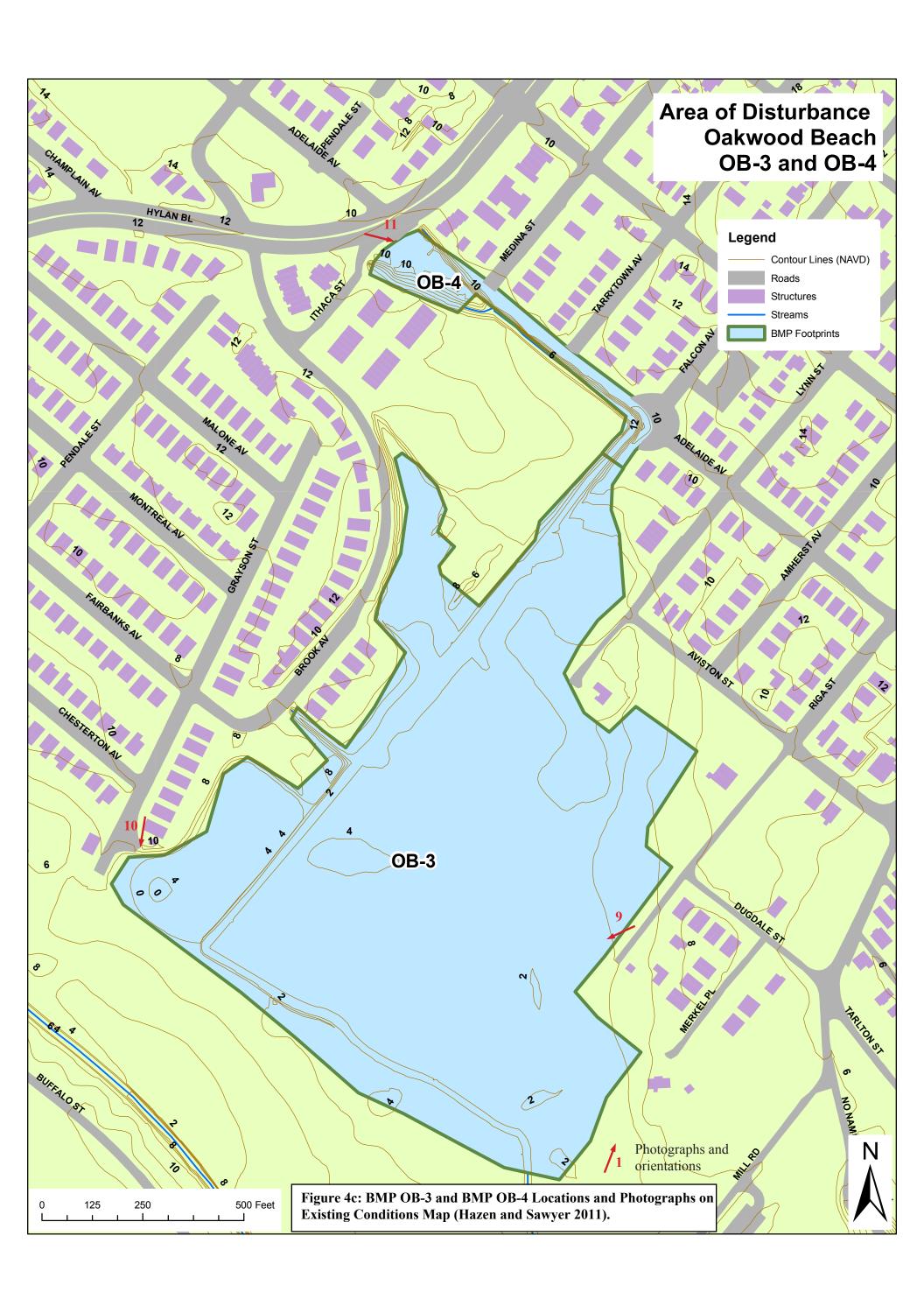


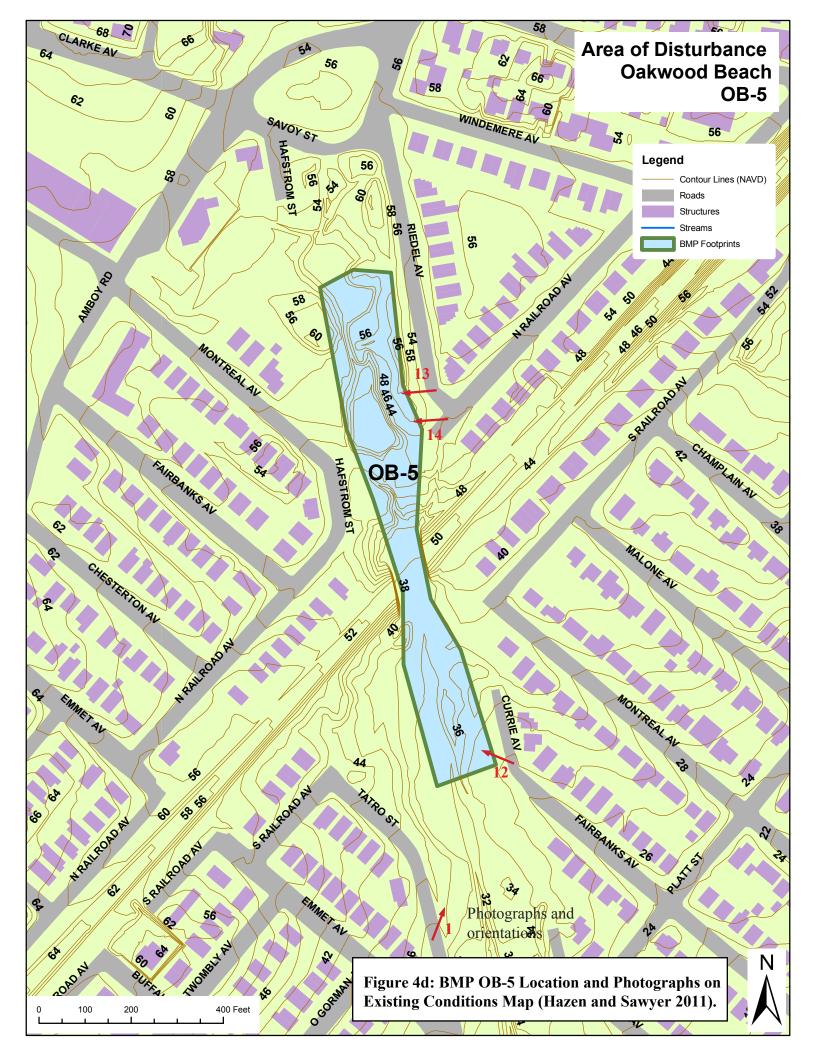












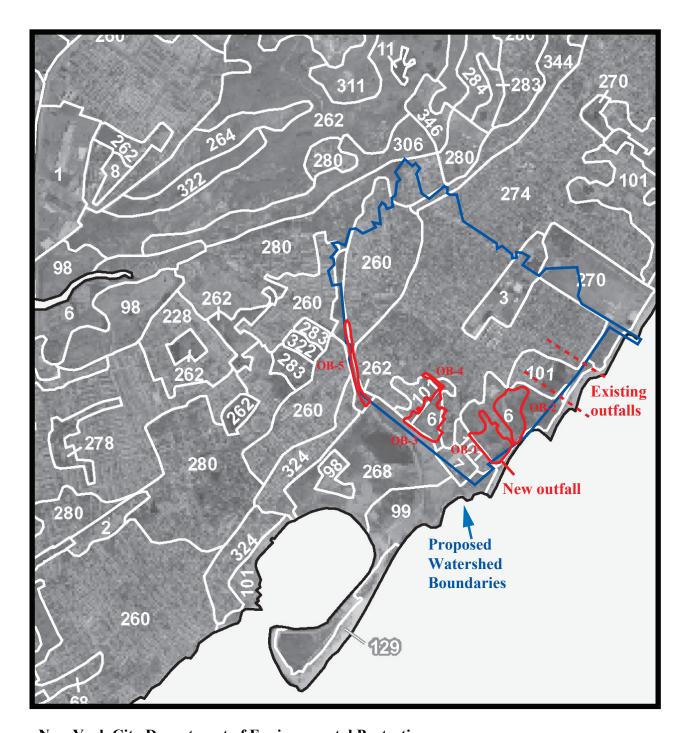




Figure 5: Oakwood Beach Watershed and BMP Locations on New York City Reconnaissance Soil Survey (U.S.D.A. 2005).





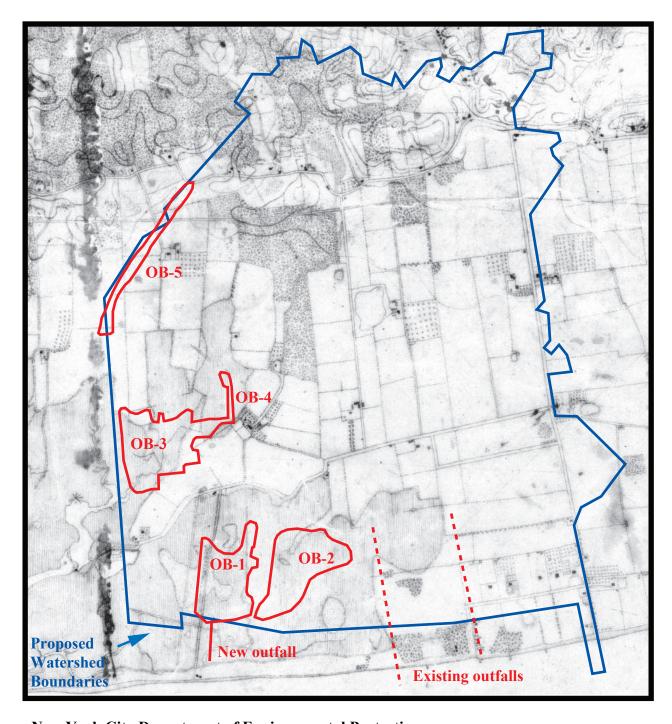
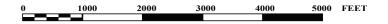




Figure 6: Oakwood Beach Watershed and BMP Locations on Staten Island From New Brighton to Great Kills (U.S.C.S. 1856).





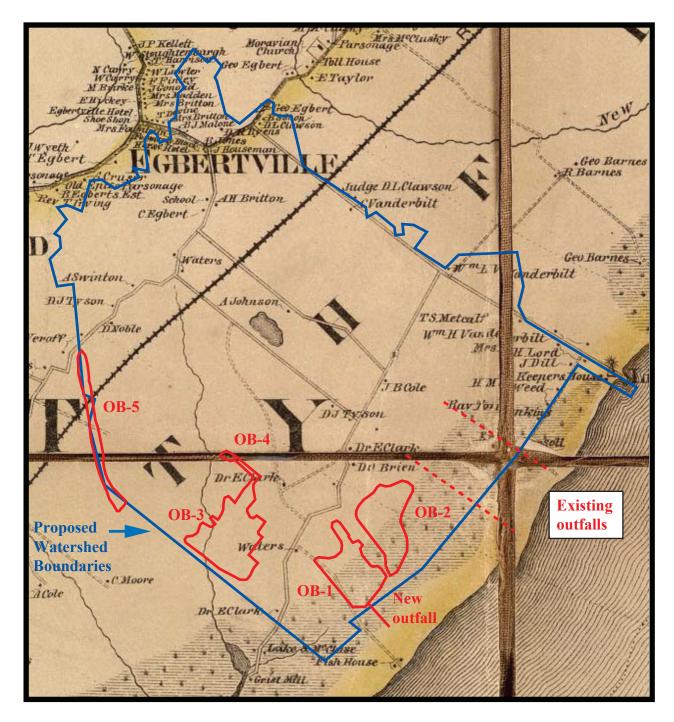




Figure 7: Oakwood Beach Watershed and BMP Locations on Map of the City Of New-York and Its Environs from Actual Surveys (Walling 1860).

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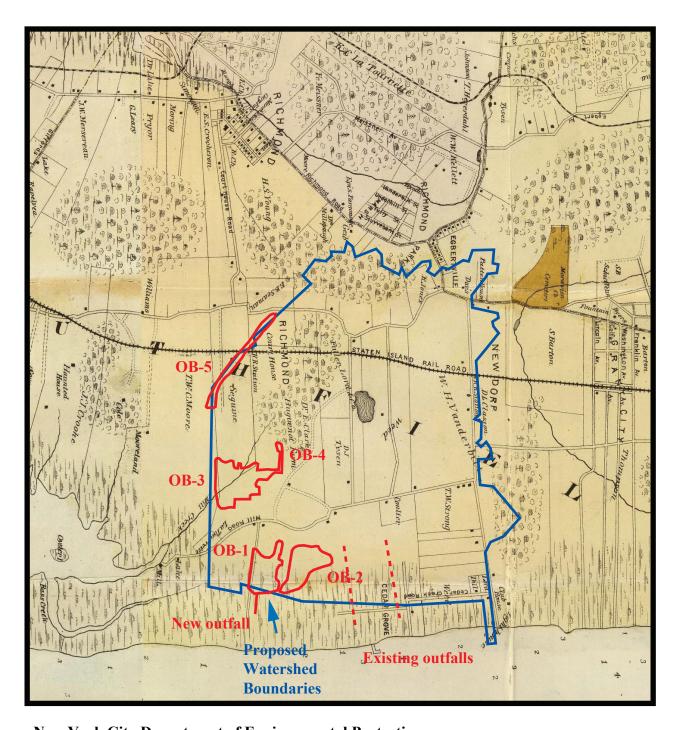




Figure 8: Oakwood Beach Watershed and BMP Locations on *Map of Staten Island, Richmond County, New York* (Dripps 1872).





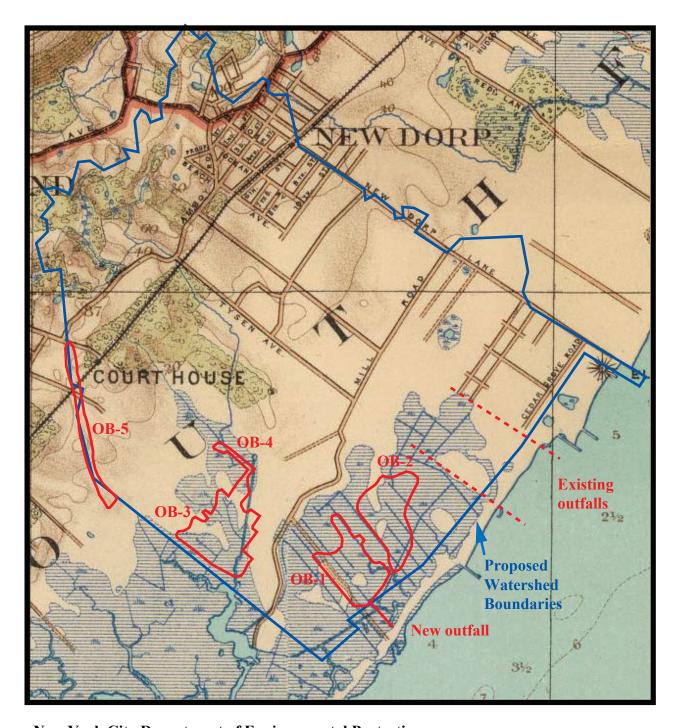
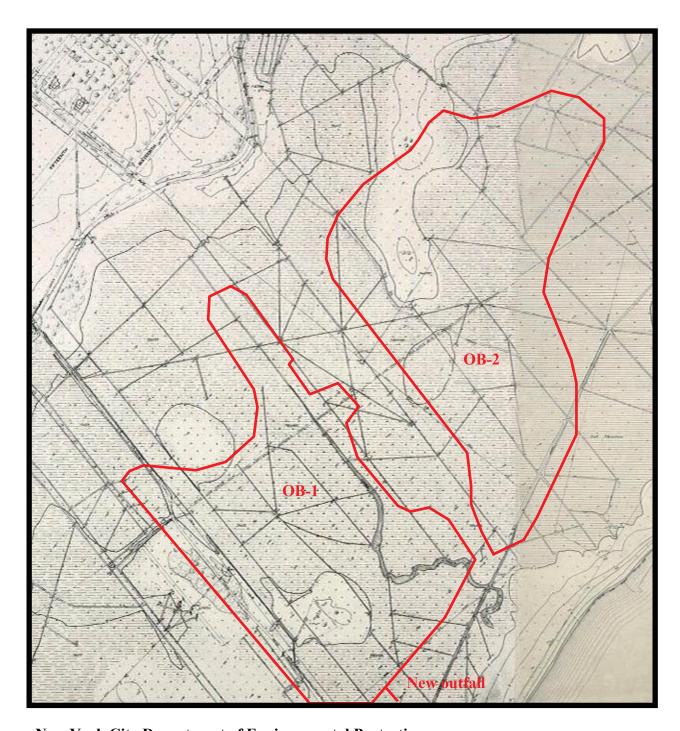




Figure 9: Oakwood Beach Watershed and BMP Locations on *Atlas of the Metropolitan District and adjacent country...* (Bien and Vermuele 1891).

0 1000 2000 3000 4000 5000 FEET

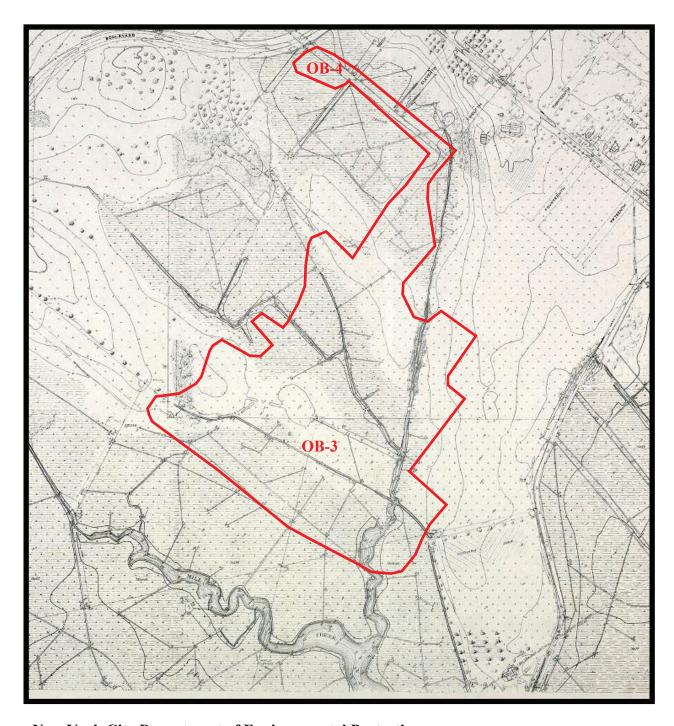


New York City Department of Environmental Protection Staten Island Bluebelt, Mid-Island of Staten Island's South Shore Oakwood Beach Watershed Phase IA Archaeological Documentary Study



Figure 10a: BMP OB-1 and OB-2 on *Borough of Richmond Topographical Survey*, Sheets 71 and 72 (Borough of Richmond 1911).

0 200 400 600 800 1000 FEET



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



Figure 10b: BMP OB-3 and OB-4 on Borough of Richmond Topographical Survey, Sheet 71 (Borough of Richmond 1911).  $\bot$ 

0 200 400 600 800 1000 FEET



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



Figure 10c: BMP OB-5 on *Borough of Richmond Topographical Survey*, Sheets 61, 62, 70 and 71 (Borough of Richmond 1911).

0 500 1000 1500 2000 2500 FEET

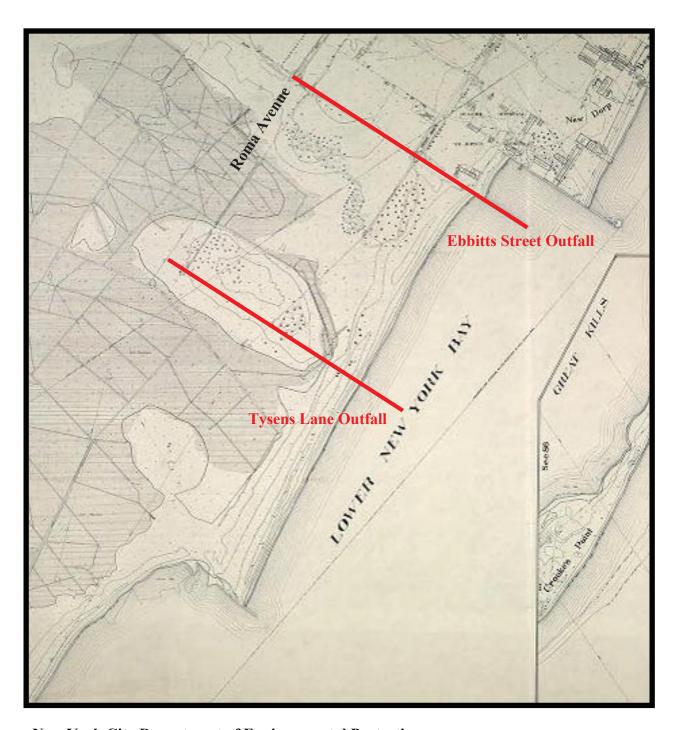
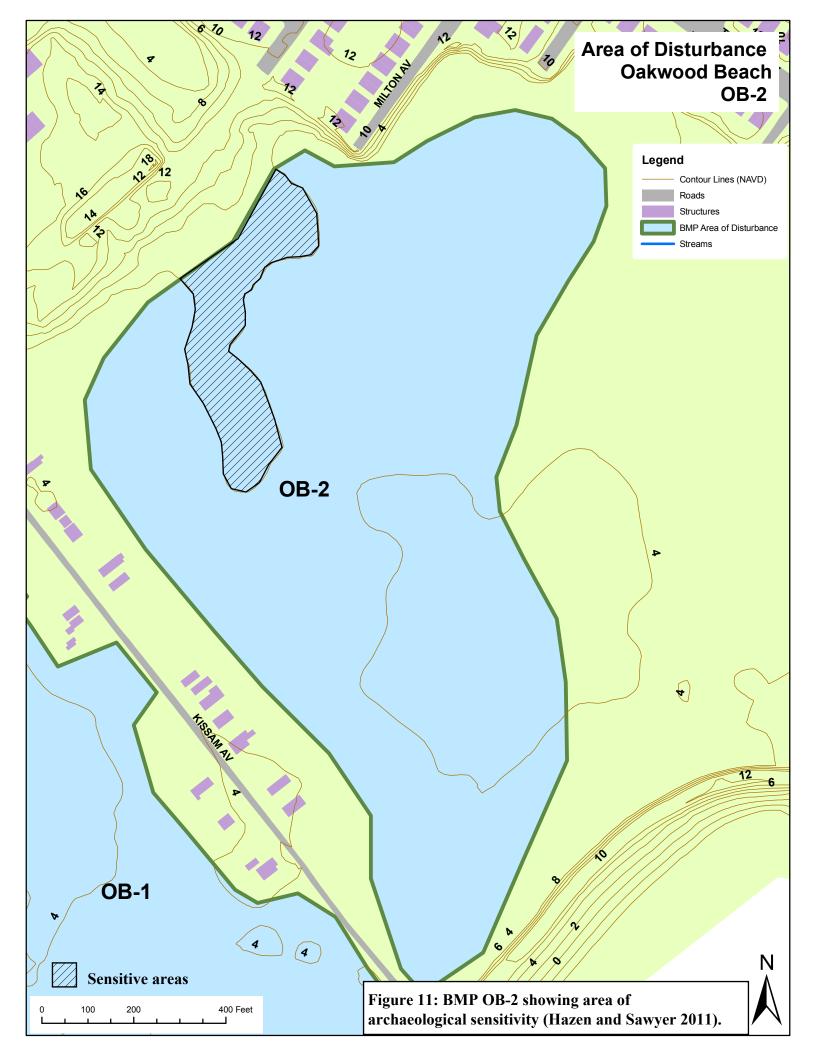




Figure 10d: Existing Outfalls on *Borough of Richmond Topographical Survey*, Sheet 72 (Borough of Richmond 1911).

0 200 400 600 800 1000 FEET





Photograph 1: OB-1, Fox Lane, view to the east.



Photograph 2: OB-1, Old Mill Road, view to the southeast.



Photograph 3: OB-1, from Oakwood Beach, view to the northwest.



Photograph 4: OB-1, Kissam Avenue, view to the northwest.



Photograph 5: OB-2, from Oakwood Beach, view to the north.



Photograph 6: OB-2, Kissam Avenue, view to the north.



Photograph 7: OB-2, Hett Avenue, view to the south.



Photograph 8: OB-2, Milton Avenue, view to the northeast.



Photograph 9: OB-3, Riga Street, view to the southwest.



Photograph 10: OB-3, Grayson Street, view to the south.



Photograph 11: OB-4, Hylan Boulevard, view to the east.



Photograph 12: OB-5, Currie Avenue and Fairbanks Avenue, view to the northwest.



Photograph 13: OB-5, N. Railroad Avenue and Riedel Avenue, view to the west (note storm drainage pipe).

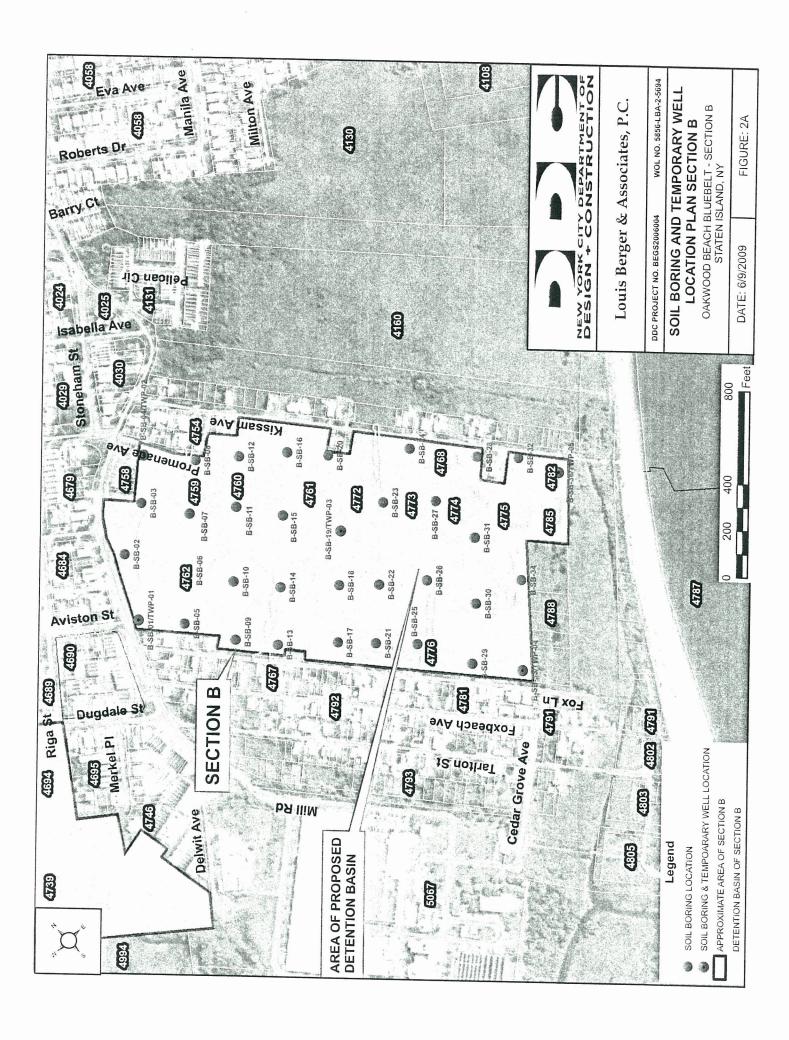


Photograph 14: OB-5, N. Railroad Avenue and Riedel Avenue, view to the west.

Appendix A: Block and Lot Data

BMP	Block	Lots
OB-1	4754	1, 23, 25, 63, 67, 68, 71, 76, 85
OB-1	4758	16, 19
OB-1	4759	1, 9, 11, 13, 17
OB-1	4760	1, 12
OB-1	4761	1, 8, 12, 16
OB-1	4762	1, 2, 3, 33, 105, 180, 255, 335
OB-1	4768	1, 51, 52, 62, 65, 68, 69, 70, 85, 86, 89
OB-1	4772	1
OB-1	4773	1
OB-1	4774	1
OB-1	4775	1
OB-1	4776	1, 90, 180, 270, 360
OB-1	4782	25, 38, 39, 40, 41
OB-1	4785	1
OB-1	4788	11, 105, 200, 290, 375
OB-2	4105	50
OB-2	4130	200
OB-2	4160	59, 70, 100, 318, 321, 325, 327, 328, 329
OB-3	4673	1, 7
OB-3	4680	1, 10, 11, 13, 17, 18, 20
OB-3	4681	17, 18, 22, 24, 28, 34
OB-3	4686	4, 5, 6, 7, 8, 9, 20, 22
OB-3	4687	1, 3, 7, 8, 9, 11, 18, 20, 22, 24, 26, 28
OB-3	4688	11, 18, 20, 26, 28, 30
OB-3	4689	25, 27, 28
OB-3	4691	6, 11, 13, 18, 23, 25, 26, 27, 30
OB-3	4692	1, 11, 18, 21, 28, 33
OB-3	4693	1, 3, 7, 8, 9, 11, 15, 18, 22, 25, 28
OB-3	4694	1, 3, 9, 11, 13, 15, 18, 21, 25, 28, 34
OB-3	4728	2
OB-3	4736	1, 6, 12, 15
OB-3	4737	1, 5, 7, 9, 13, 14, 18
OB-3	4738	1, 3, 13
OB-3	4739	1, 3, 9, 20, 29
OB-3	4740	1, 7, 9, 11, 13, 14, 15, 16, 21, 24, 33, 35, 36, 37, 41, 43, 46
OB-3	4746	49, 54, 58, 59, 62, 66, 69, 70, 71, 73, 75, 77, 78, 81, 83
OB-5	4696	150

# APPENDIX B: SOIL BORINGS FOR BMP OB-1



Louis Berger & Assoc., P.C.	Duilling Log	BORING ID: SB01
199 Water Street, 23rd Floor	Drilling Log	WELL ID: N/A
New York, New York 10038	Page 1 of 1	LOCATION: Staten Island, NY
CLIENT: New York City Departmen	t of Design and Construction	PROJECT NO: JG880F4
PROJECT: Oakwood Beach Bluebell	: - Section B	FMS ID#: BEGS2006004
DRILLING CONTRACTOR: Aqu	ifer Drilling and Testing, Inc.	WOL #: 5856-LBA-2-5694
DRILLING METHOD: Direct Push	<b>DATE STARTED:</b> 1/19/2009	
BOREHOLE DATA	WELL DATA	<b>DATE FINISHED:</b> 1/19/2009
Diameter (in): 2	Well Diameter: N/A	<b>DRILLER:</b> T. Palomeque
Total Depth (ft): 8.00	Total Depth (ft): N/A	LBA INSPECTOR: J. Lacanlale
Depth to Refusal (ft): N/A	Screen Length (ft): N/A	NORTHING: N/A
Depth to Water (ft): N/A	Depth to Water (ft): N/A	<b>EASTING:</b> N/A
Depth to Rock (ft): N/A	Slot Size: N/A	SURFACE ELEVATION: N/A
NOTES:		
val	-	

Well	Depth	Lithology	nscs	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	-		CL				<1	Dusky yellowish brown (10YR2/2) Silty CLAY, trace medium to fine Sand; moist.	Silty Clay, collected composite sample SB01 from 0.0 - 1.5 ft bgs
	2 -		ML				<1	Moderate brown (5YR4/4) Clayey SILT, little medium to fine Gravel; wet.	Clayey Silt, collected sample SB01 for VOC analysis from 2.0 - 2.5 ft bgs
	6 -		ML				<1	Moderate brown (5YR4/4) Clayey SILT, little medium to fine Gravel; saturated.	End of Boring at 8 ft. bgs.

			& Assoc., eet, 23rd F				]	Drilling Log		SB02 N/A
			w York 10					Page 1 of 1		Staten Island, NY
	-	-								JG880F4
			wood Bea							
								g and Testing, Inc.		BEGS2006004
			THOD:				Juning	g and resung, inc.		5856-LBA-2-569
JKILL		THE RESIDENCE AND ADDRESS.	OLE DA	distribution and the	ctru	511		WELL DATA	DATE STARTED:	
Diamet			2	III		11/	II Dia	meter: N/A	DATE FINISHED:	
Fotal D		<u> </u>								T. Palomeque
			I (ft): N/					oth (ft): N/A ength (ft): N/A	LBA INSPECTOR:	
Depth t								0 ( )		N/A
						_		Water (ft): N/A		N/A
Depth t	THE REAL PROPERTY.	ock (	It): 1N/	A		510	t Size	: N/A	SURFACE ELEVA	FION: N/A
ion				rval	very	ii —	<u> </u>			
Well Construction	Depth	Lithology	USCS Sample Interval Blows/6 in Blows/6 in						Remarks	
	-0		SM				<1	Dark yellowish brown (10YR4/2) Silt, little medium to fine Gravel; r	Silty Sand, collected composite sample SB02 from 0.0 - 6.5 ft bgs	
	2 -		ML				<1	Moderate brown (5YR4/4) Clayey Gravel; moist.	SILT, little medium to fin	Clayey Silt, collected sample SB02 for VOC analysis fron 2.0 - 2.5 ft bg
	6 -		SM SM				<1	Moderate brown (5YR4/4) coarse little medium to fine Gravel; wet.  Moderate brown (5YR4/4) to ligh fine SAND, some Silt, little media	t brown (5YR5/6) coarse t	
		1::::								End of Borin

at 8 ft. bgs.

			Assoc.,				1	Drilling Log	BORING ID:	SB03	
1			et, 23rd I				1	0 0	WELL ID:	N/A	
			York 10					Page 1 of 1	LOCATION:		n Island, NY
								and Construction	PROJECT NO:	JG88	
			ood Bea						FMS ID#:		S2006004
							Orilling	and Testing, Inc.	WOL #:		-LBA-2-5694
DRILL	and the latest designation of the latest des	-	HOD:	and the same of the same of	et Pus	sh			DATE STARTED:		
	BOF	REHC	DLE DA	TA				WELL DATA	DATE FINISHED:	: 1/21/	2009
Diamet			2			We	ll Dia	meter: N/A	DRILLER:	T. Pa	lomeque
Total E			8.00					oth (ft): N/A	LBA INSPECTOR	<b>₹:</b> J. La	canlale
Depth	to Re	fusal	(ft): N/			Scr	een L	ength (ft): N/A	NORTHING:	N/A	
Depth								Water (ft): N/A	EASTING:	N/A	
Depth	to Ro	ck (ft	t): N/	'A		Slo	t Size	: N/A	SURFACE ELEVA	ATIO	N: N/A
NOTE	S:										TO THE RESIDENCE OF THE PROPERTY OF THE PROPER
				T	<u>                                    </u>		·				
ion				Sample Interval	Sample Recovery	.=	<u> </u>				
Well Construction	ith	Lithology	USCS	nte	000	Blows/6 in	PID (ppm)	Danauin ti			Day
W nsti	Depth	thol	S	le l	le R	low	) (I)	Description			Remarks
ပိ		<u>:</u>		amp	du	8	Ы				
	0			(XXXX	Sa						
			SM				<1	Moderate yellowish brown (10YR		О,	Silty Sand, collected
		::::						some Silt, little coarse to fine Grav	/el; moist.		composite
	_	::::									sample SB03
	_										from 0.0 - 3.0
											ft bgs
	2 -	1									
		<del>       </del>									
				$\bowtie$							
	-	==		-			<u></u>	D 1 11 111 (101102)	) Cl — CH T () I		Cl 014
			ML				<1	Dusky yellowish brown (10YR2/2 to fine Gravel, little Peat; moist.	) Clayey SILT, little med	lium	Clayey Silt, collected
								to this Graver, little I cat, moist.			sample SB03
	4 -										for VOC
	7	$\div$	ML				<1	Dusky yellowish brown (10YR2/2	2) Clayey SILT, little coa	rse	analysis from
								to fine Gravel, little Peat; wet.			3.5 - 4.0 ft bgs
	-	<u>:::</u>	ML	$\bowtie$			<1	Moderate brown (5YR3/4) Clayer	/ SILT, little coarse to fir	ne	
		÷:-:						Gravel; saturated.		200 <sup>-2</sup>	
					1//						
	6 -										
					1//						
					14						
				$\bowtie$							
											End of Boring
		<u>:::</u>									at 8 ft. bgs.
	1-8	<u> </u>		XXX	1						

199	9 Wat	er Stre	x Assoc., et, 23rd York 10	Floor				Drilling Page 1 of	_	BORING ID: WELL ID:	SB04 N/A	
				17 542	o etm o	nt of I	Dogios	and Construc		LOCATION:	Staten Island, NY	
			ood Be						ction	PROJECT NO:	JG880F4	
									т.	FMS ID#:	BEGS2006004	
			THOD:				Drilling	g and Testing,	Inc.	WOL #:	5856-LBA-2-569	
KILI	-	-	DLE DA	THE RESERVE AND ADDRESS OF THE PERSON NAMED IN COLUMN	Ct Pus	T		WELLD	A 7D A	DATE STARTED:		
Diame			2	AIA		NV.	JI D!-	WELL D		DATE FINISHED		
Total I			8.00	)				meter:	N/A	DRILLER:	T. Palomeque	
			(ft): N			_		oth (ft):	N/A	LBA INSPECTOR		
		ater (		$\frac{A}{A}$				ength (ft):	N/A	NORTHING:	N/A	
				$\frac{A}{A}$				Water (ft):	N/A	EASTING:	N/A	
NOTE		ock (ft	i): IN/	A		510	t Size	•	N/A	SURFACE ELEVA	ATION: N/A	
Well Construction	Oepth Depth	Lithology	nscs	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)		Descripti		Remarks	
	2 -		SM				<1	Moderate yel some Silt, litt	lowish brown ( le medium to fir	10YR5/4) coarse to fine SANI ne Gravel; moist.	Silty Sand, collected composite sample SB0- from 0.0 - 2.0 ft bgs	
	-		ML				<1	Moderate bro Gravel; moist	wn (5YR4/4) C t.	layey SILT, trace medium to f	Clayey Silt, collected sample SB0-for VOC analysis from 3.0 - 3.5 ft by	
	6 -		ML				<1	Moderate bro Gravel; wet.	own (5YR4/4) C	layey SILT, trace medium to f	īne	

End of Boring at 8 ft. bgs.

199 Ne	9 Wate w Yorl	r Stre c, Nev	& Assoc., Feet, 23rd F	loor )38				Drilling Log Page 1 of 1	BORING ID: WELL ID: LOCATION:		n Island, NY
								and Construction	PROJECT NO:	JG880F4	
			vood Bea						FMS ID#:	BEG	S2006004
							Drilling	g and Testing, Inc.	WOL #:		-LBA-2-5694
DRILI	-	-	rhod: 1	-	ct Pu	sh			DATE STARTED:		
			OLE DA	TA				WELL DATA	DATE FINISHED	: 1/27/	2009
Diame			2					meter: N/A	DRILLER:		alomeque
Total I								oth (ft): N/A	LBA INSPECTOR	<b>l:</b> J. La	canlale
		_	(ft): N/A					ength (ft): N/A	NORTHING:	N/A	
Depth								Water (ft): N/A	EASTING:	N/A	
Depth	to Ro	ck (f	(t): $N/A$	4		Slo	t Size	: N/A	SURFACE ELEVA	ATIO	N: N/A
Well Construction	Depth	Lithology	nscs	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description			Remarks
·	2 -		OL				<1	Dusky yellowish brown (10YR2/	2) PEAT, little Clay; mois	st.	Peat, collected composite sample SB05 from 0.0 - 1.5 ft bgs and collected sample SB05 for VOC analysis from 1.0 - 1.5 ft bgs  End of Boring at 4 ft. bgs.

Louis Berger & Assoc., P.C. 199 Water Street, 23rd Floor	Dril	ng log	RING ID: SB06 CLL ID: N/A	5
New York, New York 10038	Pa			n Island, NY
CLIENT: New York City Departmen	t of Design and C	struction PRO	OJECT NO: JG88	0F4
PROJECT: Oakwood Beach Bluebe			S ID#: BEG	S2006004
DRILLING CONTRACTOR: Aq	ifer Drilling and	sting, Inc. WO	DL #: 5856	-LBA-2-5694
DRILLING METHOD: Direct Pus			TE STARTED: 2/3/2	009
BOREHOLE DATA	W	LL DATA DAT	<b>TE FINISHED:</b> 2/3/2	009
Diameter (in): 2	Well Diameter	N/A <b>DRI</b>	ILLER: T. Pa	lomeque
Total Depth (ft): 4.00	Total Depth (ft	N/A LBA	A INSPECTOR: J. La	canlale
Depth to Refusal (ft): N/A	Screen Length	t): N/A <b>NO</b> I	RTHING: N/A	
Depth to Water (ft): N/A	Depth to Wate	ft): N/A EAS	STING: N/A	
Depth to Rock (ft): N/A	Slot Size:	N/A SUR	RFACE ELEVATIO	N: N/A
NOTES:				
Well Construction Depth Lithology USCS Sample Interval	Blows/6 in PID (ppm)	Description		Remarks
2	<1 Dust	yellowish brown (10YR2/2) PEA	xT, some Silt; wet.	Silty Peat, collected composite sample SB06 from 0.0 - 4.0 ft bgs and collected sample SB06 for VOC analysis from 1.0 - 1.5 ft bgs.  End of Boring at 4 ft. bgs.

1		100	& Assoc., F					 Drilling Log	BORING ID:	SB07	7
1			eet, 23rd F			1	,	0 0	WELL ID:	N/A	
			w York 100					Page 1 of 1	LOCATION:		n Island, NY
								and Construction	PROJECT NO:	JG88	
			wood Bea						FMS ID#:	BEG	S2006004
							Orilling	and Testing, Inc.	WOL #:		-LBA-2-5694
DRILI	-	-	THOD: I	and the restored	et Pu	sh			DATE STARTED:	1/27/	2009
	BOR	REH	OLE DA	TA				WELL DATA	DATE FINISHED	: 1/27/	2009
Diame	ter (in	ı):	2			We	ll Dia	meter: N/A	DRILLER:	T. Pa	lomeque
Total I	otal Depth (ft): 4.00						al Dep	oth (ft): N/A	LBA INSPECTOR	t:J. La	canlale
Depth	to Re	fusa	I (ft): N/A	4		Scr	een L	ength (ft): N/A	NORTHING:	N/A	
Depth	to Wa	iter	(ft): N/A	4		Dej	oth to	Water (ft): N/A	EASTING:	N/A	
Depth	to Ro	ck (	ft): N/A	4		Slo	t Size	: N/A	SURFACE ELEVA	ATIO	N: N/A
NOTE	ES:			Γ_	ि	Anche o se o veneza a con	I				PART METER STORE SERVICE SERVI
Well Construction	Depth	Lithology	NSCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description			Remarks
	2 -		OL				<1	Dusky yellowish brown (10YR2/	2) PEAT, little Clay; wet.		Peat, collected composite sample SB07 from 0.0 - 3.0 ft bgs and collected sample SB07 for VOC analysis from 2.5 - 3.0 ft bgs  End of Boring at 4 ft. bgs.

<u> </u>	. 0		0 1	D.C.		т-				
1			& Assoc., eet, 23rd					Drilling Log	BORING ID:	SB08
1			w York 10					Page 1 of 1	WELL ID:	N/A
		CONCUSTOR OF			ortma	nt of l	Dagion	and Construction	LOCATION:	Staten Island, NY
									PROJECT NO:	JG880F4
-			wood Be						FMS ID#:	BEGS2006004
							Drilling	g and Testing, Inc.	WOL #:	5856-LBA-2-5694
DRIL		THE RESERVE AND ADDRESS OF THE PERSON NAMED AND ADDRESS OF THE	THOD:	100 TO 10	ct Pus	h			DATE STARTED:	
			OLE DA	ATA		-	Name and the	WELL DATA	DATE FINISHED:	: 1/20/2009
Diame			2			_		meter: N/A	DRILLER:	T. Palomeque
Total								oth (ft): N/A	LBA INSPECTOR	:J. Lacanlale
			1 (ft): N			_		ength (ft): N/A	NORTHING:	N/A
Depth						_		Water (ft): N/A	EASTING:	N/A
Depth	to Ro	ock (	ft): N	/A		Slo	t Size	: N/A	SURFACE ELEVA	ATION: N/A
NOTE	ES:		:	la/	ery					
Well	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	1	Remarks
	0		SM				<1	Dark yellowish brown (10YR4/ Silt, trace medium to fine Grave		ne Silty Sand
	2 -		ML				<1	Moderate brown (5YR4/4) Clay Gravel; wet.		collected composite sample SB08 from 0.0 - 8.0 ft bgs and sample SB08 for VOC analysis from 1.5 - 2.0 ft bgs
	6 -		CL				<1	Medium light gray (N6) Silty C Gravel; satuarted.	LAY, trace medium to fine	End of Boring at 8 ft. bgs.

Louis Berger & Assoc., P.C. 199 Water Street, 23rd Floor New York, New York 10038	Drilling Log	BORING ID: SB09 WELL ID: N/A LOCATION: Staten Island, NY
CLIENT: New York City Departmen	9	PROJECT NO: JG880F4
PROJECT: Oakwood Beach Bluebel		FMS ID#: BEGS2006004
DRILLING CONTRACTOR: Aqu		<b>WOL #:</b> 5856-LBA-2-5694
DRILLING METHOD: Direct Pus		<b>DATE STARTED:</b> 1/19/2009
BOREHOLE DATA		DATE FINISHED: 1/19/2009
Diameter (in): 2	Well Diameter: N/A	DRILLER: T. Palomeque
Total Depth (ft): 8.00	Total Depth (ft): N/A	LBA INSPECTOR: J. Lacanlale
Depth to Refusal (ft): N/A	Screen Length (ft): N/A	NORTHING: N/A
Depth to Water (ft): N/A	Depth to Water (ft): N/A	EASTING: N/A
Depth to Rock (ft): N/A	Slot Size: N/A	SURFACE ELEVATION: N/A
Construction Depth Lithology USCS Sample Interval	Description    Column   Column	Remarks  PEAT little Clay: moist Peat, collected
2 - 11 11 11 11 11 11 11 11 11 11 11 11 1	<1 Dusky yellowish brown (10YR2/2)	reat, conected composite sample SB09 from 0.0 - 1.5 ft bgs and collected sample SB09 for VOC analysis from 1.0 - 1.5 ft bg

<1

CL

Dusky yellowish brown (10YR2/2) PEAT, little Clay; saturated.

Medium light gray (N6) Clay; saturated.

Clay

End of Boring at 8 ft. bgs.

199 Wa	iter Str	& Assoc., reet, 23rd l w York 10	Floor				Drilling Log	BORING ID: WELL ID: LOCATION:	SB10 N/A Staten Island, NY
CLIENT:	New '	York City	Dep	artme	ent of l	Design	and Construction	PROJECT NO:	JG880F4
PROJECT	r: Oak	wood Bea	ach E	Bluebe	elt - Se	ection l	3	FMS ID#:	BEGS2006004
DRILLING	G CO	NTRAC'	TOF	<b>R:</b> Ac	quifer	Drillin <sub>i</sub>	g and Testing, Inc.	WOL #:	5856-LBA-2-5694
DRILLING	G ME	THOD:	Dire	ct Pu	sh			DATE STARTED	: 2/3/2009
BC	DREH	OLE DA	TA				WELL DATA	DATE FINISHED	: 2/3/2009
Diameter (	(in):	2			We	ell Dia	meter: N/A	DRILLER:	T. Palomeque
Total Dept	th (ft):	4.00	1		Tot	tal De	oth (ft): N/A	LBA INSPECTOR	
Depth to R					Ser	reen L	ength (ft): N/A	NORTHING:	N/A
Depth to V	Vater	(ft): N/	'A		De	pth to	Water (ft): N/A	EASTING:	N/A
Depth to R	Rock (	ft): N/	Ά		Slo	ot Size	: N/A	SURFACE ELEV	ATION: N/A
Well Construction Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description		Remarks
2		OL				<1	Dusky yellowish brown (10YR2/2  Dusky yellowish brown (10YR2/2		Peat, collected composite sample SB10 from 0.0 - 4.0 ft bgs  Collected sample SB10 for VOC

Pale yellowish brown (10YR6/2) Clayey SILT; wet.

Clayey Silt

End of Boring at 4 ft. bgs.

	. D	0 1			_						
			soc., P.C. 3rd Flooi			1	Drilling I	ωσ	BORING ID:	SB1	
1		New Yor				•	_	105	WELL ID:	N/A	
-							Page 1 of 1		LOCATION:	-	en Island, NY
							and Constructi	on	PROJECT NO:	JG88	
			Beach I					77 P 4 P 4 P 4 P 4 P 4 P 4 P 4 P 4 P 4 P	FMS ID#:	BEC	S2006004
						Drilling	g and Testing, In	nc.	WOL #:	5856	5-LBA-2-5694
DRILI	-	Committee of the second of the	D: Dire	DESCRIPTION OF THE PERSON	h				DATE STARTED:	2/6/2	2009
			DATA				WELL DA	TA	DATE FINISHED:	2/6/2	2009
Diame	ter (in)		2		We	ell Dia	meter:	N/A	DRILLER:	T. P	alomeque
-	Depth (		8.00		Tot	al Dep	oth (ft):	N/A	LBA INSPECTOR	J. La	acanlale
Depth	to Refu	ısal (ft):	: N/A		Scr	een L	ength (ft):	N/A	NORTHING:	N/A	
Depth	to Wat	er (ft):	N/A		De	pth to	Water (ft):	N/A	EASTING:	N/A	
Depth	to Roc	k (ft):	N/A		Slo	t Size:	•	N/A	SURFACE ELEVA	TIO	N: N/A
NOTE	S:		To an an amendment and a								
l ction		Y	erval	overy	6 in	m)					
Well Construction	Depth	Lithology	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)		Description			Remarks
5		7	Sam	Sam							
	2 -	OL				<1			) Silty CLAY, little Peat;	wet.	Silty Clay, collected composite sample SB11 from 4.0 - 6.5 ft bgs and collected sample SB11 for VOC analysis from 4.0 - 4.5 ft bgs
	3	OL					Medium light g	rey (N6) CLAY; n	oist.		Clay  End of Boring at 8 ft. bgs.

199	Wate	r Stree	Assoc., I et, 23rd F York 100	loor				Drilling Page 1 of	0		BORING ID: WELL ID: LOCATION:	SB12 N/A State	n Island, NY
CLIEN	T: N	ew Yo	ork City	Depa	artmei	nt of [	Design	and Construc	tion		PROJECT NO:	JG88	0F4
			ood Bea								FMS ID#:	BEG	S2006004
						uifer Drilling and Testing, Inc.					WOL #:	5856	-LBA-2-5694
			HOD:								DATE STARTED:	: 1/20/	2009
	BOE	REHC	LE DA	TA		WELL DATA					DATE FINISHED	: 1/20/	2009
Diamet	meter (in): 2					We	II Dia	meter:	N/A		DRILLER:	T. Pa	lomeque
Total I	al Depth (ft): 4.00					Tot	al Dep	oth (ft):	N/A		LBA INSPECTOR	R:J. La	canlale
Depth	th to Refusal (ft): N/A					Scr	een L	ength (ft):	N/A		NORTHING:	N/A	
Depth	to Wa	ater (f	t): N/.	A		Dep	oth to	Water (ft):	N/A		<b>EASTING:</b>	N/A	
Depth	to Ro	ck (ft	): N/.	A		Slo	t Size	•	N/A		SURFACE ELEV	ATIO	N: N/A
a	T	Π		la la	y.								
Well Construction	Depth	Lithology	NSCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)		Descript	tion			Remarks
	-		OL				<1	Dusky yellow	vish brown (10Y	YR2/2)	PEAT, little Clay; wet.		Peat
	2 -		OL				<1	Medium ligh	t gray (N6) CL	AY; sa	nturated.		Clay, collecte composite sample SB12 from 0.0 - 4.0 ft bgs and collected sample SB12 for VOC analysis from 1.0 - 1.5 ft bg End of Boring

at 4 ft. bgs.

Louis Berger & Assoc., P.C.	Duilling Log	BORING ID:	SB13
199 Water Street, 23rd Floor	Drilling Log	WELL ID:	N/A
New York, New York 10038	Page 1 of 1	LOCATION:	Staten Island, NY
CLIENT: New York City Department	ent of Design and Construction	PROJECT NO:	JG880F4
PROJECT: Oakwood Beach Blueb	elt - Section B	FMS ID#:	BEGS2006004
DRILLING CONTRACTOR: A		WOL #:	5856-LBA-2-5694
<b>DRILLING METHOD:</b> Direct Pu	sh	DATE STARTED	<b>):</b> 1/19/2009
BOREHOLE DATA	WELL DATA	DATE FINISHEI	<b>):</b> 1/19/2009
Diameter (in): 2	Well Diameter: N/A	DRILLER:	T. Palomeque
Total Depth (ft): 8.00	Total Depth (ft): N/A	LBA INSPECTO	
Depth to Refusal (ft): N/A	Screen Length (ft): N/A	NORTHING:	N/A
Depth to Water (ft): N/A	Depth to Water (ft): N/A	EASTING:	N/A
Depth to Rock (ft): N/A	Slot Size: N/A	SURFACE ELEV	ATION: N/A
NOTES:			

Well Construction	Depth	Lithology	nscs	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	2 -		OL				<1	Dusky yellowish brown (10YR2/2) PEAT, little clay; moist.  Dusky yellowish brown (10YR2/2) PEAT, little clay; wet.	Peat, Collected composite sample SB13 from 0.0 - 1.5 ft bgs and collected sample SB13 for VOC analysis from 1.0 - 1.5 ft bgs
	6 -		CL				<1	Medium light gray (N6) CLAY; saturated.	End of Boring at 8 ft. bgs.

Louis Berger & Assoc., P.C.	Drilling Log	DOTTE TO	SB14
199 Water Street, 23rd Floor	Drilling Log	WELL ID:	N/A
New York, New York 10038	Page 1 of 1	LOCATION:	Staten Island, NY
CLIENT: New York City Departmen	t of Design and Construction	PROJECT NO:	JG880F4
PROJECT: Oakwood Beach Bluebelt	- Section B	FMS ID#:	BEGS2006004
DRILLING CONTRACTOR: Aqu		WOL #:	5856-LBA-2-5694
DRILLING METHOD: Direct Push		DATE STARTED:	2/3/2009
BOREHOLE DATA	WELL DATA	DATE FINISHED:	2/3/2009
Diameter (in): 2	Well Diameter: N/A	DRILLER:	T. Palomeque
Total Depth (ft): 8.00	Total Depth (ft): N/A	LBA INSPECTOR	:J. Lacanlale
Depth to Refusal (ft): N/A	Screen Length (ft): N/A	NORTHING:	N/A
Depth to Water (ft): N/A	Depth to Water (ft): N/A	EASTING:	N/A
Depth to Rock (ft): N/A	Slot Size: N/A	SURFACE ELEVA	TION: N/A
NOTES:			
TO LES.			
la al			
Well struction ology ology SCS Recovery	ii î		
Well structi epth ology JSCS	Description		Remarks

Well Construction	Depth	Lithology	nscs	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	2 -		SM				<1	Moderate brown (5YR3/4) to moderate yellowish brown (10YR5/4) coarse to fine SAND, some Silt, little medium to fine Gravel; wet.  Moderate brown (5YR4/4) coarse to fine SAND, some Silt, trace medium to fine Gravel; moist.	Silty Sand, collected composite sample SB14 from 0.0 - 2.5 ft bgs and collected sample SB14 for VOC analysis from 2.0 - 2.5 ft bgs

Louis Berger & Assoc., P.C. 199 Water Street, 23rd Floor	Drilling Log	BORING ID: SB15 WELL ID: N/A	5
New York, New York 10038	Page 1 of 1		n Island, NY
CLIENT: New York City Departmen	at of Design and Construction	PROJECT NO: JG88	30F4
PROJECT: Oakwood Beach Bluebel	t - Section B	FMS ID#: BEG	S2006004
DRILLING CONTRACTOR: Aqu	uifer Drilling and Testing, Inc.	WOL #: 5856	-LBA-2-5694
<b>DRILLING METHOD:</b> Direct Push	1	DATE STARTED: 2/6/2	.009
BOREHOLE DATA	WELL DATA	DATE FINISHED: 2/6/2	.009
Diameter (in): 2	Well Diameter: N/A	DRILLER: T. Pa	alomeque
Total Depth (ft): 4.00	Total Depth (ft): N/A	LBA INSPECTOR: J. La	icanlale
Depth to Refusal (ft): N/A	Screen Length (ft): N/A	NORTHING: N/A	
Depth to Water (ft): N/A	Depth to Water (ft): N/A	<b>EASTING:</b> N/A	
Depth to Rock (ft): N/A	Slot Size: N/A	SURFACE ELEVATIO	N: N/A
NOTES:		200/01 south and hardware and down hards and special statement as a second contract and second contract and se	
Well Construction Depth Lithology USCS Sample Interval	Mi 9/s Mold Description		Remarks
2 - HIII HIII HIII HIII HIII HIII HIII H	<1 Dusky yellowish brown (10YR2/2	) Silty CLAY, little Peat; wet.	Silt Clay, collected composite sample SB15 from 0.0 - 1.5 ft bgs and collected sample SB12 for VOC analysis from 1.0 - 1.5 ft bgs

End of Boring at 4 ft. bgs.

Louis Berger & Assoc., P.C.			BORING ID:	SB16
199 Water Street, 23rd Floor	Drillin	ng Log	WELL ID:	N/A
New York, New York 10038	Page 1	of l	LOCATION:	Staten Island, NY
CLIENT: New York City Departme	nt of Design and Cons	truction	PROJECT NO:	JG880F4
PROJECT: Oakwood Beach Bluebe			FMS ID#:	BEGS2006004
DRILLING CONTRACTOR: Ac	uifer Drilling and Test	ing. Inc.	WOL #:	5856-LBA-2-5694
DRILLING METHOD: Direct Pus			DATE STARTED:	
BOREHOLE DATA	WEL	L DATA	DATE FINISHED	
Diameter (in): 2	Well Diameter:	N/A	DRILLER:	T. Palomeque
Total Depth (ft): 8.00	Total Depth (ft):	N/A	LBA INSPECTOR	
Depth to Refusal (ft): N/A	Screen Length (ft)	: N/A	NORTHING:	N/A
Depth to Water (ft): N/A	Depth to Water (fi		EASTING:	N/A
Depth to Rock (ft): N/A	Slot Size:	N/A	SURFACE ELEVA	
NOTES:				
Well Construction Depth Lithology USCS mple Interval nple Recovery	Blows/6 in PID (ppm)			
Well Construction Depth Lithology USCS Sample Interval	Blows/6 ir PID (ppm)	Description		Remarks
2 - 11   11   11   11   11   11   11   1	<1 Dusky ye	ellowish brown (10YR2/2	) PEAT, little Clay; mois	
6 - HI	Medium	light gray (N6) Silty CLA	Y; moist.	Silty Clay  End of Boring at 8 ft. bgs.

Louis Berger & Assoc., P.C.	Drilling Log		SB17					
199 Water Street, 23rd Floor			N/A					
New York, New York 10038	Page 1 of 1	LOCATION:	Staten Island, NY					
CLIENT: New York City Departmen	t of Design and Construction	PROJECT NO: J	JG880F4					
PROJECT: Oakwood Beach Bluebel	: - Section B	FMS ID#:	BEGS2006004					
RILLING CONTRACTOR: Aquifer Drilling and Testing, Inc. WOL #: 5856-LBA								
DRILLING METHOD: Direct Push		<b>DATE STARTED:</b> 1/19/2009						
BOREHOLE DATA	WELL DATA	DATE FINISHED:	1/19/2009					
Diameter (in): 2	Well Diameter: N/A	DRILLER:	T. Palomeque					
Total Depth (ft): 4.00	Total Depth (ft): N/A	LBA INSPECTOR: J. Lacanlale						
Depth to Refusal (ft): N/A	Screen Length (ft): N/A	NORTHING:	N/A					
Depth to Water (ft): N/A	Depth to Water (ft): N/A	EASTING:	N/A					
Depth to Rock (ft): N/A	Slot Size: N/A	SURFACE ELEVATION: N/A						
NOTES:								
ito ruo.								
la la Çı								
Well struction bepth ology JSCS JSCS FRECOVETY	ui 9/s dd Description							
Well struction of the s	Description		Remarks					

Well Construction	Depth	Lithology	nscs	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		ML				<1	Moderate yellowish brown (10YR5/4) to light brown (5YR5/6) Clayey SILT, little medium fine Gravel; wet.	Clayey Silt, collected composite sample SB17 from 0.0 - 2.0 ft bgs and collected sample SB17 for VOC analysis from 1.5 - 2.0 ft bgs
	2 -						<1	Dusky yellowish brown (10YR2/2) PEAT, little Clay; saturated.	Peat  End of Boring at 4 ft. bgs.

199 New CLIEN PROJE DRILL	Water York T: No CT: 0	Stre , New Sew Y Dakw	vood Bea	Departure B	lueb : A	elt - Se quifer l	Design	Page 1 of 1 and Construction  and Testing, Inc.	WELL ID: N LOCATION: St PROJECT NO: JC FMS ID#: B	318 /A aten Island, NY 6880F4 EGS2006004 556-LBA-2-5694 3/2009
			OLE DA	TA				WELL DATA	DATE FINISHED: 2/	
Diamete			2					meter: N/A		Palomeque
Total D	-	` .	4.00		•			oth (ft): N/A	LBA INSPECTOR:J.	
			(ft): N/A					ength (ft): N/A		/A
Depth to								Water (ft): N/A	<del></del>	/A
Depth t	-	ck (f	t): N/A	4		Slo	t Size	: N/A	SURFACE ELEVAT	ON: N/A
NOTES	S:			val	ery	-				
Well Construction	Depth	Lithology	NSCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description		Remarks
	2 -		SM				<1	Moderate brown (5YR3/4) to mode (10YR5/4) coarse to fine SAND, s Gravel.		Silty Sand, collected composite sample SB18 from 0.0 - 2.5 ft bgs and collected sample SB18 for VOC analysis from 2.0 - 2.5 ft bgs End of Boring at 4 ft. bgs.

Loi	uis Bei	ger &	Assoc., I	P.C.		Т	1	Duilling Ton	BORING ID: SB	19
199	) Wate	r Stree	et, 23rd F	loor				Drilling Log	WELL ID: N/A	4
Nev	w Yorl	c, New	York 100	038				Page 1 of 1	LOCATION: Sta	ten Island, NY
CLIEN	IT: N	ew Yo	ork City	Depa	artmo	ent of I	Design	and Construction	PROJECT NO: JG	380F4
PROJE	ECT:	Oakw	ood Bea	ich B	luebe	elt - Se	ction E	3	FMS ID#: BE	GS2006004
DRILL	ING	CON	TRACT	ГOR	: A	quifer I	Orilling	and Testing, Inc.	<b>WOL #:</b> 583	6-LBA-2-5694
DRILL	ING	MET	HOD:	OD: Direct Push DATE STARTED: 2/6/200						/2009
	BOF	REHC	LE DA	TA				WELL DATA	DATE FINISHED: 2/6	/2009
Diamet	ter (ir	ı):	2			We	ell Dia	meter: N/A	DRILLER: T.	Palomeque
Total I	Depth	(ft):	4.00			Tot	al Dep	oth (ft): N/A	LBA INSPECTOR:J.	Lacanlale
Depth	to Re	fusal	(ft): N/	A		Ser	een L	ength (ft): N/A	<b>NORTHING:</b> N/	A
Depth	to Wa	iter (f				De	pth to	Water (ft): N/A	<b>EASTING:</b> N/	A
Depth	to Ro	ck (ft	:): N/	A		Slo	t Size	: N/A	SURFACE ELEVATI	ON: N/A
NOTE	ES:	T	tooline to an agree of the the territories	т			1			
Well	Depth	Lithology	nscs	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description		Remarks
	2 -		CL				</td <td>Dusky yellowish brown (10YR2/2</td> <td>) Silty CLAY, little Peat; wet</td> <td>Silty Clay, collected composite sample SB19 from 0.0 - 1.5 ft bgs and collected sample SB19 for VOC analysis from 1.0 - 1.5 ft bgs End of Boring at 4 ft. bgs.</td>	Dusky yellowish brown (10YR2/2	) Silty CLAY, little Peat; wet	Silty Clay, collected composite sample SB19 from 0.0 - 1.5 ft bgs and collected sample SB19 for VOC analysis from 1.0 - 1.5 ft bgs End of Boring at 4 ft. bgs.

Louis Berge	er & Assoc., P	.C.				<b>*</b>	BORING ID:	SB20	)		
199 Water S	Street, 23rd Fl	loor		L	Orilling	Log	WELL ID:	N/A			
New York,	New York 100	38			Page 1 of 1	L	LOCATION:		n Island, NY		
CLIENT: Nev	w York City I	Departmen	t of Des	sign a	and Construct	ion	PROJECT NO:	JG88	30F4		
PROJECT: O	akwood Beac	ch Bluebel	t - Section	on B			FMS ID#:		S2006004		
DRILLING C	CONTRACT	OR: Aqu	iifer Dri	lling	and Testing, 1	Inc.	WOL #:		5-LBA-2-5694		
DRILLING N							DATE STARTED				
BORE	EHOLE DA	ΓA	l .	***********	WELL DA	ATA	DATE FINISHED: 1/20/200				
Diameter (in):			Well	Diam		N/A	DRILLER:	T. Palomeque			
Total Depth (f					th (ft):	N/A	LBA INSPECTOR				
Depth to Refu		\			ngth (ft):	N/A	NORTHING:	N/A			
Depth to Water					Water (ft):	N/A	EASTING:	N/A			
Depth to Rock		1	Slot S			N/A	SURFACE ELEV.				
NOTES:						T. V. Z. L.	Journal Beer	THO	14. 14/2		
NOTES.											
Well Construction Depth	Lithology	Sample Interval	Blows/6 in	PID (ppm)		Description			Remarks		
2 -	ML  H		<1		wet.		2) Clayey SILT, little Pea	t;	Clayey Silt, collected composite sample SB20 from 0.0 - 8.0 ft bgs and collected sample SB20 for VOC analysis from 1.0 - 1.5 ft bgs		
6 -	OL		<	1	Dusky yellow saturated.	ish brown (10YR2/:	PEAT, little Clay;		End of Boring at 8 ft. bgs.		

Louis Berger & Assoc., P.C.	Duilling Log	BORING ID: SB21
199 Water Street, 23rd Floor	Drilling Log	WELL ID: N/A
New York, New York 10038	Page 1 of 1	<b>LOCATION:</b> Staten Island, NY
CLIENT: New York City Departmen	PROJECT NO: JG880F4	
PROJECT: Oakwood Beach Bluebel	FMS ID#: BEGS2006004	
DRILLING CONTRACTOR: Aqu	<b>WOL #:</b> 5856-LBA-2-5694	
<b>DRILLING METHOD:</b> Direct Pus	<b>DATE STARTED:</b> 11/26/2008	
BOREHOLE DATA	WELL DATA	<b>DATE FINISHED:</b> 11/26/2008
Diameter (in): 2	Well Diameter: N/A	<b>DRILLER:</b> T. Palomeque
Total Depth (ft): 6.00	Total Depth (ft): N/A	LBA INSPECTOR: A. Trescott
Depth to Refusal (ft): N/A	Screen Length (ft): N/A	<b>NORTHING:</b> N/A
Depth to Water (ft): N/A	Depth to Water (ft): N/A	<b>EASTING:</b> N/A
Depth to Rock (ft): N/A	Slot Size: N/A	SURFACE ELEVATION: N/A
NOTES:		

## NOTES:

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	-		SM SM				<1	Dusky brown (5YR2/2) coarse to fine SAND, some Silt; moist.  Moderate brown (5YR4/4) coarse to fine SAND, some Silt, little medium to fine Gravel; moist.	Silty Sand, collected composite sample SB21 from 0.0 - 4.0 ft bgs
	2 -		SM				<1	Moderate brown (5YR4/4) coarse to fine SAND, some Silt, little medium to fine Gravel; wet.	Collected sample SB21 for VOC analysis from 3.5 - 4.0 ft bgs
	4 -		SM				<1	Moderate brown (5YR4/4) coarse to fine SAND, some Silt, little medium to fine Gravel; saturated.	End of Boring at 6 ft. bgs.

Louis Berger & Assoc., P.C. 199 Water Street, 23rd Floor New York, New York 10038  CLIENT: New York City Departmer PROJECT: Oakwood Beach Bluebel DRILLING CONTRACTOR: Aqu DRILLING METHOD: Direct Push BOREHOLE DATA  Diameter (in): 2  Total Depth (ft): 8.00  Depth to Refusal (ft): N/A  Depth to Water (ft): N/A	tt - Section B uifer Drilling and Testing, Inc.  h  WELL DATA  Well Diameter: N/A  Total Depth (ft): N/A  Screen Length (ft): N/A  Depth to Water (ft): N/A	BORING ID: SB22 WELL ID: N/A LOCATION: Staten Island, NY PROJECT NO: JG880F4 FMS ID#: BEGS2006004 WOL #: 5856-LBA-2-5694 DATE STARTED: 2/4/2009 DATE FINISHED: 2/4/2009 DRILLER: T. Palomeque LBA INSPECTOR: J. Lacanlale NORTHING: N/A EASTING: N/A
Depth to Rock (ft): N/A NOTES:	Slot Size: N/A	SURFACE ELEVATION: N/A
Well Construction Depth Lithology USCS Sample Interval	Description	Remarks
2 -	<1 No recovery.	No recovery
6 - HIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	<1 Medium light gray (N6) CLAY; w	Clay, collected composite sample SB22 from 4.0 - 8.0 ft bgs and collected sample SB22 for VOC analysis from 4.0 - 4.5 ft bgs  End of Boring at 8 ft. bgs.

		er & Assoc.,					Drilling Log	BORING ID:	SB23	
		Street, 23rd					0 0	WELL ID:	N/A	
	,	New York 10				-	Page 1 of 1	LOCATION:	Staten Island, N	٧Y
							and Construction	PROJECT NO:	JG880F4	BC SALES AND ADDRESS OF THE PARTY OF THE PAR
		ikwood Be						FMS ID#:	BEGS2006004	
						Drillin	g and Testing, Inc.	WOL #:	5856-LBA-2-56	694
THE PERSON NAMED IN COLUMN 2 IS NOT THE OWNER.	-	ETHOD:	-	ct Pu	ısh			DATE STARTED:	2/5/2009	
		HOLE DA	ATA				WELL DATA	DATE FINISHED:	2/5/2009	
Diameter		2			W	ell Dia	meter: N/A	DRILLER:	T. Palomeque	
Total De					To	tal De	oth (ft): N/A	LBA INSPECTOR	: J. Lacanlale	
		sal (ft): N			Sci	reen L	ength (ft): N/A	NORTHING:	N/A	
Depth to					De	pth to	Water (ft): N/A	EASTING:	N/A	
Depth to	Rock	(ft): N	'A		Slo	ot Size	: N/A	SURFACE ELEVA	TION: N/A	
Well Construction	Depth	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description		Remarl	ks
	2					<1	Dusky yellowish brown (10YR2/2	PEAT, little Clay; wet.	Peat, collectomposite sample SB from 0.0 - 1 ft bgs and collected sample SB for VOC analysis fro 0.5 - 1.0 ft End of Boriat 4 ft. bgs.	323 1.5 323 om bgs

iter Str					I	Orilling Log	BORING ID:	SB24			
						0 0	WELL ID:	N/A			
New York, New York 10038						Page 1 of 1	LOCATION:	Staten Island, NY			
New '	ork City	Depa	artme	nt of I	Design	and Construction	PROJECT NO:	JG880F4			
r: Oak	wood Bead	ch B	luebe	lt - Se	lt - Section B FMS ID#: BEGS200						
G CO	NTRACT	OR	: Ac	uifer I	Drilling	and Testing, Inc.	WOL #: 5856-LBA-2-56				
G ME	THOD: [	Direc	t Pus	h			<b>DATE STARTED:</b> 1/20/2009				
DREH	OLE DA	TA		WELL DATA DATE FINISHED: 1/20/							
(in):	2			We	ll Dia	meter: N/A	DRILLER:	T. Palomeque			
th (ft):	8.00			Total Depth (ft): N/A LBA INSPECTOR				R: J. Lacanlale			
Refusa	l (ft): N/A	1		Scr	een L	ength (ft): N/A	NORTHING:	N/A			
Depth to Water (ft): N/A						Water (ft): N/A	EASTING:	N/A			
Rock (	ft): N/A	1		Slo	t Size	N/A	SURFACE ELEV	ATION: N/A			
logy	cs	Interval	Recovery	vs/6 in	(mdd)	Description		Remarks			
	G CO G ME DREH (in): th (ft): Refusa	G CONTRACT G METHOD: I DREHOLE DA' (in): 2 th (ft): 8.00 Refusal (ft): N/A Vater (ft): N/A Rock (ft): N/A	G CONTRACTOR G METHOD: Direct DREHOLE DATA (in): 2 th (ft): 8.00 Refusal (ft): N/A Vater (ft): N/A Rock (ft): N/A	G CONTRACTOR: Aq G METHOD: Direct Pus DREHOLE DATA (in): 2 th (ft): 8.00 Refusal (ft): N/A Vater (ft): N/A Rock (ft): N/A	G CONTRACTOR: Aquifer II G METHOD: Direct Push DREHOLE DATA (in): 2 We th (ft): 8.00 Tot Refusal (ft): N/A Scr Vater (ft): N/A Dep Rock (ft): N/A Slo	G CONTRACTOR: Aquifer Drilling G METHOD: Direct Push DREHOLE DATA (in): 2 Well Dian th (ft): 8.00 Total Dep Refusal (ft): N/A Screen Lo Vater (ft): N/A Depth to Rock (ft): N/A Slot Size:	OREHOLE DATA  (in): 2 Well Diameter: N/A  th (ft): 8.00 Total Depth (ft): N/A  Refusal (ft): N/A Screen Length (ft): N/A  Vater (ft): N/A Depth to Water (ft): N/A  Rock (ft): N/A Slot Size: N/A	G CONTRACTOR: Aquifer Drilling and Testing, Inc.  G METHOD: Direct Push  DREHOLE DATA  WELL DATA  (in): 2 Well Diameter: N/A  th (ft): 8.00 Total Depth (ft): N/A  Refusal (ft): N/A  Vater (ft): N/A  Depth to Water (ft): N/A  SURFACE ELEV			

Well Construction Depth Lithology USCS Sample Interval Blows/6 in PID (ppm)	Description	Remarks
2 — ML SI Dusky Gravel	yellowish brown (10YR2/2) Clayey SILT, trace fine l; moist.  y yellowish brown (10YR2/2) Clayey SILT, trace fine el; saturated.	Clayey Silt, collected composite sample SB24 from 0.0 - 4.0 ft bgs and collected sample SB24 for VOC analysis from 3.5 - 4.0 ft bgs

Louis Berger & Assoc., P.C. 199 Water Street, 23rd Floor	Drilling Log	BORING ID: SB25
	0 0	WELL ID: N/A
New York, New York 10038	Page 1 of 1	LOCATION: Staten Island, N
CLIENT: New York City Departme	nt of Design and Construction	PROJECT NO: JG880F4
PROJECT: Oakwood Beach Bluebe	lt - Section B	FMS ID#: BEGS2006004
DRILLING CONTRACTOR: Aq	uifer Drilling and Testing, Inc.	WOL #: 5856-LBA-2-569
<b>DRILLING METHOD:</b> Direct Pus	sh	<b>DATE STARTED:</b> 11/26/2008
BOREHOLE DATA	WELL DATA	<b>DATE FINISHED:</b> 11/26/2008
Diameter (in): 2	Well Diameter: N/A	DRILLER: T. Palomeque
Total Depth (ft): 10.00	Total Depth (ft): N/A	LBA INSPECTOR: A. Trescott
Depth to Refusal (ft): N/A	Screen Length (ft): N/A	NORTHING: N/A
Depth to Water (ft): N/A	Depth to Water (ft): N/A	EASTING: N/A
Depth to Rock (ft): N/A	Slot Size: N/A	SURFACE ELEVATION: N/A
NOTEG		

## NOTES:

Well Construction	Depth	Lithology	NSCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	2 - 4 - 6 - 8 -	s s	M M				<1	Dusky brown (5YR2/2) coarse to fine SAND, some Silt; moist.  Moderate brown (5YR4/4) coarse to fine SAND, some Silt, little medium to fine Gravel; wet.  Moderate brown (5YR4/4) coarse to fine SAND, some Silt, little medium to fine Gravel; saturated.	Silty Sand, collected composite sample SB25 from 0.0 - 10.0 ft bgs  Collected sample SB25 for VOC analysis from 4.5 - 5.0 ft bgs
	10								End of Boring at 10 ft. bgs.

Louis Berger & Assoc., P.C. 199 Water Street, 23rd Floor New York, New York 10038  CLIENT: New York City Department PROJECT: Oakwood Beach Bluebel DRILLING CONTRACTOR: Aqu DRILLING METHOD: Direct Push BOREHOLE DATA  Diameter (in): 2  Total Depth (ft): 8.00  Depth to Refusal (ft): N/A Depth to Water (ft): N/A  Depth to Rock (ft): N/A  NOTES:	t - Section B uifer Drilling and Testing, Inc.	BORING ID: SB26 WELL ID: N/A LOCATION: Staten Island, NY PROJECT NO: JG880F4 FMS ID#: BEGS2006004 WOL #: 5856-LBA-2-5694 DATE STARTED: 2/4/2009 DATE FINISHED: 2/4/2009 DRILLER: T. Palomeque LBA INSPECTOR: J. Lacanlale NORTHING: N/A EASTING: N/A SURFACE ELEVATION: N/A
Well Construction Lithology  VSS  USCS Sample Interval Sample Recovery	Description    (mdd) QId	Remarks  No recovery
4     CL	Medium light gray (N6) Silty CLA	Silty Clay, collected composite sample SB26 from 4.0 - 8.0 ft bgs and collected sample SB26 for VOC analysis from 4.0 - 4.5 ft bgs End of Boring at 8 ft. bgs.

			T		
Louis Berger & Assoc., P.C.		Drilling Log	BORING ID:	SB27	
199 Water Street, 23rd Floor		0 0	WELL ID:	N/A Staten Island, NY	
New York, New York 10038					
CLIENT: New York City Departm			PROJECT NO:	JG880F4	
PROJECT: Oakwood Beach Blueb					
DRILLING CONTRACTOR: A		g and Testing, Inc.	WOL #:	5856-LBA-2-5694	
DRILLING METHOD: Direct Pu	sh		DATE STARTED	: 2/5/2009	
BOREHOLE DATA		WELL DATA	DATE FINISHED	: 2/5/2009	
Diameter (in): 2	Well Dia	meter: N/A	DRILLER:	T. Palomeque	
Total Depth (ft): 8.00	Total De		LBA INSPECTO	R: J. Lacanlale	
Depth to Refusal (ft): N/A	Screen L	ength (ft): N/A	NORTHING:	N/A	
Depth to Water (ft): N/A	Depth to	Water (ft): N/A	EASTING:	N/A	
Depth to Rock (ft): N/A	Slot Size	: N/A	SURFACE ELEV	ATION: N/A	
NOTES:					
Well Construction Depth Lithology USCS Sample Interval	Blows/6 in PID (ppm)	Description		Remarks	
2 - 111 OL	<1	Dusky yellowish brown (10YR2/		Peat, collected composite sample SB27 from 0.0 - 2.5 ft bgs and collected sample SB27 for VOC analysis from 0.5 - 1.0 ft bgs	

Louis Berger & Assoc., P.C. 199 Water Street, 23rd Floor New York, New York 10038  CLIENT: New York City Department o PROJECT: Oakwood Beach Bluebelt -							Design		1	BORING ID: WELL ID: LOCATION: PROJECT NO: FMS ID#:	SB28 N/A Staten Island, NY JG880F4 BEGS2006004
								g and Testing,	Inc.	WOL #:	5856-LBA-2-5694
			THOD:					<u> </u>		DATE STARTED:	
	BOR	EHO	DLE DA	TA				WELL D	ATA	DATE FINISHED:	: 1/20/2009
Diame	ter (in)	):	2			We	ell Dia	meter:	N/A	DRILLER:	T. Palomeque
Total I		` ′	8.00					oth (ft):	N/A	LBA INSPECTOR	: J. Lacanlale
			(ft): N/					ength (ft):	N/A	NORTHING:	N/A
	Depth to Water (ft): N/A					_	Depth to Water (ft): N/A EASTIN				N/A
Depth	to Roc	k (f	t): N/	<u> </u>		Slot Size: N/A			N/A	SURFACE ELEVA	ATION: N/A
Well Construction		Lithology	nscs	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)		Description		Remarks
			OL				<	Dusky yellow	ish brown (10YR2/	2) PEAT, little Clay; mois	t. Peat, collected composite sample SB28 from 0.0 - 5.5 ft bgs and collected sample SB28 for VOC analysis from 3.5 - 4.0 ft bgs

<1

Dusky yellowish brown (10YR2/2) PEAT, little Clay; wet.

Clay

End of Boring at 8 ft. bgs.

Medium light gray (N6) CLAY; saturated.

Louis Berger & Assoc., P.C.		710	BORING ID: S	B29	
199 Water Street, 23rd Floor	Dr	lling Log		7/A	
New York, New York 10038	P	ige 1 of 1		taten Island, NY	
CLIENT: New York City Departmen	t of Design and	Construction		G880F4	
PROJECT: Oakwood Beach Bluebel	- Section B			EGS2006004	
DRILLING CONTRACTOR: Aqu	ifer Drilling and	Testing, Inc.		856-LBA-2-5694	
<b>DRILLING METHOD:</b> Direct Push	1		DATE STARTED: 1		
BOREHOLE DATA	\	ELL DATA	DATE FINISHED: 1		
Diameter (in): 2	Well Diamete	r: N/A		. Palomeque	
Total Depth (ft): 2.00	Total Depth (	t): N/A	LBA INSPECTOR:		
Depth to Refusal (ft): N/A	Screen Lengt	ı (ft): N/A	NORTHING: N	[/A	
Depth to Water (ft): N/A	Depth to Wat	er (ft): N/A	EASTING: N	//A	
Depth to Rock (ft): N/A	Slot Size:	Slot Size: N/A SURFACE ELEVATION			
Well Construction Depth Lithology USCS Sample Interval	Blows/6 in PID (ppm)	Description		Remarks	
SM SM SM	<1 Mo	ky brown (5YR2/2) coarse to derate brown (5YR4/4) coarse medium to fine Gravel; wet. derate brown (5YR4/4) coarse medium to fine Gravel; satu	e to fine SAND, some Silt,	t. Silty Sand, collected composite sample SB29 from 0.0 - 2.0 ft bgs Collected sample SB29 for VOC analysis from 0.5 - 1.0 ft bgs  End of Boring at 2 ft. bgs.	

Louis Berger & Assoc., P.C. 199 Water Street, 23rd Floor New York, New York 10038								Drilling Log Page 1 of 1	BORING ID: WELL ID: LOCATION:		n Island, NY
				ity Department of Design and Construction PROJECT NO:					JG88	30F4	
PROJI	ECT:	Oakw	ood Bea	ch B	luebe						S2006004
DRILI	ING	CON	TRACT	<b>FOR</b>	: Ac	juifer l	Drilling	g and Testing, Inc.	WOL #:	5856	-LBA-2-5694
DRILI	ING	MET	HOD:	Direc	et Pu	sh			DATE STARTED:	2/4/2	.009
	BOI	REHC	DLE DA	TA				WELL DATA	DATE FINISHED	2/4/2	009
Diame	ter (ii	1):	2	726		We	ell Dia	meter: N/A	DRILLER:	T. Pa	alomeque
Total I	Depth	(ft):	4.00			Tot	al Dep	oth (ft): N/A	LBA INSPECTOR	: J. L	acanlale
Depth	to Re	fusal	(ft): N/	A		Ser	een L	ength (ft): N/A	NORTHING:	N/A	
Depth	to Wa	ater (f	ft): N/.	A		De	pth to	Water (ft): N/A	EASTING:	N/A	
Depth	to Ro	ek (ft	:): N/.	A		Slo	t Size	: N/A	SURFACE ELEVA	OITA	N: N/A
Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description			Remarks
	2 -		CL				<1	Moderate brown (5YR4/4) Silty (Gravel; wet.	CLAY, trace medium to fi	ie	Silty Clay, collected composite sample SB30 from 0.0 - 2.0 ft bgs and collected sample SB30 for VOC analysis from 0.5 - 1.0 ft bgs End of Boring at 4 ft. bgs.

Louis Berger & Assoc., P.C. 199 Water Street, 23rd Floor New York, New York 10038  CLIENT: New York City Departmen PROJECT: Oakwood Beach Bluebelt DRILLING CONTRACTOR: Aqu DRILLING METHOD: Direct Push BOREHOLE DATA	t - Section B  ifer Drilling and Testing, Inc.  WELL DATA	BORING ID:         SB31           WELL ID:         N/A           LOCATION:         Staten Island, NY           PROJECT NO:         JG880F4           FMS ID#:         BEGS2006004           WOL #:         5856-LBA-2-5694           DATE STARTED:         2/5/2009           DATE FINISHED:         2/5/2009
Diameter (in): 2 Total Depth (ft): 8.00	Well Diameter: N/A  Total Depth (ft): N/A	DRILLER: T. Palomeque LBA INSPECTOR: J. Lacanlale
Depth to Refusal (ft): N/A	Screen Length (ft): N/A	NORTHING: N/A
Depth to Water (ft): N/A  Depth to Rock (ft): N/A	Depth to Water (ft): N/A Slot Size: N/A	EASTING: N/A
Depth to Rock (ft): N/A NOTES:	Stot Size: IN/A	SURFACE ELEVATION: N/A
NOTES:		
Well Construction Depth Lithology USCS Sample Interval	PID (ppm) Description	Remarks
2 - 11 - 11 - 11 - 11 - 11 - 11 - 11 -	Ousky yellowish brown (10YR2/).	composite sample SB31 from 0.0 - 5.0 ft bgs
4 OL	<1 Dusky yellowish brown (10YR2/	Collected sample SB31 for VOC analysis from 4.0 - 4.5 ft bgs
6 - HHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHHH	Medium light gray (N6) CLAY.	End of Boring at 8 ft. bgs.

Louis Berger & Assoc., P.C. 199 Water Street, 23rd Floor New York, New York 10038		Orilling Log Page 1 of 1		A ten Island, NY			
CLIENT: New York City Department			Trio de l'ioi	880F4			
PROJECT: Oakwood Beach Bluebe				GS2006004			
DRILLING CONTRACTOR: Aq		and Testing, Inc.		66-LBA-2-5694			
DRILLING METHOD: Direct Pus	n T	WELL DATA	DATE STARTED: 1/2				
BOREHOLE DATA	DATE FINISHED: 1/2						
Diameter (in): 2	Well Dia		N/A DRILLER: T. Palom				
Total Depth (ft): 4.00	Total Dep	LBA INSPECTOR: J.					
Depth to Refusal (ft): N/A		n Length (ft): N/A NORTHING: N/A					
Depth to Water (ft): N/A		Water (ft): N/A	EASTING: N/A				
Depth to Rock (ft): N/A	Slot Size	: N/A	N/A SURFACE ELEVATION: N				
Well Construction Depth Lithology USCS Sample Interval	Blows/6 in PID (ppm)	Description		Remarks			
SM SM	<	Dark yellowish brown (10YR4/2 Silt, little coarse to fine Gravel;	noist.	Silty Sand, collected composite sample SB32 from 0.0 - 4.0 ft bgs Clayey Silt,			
ML STATE OF THE ST	<1	Moderate brown (5YR4/4) Clayd Gravel; wet.	y SIL1, little medium to fine	collected sample SB33 for VOC analysis from 2.5 - 3.0 ft by			

Dusky yellowish brown (10YR2/2) Peat, little Clay; saturated.

Peat End of Boring at 4 ft. bgs.

Louis Berger & Assoc., P.C.	D 'III'	T	BORING ID:	SB33
199 Water Street, 23rd Floor	Drilling	Log	WELL ID:	N/A
New York, New York 10038	Page 1 of	L	LOCATION:	Staten Island, NY
CLIENT: New York City Departmen	t of Design and Construc	ion	PROJECT NO:	JG880F4
PROJECT: Oakwood Beach Bluebelt			FMS ID#:	BEGS2006004
DRILLING CONTRACTOR: Aqu	ifer Drilling and Testing.	Inc.	WOL #:	5856-LBA-2-5694
DRILLING CONTRACTOR. Page	inci Dinning una 1 comig,		DATE STARTED	: 11/26/2008
DRILLING METHOD: Direct Push	WELL D	ATA	DATE FINISHED	
BOREHOLE DATA				
Diameter (in): 2	Well Diameter:	N/A	DRILLER:	T. Palomeque
Total Depth (ft): 4.00	Total Depth (ft):	N/A	LBA INSPECTO	R: A. Trescott
Depth to Refusal (ft): N/A	Screen Length (ft):	N/A	NORTHING:	N/A
	Depth to Water (ft):	N/A	EASTING:	N/A
Depth to Water (10)	Slot Size:	N/A	SURFACE ELEV	ATION: N/A
Depth to Rock (ft): N/A	Siot Size.	11/71	Joe Hill Labor	

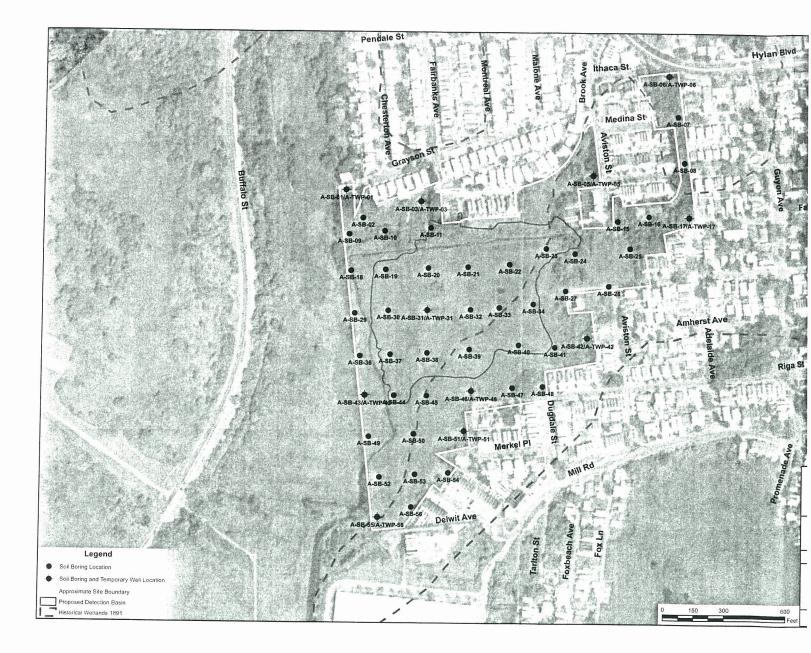
## NOTES:

Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	Remarks
	0		SM SM SM				<1 <1 <1	Dusky brown (5YR2/2) coarse to fine SAND, some Silt; moist.  Moderate brown (5YR4/4) coarse to fine SAND, some Silt, little medium to fine Gravel; moist.  Moderate brown (5YR4/4) coarse to fine SAND, some Silt, little medium to fine Gravel; wet.	Silty Sand, collected composite sample SB33 from 0.0 - 4.0 ft bgs
	2 -								Collected sample SB33 for VOC analysis from 2.5 - 3.0 ft bgs End of Boring at 4 ft. bgs.

Louis Berger & Assoc., P.C.	D 1110 F	BORING ID: SB34			
199 Water Street, 23rd Floor	Drilling Log	WELL ID: N/A			
New York, New York 10038	Page 1 of 1				
CLIENT: New York City Departmen	t of Design and Construction	0F4			
PROJECT: Oakwood Beach Bluebel		FMS ID#: BEGS	S2006004		
DRILLING CONTRACTOR: Aqu	uifer Drilling and Testing, Inc.	WOL #: 5856-	-LBA-2-5694		
DRILLING METHOD: Direct Pus	n	DATE STARTED: 2/5/20	009		
BOREHOLE DATA	WELL DATA	DATE FINISHED: 2/5/20	009		
Diameter (in): 2	Well Diameter: N/A	DRILLER: T. Pa	lomeque		
Total Depth (ft): 4.00	Total Depth (ft): N/A				
Depth to Refusal (ft): N/A	Screen Length (ft): N/A	NORTHING: N/A			
Depth to Water (ft): N/A	Depth to Water (ft): N/A				
Depth to Rock (ft): N/A	Slot Size: N/A				
Well Construction Depth Lithology USCS Sample Interval	PID (ppm) Description		Remarks		
SM SM SM	Ousky brown (5YR2/2) coarse to Moderate yellowish brown (10YR some Silt, trace medium fine Grave trace medium fine Gravel; wet.	R5/4) coarse to fine SAND, vel; moist.	Collected composite sample SB32 from 0.5 - 2.5 ft bgs and collected sample SB32 for VOC analysis from 2.0 - 2.5		

1			& Assoc., I					Drilling Log	BORING ID:	SB36	
1			et, 23rd F				1	Orilling Log	WELL ID:	N/A	
			v York 100					Page 1 of 1	LOCATION:		n Island, NY
								and Construction	PROJECT NO:	JG88	0F4
			vood Bea						FMS ID#:		S2006004
							Drilling	and Testing, Inc.	WOL #:		-LBA-2-5694
DRILL	THE OWNER WHEN	Maria de la constanta de la co	THOD:	-	et Pus	h			DATE STARTED		
			OLE DA	TA				WELL DATA	DATE FINISHED		
Diamet			2					meter: N/A	DRILLER:		lomeque
Total I								oth (ft): N/A	LBA INSPECTOR	<b>R:</b> J. L:	acanlale
			(ft): N/.		***			ength (ft): N/A	NORTHING:	N/A	
Depth						+		Water (ft): N/A	EASTING:	N/A	
Depth	to Ro	ck (f	(t): N/	A		Slo	t Size:	: N/A	SURFACE ELEV	ATIO	N: N/A
NOTE	:S:	-			<del></del>		<del></del>				
Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description			Remarks
	0		SM				<1	Dark yellowish brown (10YR4/2) Silt, little coarse to fine Gravel; m		me	Silty Sand
	2 -		ML				<1	Moderate brown (5YR4/4) Clayey Gravel; wet.		ĭine	Clayey Silt, collected composite sample SB36 from 0.0 - 4.0 ft bgs and collected sample SB36 for VOC analysis from 2.5 - 3.0 ft bgs
	6 -		OL				<1	Moderate brown (5YR4/4) PEAT	, little Clay; saturated.		End of Boring at 8 ft. bgs.

## APPENDIX C: SOIL BORINGS FOR BMP OB-3 AND 4





End of Boring at 10 ft bgs.					<b>****</b>	****			
Water at 5.5 ft bgs		Moderate brown (SYR4/4) coarse to fine SAND, some Silt, little coarse to fine Gravel; moist.	Δ			521		α σ	
Gravelly Silty Sand	to fine SANID, some Silt.	Moderate brown (5YR4/4) coarse to fine SAND, some Silt. little coarse to fine Gravel; moist.	Δ			WS		- 4	
Silty Sand	5/4) fine SAND, some Silt,	Moderate yellowish brown (10YR5/4) fine SAND, some Silt trace fine Gravel; moist.	Δ			INS	1::'::1		ппппп
Remarks		Description	Blows/6 in PID (ppm)	Sample Recovery	Sample Interval	USCS	Lithology	Construction  Depth	Well
		Sample ASB-01 collected from 5-5.5 ft bgs for VOCs, Composite sample ASB-01 collected from 0-10 ft bgs,	1 5-5.5 ft by lected fron	ed fron	ollecto ASB	ASB-01 c ate sample	ompo	NOTES: S	Z
N: N/A	SURFACE ELEVATION:	e (in): 0.1	Slot Size (in):		1	0: N/A	ock (f		Det
		Depth to Water (ft): 5.5	Depth to				ater (	Depth to Water (ft):	Det
	NORTHING: N/A	Screen Length (ft): 10	Screen I		A	(ft): N/A	efusal	Depth to Refusal (ft):	Dep
J. Lacantale	CTOR:	pth (ft): 10	Total Depth (ft):			10	h (ft):	Total Depth (ft):	Tot
J. Mever	- 1	Well Diameter (in):	Well Di			2	in):	Diameter (in):	Dia
2/8/2008		WELL DATA			TA	BOREHOLE DATA	REH	ВС	
3/8/2008 2010-1-7431-37	TARTED:	DRILLING METHOD: Geoprobe Direct Push with Macrocore Soil Sampling	irect Push	robe D	Geop	ГНОД:	ME	ILLING	DR
BEGS2006004	WOL #: BE	Aguifer Drilling and Testing, Inc.	ifer Drilli	1.5	OR:	DRILLING CONTRACTOR:	COL	ILLIN(	R
JG8554	NO:	A A MINI CONSTRUCTION	PROJECT: Oakwood Beach Phase II - Section A	hase II	ch P	wood Be	Oak	OJECT	PR
Staten Island, NY		New York City Department of Design and Construction	of Design	rtmer	Depa	York City	New	CLIENT:	의
TWP-01		Page 1 of 1			0038	New York, New York 10038	ork, N	New Y	
A3D-01				7					

End of Boring					<b>*****</b>	*****		
Gravelly Silty Sand	to fine SAND, little Silt.	Moderate brown (5YR4/4) coarse to fine SAND, little Sili, little coarse to fine Gravel; wet.	Δ	A TITLE		××××××××××××××××××××××××××××××××××××××		æ 6
Water at 1 ft bgs			1	N-		***************************************		υ 4
Silty Sand	to fine SAND, some Silt,	Moderate brown (5YR4/4) coarse to fine SAND, some Silt, little trace fine Gravel; wet	Δ	7777	to  to  to  to  to  to  to  to  to  to	N 82		·
Remarks		Description	PID (ppm)	Blows/6 in	Sample Interval Sample Recovery	USCS	Depth  Lithology	Well Construction
		Composite sample ASB-02 collected from 0-10 it bgs.	ed from	2 collec	ASB-0	ite sample	Compos	-
ION: N/A	SURFACE ELEVATION:	e: N/A	Siot Size:	from 0	llected	ASR-02 col	Sample	NOTES:
N/A	EASTING:	Water (ft):	Septh to			1	Water (	Depth to Back (ft):
N/A	G:		creen L	1 14		1.	Weinsal	Depth to Water (8).
J. Lacantale	LBA INSPECTOR: J. Lacandale		otal De			- 1	Pofucal	Denth to Refusal
J. Meyer	DRILLER: J		Well Dia	2			(III):	Total Donath (f
2/8/2008		WELL DATA		-	A	BOREHOLE DATA	OKEH	
2/8/2008	DATE STARTED:	DRILLING METHOD: Geoprobe Direct Push with Macrocore Soil Sampling	ect Push	e Din	eopro	THOD:	G ME	DKILLI
3870-LBA-1-5133		Aquifer Drilling and Testing, Inc.	er Drilli	Aquif	OR:	DRILLING CONTRACTOR:	G CO	DRILLI
BEGS2006004		Α	Section	se II -	ch Pha	PROJECT: Oakwood Beach Phase II - Section A	T: Oak	PROJEC
JG8554	ا ٪	5	of Desig	ment o	Depart	York City	: New	CLIENT
N/A Staten Island NY	LOCATION:	Page 1 of 1			)038	New York, New York 10038	York, N	New
NI/A		Sor Summer			1001	1001		

at 10 ft bgs.	a j				***	<b>***</b>	:::		Ш
End of Boring		Moderate brown (SYR4/4) coarse to fine SAND, some coarse to fine Gravel; wet.	Δ	A 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	***************************************	<u> </u>		× 5	
Water at 1 ft						***************************************		+ 13	
Gravelly Sand		Moderate brown (5YR4/4) coarse to fine SAND, some coarse to fine Gravel; wet.	<u>^</u>	71111	+	××××××			пппп
Remarks		Description	PID (ppm)	Blows/6 in	Sample Interval Sample Recovery	USCS	Lithology	- Construction - Depth	Well
		Sample ASB-03 collected from 0.5-1 ft bgs for VOCs. Composite sample ASB-03 collected from 0-10 ft bgs.	0.5-1 ft bg	from 3 colle	\SB-0	ASB-03 col ite sample /	ompos	NOTES: S	2
i: N/A	SURFACE ELEVATION:	(in): 0.1	Slot Size (in):	L	l	): N/A	ock (ft		De
	EASTING: N/A	Depth to Water (ft):	Depth to				ater (	Depth to Water (ft):	De
		Screen Length (ft): 10	Screen L			(ft): N/A	efusal	Depth to Refusal (ft):	Del
J. Lacanlale	CTOR:	<b>pth</b> ( <b>ft</b> ): 10	Total Depth (ft):			1	h (ft):	Total Depth (ft):	7
ever	- 1	Well Diameter (in):	Well Dia			12	n):	Diameter (in):	Dia
800		WELL DATA			Α	BOREHOLE DATA	REH	ВО	
3/6/2008	TARTED:	Geoprobe Direct Push with Macrocore Soil Sampling	rect Push	be Di	eopro		ME	DRILLING METHOD:	DR
BEGS2006004	WOL #: BEG	Aquifer Drilling and Testing, Inc.	fer Drilli	Aqui	ž.	DRILLING CONTRACTOR:	CON	ILLING	DR
100	i NO.	A .	Section	Se II	h Pha	PROJECT: Oakwood Beach Phase II - Section A	: Oak	OJECT	PR
IC8554	7	New York City Department of Design and Construction	of Desig	ment	)epar	Ork City I	New Y	CLIENT:	CI
9-03	WELL ID: TWP-03	Page 1 of 1			038	New York, New York 10038	ork, Ne	New Y	
100000		171 1111111 1/19							

	- Well Construction	NOTES:	Depth to Rock (ft):	Depth to Water (ft):	Depth to Refusal (ft):	Total Depth (ft):	Diameter (in):		DRILL	DRILL	ppon	CI IE	199
× 6 4 12	Depth		0 R	0 Wa	o Re	epth	er (ir	ВОІ	ING	NG:		T You	uis Bo Wat
	Lithology	mple	ck (fi	iter (	fusal	(ft):	:	EH.	ME	CON	WOW	F Z	er St
N.S.	USCS	ASB-05 atte sampl	): N/A		1	15	12	BOREHOLE DATA	HOD:	DRILLING CONTRACTOR: Aguifer Drilling	OIK CIL	New York, New York 10038	Louis Berger & Assoc, P.C. 199 Water Street, 23rd Floor
	Sample Interval	collec e ASI	>		N/A			TA	Geor	TOR	y Del	10038	, P.C
	Sample Recover	3-05 c							probe	na	Darum	1	Ä.
	Blows/6 in	om 6.5-7	Slo	Dep	Scr	Tot	We	Н	Direct	guifer l	ent of I	$\vdash$	
	PID (ppm)	7 ft bgs 1 from (	Slot Size (in):	th to	een Le	Total Depth (ft):	II Diar		Push v	Drillin	Jesign		
Silt, trace line Gravel; moist.  Dark yellowish brown (10YR4/2) to light brown (5YR5/6) coarse to fine SAND, some Silt, little medium to fine Gravel; wet.	Description	Sample ASB-05 collected from 6.5-7 ft bgs for VOCs. Composite sample ASB-05 collected from 0-15 ft bgs.	0.1	: 7	<b>t):</b> 10	15		-	il Sampling	se II - Section A  Aguifer Drilling and Testing Inc	PROJECT. Ordered Book Bright Blood Design and Construction	Page 1 of 2	Drilling Log
light brown (5YR5/6) le medium to fine Gravel:			SURFACE ELEVATION:		NORTHING: N/A	CTOR:	- 1		DATE STARTED: 32	#:	r NO:		D:
Sand Sand Sand Water at 7 ft			ON: N/A	'A	Ά	J. Lacanlale	I. Mever	2/6/2008	38/0-LBA-1-3133	BEGS2006004	JG8554	Staten Island, NY	ASB-05

	∭ We	Ze	Lo.
12 10	Dept	Ψ Yor	uis Be Wat
	Lith	· K	rger . er Str
*	USC	New York, New York 10038	Louis Berger & Assoc., P.C. 199 Water Street, 23rd Floor
	Interv	a 0038	P.C. Floor
	Rec		
	Blow	, I	T
Δ	PID		PR
Noderate brown (5YR4/4) coarse to fine SAND, little coarse to fine Gravel; wet.	Description	Page 2 of 2	PROJECT NO.: JG8554
o fine SAND, little coarse		WELL NO.:	BORING NO.:
Gravelly Sand	Remarks	TWP-05	ASB-05

	<u> </u>	$\sim$	Well Construction Depth Lithology USCS Sample Interval Sample Recovery	NOTES: Sample ASB-06 collected from 9-9.5 ft bgs for VOCs. Composite sample ASB-06 collected from 0-10 ft bgs.	Depth to Rock (ft): N/A	10	Denth to Refusal (ft): N/A	2	BOREHOLE DATA	DRILLING METHOD: Geoprobe Di	DRILLING CONTRACTOR: Aqui		CLIENT: New York City Department of Design and Construction	199 Water Street, 23rd Floor New York, New York 10038	Louis Berger & Assoc., P.C.
Moderate yellowish brown (10YR5/4) coarse to fine SAND. little Sil., little fine Gravel; wer.	And Moderate brown (5YR4/4) coarse to fine SAND, little Silt. little fine Gravel; moist.	<1 Dusky yellowish brown (10YR2/2) fine SAND, some Silt, little fine Gravel; moist.	PID (ppm)  Description	9-9.5 ft bgs for VOCs. ected from 0-10 ft bgs.	Slot Size (in): 0.1	Depth to Water (ft): 10	Screen Length (ft): 10	Well Diameter (in):	WELL DATA	DRILLING METHOD: Geoprobe Direct Push with Macrocore Soil Sampling	Aquifer Drilling and Testing, Inc.	Section A	of Design and Construction	Page 1 of 2	Drilling Log
(R5/4) coarse to fine SAND.	æ to fine SAND, little Silt.	2) tine SAND, some Silt.			SURFACE ELEVATION:	EASTING: N/A	NORTHING: N/A	I BA INSPECTOR: 1 Lacantale	ISHED:			FMS ID#: BEG	٦	LOCATION: State	BORING ID: ASB-06
		Gravelly Silty Sand	Remarks		X: NA			acantale	2008	2008	3870-LBA-1-5133	BEGS2006004	554	Staten Island, NY	-06

			Wel	New	199 199
12			Depti	w Yor	iis Be Wate
		1: ::::::::::::::::::::::::::::::::::::	Lith.	T.N.	rger Str
5	¥		USC:	New York, New York 10038	Louis Berger & Assoc., P.C. 199 Water Street, 23rd Floor
			Interv	0038	P.C. Floo
			Rec.	1	7
			Blows	-	T
Δ	_		PID		PRO
Medium light gray (N6) CLAY & SILT; wet	Grayish black (N2) SILT and fine Sand: wet.		Description	Page 2 of 2	PROJECT NO.: JG8554
ILT; wet.	sand: wet.			WELL NO.:	BORING NO.:
Clay & Silt  End of Boring at 15 ft bgs.	Sandy Silt, Water at 10 ft bgs	1	Remarks	TWP-06	ASB-06

Peat, End of Boring at 10 ft		Dark gray (N3) PEAT, some Silty Clay; wet.	^			<b>****</b>	lilili P	Talah	
∑ Water at 5 ft bgs	d concrete	Light brown (5YR5/6) coarse to fine SAND, some Silt, some coarse to fine Gravel (fill material - brick and concrete debris); wet.	Δ.				# ####################################		
	ine SAND, some Silt, some	Light brown (5YR5/6) coarse to fine SAND, some Silt, some coartse to fine Gravel; moist.	<u>v</u>				<u>^\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\</u>		
Gravelly Silty Sand (Fill)	to fine SAND, some	Dark yellowish brown (10YR4/2) coarse to fine SAND, some Silt, little medium to fine Gravel; moist.	Δ			· ·	]    	.//>.//	
Remarks		Description	PID (ppm)	Blows/6 in	Sample Recovery	USCS Sample Interval	Lithology	Depth	Well Construction
		Sample ASB-07 collected from 4.5-5 ft bgs for VOCs. Composite sample ASB-07 collected from 0-10 ft bgs.	5-5 ft bgs ed from (	om 4.5	B-07	8-07 colle sample AS	iple AS		NOTES
: N/A	SURFACE ELEVATION:	N/A	Slot Size:	S		N/A	(ft):	o Roci	Depth to Rock (It):
	EASTING: N/A		epth to	D			er (ft):	o Wat	Depth to Water (ft):
		Screen Length (ft): N/A	reen Le	Sc		): N/A	sal (ft	o Refu	Depth to Refusal (ft):
J. Lacanlale	ECTOR:		Total Depth (ft):	T		10	ft):	epth (	Total Depth (ft):
.Ver		meter: N/A	Well Diameter:	=		2		er (in)	Diameter (in):
908	-	WELL DATA		$\dashv$		BOREHOLE DATA	TOHE	BORI	
908	TARTED:	DRILLING METHOD: Geoprobe Direct Push with Macrocore Soil Sampling	et Push v	Direc	probe	OD: Gec	ETH	ING	DRILL
3870-LBA-1-5133		Aquifer Drilling and Testing, Inc.	r Drillin	quife		DRILLING CONTRACTOR:	ILNO	ING (	DRILI
BEGS2006004			ection A	II - S	Phase	PROJECT: Oakwood Beach Phase II - Section A	)akwoo	ECT: (	PROJ
54		New York City Department of Design and Construction	Design	ent of	partm	k City De	w Yor	T: Ne	CLIENT:
Staten Island, NY	LOCATION: State	Page 1 of 1			ŠC.	New York, New York 10038	, New	w York	Ne.
VIVA				_	101	Ott cett #21 0 1 1001			

	ML <1 Dusky yellowish brown (10YR2/2) SILT, some Peat; wet.	PILL.  C1  Dark yellowish brown (10YR4/2) to light brown (5YR5/6)  coarse to fine SAND, some coarse to fine Gravel (fill material  brick and concrete debris); moist.	<u>^</u>	USCS Sample Interval Sample Recovery Blows/6 in PID (ppm)	Composite sample ASB-08 collected from 0-10 it bgs.	NA	State: N/A	O Doubt Water (4) N/A	10 Total Depth (ft): N/A	2 Well Diameter: N/A	HOLE DATA WELL DATA	DRILLING METHOD: Geoprobe Direct Push with Macrocore Soil Sampling DAT	DRILLING CONTRACTOR: Aquifer Drilling and Testing, Inc. WOL #:		CLIENT: New York City Department of Design and Construction PRO	New York, New York 10038 Page 1 of 1 LOC
Water at 9 ft bgs  End of Boring at 10 ft bgs.	f, some Peat; wet. Silt	t brown (5Y85/6) Gravelly Sand e Gravel (fill material (Fill)		Remarks		SURFACE ELEVATION: N/A	1	e:	TOR:	DRILLER: J. Meyer	DATE FINISHED: 2/5/2008	DATE STARTED: 2/5/2008	L#: 3870-LBA-1-5133	FMS ID#: BEGS2006004	PROJECT NO: JG8554	LOCATION: Staten Island, NY

End of Boring at 10 ft bgs.			_		X	X	•	:	-	
					****	<b>***</b>				
K					*****	<b>****</b>		****		
Water at 8.5 ft bgs					*****	<b>****</b>		•••••	∞	
					****	<b>*****</b>				
				777,	<del>////</del>	<b>***</b>				
Sand		Gravel; wet.		7777	1	<b>***</b>			0	
Gravelly Silty	e SAND, little Silt, and	Moderate brown (5YR3/4) coarse SAND, little Silt, and	^	77	<i></i>	<b>***</b>	SP-SM			
					****	<b>***</b>	11111		4	
					x	<b>***</b>			4-	
					····	<b>****</b>				
					****	***				
					*****	<b>****</b>			ы	
					·	<b>***</b>				
		No Recovery	Δ		*****	****	N/A			
Remarks		Description	PID (ppm)	Blows/6 in	Sample Recover	Sample Interva	USCS	Lithology	Depth	Well Construction
		Composite sample ASB-09 collected from 0-10 ft bgs.	ed from	collecte	y 8	le AS	site samp	onino	٦,	
	35	Sample ASB-09 collected from 8-8.5 ft bgs for VOCs.	.5 ft bgs	rom 8-8	led f	collec	ASB-09	unple	S: S	NOTES:
TON: N/A	SURFACE ELEVATION:	N/A	Slot Size:	SI		N/A		ck (f	to Ro	Depth to Rock (ft):
N/A	EASTING:	·	pth to	De		Ċ.	(ft): 8.5	iter	to Wa	Depth to Water (ft):
N/A	NORTHING:	:(1)	reen Le	Sc		N/A		fusal	to Re	Depth to Refusal (ft):
J. Lacanial	ECTOR:		tal Dep	To		0	10	Œ:	Depth	Total Depth (ft):
J. Meyer	- 1		Well Diameter:	¥			2	=	ter (i	Diameter (in):
2/7/2008		BOREHOLE DATA WELL DATA		- 0	100	TA	BOREHOLE DATA	EH	BO	
26/7/2008	DATE STARTED:	Addied Diffing and resung, no.	Dillill	. Dirac	, dom	Z Z	DRILLING CONTRACTOR:	4 5	NO.	DRIL
BEGS2006004	#. D#:	Tourism Inc	ection A	11 - Se	hase	ach I	PROJECT: Oakwood Beach Phase II - Section A	Oak	ECT:	PROJ
JG8554	CNO:	CLIENT: New York City Department of Design and Construction	Design	ent of	artn	y Dep	York Cit	iew i	VT: 7	CLIE
Staten Island, NY	N:	Page 1 of 1		_	-	10038	New York, New York 10038	Z	w You	Z
N/A		Drilling Log	_		7	Hoc	199 Water Street, 23rd Floor	er St	9 Wat	19
ASB-09	BORING ID:			_		, P.C	Louis Berger & Assoc., P.C.	rger	uis Be	L

End of Boring	o fine SAND, little Silt,	Moderate brown (5YR4/4) coarse to fine SAND, little Silt, little coarse to fine Gravel; wet.	Δ			××××××××××××××××××××××××××××××××××××××		× 5 4
Gravelly Silly Sand  Sand	to fine SAND, little Silt.	Moderate brown (5YR4/4) course to fine SAND, little Silt. little course to fine Gravel; wet.	Δ			SESM		13
Remarks		Description	Blows/6 in PID (ppm)	Sample Recover	Sample Interva	USCS	Lithology	Well Construction Depth
		Sample ASB-10 collected from 0.5-1 ft bgs for VOCs.  Composite sample ASB-10 collected from 0-10 ft bgs.	0.5-1 ft by ected from	1 from 10 coll	ASB-	ASB-10 ec	Sample Compos	NOTES:
ON: N/A	SURFACE ELEVATION:	e: N/A	Slot Size:	L	_	): N/A	Rock (ft	Depth to Rock (ft):
'A		Depth to Water (ft): N/A	Depth to	L			Vater (	Depth to Water (ft):
Α,	NORTHING: N/A	Screen Length (ft): N/A	Screen I		-	(ft): N/A	Refusal	Depth to Refusal (ft):
Lacanlale	LBA INSPECTOR: J. Lacanlale	epth (ft): N/A	Total Depth (ft):			10	th (ft):	Total Depth (ft):
J. Meyer	- 1	ameter: N/A	Well Diameter:			13	(in):	Diameter (in):
2/8/2008		WELL DATA			[A	BOREHOLE DATA	OREH	В
2/8/2008	TARTED:	DRILLING METHOD: Geoprobe Direct Push with Macrocore Soil Sampling	rect Push	be Di	icopro	HOD: (	G ME	DRILLIN
3870-LBA-1-5133		Aquifer Drilling and Testing, Inc.	ifer Drilli	Aqu	OR:	TRACT	G CON	DRILLING CONTRACTOR:
BEGS2006001		A	- Section	ase II	ch Ph	vood Bea	I: Oak	PROJECT: Oakwood Beach Phase II - Section A
JG8554	۲	New York City Department of Design and Construction	of Desig	tment	Depai	ork City	New Y	CLIENT:
Staten Island, NY	Z	Page 1 of 1			0038	New York, New York 10038	fork, No	New
ASB-10	WELL ID:	Drilling Log			Floor	199 Water Street, 23rd Floor	atel off	199 1
ASB-10							11000	

End of Boring at 10 ft bgs.			****					
						************	×	
Sand	o fine SAND, little	Moderate brown (5YR4/4) coarse to fine SAND, little medium to fine Gravel; wet.	۵			Ŕ	6	
						DE POSITION OF THE PARTY OF THE	4	
Water at 2 ft					<b>*****</b>		12	
	ne SAND, little Silt, some	Light brown (5YR5/6) coarse to fine SAND, little Silt, some coarse to fine Gravel; wet.	Δ		F			
Gravelly Silty Sand (Fill)	5/4) coarse to fine SAND, vel; moist.	Moderate yellowish brown (10YR5/4) coarse to fine SAND, some Silt, some coarse to fine Gravel; moist,	Δ		-			
Remarks		Description	Blows/6 in PID (ppm)	Sample Recover	USCS Sample Interval	Lithology	Depth	Well Construction
1 1		Sample ASB-11 collected from 1.5-2 ft bgs for VOCs. Composite sample ASB-11 collected from 0-10 ft bgs.	1.5-2 ft bg ected from	cted from B-11 coll	SB-11 colle sample As	umple A omposito		NOTES:
ON: N/A	SURFACE ELEVATION:		Slot Size:		N/A	ck (ft):	Depth to Rock (ft):	Dept
'A	EASTING: N/A	•	Depth to		-	ater (ft	Depth to Water (ft):	Dept
Lacantale	NORTHING: NORTHING:	Screen Length (ft): N/A	Screen L			fusal (t	Depth to Refusal (ft):	Dept
J. Meyer	DRILLER: J.		Total Denth (ft):		- I	ı (ft):	Total Depth (ft):	Tota
2/6/2008	ISHED:	WELL DATA			BOREHOLE DATA	REHO	BO	
2/6/2008	TARTED:	DRILLING METHOD: Geoprobe Direct Push with Macrocore Soil Sampling	irect Push	probe D	IOD: Geo	METH	LLING	DRI
BEGS2006004	WOL #: B	Aquifer Drilling and Testing, Inc.	DRILLING CONTRACTOR: Aquifer Drilling	R: Aqu	DRILLING CONTRACTOR:	CONT	LLING	DRI
JG8554	I NO:	PROJECT: Onknowed Banch Debartine to Design and Construction	or Design	parunen	and Barnsh	Oukun	IECT.	PRC
Staten Island, NY	Z.	Page 1 of 1		8	New 10fk, New York 10038	rk, New	New 10	3
N/A	WELL ID:	0		20000	Name Visualization Visualizati			

					Well struction	NOTES:	Depth to Rock (ft):	Depth to Water (ft):	Depth to Refusal (ft):	Total Depth (ft):	Diameter (in):		DRILL	DRILLING CONTRACTOR: Acuifar Delling	CLIEN	Ne	199
i <del>aaaaabaaa</del>		×	4 (2	D	epth	Co Sa	Roc	Wa	Ref	epth	er (in	ВОН	NG C		7	v Yor	Wat
	Щ			Litt	nology	mple	K (fi	ter (	usal	(ft):	9	REH	ME	Cak	lew	KN	er St
	1	9.	NS.	ι	JSCS	ASB-15 c ite sampl	): N/A		(ft): N/A	10	2	BOREHOLE DATA	THOD:	Wood Be	rork City	New York, New York 10038	199 Water Street, 23rd Floor
	$\bigotimes$			Sample	e Interval	ollec e ASI	Ä		A			AT	Geor	ach I	Del	10038	l Floo
	7			Sample	Recovery	15 c							one .	15	artm	٦	Ä.
				Blo	ows/6 in	om 7.5- collected	Slo	Del	Scr	Tot	We	-	Direct	II - Se	ent of	-	
	_	Δ	Δ	PID	(ppm)	8 ft bgs 1 from (	Slot Size:	oth to	een Le	al Dep	Well Diameter:	5	Push	ction A	Design		
	Light gray (N7) SILTY CLAY: wet	Dark gray (N3) to medium gray (N5) PEAT, some Silty Clay: moist.	Moderate yellowish brown (10YR5/4) coarse to fine SAND, some Silt, little medium to fine Gravel; moist.		Description	Sample ASB-15 collected from 7.5-8 it bgs for VOCs. Composite sample ASB-15 collected from 0-10 it bgs.	N/A	: N/A	t): N/A	: N/A	N/A	_	DRILLING METHOD: Geoprobe Direct Push with Macroscope Soil Sampling	T	and Construction	Page 1 of 1	Drilling Log
		) PEAT, some Silty Ci	vel; moist.				ELEVA:		NORTHING:	LBA INSPECTOR: J. Lacanlale		DATE FINISHED:	WOL #:	FMS ID#:	PROJECT NO:	LOCATION:	BORING ID:
Water at 8 ft bgs End of Boring at 10 ft bgs.	Silte Class	ıy: Peat	D. Gravelly Silty Sand		Remarks		TION: N/A	NA	N/A	J. Lacantale	J. Mever	2/6/2008	3870-LBA-1-5133	BEGS2006004	JG8554	Staten Island, NY	ASB-15

							Well Construction Depth Lithology	Compo		Depth to Water (ft):	Depth to Refusal (ft):	Total Depth (ft):	Diameter (in):	BOREH	DRILLING ME	DRILLING CONTRACTOR: Acuifer Drilling	CLIENT: New	New York, New York 10038	199 Water Street, 23rd Floor
******		:   <u>a</u>	<b>=</b>	Ē	E S	F	uscs	Sample ASB-16 collected from 4.5-5 ft bgs for VOCs. Composite sample ASB-16 collected from 0-10 ft bgs.	t): N/A	1	1	1	12	BOREHOLE DATA	THOD: G	WOOD Beac	York City L	iew York 100	treet, 23rd F
*******	*****	%	************	***************************************	$\aleph$		Sample Interval Sample Recovery	SB-1							ongo	h Ph	epar	)38	loor
	Alli	777	A1111111V		777	XIIII	Blows/6 in	from 4.2 6 collect	S	D	S	T	11	$\dashv$	be Dire	Aguifa	tment o	_	_
	<u>^</u>		<u>^</u>			<u>^</u>	PID (ppm)	ed from	Slot Size:	epth to	reen L	otal De	Well Diameter:		et Push	ection	f Design		
	Light gray (N7) SILTY CLAY; wet	Dark gray (N3) PEAT, some Silty Clay; wer.	Moderate brown (5YR3/4) to dark yellowish brown (10YR4/2) coarse to fine SAND, some Silt, little fine Gravel; moist.	Moderate brown (5YR3/4) to dark yellowish brown (10YR4/2) coarse to fine SAND, some Silt, little fine Gravel; moist.	Very light gray (N8) CONCRETE debris: dry	Moderate brown (5YR3/4) to dark yellowish brown (10YR4/2) coarse to fine SAND, some Sill, little fine Gravel; moist.	Description	o for VOCs. 0-10 ft bgs.	N/A	: N/A	Screen Length (ft): N/A	N/A	N/A	_	DRILLING METHOD: Geoprobe Direct Push with Macrocore Soil Sampling	A Tables In	CLIENT: New York City Department of Design and Construction	Page 1 of 1	Drilling Log
		lay; wet.	ællowish brown me Silt. little fine Gravel;	me Silt, little fine Gravel:	lebris; dry.	yellowish brown mne Silt, little fine Gravel;			SURFACE ELEVATION:		NORTHING: N	CTOR:	- 1	DATE FINISHED: 2		#:	١	LOCATION: S	
End of Boring at 10 ft bgs.	Silty Clay  Silty Clay  Water at 8 ft	Peat		Gravelly Silty Sand (Fill)	Concrete(Fill)	Gravelly Silty Sand (Fill)	Remarks		ON: N/A	N/A	N/A	Lacantale	I. Mever	2/6/2008	3870-LBA-1-5133	BEGS2006004	JG8554	N/A Staten Island, NY	

		Well Construction	NOTES:	Depth to Rock (ft):	Depth to Water (ft):	Depth to Refusal (ft):	Total Depth (ft):	Diameter (in):		DRILI	DRILI	PROJ	CLIEN	ž 2	-
× 5	4 12	Depth		to Ro	to W	to Re	Depth	ter (i	ВО	ING	ING	ECT:	VT:	9 War	d Sin
		Lithology	ample	ck (f	ater (	fusal	(ft):	<u>.</u>	REH	ME	CON	Oak	Vew 1	rk, N	erger
ži.	ž	USCS	Sample ASB-17 collected from 9.5-10 ft bgs for VOC. Composite sample ASB-17 collected from 0-15 ft bgs.	t): N/A		(ft): N/A	15	2	BOREHOLE DATA	THOD: (	DRILLING CONTRACTOR:	PROJECT: Oakwood Beach Phase II - Section A	York City	199 Water Street, 23rd Floor New York, New York 10038	Louis berger & Assoc., P.C.
		Sample Interval	ASB.			-			ΓA	ìeopr	유	ch Pt	Depa	Floor 0038	r.c.
		Sample Recovery	d from							obe I	Aq	iase I	rtme		
		Blows/6 in	n 9.5- illecte	Slo	De	Scr	Tot	We		Direct	uifer	I - Se	nt of		_
Δ	Δ	PID (ppm)	10 ft bg	Slot Size (in):	oth to	een Le	al Dep	II Dia		Push v	Drillin	ction A	Design		
Dusky yellowish brown (10YR2/2) SILT. little medium to fine SAND, little coarse to fine Gravel; moist.	Moderate brown (5YR4/4) coarse to fine SAND, some Silt, some coarse to fine Gravel; moist.	Description	Sample ASB-17 collected from 9.5-10 ft bgs for VOCs. Composite sample ASB-17 collected from 0-15 ft bgs.	(in): 0.1	Depth to Water (ft): 10	1):	Total Depth (ft):	Well Diameter (in):	WELL DATA	DRILLING METHOD: Geoprobe Direct Push with Macrocore Soil Sampling	Aquifer Drilling and Testing, Inc.		CLIENT: New York City Department of Design and Construction	Drilling Log Page 1 of 2	7 111. 4
) SILT: little medium to avel; moist.	to fine SAND, some Sil			SURFACE ELEVATION:	EASTING:	NORTHING:	LBA INSPECTOR:	DRILLER:	DATE FINISHED:	DATE STARTED:	WOL #:	FMS ID#:	PROJECT NO:	WELL ID:	DUKING ID:
Gravelly Sandy Sitt	li. Gravelly Silty Sand	Remarks		TION: N/A	N/A	N/A		J. Meyer	2/5/2008	2/5/2008	3870-LBA-1-5133	BEGS2006004	JG8554	TWP-17 Staten Island, NY	ASB-I/

			_	
		Well	Ne	199 Lot
<del>-</del> ;	10 -	Depth	« Yor	iis Bei Wate
		Lith.	F.N.	r Str
S.S.	ИL	USCS	New York, New York 10038	Louis Berger & Assoc., P.C. 199 Water Street, 23rd Floor
		Interval	038	P.C.
		Rec.		•
		Blows	_	
^	Δ	PID		PR(
Moderate brown (5YR4/4) coarse to fine SAND, some coarse to fine Gravel; wet.	Dark yellowish orange (10YR6/2) SILT, little coarse to fine Gravel; wet.	Description	Page 2 of 2	PROJECT NO.: JG8554
to fine SAND, some coarse	SIUT, little coarse to fine		WELL NO.:	BORING NO.:
Gravelly Sand  End of Boring at 14 ft bgs.	Water at 10 ft bgs  Gravelly Silt	Remarks	TWP-17	ASB-17

	, , , , , , , , , , , , , , , , , , ,			Well Construction Depth Lithology	NOTES: Sample . Composi	Depth to Rock (ft):	Depth to Water (ft):	Depth to Refusal (ft):	Total Depth (ft):	Diameter (in):	BOREHO	DRILLING CONTRACTOR:	PROJECT: Oakwood Beach Phase II - Section A	CLIENT: New York City Department of Design and Construction	New York, New York 10038	199 Water Street 23rd Floo
· · · · · · · · · · · · · · · · · · ·	SP 5232	New N	Neds	USCS Sample Interval	Sample ASB-18 collected from 5-5.5 ft bgs for VOCs. Composite sample ASB-18 collected from 0-10 ft bgs.	): N/A		100,000	10	7	BOREHOLE DATA	TRACTOR	vood Beach	ork City De	eet, 23rd 110 w York 1003	ant 32md Flo
				Sample Recovery	B-18						probe	-   -	Phase	partn	oc 0	•
				Blows/6 in	om 5-5	Sic	De	Sci	To	¥.	- Direc	quifer	II - Se	ent of		_
<u>′</u>	^		^	PID (ppm)	.5 ft bgs	Slot Size:	pth to	reen La	Total Depth (ft):	Well Diameter:	t Push	Drillin	ction A	Design		
Dark gray (N5) PEAT; wet.	Dark yellowish brown (10YR4/2) coarse to fine SAND, little Silt, little medium to fine Gravel; wet.	Darky gray (N3) medium to fine SAND, little Silt: moist.	Moderate yellowish brown (10YR5/4) to darky gray (N3) coarse to fine SAND, little Silt, little coarse Gravel (fill material - glass and rubber debris); moist.	Description	for VOCs. -10 ft bgs.	N/A	: N/A	t): N/A	N/A	N/A	BOREHOLE DATA WELL DATA	-		and Construction	Page 1 of 1	Prilling Lag
	coarse to fine SAND, little	AND, little Silt: moist.	5/4) to darky gray (N3) the coarse Gravel (fill t moist.			SURFACE ELEVATION:		NORTHING: N	LBA INSPECTOR: 1 I acquilate	SHED:			#:	٦		
Peat  End of Boring at 10 ft bgs.	Gravelly Silty Sand   Water at 5.5 ft bgs	Sity Sand	Gravelly Silty Sand	Remarks		ION: N/A	N/A	N/A	J. Meyer	2///2008	2/7/2008	3870-LBA-1-5133	BEGS2006004	JG8554	N/A Staten Island, NY	

End of Boring at 10 ft bgs.							<del>.</del>	
	to moderate brown me coarse to fine Gravel;	Dark yellowish brown (10YR4/2) to moderate brown (5YR4/4) coarse to fine SAND, some coarse to fine Gravel: saturated.				ž.		
Gravelly Sand  Z Water at 0.5 ft bgs		Dark yellowish brown (10YR4/2) coarse to fine SAND, some coarse to fine Gravel; wet.				ş		
Remarks		Description	Blows/6 in PID (ppm)	Sample Recovery	Sample Interval	USCS	Depth Lithology	Well Construction
		Sample ASB-19 collected from 0-0.5 ft bgs for VOCs. Composite sample ASB-19 collected from 0-10 ft bgs.	0-0.5 ft bg	ed from 3-19 col	9 collec	e ASB-1 osite san		NOTES:
i: N/A	SURFACE ELEVATION:	" N/A	Slot Size:	L	N/A	E.	Rock (	Depth to Rock (ft):
		Water (ft):	Depth to		-		Water	Depth to Water (ft):
		Screen Length (ft): N/A	Screen I		N/A		Refusa	Depth to Refusal (ft):
elson	CTOR:		Total Depth (ft):		0	"	pth (ft)	Total Depth (ft):
ever	- 1	imeter: N/A	Well Diameter:		12		r (in):	Diameter (in):
8008		WELL DATA			DATA	IOLEI	BOREHOLE DATA	
1008	TARTED:	DRILLING METHOD: Geoprobe Direct Push with Macrocore Soil Sampling	irect Push	robe D	: Geop	THOD	NG ME	DRILLI
3870-LBA-1-5133	WOL #: 3870	Aquifer Drilling and Testing, Inc.	ifer Drilli	Aqu	CTOR	NTRA	NG CO	DRILLING CONTRACTOR:
convon.		A	PROJECT: Oakwood Beach Phase II - Section A	hase II	Beach F	kwood	CT: Oa	PROJE
554	ا ٪	CLIENT: New York City Department of Design and Construction	t of Desig	artmen	ity Dep	York C	f: New	CLIEN
N/A Staten Island NY	LOCATION: State	Page 1 of 1			New York, New York 10038	iew Yor	New York, New York 10038	Nev
		The same of the sa						

							8			
End of Boring at 10 ft bgs.		ne coarse to fine Gravel	Medium light gray (N6) to dark yellowish brown (10YR4/2) coarse to line SAND, little Silt, some coarse to line Gravel; wet.	Nicd coars wet.				WSS-dS		× 5 4
Gravelly Silty Sand  Sand  Water at 1 ft bgs		fine SAND, little Silt, »	Medium light gray (N6) coarse to fine SAND, little Silt, some coarse to fine Gravel; wet.	cour				SPSM		10
Remarks			Description	PID (ppm)	Blows/6 in	Sample Recover	Sample Interva	USCS	Lithology	Construction
			/OCs. ît bys.	NOTES: Sample ASB-20 collected from 0.5-1 ft bgs for VOCs. Composite sample ASB-20 collected from 0-10 ft bgs.	offecte	3-20 c	collec	ASB-20 ite samp	Sample	TES:
i: N/A	TION	SURFACE ELEVATION:	N/A	Slot Size:	SI		N/A	7	ock (ft	Depth to Rock (ft):
	N/A	EASTING:		Depth to Water (ft):	De			Ä	ater (	Depth to Water (ft):
	N/A	NORTHING:	h (ft): N/A	Screen Length (ft):	Sc		N/A		efusal	Depth to Refusal (ft):
dson	: J. Ne	LBA INSPECTOR: J. Nelson	ft): N/A	Total Depth (ft):	To	l	0		h (III):	Total Depth (II):
eyer	J. Meyer	DRILLER:	r: N/A	Well Diameter:	1 2	ĺ			III):	Diameter (III):
800		DATE FINISHED:	WELL DATA	u u	+		ATA	BOREHOLE DATA	KEH	BC
800	2/1/2008	DATE STARTED:	DKILLING ME I HOD: Geoprobe Direct Push with Macrocore Soil Sampling	t Push with I	Direc	probe	Geol	HOD:	ME	TELLIN
3870-LBA-1-5133	3870-	WOL #:	Aquifer Drilling and Testing, Inc.	Drilling and	quifer	.	IOR	IKA		DRILLING CONTRACTOR:
BEGS2006004	BEGS	FMS ID#:		PROJECT: Oakwood Beach Phase II - Section A	II - Se	na	each l	wood B	Cak	OJECI
554	JG8554	PROJECT NO:	BBO LECT: Only Life Department of Design and Construction	Design and	ent of	bartm	y Del	OFK CI	New	TENT
Staten Island, NY	State	LOCATION:	Page 1 of 1		-	ľ				IENIT.
	N/A	WELL ID:	Pros of 0	ט		~	10038	New York, New York 10038	ork, Ne	New Y
			TOP TOP		_					

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New York City Department of Dosign and Construction	End of Boring at 10 ft bgs.	# F				******	******		5	
Work 1003	Gravelly Sano		Moderate brown (5YR4/4) to pale y (10YR6/2) coarse to fine SAND, so wet.						× 6	
Well Diameter:   Well	Gravelly Silt Sand ⊠ Sand ⊠ Sand I Sand Sand Sand Sand Sand I Sand Sand Sand Sand Sand Sand Sand Sand	brown coarse to	Dark yellowish brown (10YR4/2) to (10YR6/2) coarse to Jine SAND, so fine Gravel; moist.			***************************************	<u>-</u>		4 (3 (c	
WELL ID: WELL ID: WELL ID: WORK 10038	Remarks		Description	PID (ppm)	Blows/6 in			Lithology	Depth	Well Construction
Well IIII			0-10 ft bgs.	-0.5 ft bgs :ted from (	collec	SB-21	e sample A	amposii		2
WELL ID:   WELL ID:   WELL ID:   WELL ID:   WELL ID:   LOCATION:		SURFACE ELEVATION	N/A	slot Size:	-		: N/A	CK (11)	10 KG	Depu
A City Department of Design and Construction  MELL ID:  LOCATION:  ROJECT NO:  Ad Beach Phase II - Section A  MACTOR: Aquifer Drilling and Testing. Inc.  DI: Geoprobe Direct Push with Macrocore Soil Sampling  E DATA  Well Diameter:  Well Diameter:  N/A  Well Diameter:  N/A  MORTHING:		EASTING: N/A	N/A	Depth to	-		1	ater (f)	10 W	Depur
WELL ID:   WELL ID:		NORTHING: N/A	N/A	creen Le	100		1	Tusal (	TO Ke	Depu
WELL ID: LOCATION: PROJECT NO: FMS ID#: WOL #: DATE STARTED: DATE FINISHED: DRILLER:	canlale	LBA INSPECTOR: J. La	N/A	otal Dep	_				Depth	lotal
WELL ID: LOCATION: PROJECT NO: FMS ID#: WOL #: DATE STARTED: DATE FINISHED:	yer		N/A	Well Dia			12	) <u></u>	eter (i	Diam
WELL ID: LOCATION: PROJECT NO: FNIS ID#: WOL #: DATE STARTED:	008		$\vdash$		L	-	LE DAT	REHO	ВО	!
WELL ID: LOCATION: PROJECT NO: FMS ID#: WOL #:	008	- 1		ect Push v	e Din	oprob	HOD: Ge	MET	LING	DRII
Page 1 of 1  And Construction  PROJECT NO:  EMS In#.	-I_BA-1-513		g and Testing, Inc.	er Drillin	Aquif	₽.	<b>FRACTO</b>	CON	LING	DRII
ork, New York City Department of Design and Construction  Page 1 of 1  New York City Department of Design and Construction  PROJECT NO:	ronannes			Section A	e II -	1 Phas	ood Beach	Oakw	ECT:	PRO.
ork, New York 10038 Page 1 of 1 LOCATION:	54		and Construction	of Design	nent o	eparti	ork City D	New Y	NT:	CLIE
WELL ID.	n Island, NY		Page 1 of 1		_	138	v York 100	rk, Ne	iew Yo	-
Drilling	-21	D:	Drilling Log			oor	et, 23rd Fl	ter Str	99 Wa	

	∞	6		+		2		Well Construction Depth	- 5	Depth to Rock (ft):	Depth to Water (ft):	Depth to Refusal (ft):	Total Depth (ft):	Diameter (in):	В	DRILLIN	DRILLING CONTRACTOR: Aguifer Drilling	CLIENT:	New 1	199 W
			aad i		0000	00000	000000	·	Comp	*Ock	Vate	}efus	th (fi	in):	ORE	GM		Nev	ork,	ater
*****	• <del></del>		333					Lithology	- osite	<b>:</b>	r (ft	al (t			ΘE	E	N K W	170	New	Stree
	SP-SM		SP-SM				>	USCS	sample	N/A	): 5.5	t): N/A	10	2	BOREHOLE DATA	IOD:	RACT	rk City	New York, New York 10038	199 Water Street, 23rd Floor
								Sample Interva	: ASE	:  >		Ā			TA	Geon	OR ICE	Dep	0038	Floo
								Sample Recover	y 22 cd In							robe	12	artm		7
								Blows/6 in	ollecter	Slo	Del	Scr	Tot	We	1	Direct	II - Se	ent of I	-	
	<u>^</u>		<u>^</u>				^	PID (ppm)	d from (	Slot Size:	oth to	een Le	Total Depth (ft):	Well Diameter:		Push	Ction A	Design		
	Moderate brown (5YR4/4) coarse to fine SAND, little Silt some coarse to fine Gravel; wet.		Pale brown (5YR5/2) coarse to fine SAND, little Silt, some coarse to fine Gravel: wer.				No Recovery	Description	Sample ASB-22 collected from 0-10 ft bgs.  Composite sample ASB-22 collected from 0-10 ft bgs.	N/A		t):		eter: N/A	WELL DATA	DRILLING METHOD: Geoprobe Direct Push with Macrocore Soil Sampling	and Testing Inc	CLIEN1: New York City Department of Design and Construction	Page 1 of 1	Drilling Log
	to line SAND, little Silt		e SAND, little Silt, som							SURFACE ELEVATION:	EASTING:	NORTHING:	LBA INSPECTOR: J. Lacanlale	DRILLER:	DATE FINISHED:	DATE STARTED:	WOI #:	PROJECT NO:	LOCATION:	WELL ID:
End of Boring at 10 ft bgs.		Water at 5.5 ft bgs	e Gravelly Silty					Remarks		TION: N/A	N/A	N/A	J. Lacanlale	I. Mever	2/4/2008	3670-LBA-1-3133	BEGS2006004	JG8554	Staten Island, NY	N/A

End of Boring at 10 ft bgs.					***************************************		
					······································	<u> </u>	×
Water at 5 ft bgs		Moderate brown (5YR4/4) coarse to line SAND, some coarse to line Gravel; moist.	Δ		**************************************		~ <del>~~~</del>
Gravelly Sand		Moderate brown (5YR4/4) coarse to fine SAND, some coarse to fine Gravel; moist.	^		**************************************		<u> </u>
	NYEY SILT, little medium	Dark greenish gray (5GY4/1) CLAYEY SILT, little medium to Ine Gravel; moist.	^		¥	!i!i!i!i!	1s 1
	CLAYEY SILT, little	Pale yellowish brown (10YR6/2) CLAYEY SILT, little medium to fine Gravel; moist.	Δ		¥		,
Gravelly Clayey Silt	) CLAYEY SILT, little	Dusky yellowish brown (10YR2/2) CLAYEY SILT, little medium to fine Grave; moist.			¥	!i!i!i!i	
Remarks		Description	Blows/6 in PID (ppm)	Sample Interval	USCS	Lithology	Depth
		Composite sample ASB-23 collected from 0-10 ft bgs.	ected fron	ASB-23 col	ASB-25 co site sample	Compo	NOTES:
N: N/A	SURFACE ELEVATION:	e: N/A	Slot Size:		t): N/A	Depth to Rock (ft):	
		Depth to Water (ft): N/A	Depth to			Depth to Water (ft):	O W
		Screen Length (ft): N/A	Screen l			fusa	0 Re
J. Lacanlale	CTOR:		Total Do		1	Total Depth (ft):	epth
J. Meyer		Well Diameter: N/A	Well Di		2	=	Diameter (in):
2/4/2008				'A	BOREHOLE DATA	REH	ВОІ
3870-LBA-1-5133	DATE STARTED: 387	DRILLING METHOD: Geoprobe Direct Push with Macrocore Soil Sampling	irect Push	eoprobe D	THOD: G	ME	NG.
BEGS2006004	#:	A	- Section	12	DRILLING CONTRACTOR:	Cal	
554	٦	CLIENT: New York City Department of Design and Construction	t of Desig	Departmen	York City	New	1
Staten Island, NY	Z	Page 1 of 1		1038	New York, New York 10038	ork, N	7
ASB-23	WELL ID: ASI	Drilling Log		Floor	199 Water Street, 23rd Floor	ater St	=

End of Boring at 10 ft bgs.						*******			
Gravelly Sand	to fine SAND, some coarse	Moderate brown (5YR4/4) coarse to fine SAND, some coarse to fine Gravel; wet.	^				Š	∞ 1	
bgs	ttle coarse to line	Pale yellowish brown (10YR6/2) SILT, little coarse to fine SAND, trace medium to fine Gravel; wet.						5	
Sandy Silt	SILT, little fine Sand;	Pale yellowish brown (10YR6/2) SILT, little fine Sand: nuclst.	<u>^</u> _		<b>*****</b>	×××××	!!!!!! *		
SII.	9 all. 1. trace line thave!	(organic debris); moist.						+ 12	
Gravelly Silty Sand	to fine SAND, some Silt,	Moderate brown (5YR4/4) coarse to fine SAND, some Silt. little medium to fine Gravel; moist.	^				<u> </u>		
Remarks		Description	PID (ppm)	Blows/6 in	Sample Recover	USCS Sample Interval	Lithology	Depth	Construction
		Composite sample ASB-25 collected from 0-10 ft bgs.	ed from	collec	SB-25	sample A	mposite		NOTES
N: N/A	SURFACE ELEVATION:	: N/A	Slot Size:	5		N/A	Depth to Rock (ft):	to Koc	T PI
	EASTING: N/A	Water (ft):	epth to				Depth to Water (ft):	to Wa	Ph
	NORTHING: N/A		reen L	Š		1	Depth to Refusal (ft):	to Ref	pth
acanlale	LBA INSPECTOR: J. Lacanlale	Total Depth (ft): N/A	otal De	T		1	(ft):	Total Depth (ft):	Ē
eyer	DRILLER: J. Meyer	meter: N/A	Well Diameter:	V		12	÷.	Diameter (in):	am
2/5/2008	1	WELL DATA		-		BOREHOLE DATA	REHOI	ВОК	
2/5/2008	DATE STARTED: 2/5/	DRILLING METHOD: Geoprobe Direct Push with Macrocore Soil Sampling	et Push	e Dire	prob	IOD: Geo	METE	LING	E .
3870-LBA-1-5133		Aquifer Drilling and Testing, Inc.	r Drillir	Aquife		DRILLING CONTRACTOR:	CONT	LING	Ē
BEGS2006004		Δ	ection /	e II - S	Phase	PROJECT: Oakwood Beach Phase II - Section A	Oakwo	ECT:	õ
554	اڌ	CLIENT: New York City Department of Design and Construction	Design	nent o	partn	rk City Do	ew Yo	VT: N	E
Staten Island, NY	LOCATION: State	-			38	New York, New York 10038	k, New	ew Yor	z
NIA		Ciming Log		_	or	177 Water Street, 23rd Floor	ou out	A MAIN	-

End of Boring at 10 ft bgs.					××××××			
Gravelly Sand	e to line SAND, some coarse	Moderate brown (5YR4/4) coarse to fine SAND, some coarse to fine Gravel; saturated.				ž.	σ σ	
bgs			La constitución de la constituci	***************************************			4 12	
Silty Sand		Moderate yellowish brown (10YR5/4) to moderate brown (5YR4/4) coarse to fine SAND, little Silt, some coarse to fine Gravel; wet.				SP-SM	c	
Remarks		Description	Blows/6 in PID (ppm)	Sample Recovery	USCS Sample Interval	Lithology	Depth	Well Construction
		for VOCs. 0-10 ft bgs.	Sample ASB-34 collected from 1-1.5 ft bgs for VOCs. Composite sample ASB-27 collected from 0-10 ft bgs.	ted from 3-27 coll	-34 collec	nple ASB	NOTES: San	O
: N/A	SURFACE ELEVATION:	N/A	Slot Size:	L	N/A	k (ft):	Depth to Rock (ft):	Dep
	EASTING: N/A	Depth to Water (ft): N/A	Depth to		1.5	er (ft):	Depth to Water (ft):	Dep
	NORTHING: N/A	Screen Length (ft): N/A	Screen Le		N/A	ısal (ft):	Depth to Refusal (ft):	Dep
lson	LBA INSPECTOR: J. Nelson	th (ft): N/A	Total Depth (ft):		10	ft):	Total Depth (ft):	Tota
yer	DRILLER: J. Meyer	neter: N/A	Well Diameter:		2		Diameter (in):	Diar
308	DATE FINISHED: 2/1/2008	BOREHOLE DATA WELL DATA	ect Push v	robe DII	DATA	BOREHOLE DATA	BOR	125
38/0-LBA-1-5133		Aquifer Drilling and Testing, Inc.	er Drilling	Aqui	ACTOR:	ONTR	DRILLING CONTRACTOR:	R
BEGS2006004	#:		PROJECT: Oakwood Beach Phase II - Section A	has	Beach P	)akwood	JECT: (	PRC
54	I NO:	CLIENT: New York City Department of Design and Construction	of Design	artment	City Dep	w York	ENT: Ne	E
Staten Island, NY	Z.	Page 1 of 1			ork 10038	, New Yo	New York, New York 10038	
	WELL ID: N/A	0			and the same of the same of the same of	Section of the second	CONTRACTOR AND ANDRESS	

× 2			Well Construction	NOTES:	Depth to Rock (ft):	Depth to Water (ft):	Depth to Refusal (ft):	Total Depth (ft):	Diameter (in):		DRILL	PROJE	CLIEN	Nes	199
~ o	<del>-</del>	, , , , , , , , , , , , , , , , , , ,	Depth		200	0 Wa	o Re	epth	er (ir	BOI			::	« You	Wat
			Lithology	mple	CK (f	iter (	fusal	(ft):	<u>:</u>	Ê		Cak	Vew	F.Z	er St
SP	ME	SNI	USCS	ASB-28 atte sample	);  Z		(ft): N/A	15	2	BOREHOLE DATA	DRILLING CONTRACTOR:	PROJECT: Oakwood Beach Phase II - Section A	York Cit	New York, New York 10038	199 Water Street, 23rd Floor
			Sample Interval	collec e ASI	N/A	Si	/A			F	NO.	ach	y Del	1003	i Flor
			Sample Recovery	ted fr B-28						200	or ob	Phase	partn	~	ę .
			Blows/6 in	om 4-4. collected	Slo	Del	Scr	Tot	We	- 1000	Direct	II - Se	ent of		
Δ	Δ	^	PID (ppm)	5 ft bgs 1 from (	Slot Size:	oth to	een L	al Dep	II Dia	I usu	Drillin	ction /	Design		
Dark yellowish brown (10YR4/2) to pale yellowish brown (10YR6/2) coarse to fine SAND, some coarse to fine Gravel: wet.	Greenish gray (3GY6/1) SILT, little fine Gravel; wet	Dusky yellowish brown (10YR2/2) medium to fine SAND, some Silt, little medium to fine Gravel; moist.	Description	Sample ASB-28 collected from 4-4.5 ft bgs for VOCs. Composite sample ASB-28 collected from 0-15 ft bgs.	N/A	: N/A	t): N/A	. N/A	V/A	BOREHOLE DATA WELL DATA	_		CLIENT: New York City Department of Design and Construction	Page 1 of 2	Drilling Log
pale yellowish brown me course to fine Gravel	e fine Gravel; wet.	nedium to fine SAND, wel: moist.			SURFACE ELEVATION:		NORTHING:	CTOR:	DRII I FR.			#:	إ	WELL ID:	BORING ID:
Gravelly Sand	Silt Water at 4.5 ft	Gravelly Silty Sand	Remarks	- 1	TION: N/A	N/A	N/A	J. Lacantale	1 May 2	2/5/2008	3870-LBA-1-5133	BEGS2006004	JG8554	N/A Staten Island, NY	ASB-28

	Well	Ne	Lo 199
14 12 10	Depti	w Yor	uis Be Wat
	Lith.	K. Ne	rger o
ds ds	USCS	New York, New York 10038	Louis Berger & Assoc., P.C. 199 Water Street, 23rd Floor
	Interva	0038	P.C. Floor
	Rec.		
	Blows		
Δ Δ	PID		PR
Dark yellowish brown (10YR4/2) to pate yellowish brown (10YR6/2) coarse to fine SAND, some coarse to fine Gravel; wet.  Moderate brown (5YR4/4) coarse to fine SAND, little medium to fine Gravel; wet.	Description	Page 2 of 2	PROJECT NO.: JG8554
o pale yellowish brown ome coarse to fine Gravel; o fine SAND, little		WELL NO.:	BORING NO.:
End of Boring at 15 ft bgs.	Remarks	N/A	ASB-28

				F	8		-	
Sand Sand Sand End of Boring at 10 ft bgs.		Medium gray (N5) coarse to fine SAND, little Silt, some coarse to fine Gravel; saturated.				SP-SM		∞
Clayey Silt	,	No Recovery  Medium dark gray (N4) CLAYEY SILT; saturated				N-		L1 4 0
Remarks			Blows/6 in PID (ppm)	Sample Recovery	Sample Interval	USCS	Depth Lithology	Well Construction
		Sample ASB-30 collected from 0-1.0 ft bgs for VOCs. Composite sample ASB-30 collected from 0-10 ft bgs.	0-0.5 ft b	d from	ASB	site sample		NOTES:
i: N/A	SURFACE ELEVATION:	ze: N/A	Slot Size:	L		t): N/A	Kock (	Depth to Rock (II):
		Depth to Water (ft): N/A	Depth t				Water	Depth to Water (ft):
	NORTHING: N/A	Screen Length (ft): N/A	Screen		A		Refusa	Depth to Refusal (ft):
elson	CTOR:	Total Depth (ft): N/A	Total D				pth (ft)	Total Depth (ft):
eyer		Well Diameter: N/A	Well D			2	(in):	Diameter (in):
800		WELL DATA			TA	BOREHOLE DATA	BOREH	
8008	TARTED:	DRILLING METHOD: Geoprobe Direct Push with Macrocore Soil Sampling	irect Pus	obe D	Geopi	THOD:	NG ME	DRILLI
3870-LBA-1-5133		Aquifer Drilling and Testing, Inc.	ifer Drill	Aqu	OR:	DRILLING CONTRACTOR:	NG CO	DRILLI
REGS2006004		1 A	- Section	nase II	ıch Pł	PROJECT: Oakwood Beach Phase II - Section A	T: Oal	PROJEC
554	اي	5	t of Desi	ırtmen	Depa	York City	: New	CLIENT
Staten Island, NY	Z	Page 1 of 1			0038	New York, New York 10038	York, N	New
0.00		Drilling Log			Floor	199 Water Street, 23rd Floor	Water S	199
-30	BORING ID: ASB-30	7 :11:			P.C.	Louis Berger & Assoc., P.C.	S Del Sei	200

Moderate yellowish brown (10YR5/4) to moderate brown (5YR4/4) course to fine SAND, trace Silt, some course to fine Gravel; saturated.	2 - 2		Well Construction  Depth  Lithology  USCS  Sample Interval Sample Recovery  Blows/6 in  PID (ppm)	NOTES: Sample ASB-31 collected from 1-1.5 ft bgs for VOCs.  Composite sample ASB-31 collected from 0-10 ft bgs.	Rock (ft): N/A Slot Size (in): 0.1	1: 1.5 Depth to Water (ft): 1.5	ť): 10	10		4	robe Direct Push with Macrocore Soil Sampling	and Testing, Inc.		artment of Design and Construction	199 Water Street, 23rd Floor Drilling Log New York, New York 10038 Page   of
t) to moderate brown Silt, some coarse to		4) coarse to fine SAN			SURFACE ELEVATION:	EASTING:	NORTHING:	LBA INSPECTOR: J. Nelson	DRILLER:	DATE FINISHED:	DATE STARTED:	WOL#:	EMS ID#:	PROJECT NO:	WELL ID:
line End of Boring at 10 ft bgs.	Water at 1.5 ft	D. Gravelly Sand	Remarks		TION: N/A	N/A	N/A	J. Nelson	J. Meyer	2/1/2008	2/1/2008	3870-I BA-I-5133	REGS2006001	Staten Island, NY IG8554	TWP-31

End of Boring at 10 ft bgs.					************			∞	
Gravelly Silty Sand	5/4) coarse to line SAND, wel: saturated.	Moderate yellowish brown (10YRS/4) coarse to fine SAND, little Silt, some coarse to fine Gravel; saturated.				<u>2</u>	Sp-SN	1	
Gravelly Sand	SAND, some coarse to fine	Medium gray (N5) coarse to fine SAND, some coarse to fine Gravel; saturated.				**********	×	6	
Silty Clay  Water at 0.5 ft bgs	LAY, wet.	Medium light gray (No) SILTY CLAY; wet						- 13	
Remarks		Description	PID (ppm)	Blows/6 in	Sample Inter Sample Recov	USCS	Lithology	Constructi  Depth	Well
		Composite sample ASB-32 collected from 0-10 ft bgs.	ted from	collec	ery SB-32	sample A	omposite		
N: N/A	SURFACE ELEVATION:	Sample ASR-32 callected from 0.0 5 it has for VOC:	Slot Size:		Period f	N/A	mple As	NOTES: Sample A:	2 5
,	EASTING: N/A	Water (ft):	epth to				ater (ft)	Depth to Water (ft):	Į p
	NORTHING: N/A	Screen Length (ft): N/A	creen L	S		t): N/A	fusal (f	Depth to Refusal (ft):	D
Velson	CTOR:	Total Depth (ft): N/A	otal De	I		10	ft):	Total Depth (ft):	H
J. Meyer		imeter: N/A	Well Diameter:	_		2	1.	Diameter (in):	D
2/1/2008		WELL DATA		Н		BOREHOLE DATA	REHOI	ВО	
2/1/2008	TARTED:	DRILLING METHOD: Geoprobe Direct Push with Macrocore Soil Sampling	ct Push	e Dire	oprob	OD: Ge	METH	RILLING	D
3870-LBA-1-5133		Aquifer Drilling and Testing, Inc.	er Drilli	Aquif		RACTO	CONT	DRILLING CONTRACTOR:	D
BEGS2006004		A	Section .	e II - 9	Phas	od Beach	Oakwo	PROJECT: Oakwood Beach Phase II - Section A	P
JG8554		CLIENT: New York City Department of Design and Construction	f Design	nent c	eparti	rk City D	New Yo	JENT: 1	0
N/A Staten Island NY	LOCATION: State	Page 1 of 1			38	New York, New York 10038	rk, New	New Yo	_
AJD*JL		DIMME LOS		-					

End of Boring at 10 ft bgs.			****			• • • • • • • • • • • • •	: ::::::::::::::::::::::::::::::::::::	
							∞ <u> </u>	
	to fine SAND, some coarse	Moderate brown (5YR4/4) coarse to fine SAND, some coarse to fine Gravel; saturated.			<b>****</b>	SP-SM		
Gravelly Sand	coarse to fine SAND, some	Dark yellowish brown (10YR4/2) coarse to fine SAND, some coarse to fine Gravel; saturated.			× × × × × × × × × × × × × × × × × × ×	SP-SM	~ <<<	
,								
Silty Clay  Silty Clay  Water at I ft	, wet.	Medium gray (N5) SILTY CLAY; wet			**********	<u>lililililililili</u> F	ताततीतत <u>ा</u>	
Remarks		Description	Blows/6 in PID (ppm)	Sample Recover	Sample Interva	Lithology USCS	Depth	Well Construction
1 1		NOTES: Sample ASB-33 collected from 0.5-1 it bgs for VOCs.  Composite sample ASB-33 collected from 0-10 it bgs.	0.5-1 It b	cted from SB-33 col	-33 colle umple A:	ple ASB posite s:	S: Sam	NOTE
N/A	ELEVA		Slot Size:		N/A	(ft):	Depth to Rock (ft):	Depth
			Depth to		-	r (ft):	Depth to Water (ft):	Depth
N/A	NORTHING: N/A	į.	Screen l		N/A	sal (ft):	Depth to Refusal (ft):	Depth
I Nelson	CTOR:		Total D		10	ť):	Total Depth (ft):	Total I
2/1/2008	DRII I EB.	Well Diameter: N/A	Well Di		2		Diameter (in):	Diame
2/1/2008		ROREHOLE DATA  ROREHOLE DATA	irect Pusi	oprobe D	DATA	ROREHOI E DATA	RORE	- CANALL
3870-LBA-1-5133	WOL #: 387	Aquifer Drilling and Testing, Inc.	ifer Drill	R: Aqu	ACTO	ONTR	DRILLING CONTRACTOR:	DELL
BEGS2006004		A	PROJECT: Oakwood Beach Phase II - Section A	15	1 Beach	akwood	ECT: C	PROJ
JG8554	۲	CLIENT: New York City Department of Design and Construction	t of Desig	epartmen	City D	w York	VT: Ne	CLIE
N/A Staten Island, NY	LOCATION: State	Page 1 of 1		38	ork 100	New Y	New York, New York 10038	Z
1114		CIMING LOS		100	To the part of the "old blook	· · · · · · · · · · · · · · · · · · ·		

End of Boring at 10 ft bgs.						· · · · · · · · · · · · · · · · · · ·	
							∞
Gravelly Sand		Moderate brown (5YR4/4) coarse to fine SAND, some coarse to fine Gravel; wet.				ž.	5
₩ater at 2.5 ft							υ 4
Clayey Silt	85/4) CLAYEY SILT; wet.	Moderate yellowish brown (10YR5/4) CLAYEY SILT; wet.					9
Remarks	-	Description	Blows/6 in PID (ppm)	Sample Recovery	USCS Sample Interval	Lithology	Well Construction
		Sample ASB-34 collected from 2-2.5 ft bgs for VOCs. Composite sample ASB-34 collected from 0-10 ft bgs.	2-2.5 ft by ected fron	ated from B-34 coll	3-34 collections	Sample ASE Composite s	NOTES:
N/A	SURFACE ELEVATION:	e: N/A	Slot Size:		N/A	ock (ft):	Depth to Rock (ft):
	-		Depth to		2.5	Vater (ft):	Depth to Water (ft):
	NORTHING: N/A	t):	Screen I		: N/A	Depth to Refusal (ft):	Depth to F
elson	CTOR:		Total Do		10	th (ft):	Total Depth (ft):
AVer		ameter: N/A	Well Diameter:		12	in):	Diameter (in):
2008	DATE FINISHED: 2/1/2008	WELL DATA			E DATA	BOREHOLE DATA	ВС
38/0-LBA-1-3133	DATE STARTED: 3/1/2	DRILLING METHOD: Geoprobe Direct Plush with Macrocore Soil Sampling	rect Push	probe Di	DD: Geo	GMETHO	DRILLIN
BEGS2006004	#	A Tacting Inc	Section for Drill	Phase II	d Beach	DRILLING CONTRACTOR: Aguifer Drilling	DRILLIN
554	PROJECT NO: JG8554	CLIENT: New York City Department of Design and Construction	of Desig	partment	CUITY De	New TOTA	CLIENT:
Staten Island, NY		Page I of I		L	OFK 1003	ENT. New York City Day	OI IENT.
		Drilling Log		. o	New York New York 10039	arci on ect,	Naw V
ASB-34						ofor Stroot	100

End of Boring at 10 ft bgs.	to medium SAND, little	Moderate brown (5YR3/4) coarse to medium SAND, little Silt, and medium to fine Gravel; wet.	Δ			<u>*****</u>		
Gravelly Silty Sand, Water at 5 ft bgs	coarse to medium \$AND.	Dark yellowish brown (10YR4/2) coarse to medium SAND, little Silt, little Gravel; wet.	<u>^</u>			Neda	× 6	
Silty Sand	VD. little Silt, trace fine	Dark gray (N3) coarse to fine SAND, little Silt, trace fine Gravel; moist.	Δ		2	Nes-Ark	- 1 1	
Remarks		Description	Blows/6 in PID (ppm)	Sample Recovery	USCS Sample Interval	Lithology	Depth	Well Construction
		Sample ASB-36 collected from 4.5-5 ft bgs for VOCs. Composite sample ASB-36 collected from 0-10 ft bgs.	4.5-5 ft bg ected from	ted from B-36 coll	B-36 colles sample AS	nple AS mposite	1	NOTES:
ION: N/A	SURFACE ELEVATION:	: N/A	Slot Size:	L	N/A	K (ft):		Depti
N/A	EASTING: N	Depth to Water (ft): N/A	Depth to			ter (ft):	Depth to Water (ft):	Depti
N/A	NORTHING: N	Screen Length (ft): N/A	Screen L			usal (ft	Depth to Refusal (ft):	Depti
. Lacantale	LBA INSPECTOR: J. Lacanlale	pth (ft): N/A	Total Depth (ft):		1	(ft):	Total Depth (ft):	Total
J. Meyer	DRILLER: J	meter: N/A	Well Diameter:		12	×	Diameter (in):	Diam
2/7/2008	DATE FINISHED: 2	WELL DATA			BOREHOLE DATA	EHOL	BOR	2
2/7/2008	DATE STARTED: 2	DRILLING METHOD: Geoprobe Direct Push with Macrocore Soil Sampling	rect Push	probe Di	OD: Geo	METH	LING	DRII
3870-LBA-1-5133		Aquifer Drilling and Testing, Inc.	fer Drilli	: Aqui	DRILLING CONTRACTOR:	CONT	LING	DRII
BEGS2006004	FMS ID#: B	A	- Section .	Phase II	PROJECT: Oakwood Beach Phase II - Section A	Oakwoo	ECT:	PRO
JG8554	۲	CLIENT: New York City Department of Design and Construction	of Design	partment	k City De	ew Yor	NT: N	CLIE
Staten Island, NY	LOCATION: S	Page 1 of 1		σ.	New York, New York 10038	k, New	iew Yor	-
1/ A		)						

at 10 ft bgs.					····	<b>****</b>		
	fine SAND, some course to	Medium light gray (N6) coarse to fine SAND, some coarse to fine Gravel; saturated.	Δ				**************************************	∞
Silty Sand  Silty Sand  Water at 5.5 ft bgs	fine SAND, some Silt;	Medium light gray (N6) coarse to fine SAND, some Silt: saturated.				**********		6
Clayey Silt	'SILT: moist.	Medium dark gray (N4) CLAYEY SILT; moist.	Δ.					· · · · · · · · · · · · · · · · · · ·
Remarks		Description	PID (ppm)	Blows/6 in	Sample Recovery	USCS Sample Interval	Lithology	Well Construction Depth
		Sample ASB-37 collected from 5-5.3 if bgs for VOCs. Composite sample ASB-37 collected from 0-10 it bgs.	5.5 ft bgs ted from	rom 5- collec	SB-37	sample A	Composite	NOTES:
ION: N/A	SURFACE ELEVATION:	: N/A	Slot Size:	S		N/A	Kock (II):	Depth to Rock (tt):
N/A	EASTING: N	Depth to Water (ft): N/A	epth to	D			Water (ft	Depth to Water (ft):
N/A	NORTHING: N	Screen Length (ft): N/A	creen L	S		1	Refusal (	Depth to Refusal (ft):
J. Lacanlale	CTOR:	Total Depth (ft): N/A	otal Dep	T		1	oth (ft):	Total Depth (ft):
J. Mever	s 1	meter: N/A	Well Diameter:	_		2	(in):	Diameter (in):
1/31/2008		WELL DATA		Н		BOREHOLE DATA	OREHO	8
1/31/2008	TARTED	DRILLING METHOD: Geoprobe Direct Push with Macrocore Soil Sampling	ct Push	e Dire	oprob	IOD: Ge	G METI	DRILLIN
3870 I B A I SI		Aquifer Drilling and Testing, Inc.	r Drillin	Aquife		DRILLING CONTRACTOR:	G CON	DRILLIN
RECEDITION		A	Section /	e II - 9	Phas	PROJECT: Oakwood Beach Phase II - Section A	T: Oakw	PROJEC
JG8554	۳	CLIENT: New York City Department of Design and Construction	f Design	nent o	epartr	ork City D	New Yo	CLIENT
N/A	LOCATION:	Page 1 of 1			38	New York, New York 10038	York, New	New
ASB-37	D.	Drilling Log		-	100	177 Water Street, 23rd Floor	THE TARRE	

	***************************************	\$ \$				Well Construction  Depth Lithology  USCS  Sample Interval Sample Recovery  Blows/6 in	NOTES: Sample ASB-38 collected from 2.5-3 it bgs for VOCs. Composite sample ASB-38 collected from 0-10 it bgs.		S	(ft): N/A	t): 10	Diameter (in): 2 Wall	ROBERO E DATA	DRILLING CONTRACTOR: Aquifer Dr	PROJECT: Oakwood Beach Phase II - Section A	G. and Constitution
700		Moderate brown (5YR4/4) coarse to fine SAND, some medium to fine Gravel; saturated.	Moderate brown (5YR4/4) coarse to fine SAND, little Silt. some coarse to fine Gravel; moist.	Dusky yellowish brown (10YR2/2) CLAYEY SILT, trace fine Gravel; moist.	Dusky yellowish brown (10YR2/2) CLAYEY SILT (organic debris); moist.	PID (ppm)  Description	it bgs for VOCs. rom 0-10 it bgs.	Size: N/A	Depth to Water (ft): N/A	ť:	Total Depth (ft): N/A	Well Diameter: NEAL DATA	ush with Macrocore Soil Sampling	Aquifer Drilling and Testing, Inc.	ion A	Sign and Construction
		e to fine SAND, some	e to fine SAND, little Silt,	2) CLAYEY SILT. trace	/2) CLAYEY SILT (organic			SURFACE ELEVATION:			LBA INSPECTOR: 1	ISHED:		WOL #: 38		PROJECT NO: JC
	End of Boring at 10 ft bgs.	GravellySand	Silty Sand  Silty Sand  Water at 3 ft bgs		Clayey Silt	Remarks		ON: N/A	A	Ä	J. Meyer	1/31/2008	1/31/2008	3870-LBA-1-5133	BEGS2006004	JG8554

Aquifer Design and Construction  PROJECT NO: Ustate pass thate II - Section A  Aquifer Drilling and Testing, Inc.  PROJECT NO: USS STORAGE Push with Macrocore Soil Sampling  Well Diameter: N/A  Depth (ft): N/A  Depth to Water (ft): N/A  Slot Size: N/A  Depth to Water (ft): N/A  Depth to Water (ft): N/A  Depth to Water (ft): N/A  Solid Size: N/A  Solid Size: N/A  Depth to Water (ft): N/A  Depth to Water (ft): N/A  Solid Size: N/A  Solid Size: N/A  Solid Size: N/A  Depth to Water (ft): N/A  Solid Size: N/A  Solid Size: N/A  Solid Size: N/A  Depth to Water (ft): N/A  Solid Size: N/A  Solid Size: N/A  Depth to Water (ft): N/A  Solid Size:	End of Boring						*******			
LOCATION: State   PROJECT NO: JG85   FMS ID#: BEG3   WOL #: 3870.   DATE STARTED: 1/31/    DATE FINISHED: 1/31/    LBA INSPECTOR: J. Ma   EASTING: N/A   SURFACE ELEVATION   SURFACE ELEVATION   ILT. trace fine Gravel:		to line SANE	olderate brown (5YR4/4) coarse					<b>\$</b>	<sub>∞</sub>	
PROJECT NO: PROJECT NO: ENIS ID#: WOL #: DATE STARTED: DATE FINISHED: DRILLER: LBA INSPECTOR: NORTHING: EASTING: SURFACE ELEVAT		T, trace fine G	ledium gray (N5) CLAYEY SIU aurated.				*******	:!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!		
PROJECT NO: PROJECT NO: ENIS ID#: WOL #: DATE STARTED: DATE FINISHED: DRILLER: LBA INSPECTOR: NORTHING: EASTING: SURFACE ELEVATIONS OF THE PROJECT OF THE PR	Wa bgs								t (2	
PROJECT NO: PROJECT NO: ENS ID#: WOL #: DATE STARTED: DATE FINISHED: DRILLER: LBA INSPECTOR: NORTHING: EASTING: SURFACE ELEVAT		sh gray (5GY4	ledium gray (N5) to dark greenis ILT, trace line Gravel; moist.				<b>*****</b>	<u>i!i!i!i!i</u> ≩		
PROJECT NO: ENIS ID#: WOL #: DATE STARTED: DATE FINISHED: DATE FINISHED: DRILLER: LBA INSPECTOR: NORTHING: EASTING: SURFACE ELEVAT	_		Description	PID (ppm)	Blows/6 in			Lithology USCS	Depth	Well Construction
PROJECT NO: PROJECT NO: ENS ID#: WOL #: DATE STARTED: DATE FINISHED: DRILLER: LBA INSPECTOR: NORTHING: EASTING: SURFACE ELEVAT			r vOCs. D ft bgs.	from 0-10	ollected	B-39 c	mple AS	nposite sa	2000	NOTES:
PROJECT NO: PROJECT NO: EMS ID#: WOL #: DATE STARTED: DATE FINISHED: DRILLER: LBA INSPECTOR: NORTHING:	1	SURFACE	N/A	Size:	Slot		N/A	(ft):		Depti
PROJECT NO: PROJECT NO: FMS ID#: WOL #: DATE STARTED: DATE FINISHED: DRILLER: LBA INSPECTOR: NORTHING:	4	EASTING:	N/A	th to Wa	Dep		1.5	er (ft):	Depth to Water (ft):	Depti
PROJECT NO: PROJECT NO: ENS ID#: WOL #: DATE STARTED: DATE FINISHED: DRILLER: LBA INSPECTOR:	G:	NORTHIN	N/A	en Lengi	Scre		N/A	ısal (ft):	Depth to Refusal (ft):	Depti
PROJECT NO: PROJECT NO: ENS ID#: WOL #: DATE STARTED: DATE FINISHED: DRILLER:	TOR:	LBA INSPI	N/A	d Depth	Tota		10	ft):	Total Depth (ft):	Total
PROJECT NO: FINS ID#: WOL #: DATE STARTED: DATE FINISHED:		DRILLER:		I Diamet	Wel		2		Diameter (in):	Diam
PROJECT NO: FMS ID#: WOL #: DATE STARTED:		DATE FINI					DATA	BOREHOLE DATA	BORI	
and Construction PROJECT NO: FMS ID#:  and Testing, Inc. WOL #:		DATE STA		Push with	Direct I	probe	D: Geo	IETHOI	LINGN	DRII
and Construction PROJECT NO:  FMS ID#:	3870-LB	WOL #:	nd Testing, Inc.	rilling ar	luifer D	: Ac	CTOR	DRILLING CONTRACTOR:	LING	DRII
PROJECT NO:		FMS ID#:		tion A	II - Sect	Phase	Beach	akwood	ECT:	PRO
rage 1 01 1		PROJECT	1 Construction	esign and	nt of D	partine	City De	w York (	NT: Ne	
Digital of I OCATION.		LOCATIO	Page 1 of 1			<b>o</b> c	rk 1003	New York, New York 10038	ew York	7
199 Water Street, 23rd Floor Drilling Log WELL ID: N/A		WELL ID:	rilling Log	Dr		ř	3rd Flo	199 Water Street, 23rd Floo	99 Water	_

End of Boring at 10 ft bgs.						•••••		
						·····	<u> </u>	∞
	o fine SAND, some coarso	Moderate brown (SYR4/4) coarse to fine SAND, some coarse to fine Gravel; saturated.	<u>v</u>			â		6
Water at 3.5 ft								45
e Gravelly Sand	to line SAND, some coars	Moderate brown (5YR4/4) coarse to fine SAND, some coarse to fine Gravel; wet.	Δ		$\bowtie$	SÞ		
	LAY; moist.	Medium light gray (N6) SILTY CLAY; moist	^			P		12
Silty Clay	SILTY CLAY; moist.	Pale yellowish orange (10YR8/6) SILTY CLAY; moist	Δ			Ð		
Remarks		Description	Blows/6 in PID (ppm)	Sample Recovery	Sample Interval	USCS	Depth Lithology	Well Construction
			NOTES: Sample ASB-40 collected from 3-3.5 ft bgs for VOCs. Composite sample ASB-40 collected from 0-10 ft bgs.	d from 40 coll	ASB-	osite sample	Comp	NOTES:
ION: N/A	ELEVA		Slot Size:	L	A	ft): N/A	Rock (	Depth to Rock (ft):
N/A			Depth to '				Water	Depth to Water (ft):
J. Lacantale	NORTHING:	ength (ft): N/A	Screen Length (ft):		A		Refus	Depth to Refusal (ft):
. Meyer			Total Denth (ft).				oth (ft	Total Depth (ft):
1/31/2008	ISHED:	ELL DATA	Well Diar	1	IA	er (in):	(in):	Diameter (in):
1/31/2008	DATE STARTED:	BODEHOLE Security Direct Push with Macrocore Soil Sampling	rect Push v	obe Di	Geopr	STHOD:		OKILLI
3870-LBA-1-5133		Aquifer Drilling and Testing, Inc.	ifer Drillin	Aqui	OR:	DRILLING CONTRACTOR:	NG CC	DRILLI
BEGS2006004			PROJECT: Oakwood Beach Phase II - Section A	nase II	ich Pl	kwood Be	T: Oa	PROJEC
JG8554	۳	a	of Design	urtment	Depa	York City	: New	CLIENT:
N/A	LOCATION:	Page 1 of 1			10038	New York, New York 10038	York,	New
ASB-40	D:	Drilling Log			Floor	199 Water Street, 23rd Floor	Water S	199

End of Boring at 10 ft bgs.					<b>*******</b>	*******		***************************************
GravelySand. Water at 5 ft bgs	o fine SAND, little coarse	Moderate brown (5YR4/4) coarse to fine SAND, little coarse to fine Gravel; wet.				***************************************		× 0
4	brown (10YR5/6) coarse to fine Gravel: moist.	nouncatale brown (5YR-44) to light brown (10YR-5/6) coarse to fine SAND, some Silt, some coarse to fine Gravel; moist.	7	(1)		4		در 4
Silty Sand	) medium to fine SAND,	Dusky yellowish brown (10YR2/2) medium to fine SAND, some Silt (organic debris); moist.	<u>^</u> _	11111	$\leftarrow$	× × ×		
Remarks		Description	PID (ppm)	Blows/6 in	Sample Interval	USCS	Lithology	Well Construction  Depth
		Sample ASB-41 collected from 4.5-5 ft bgs for VOCs. Composite sample ASB-41 collected from 0-10 ft bgs.	t.5-5 ft bg	from .	ASB-4	ASB-41 co ite sample	Compos	NOTES:
N: N/A	SURFACE ELEVATION:	N/A	Slot Size:	L	ľ	D: N/A	OCK (I	
	EASTING: N/A	Depth to Water (ft): N/A	Depth to				ater (	Depth to Water (ft):
	NORTHING: N/A	Screen Length (ft): N/A	Screen I	L		(II): N/A	efusal	Depth to Refusal (ft):
Lacanlale	LBA INSPECTOR: J. Lacanlale	Total Depth (ft): N/A	Total De	L			n (II):	Port to B f
J. Meyer		ameter: N/A	Well Diameter:			2	In):	Diameter (in):
2/5/2008	2.0	WELL DATA			À	BOREHOLE DATA	OREH	В
2/5/2008	DATE STARTED: 2/5	DRILLING METHOD: Geoprobe Direct Push with Macrocore Soil Sampling	rect Push	be Di	eopre	THOD: G	GME	KILLIN
3870-LBA-1-5133		Aquifer Drilling and Testing, Inc.	fer Drilli	Aqui	OR:	DRILLING CONTRACTOR:	G CO	DRILLIN
BEGS2006004		A	Section	ıse II -	h Pha	PROJECT: Oakwood Beach Phase II - Section A	: Oak	ROJEC
JG8554	ا:	CLIENT: New York City Department of Design and Construction	of Desig	tment	Depar	York City	New	LIENT
Staten Island, NY	LOCATION: State	Page 1 of 1			038	New York, New York 10038	ork, N	New 1
N1/ A		נ						

Water at 7 ft bgs							*******	∞
Gravelly Sand	to fine SAND, some coarse	Moderate brown (5YR4/4) coarse to fine SAND, some coarse to fine Gravel; wet.	_			*		6
Clayey Silt	CLAYEY SILT, trace fine	Dark yellowish orange (10YR6/6) CLAYEY SILT, trace line Gravel: moist.	Δ	***************************************		Ě		44
Silty Sand	3/4) coarse to fine SAND, avel; moist.	Moderate yellowish brown (10YR5/4) coarse to fine SAND, some Silt, little medium to fine Gravel; moist.	Δ			**************************************	1::::::::::::::::::::::::::::::::::::::	12
Remarks		Description	PID (ppm)	Blows/6 in	Sample Interval	USCS	Depth Lithology	L
		ss for VOCs. 10-10 ft bgs.	ted from	from 6 2 collec	SB-4	Sample ASB-42 collected from 6.5-7 ft bgs for VOCs. Composite sample ASB-42 collected from 0-10 ft bgs.	Compos	NOTES:
N: N/A	SURFACE ELEVATION:	(in): 0.1	Slot Size (in):	-		D: N/A	Depth to Rock (ft):	10
		Depth to Water (ft): 7	epth to	F		1	Depth to Water (ft):	0
	NORTHING: N/A	Screen Length (ft): 10	creen I	50		·:-	Depth to Refusal (ft):	0
acanlah	CTOR:	Total Depth (ft): 10	otal De	1			Total Depth (ft):	e
J. Meyer	- 1	Well Diameter (in):	Vell Dia	_		2	Diameter (in):	C
2/5/2008		WELL DATA			A	BOREHOLE DATA	OREH	-
2/5/2008	TARTED:	Geoprobe Direct Push with Macrocore Soil Sampling	ect Push	e Dir	eopro	DRILLING METHOD: G	G ME	
3870-J BA-1-5133		Aquifer Drilling and Testing, Inc.	er Drilli	Aquif		DRILLING CONTRACTOR:	G CO	-
SOUCES		A	Section	se II -	h Pha	PROJECT: Oakwood Beach Phase II - Section A	T: Oak	E
JG8554	7	CLIENT: New York City Department of Design and Construction	of Desig	ment o	Depart	York City I	New	
TWP-42	LOCATION: SE	Page 1 of 1			038	New York, New York 10038	York, N	£ .
A5B-42		AUTHUR POS			1001	T TO THE PARTY IS		

End of Boring	o medium SAND, little et.	Moderate brown (5YR3/4) coarse to medium SAND, little Silt, little medium to fine Gravel; wet,	^			×××××	SP-SM	aaaab.	шшш
Sand	coarse to fine SAND, some	Dark yellowish brown (10YR4/2) coarse to fine SAND, some Silt, little fine Gravel; wet.	Δ			<u> </u>	<u> </u>	∞ 	
Peat, Water at 5 ft bgs		Dark gray (N3) PEAT; wet.	Δ			******	ilililili 2	。 -	шшш
Sand Silty	) course to line SAND.	Dusky yellowish brown (10YR2/2) course to fine SAND, little Silt, little fine Gravel; moist.	Δ			<u> </u>	SF-SN	+ 12	
Remarks		Description	PID (ppm)	Blows/6 in	Sample Interva Sample Recover	USCS	Lithology	Depth	Well Construction
		Sample ASB-43 collected from 4.5-5 ft bgs for VOCs.  Composite sample ASB-43 collected from 0-10 ft bgs.	5-5 ft bg ed from	collect	SB-43	sample A	ple AS		NOTES:
ION: N/A	SURFACE ELEVATION:	(in): 0.1	Slot Size (in):	s		N/A	E.		epth
N/A		Depth to Water (ft): 5	epth to	D			er (ft)	Depth to Water (ft):	epth
N/A	NORTHING:	Screen Length (ft): 10	reen L	S		(): N/A	Isal (fi	Depth to Refusal (ft):	epth
I. Lacanlale	LBA INSPECTOR: J. Lacanlale	Total Depth (ft): 10	otal De	Ħ		1	E.	Total Depth (ft):	otal
J. Meyer		Well Diameter (in):	ell Dia	=		12		Diameter (in):	iame
2/7/2008		WELL DATA		-		BOREHOLE DATA	EHOI	BOR	
2/7/2008	DATE STARTED: 2	DRILLING METHOD: Geoprobe Direct Push with Macrocore Soil Sampling	ct Push	Dire	oprob	OD: G	HTEI	INGN	KE
3870-LBA-1-5133	WOL #:	Aquifer Drilling and Testing, Inc.	r Drillin	Aquife	R:	DRILLING CONTRACTOR:	LNO	INGC	RILI
BEGS2006004		A	ection .	8 - II e	n Phase	PROJECT: Oakwood Beach Phase II - Section A	)akwo	ECT: (	ROJ
JG8554	=	1 5	f Design	nent o	epartn	rk City L	w Yo	T: Ne	TIE
Staten Island, NY	Z	Page 1 of 1		_	138	New York, New York 10038	, New	w York	Z
TWP-13	WELL ID:	Sort Summer		_				:	

199 New	Wate	k, N	199 Water Street, 23rd Floor New York, New York 10038	Floo 10038	-			$\mathbf{Drilling} \ \mathbf{Log}$	WELL ID: N	ASB-44 N/A
CLIENT	 Z	ew	York City	Dep	artm	ent of I	Design	CLIENT: New York City Department of Design and Construction		JG8554
PROJE	T:	Oak	PROJECT: Oakwood Beach Phase II - Section A	ach P	hase	II - Se	ction /			BEGS2006004
DRILLI	S		DRILLING CONTRACTOR:		A	quifer	Drillin	Aquifer Drilling and Testing, Inc.		3870-LBA-1-5133
DRILLI	S	Ě	DRILLING METHOD: B-57		Aug	er Rig	with S	Auger Rig with Split Spoon Soil Sampling	DATE STARTED: 1/	1/24/2008
	BOR	EH	BOREHOLE DATA	1				WELL DATA		1/24/2008
Diameter (in):	r (in	<u>.</u> :	2			We	II Dia	Well Diameter: N/A	.	Mever
Total Depth (ft):	pth	3	12			Tot	al De	Total Depth (ft): N/A	CTOR:	J. Lacantale
Depth to Refusal (ft):	Ref	usal	(ft): N/A	A		Ser	een L	Screen Length (ft): N/A		A
Depth to Water (ft):	Wa	ter (	ft): 2			Det	oth to	Depth to Water (ft): N/A		A :
Depth to Rock (ft):	00	K (f	(): N/A	Þ		Slo	Slot Size:	N/A	SURFACE ELEVATION:	ON: N/A
NOTES:		mple	ASB-44 c site sample	ollect : ASB	ed fin	on 1.5-	2 ft bgs I from	Sample ASB-44 collected from 1.5-2 ft bgs for VOCs.  Composite sample ASB-44 collected from 0-12 ft bgs.		
Well Construction	Depth	Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description	-	Remarks
J	<del> </del>		NS NS				<u>^</u>	Dusky yellowish brown (10YR2/2) coarse to fine SAND, some Silt (roots); moist.	2/2) coarse to line SAND,	Silty Sand
			NIT-CL					Medium light gray (N6) to medium dark gray (N4) Silty Claywet.	ium dark gray (N4) Silty Clay:	Silty Clay, Water at 2 ft
2 4			NF-CL		s + 13 -		^	Medium light gray (N6) to medium dark gray (N4) Silty Clay. little medium to line Gravel; wet.	ium dark gray (N4) Silty Clay.	Gravelly Silty Clay
× .			SP-SM				<u>^</u>	Moderate brown (5YR4/4) coarse to fine SAND, little Silt some coarse to fine Gravel; wet.	se to line SAND, little Silt,	Gravelly Silty Sand
		1			13 X////					

Lo Lo	uis Be	198	Louis Berger & Assoc., P.C.	P.C.			PRO	PROJECT NO.: JG8554	BORING NO.:	ASB-44
Z	w Yor	N.	New York, New York 10038	038	-			Page 2 of 2	WELL NO.:	N/A
Well	Depth	Lith.	USCS	Interval	Rec.	Blows	PID	Description		Remarks
					11111	20				
	5		SP-SM	$\bowtie$	11	~	^	Moderate brown (5YR4/4) coarse to fine SAND, little Silt:	o fine SAND, little Silt;	Silty Sand
					111	12		wet.		
	1			>>>>	111	13				End of Boring
	-			$\bowtie$	1111	16				at 12 ft bgs.

mpling mpling N/A	Loui 199 New	Wate Vorl	r Str k, Ner	Louis Berger & Assoc., P.C. 199 Water Street, 23rd Floor New York, New York 10038 ENT: New York City Depa	, P.C. Floo 10038	artme	ent of	Design	Louis Berger & Assoc., P.C.  199 Water Street, 23rd Floor New York, New York 10038  CLIENT: New York City Department of Design and Construction	BORING ID: WELL ID: LOCATION: PROJECT NO:	ASB-45 N/A Staten Island, NY JG8554
Description  EDATA  EDATA  EDATA  Well Diameter: N/A  12  Total Depth (ft): N/A  8-45 collected from 3.5-4 ft bgs for VOCs. sample ASB-45 collected from 0-12 ft bgs.  Sample Recovery  Blows/6 in PID  PID  PID  Description  Description  Description  Description  Description  Description  Description  Description  Adderate brown (5YR4/4) coanse to fine SAND, trace Silt, son medium to fine Gravel; wet.	PROJEC	CT: 0	Oakw	ood Be	ach P	hase	II - Se	ction /		FMS ID#:	
EDATA  EDATA  Well Diameter:  Well Diameter:  N/A  12  Well Diameter:  N/A  4  Depth (ft):  N/A  Screen Length (ft):  N/A  Sollected from 3.5-4 ft bgs for VOCs.  Sample Recovery  Sample Recovery  Sample Recovery  I  Depth to Water (ft):  N/A  PID  PID  Description  Description  Description  Description  Description  Description  Description  Moderate brown (5YR4/4) coanse to fine SAND, trace Silt, sor medium to fine Gravel; wet.	DRILLI	SON	E	TRACT	OR:	A A	quifer	Drillin	and Testing, Inc.	WOL #:	1 1
2 Well Diameter: N/A 12 Total Depth (ft): N/A 13 Screen Length (ft): N/A 4 Depth to Water (ft): N/A 14 Depth to Water (ft): N/A 15 collected from 3.5-4 ft bgs for VOCs.  Sample Recovery  Sample Recovery    1		BOR	EHO	LE DA	TA	Augo	- Kig	c ultw	WELL DATA	DATE STARTS	- 1
12 Total Depth (ft): N/A  13: N/A  4 Depth to Water (ft): N/A  8-4 Obleted from 3.5-4 ft bgs for VOCs.  Sample Recovery  Sample Recovery  1 PID (ppm)  1 No Recovery  2 Al Description  Description  Description  Description  Description  Description  Al Moderate brown (5YR3/4) to dark, course to fine SaNID, trace Silt, son medium to fine Gravel; wet.	Diameter	r (in)		12			We	II Dia		DRILLER:	
Screen Length (ft): N/A  4 Depth to Water (ft): N/A  8-45 collected from 3.5-4 it bgs for VOCs.  Sample Recovery  Blows/6 in  PID (ppm)  2 Al No Recovery  1 Dusky yellowish brown (10YR4/2)  1 Moderate brown (5YR3/4) to dark, course to fine SaNID, trace Silt, son medium to fine Gravel; wet.	Total De	pth (	ft):	1 1			Tot	al Dep		LBA INSPECTO	R: J. Lacanlale
USCS Sample Interval Sample Recovery  Blows/6 in PID (ppm)  Description  Description  Dusky yellowish brown (10YR4/2)  Moderate brown (5YR3/4) to dark, course to fine SaNID, trace Silt, son medium to fine Gravel; wet.	Depth to	Retu	ısal (	1	A		Ser	een L		NORTHING:	
USCS  Sample Interval  Sample Recovery  Sample Recovery  Blows/6 in  PID (ppm)  1	Depth to	Wat	er (fi				Del	oth to		EASTING:	N/A
Construction  Depth  Lithology  USCS  Sample Interval  Sample Recovery  Blows/6 in  PID (ppm)  Dusky yellowish brown (5YR4/4) coanse to fine SAND, trace Silt, son medium to fine Gravel; wet.	Depth to	Roci	K (II)	N.	A		Slo	t Size:		SURFACE ELE	VAT
Construction  Depth  Lithology  USCS  Sample Interval  Sample Recovery  Blows/6 in  A A A A PID (ppm)	NOTES:		iple A	\SB-45 c	ollect ASB	ed fro	ım 3.5- ollected	4 ft bgs 1 from 1	for VOCs. -12 ft bgs.		
	Construction		Lithology	USCS	Sample Interval	Sample Recovery	Blows/6 in	PID (ppm)	Description		
	10	L				V	_	Δ	No Recovery		
¥ ¥	- L	<del> </del>		=				<u>^</u>	Dusky yellowish brown (10YR4/7	2) SILT (roots); mo	ist
¥g	٠.	**************************************	<u> </u>	i					Moderate brown (5YR3/4) to dark coarse to line SAND, trace Silt, sc wet.	greenish gray (5GY) nne coarse to line Gr	4/1) avel;
TXXX/	<u>و</u>	33335333355	<u>                                      </u>	~~~				Δ	Moderate brown (5YR4/4) coarse nedium to fine Gravel; wet.	to fine SAND, little	

				_		_
			Wel	Nes	199 199	
5		10 -	Dept	h Yor	iis Bei Wate	
			Lith	Z	rger r St	
	Sb		USC	New York, New York 10038	Louis Berger & Assoc., P.C. 199 Water Street, 23rd Floor	
			Interv	38	P.C. Floo	-
		JILL	Rec.		-	
7	7	7	Blows	-	T	1
	Δ		PID		PR(	
	Moderate brown (5YR4/4) coarse to fine SAND, trace fine Gravel; wet.		Description	Page 2 of 2	PROJECT NO.: JG8554	
	o fine SAND, trace fine			WELL NO.:	BORING NO.:	
End of Boring at 12 ft bgs.	Sand		Remarks	N/A	ASB-45	

SPASAM	×	□ 3	- - - - - -		Well Construction Depth Lithology	NOTES: Sample A: Composite	Depth to Rock (ft):	Depth to Water (ft):	Depth to Refusal (ft):	Total Depth (ft):	Diameter (in):	BOREHOLE DATA WELL DATA	DRILLING CONTRACTOR: B 57	PROJECT: Oakwood Beach Phase II - Section A	CLIENT: New York City Department of Design and Construction	New York, New York 10038
10 17	T = 5 °	+ 2 2 0	7 + 7 5	MLC1.	USCS Sample Interval Sample Recovery	Sample ASB-46 collected from 1.5-2 ft bgs for VOCs. Composite sample ASB-46 collected from 0-14 ft bgs.	N/A		U: N/A	14	12	LE DATA	RACTOR: Aq	ha	ork City Departme	York 10038
Δ	Δ	^	Δ	Δ	Blows/6 in PID (ppm)	m 1.5-2 ft bgs ollected from (	Slot Size (in):	Depth to	Screen Length (ft):	Total Depth (ft):	Well Dia	- Kig With S	uifer Drillin	II - Section A	nt of Design	
Dark yellowish brown (10YR4/2) course to fine SAND, little Silt, little course to fine Gravel; wet.	Dark yellowish brown (10YR4/2) coarse to fine SAND, some coarse to fine Gravel; wet.	Dark yellowish brown (10YR4/2) medium to fine SAND, trace Silt; wet.	Medium light gray (No) medium to fine SAND, some Silty Clay (roots); wet	Medium light gray (N6) to dark gray (N3) SILTY CLAY (roots); moist.	Description	for VOCs. )-14 ft bgs.	(in): 0.1	Depth to Water (ft): 3		th (ft): 14	Well Diameter (in):	WELL DATA	Aquifer Drilling and Testing, Inc.		and Construction	Page 1 of 2
coarse to fine SAND, little	coarse to fine SAND, some	) medium to fine SAND,	to fine SAND, some Silty	gray (N3) SILTY CLAY			SURFACE ELEVATION:			CTOR:	DRILLER:	3	1 1		$\mathbb{I}$	WELL ID: ATWP-LOCATION: Staten Is
Sand	Gravelly Sand	Sand	Sitty Clayey Sand  Water at 3 ft	Sity Clay	Remarks		ION: N/A	N/A	N/A	J. Lacaplale	1/22/2008	1/22/2008	3870-LBA-1-5133	BEGS2006004	JG8554	ATWP-46 Staten Island, NY

	ШП	ШШ	Ш	ШП	ШШП	Wel	Nev	Lot 199
į į	- -		- Distance	10 -		Dept	v Yor	и́s Ве Wate
						Lith.	K Ne	r Str
NS-48					Sp	USC:	New York, New York 10038	Louis Berger & Assoc., P.C. 199 Water Street, 23rd Floor
	<b>****</b>	$\bowtie$				Interv	038	P.C. Floor
				7//	VIII	Rec.		
	19	17	12	17	15 I	Blows		
Δ				<u>^</u>		PID		PRO
Moderate brown (5YR4/4) medium to fine SAND, little Silt: wet.					Moderate brown (5YR4/4) coarse to fine SAND, some coarse to fine Gravel; wet.	Description	Page 2 of 2	PROJECT NO.: JG8554
to line SAND, little Silt:					to fine SAND, some coarse		WELL NO.:	BORING NO.: A
Sitty Sand  End of Boring at 14 ft bgs.					Gravelly Sand	Remarks	ATWP-46	ASB-46

		0	+-	ı.		Well Construction	NOTES	Depth to Rock (ft):	Depth to Water (ft):	Depth to Refusal (ft):	Total Depth (ft):	Diameter (in):	DKILLI	DRILLING CONTRACTOR:	PROJECT: Oakwood Beach Phase II - Section A	CLIENT	New	Lou
aaaad	******		h/////////////////////////////////////	h.//h.//h.//h	, , , , ,	Depth	Con	Rock	Wat	Refu	pth (	r (in)		NGC	T: (	I. N	York	is Ber
<u></u> ≨	<u></u>	.{!::;::!::;::!::::::::: 	1357357357357	<i>₹</i> IJ <i>⋝</i> ₹IJ <i>⋝</i> ₹	$\mathcal{W}^{\mathbb{Z}}$	Lithology	iple A	k (ft)	er (f)	ısal (	3	.	E	NO.	Dakw	w Y	, Ne	ger &
*****		_	HIT.	THE RESERVE THE RE	HE T	USCS	SB-47 e e sample	: N/A			00	er (in):	HOD:	[RAC]	ood Be	ork City	New York, New York 10038	Louis Berger & Assoc., P.C.
						Sample Interval	ASB	A		)		A	B-57	OR:	ach P	Dep	10038	P.C
† 22	± 2 2 2 3	XIIIIIIII				Sample Recovery	ed fro						Augo	A	hase	artm	-	
		1 + 1	5 5 7 4	13 13 -		Blows/6 in	ollecter	Slo	De	Scr	7	W.	er Rig	quifer	II - Se	ent of		-
			Δ		<u>^</u>	PID (ppm)	5 ft bgs d from	Slot Size:	oth to	een L	Total Denth (ft)		with S	Drillin	ction /	Design		
Moderate brown (5YR4/4) coarse to line SAND, some medium to fine Gravel; wet.	Moderate brown (5YR4/4) coarse to Tine SAND, some medium to fine Gravel; wet.	Moderate brown (5YR4/4) to moderate yellowish brown (10YR5/4) coarse to line SAND, some Silt, little medium to fine Gravel; wet.	Moderate brown (10YR4/4) coarse to fine SAND, some Silt, little medium to fine Gravel (fill material - brick debris); wet.	Moderate yellowish brown (10YR5/4) CLAYEY SILT; moist.	Dusky yellowish brown (10YR2/2) coarse to fine SAND, some Silt, trace fine Gravel; moist.	Description	NOTES: Sample ASB-47 collected from 0-20 ft bgs. Composite sample ASB-47 collected from 0-20 ft bgs.			Screen Length (ft): N/A		ELL DAT/	BORELOI E 5.57 Auger Rig with Split Spoon Soil Sampling	Aquifer Drilling and Testing, Inc.		5	Page 1 of 2	Drilling I og
o line SAND, some	to fine SAND, some	erate yellowish brown ome Silt, little medium to	e to fine SAND, some Situaterial - brick debris); we	5/4) CLAYEY SILT:	) coarse to fine SAND,			ELEVA'		NORTHING:	DRILLER:	ISHED:	DATE STARTED:			ا≍		BORING ID:
	Gravelly Sand	Sity Sand	Sily Sand L (Fill)  Water at 3 ft	Clayey Silt (Fill)	Silty Sand	Remarks	- 1	ION: N/A	NA	J. Lacantale	J. Meyer	1/23/2008	1/23/2008	3870-LBA-1-5133	BEGS2006004	JG8554	N/A	ASB-47

				Ξ		<b>***</b>			36	
End of Boring at 20 ft bgs				7		<b>****</b>				
Sand	cy brown (5YR2/2) coarse	Moderate brown (5YR4/4) to dusky brown (5YR2/2) coarse to fine SAND, little fine Gravel; wet.	Δ	+ 5		<b>******</b>	Ą			
				- 5	1111					
				=		<b>****</b>				
	to little section, solite	medium to line Gravel; wet.		6		<b>****</b>	\$			
,	E Fine CAND	Modernia brown (SVP4/1) conseq	^	12 9	XIII		f		16 -	
				ç		<b>****</b>				
	to line struct, some	medium to fine Gravel; wet.		6		<b>****</b>	į			
	to line SANID some	Moderne brown (SYR4/4) coarse	^	۶ <u>۱</u> ۵	XIII		Ę		<b>=</b>	
				10		****			1	
		medium to fine Gravel; wet.		12		<b>****</b>				
	to line SAND, some	Moderate brown (5YR4/4) coarse to fine SAND, some	Δ	∞	M	<b>XXX</b>	SP		12-	
				7 6		<b>****</b>				
				y.		***			1	
	to fine SAND, some	Moderate brown (5YR4/4) coarse to fine SAND, some medium to fine Gravel; wet.	<u>^</u>	∞	11/1	<b>****</b>	SP		10	
				Si i					;	
Remarks		Description	PID	Blows	Rec.	Interv	usc	Lith.	Depti	Well
N/A	WELL NO.:	Page 2 of 2	1	$\vdash$		0038	New York, New York 10038	S. N.	w Yorl	Ne.
ASB-47	BORING NO.:	PROJECT NO.: JG8554	PR(		7	P.C. Floor	Louis Berger & Assoc., P.C. 199 Water Street, 23rd Floor	r Stre	is Ber Wate	195 Lo

	se to fine SAND, little coarse	Moderate brown (5YR4/4) course to fine SAND, little course to fine Gravel; wet.		12	11111		SP-SM		
Sand		Moderate brown (5YR4/4) coarse to fine SAND, little coarse to fine Gravel; wet.	Δ				SP-SM	******	
	2) coarse to fine SAND, some	Dark yellowish brown (10YR4/2) coarse to fine SAND, some Silt; wet.	Δ	+ 0, ∞ +	+ 5, & +		\$2	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	6
Silty Sand  Silty Sand  Water at 3 ft	se to line SAND, some Silt,	Moderate brown (3YR4/4) coarse to fine SAND, some Silt, little trace fine Gravel; moist.	2	7 6			<u> </u>	1	<i>t</i> -
Clayey Silt	ight brown (5YR5/6)	Moderate brown (SYR4/4) to light brown (SYR5/6) CLAYEY SILT; dry.	<u>^</u>	. or + or			C	 4	13
Remarks	_	Description	PID (ppm)	Blows/6 in	Sample Recovery	Sample Interval	CA.	Depth	Well Construction
		Sample ASB-48 collected from 3-3.5 ft bgs for VOCs, Composite sample ASB-48 collected from 0-20 ft bgs,	.5 ft bg.	om 3-3 collecte	SB-48	mple A	osite sa		NOTES:
N: N/A	SURFACE ELEVATION:	: N/A	Slot Size:	S		NA	(3)	KOCK	Deput to Rock (II):
	EASTING: N/A	Depth to Water (ft): N/A	pth to	De			r (ft):	Wate	Depth to Water (ft):
	NORTHING: N/A	Screen Length (ft): N/A	reen L	Sc		N/A	Depth to With (%)	Keins	ebui to
J. Lacanlale	TOR:		tal De	7 70		20	0:	pin (I	Denth to Defuce!
Meyer	DRILLER: J. N		ell Dia	1 5		3 1		(111):	Total Donth (
1/22/2008	DATE FINISHED: 1/2	WELL DATA		-		DALA	DOREHOLE DATA	ONE	innet
1/22/2008	TARTED:	Auger Rig with Split Spoon Soil Sampling	with S	er Rig		D. B.	BOBELOU E B-57	NG M	MILL
3870-LBA-1-5133	WOL #: 387	Aquifer Drilling and Testing, Inc.	Drillin	quifer		ACTO	DRILLING CONTRACTOR:	NGC	KILL
BEGS2006004	FMS ID#: BE	A	ection	11 - S	Phase	Beach	PROJECT: Oakwood Beach Phase II - Section A	1:0	KOJE
JG8554	ا≍	CLIENI: New York City Department of Design and Construction	Design	ent of	epartn	City D	w York	. Ne	LIEN
Staten Island,	Z.	Page 1 of 2		H	00	00 V 100	THE TOTAL NEW LOTA 10030		
1 0-40	WELL ID: N/A	Drilling Log			70 OOF	New York, New York 10038	Naw Y	Vark	Z S
ASB-48							100		

						1		
						Well	Nev	Lou
<b></b> ::::::::::::::::::::::::::::::::::::	≂	5 3	<del>-</del>	. <del></del>	<del></del>	Depti	v York	iis Berg Water
		· · · · · · · · · · · · · · · · · · ·				Lith.	N.	Str
	SP-SM	SP-SM	SP-SM	SP-SM	SP-SM	USCS	New York, New York 10038	Louis Berger & Assoc., P.C. 199 Water Street, 23rd Floor
						Interva	0038	P.C.
						Rec.	1	Ť.
io *	C 13		9 10 6	8 9 7 7	7 8 = 5 15	Blows	H	T
	<u> </u>	<u>^</u>	^	Δ	^	PID		PR(
	Moderate brown (5YR4/4) coarse to fine SAND, little coarse to fine Gravel; wet.	Moderate brown (5YR4/4) coarse to fine SAND, little coarse to fine Gravel; wet.	Moderate brown (SYR4/4) coarse to fine SAND, little coarse to fine Gravel; wet.	Moderate brown (5YR4/4) coarse to fine SAND, little coarse to fine Gravel; wet.	Moderate brown (5YR4/4) coarse to fine SAND, little coarse to fine Gravel; wet.	Description	Page 2 of 2	PROJECT NO.: JG8554
	fine SAND, little coarse	fine SAND, little coarse	tine SAND, little coarse	fine SAND, little coarse	o fine SAND. little coarse		WELL NO.:	BORING NO.:
End of Boring at 20 ft bgs.						Remarks	N/A	ASB-48

rk City Department of Design and Construction  ood Beach Phase II - Section A  RACTOR: Aquifer Drilling and Testing, Inc.  IOD: Geoprobe Direct Push with Macrocore Soil Sampling  EDATA  Well Diameter: N/A  Vell Diameter: N/A  DATE FINISHED:  N/A  Soreen Length (ft): N/A  NORTHING:  N/A  Slot Size: N/A  SURFACE ELEVAT	Date   Ensired   Date   Ensished   Date   Date   Ensished   Date   Date			ss for VOCs. 1.0-10 ft bgs.	Blows/6 in bected from PID (ppm)	Sample Interval Sample Recovery Sample Recovery	Sample ASB-49 collected from 4.5.5 ft bgs for VOCs. Composite sample ASB-49 collected from 0-10 ft bgs.  Sample Interval Sample Recovery Blows/6 in  All PID (ppm) Dusky ye trace fine	Well Construction Depth
rk City Department of Design and Construction  ood Beach Phase II - Section A  RACTOR: Aquifer Drilling and Testing, Inc.  IOD: Geoprobe Direct Push with Macrocore Soil Sampling  EDATA  Well Diameter: N/A  Vell Diameter: N/A  DRILLER:  10  Total Depth (ft): N/A  Screen Length (ft): N/A  Depth to Water (ft): N/A  EASTING:	WELL ID:   WELL ID:   WELL ID:	CE ELEVATION:		le:	Slot Size		(ft): N/A	to Rock
k City Department of Design and Construction  d Beach Phase II - Section A  ACTOR: Aquifer Drilling and Testing, Inc.  DD: Geoprobe Direct Pash with Macrocore Soil Sampling  E DATA  Well Diameter: N/A  Total Depth (ft): N/A  Screen Length (ft): N/A  NORTHING:  PROJECT NO:  PROJECT NO:  WMS ID#:  WAS ID#:  WAS ID#:  PROJECT NO:  WOL #:  DATE STARTED:  DATE FINISHED:	WELL ID:   LOCATION:   City Department of Design and Construction   PROJECT NO:   d Beach Phase II - Section A   WOL #:   DD: Geoprobe Direct Push with Macrocore Soil Sampling   DATE STARTED:   E DATA   Well Diameter:   N/A   DRILLER:   I0   Total Depth (ft):   N/A   NORTHING:   N/A   NORTHING:   N/A   NORTHING:	NG: N/A		Water (ft):	Depth to		1.	II to wate
A York City Department of Design and Construction  A Work City Department of Design and Construction  A Woll Beach Phase II - Section A  A Quifer Drilling and Testing, Inc.  BY WOL #:  ETHOD: Geoprobe Direct Push with Macrocore Soil Sampling  HOLE DATA  Well Diameter:  Well Diameter:  N/A  DATE FINISHED:  Total Depth (ft):  N/A  LEA INSPECTOR:	New York 10038         Page 1 of 1         WELL ID:           New York 10038         Page 1 of 1         LOCATION:           A York City Department of Design and Construction         PROJECT NO:           alwood Beach Phase II - Section A         FMS ID#:           ONTRACTOR: Aquifer Drilling and Testing, Inc.         WOL #:           ETHOD: Geoprobe Direct Push with Macrocore Soil Sampling         DATE STARTED:           HOLE DATA         Well Diameter:         N/A         DATE FINISHED:           D: 10         Total Depth (ft):         N/A         LBA INSPECTOR:           City: N/A         Second Locat (ft):         N/A         LBA INSPECTOR:	G:		Water (ft):	Danth to		1.	th to Wate
w York City Department of Design and Construction  akwood Beach Phase II - Section A  ONTRACTOR: Aquifer Drilling and Testing, Inc.  ETHOD: Geoprobe Direct Push with Macrocore Soil Sampling  HOLE DATA  Well Diameter: N/A  DRILLER:  OTHER TOTAL DEPTH (ft): N/A  LBA INSPECTOR:	New York 10038			ength (ft):	Screen I			th to Refus
akwood Beach Phase II - Section A  ONTRACTOR: Aquifer Drilling and Testing, Inc.  ETHOD: Geoprobe Direct Push with Macrocore Soil Sampling HOLE DATA  Well Diameter: N/A  DATE STARTED: DATE FINISHED:	New York 10038  New York 10038  Page 1 of 1  A CATION:  Page 1 of 1  A CATION:  PROJECT NO:  Rew York City Department of Design and Construction  Rew York City Department of Design and Construction  Rew York 10038  Page 1 of 1  PROJECT NO:  Rew York 10038  Page 1 of 1  PROJECT NO:  Rew York 10038  PROJECT NO:  Rew York 10038  Page 1 of 1  PROJECT NO:  Rew York 10038  PAGE TION:  PROJECT NO:  Rew York 10038  PAGE TON:  PROJECT NO:  Rew York 10038  PAGE TON:  PROJECT NO:  Rew York 10038  Page 1 of 1  PROJECT NO:  Rew York 10038  Page 1 of 1  PROJECT NO:  BMS 1D#:  WOL #:  BATE STARTED:  HOLE DATA  Well Diameter:  N/A  DRILLER:			epth (ft):	Total De		1	al Depth (r
w York City Department of Design and Construction  ### PROJECT NO:  #### PROJECT NO:  ##### PROJECT NO:  ###################################	New York 10038  New York 10038  Page 1 of 1  LOCATION:  Page 1 of 1  LOCATION:  PROJECT NO:  Alwood Beach Phase II - Section A  ONTRACTOR: Aquifer Drilling and Testing, Inc.  ETHOD: Geoprobe Direct Push with Macrocore Soil Sampling  MOL#:  DATE STARTED:  WELL ID:  WELL ID:  WELL ID:  ACTION:  ACTION:  WELL ID:  WELL ID:  ACTION:  ACTION:  WELL ID:  LOCATION:  PROJECT NO:  FMS ID#:  WOL #:  DATE STARTED:  DATE FINISHED:			ameter:	Well Dia			al Danth (f.
PROJECT NO: FMS ID#: WOL #: DATE STARTED: DATE FINISHED.	WELL ID: LOCATION: PROJECT NO: ENSI ID#: WOL #: DATE FINISHED: DATE FINISHED:		17.4	amatar.	Wall Di		2	meter (in):
PROJECT NO: FMS ID#: WOL #: DATE STARTED:	WELL ID: LOCATION: PROJECT NO: FMS ID#: WOL #: DATE STARTED:			WELL DAT		[A	HOLE DAT	BORE
PROJECT NO: FMS ID#: WOL #:	WELL ID: LOCATION: PROJECT NO: FMS ID#: WOL #:		_	with Macrocore S	rect Push	ieoprobe Di	FIHOD: C	ILLING M
autment of Design and Construction PROJECT NO: hase II - Section A FMS ID#:  Acoustic Design and Teacher Inc.  Acoustic Design and Construction Inc.  Acoustic D	Page   of	1	_	ng and Lesung, m	IEI DIIII	ON. Ayu	ONINACI.	II INC VI
and Construction PROJECT NO:  FMS ID#:	Page 1 of 1  And Construction  PROJECT NO:  FMS ID#:			no and Testino In	fer Drilli		ONTRACTO	ILLING C
and Construction PROJECT NO:	Page   1 of     WELL ID:	1	I SIVE	A	Section	ch Phase II	akwood Beac	OJECT: 0
BOCKLION.	WELL ID:		71.00	n and Construction	of Desig	Department	w York City I	IENI: Nev
Page 1 of 1 I OCATION:	WELL ID:	TION: Staten Island, NY		Page 1 of 1		000	MEN TOTATO	THE TOTAL
WELL ID:						1001	New York 10	New York.
Drilling Log	Dailing To		à	- 1		Hoor	311 cct. 231 d I	199 Water

+	to line SAND, little line	Moderate brown (5YR4/4) coarse to fine SAND, little fine Gravel; wet.	Mode Grave	<u>^</u>	o o	****	*****	¥		
	me Silt, little medium to	(5YR4/4) coarse to fine SAND, some Silt, little medium to fine Gravel; wet.	(5YR line (		= = 0		************		∞ 	
		Dark vellowish brown (10VB 17) to modern by	Dark	Δ	7 + 12	<b>********</b>	×	<u>\$</u>	6	
Gravelly Silty Sand	coarse to fine SAND, some	Dark yellowish brown (10YR4/2) coarse to fine SAND, some Silt, little medium to fine Gravel; wet.	Dark Silt, J	<u>^</u>	2 12		×××××		+	
Silt	) SILT; wet.	Dusky yellowish brown (10YR2/2) SILT; wet	Dust	<u>^</u>	12		<u></u>		. 13	
		No Recovery	No F	Δ	_	<b>*****</b>	×××××	0000	3	
Remarks		Description	PID (ppm)	Blows/6 in		Sample Interval Sample Recovery	USCS	Lithology	Depth	Well Construction
- 1			om 0-12 f	ected fr	0 coll	ASB-S	NOTES: Composite sample ASB-50 collected from 0-12 it bgs	ompos	ES: C	NOT
ON: N/A	ELEVA.		ize:	Slot Size:			): N/A	ck (ft	Depth to Rock (ft):	Depti
N/A			Depth to Water (ft):	Depth				ater (	Depth to Water (ft):	Depti
. Lacantale	NORTHING: NYA		Screen Length (ft):	Screen				fusal	Depth to Refusal (ft):	Depti
J. Meyer	I BA INSPECTOR.	T): N/A	Total Depth (ft):	Total			12	íť):	Total Depth (ft):	Total
1/25/2008	ISHED:	SLL DATA	Well Diameter:	Well		1	2	<u>n</u> ):	Diameter (in):	Diam
1/25/2008		BOREHOLE DATA WELL BATA	h Split S	Kig Wit	nger	A C	BOREHOLE DATA	REH	BO	
3870-LBA-1-5133	1	Aquifer Drilling and Testing, Inc.	lling and	ifer Dri	Aqu	<u>ن</u> ا	DRILLING CONTRACTOR:	CON		DRI
BEGS2006004			on A	- Section	Ise II	h Ph	PROJECT: Oakwood Beach Phase II - Section A	Oak	JECT	PRO
JG8554	٦	New York City Department of Design and Construction	ign and	of Des	tmen	Эераг	ork City I	New 1	CLIENT:	CLI
Staten Island, NY	LOCATION: S	Page 1 of 2	P.			038	New York, New York 10038	ork, No	Yew Yo	
114										

	Wel	Neg	199 199	
	Depti	w York	uis Ber Wate	
	Lith.	, Ne	ger &	
	USCS	New York, New York 10038	Louis Berger & Assoc., P.C. 199 Water Street, 23rd Floor	
	Interv	0038	P.C. Floor	
	Rec.			
© = x x x x	Blows	$\vdash$	Т	-
<u>^</u>	PID		PRC	
	Description	Page 2 of 2	PROJECT NO.: JG8554	
		WELL NO.:	BORING NO.: ASB-50	
End of Boring at 12 ft bgs.	Remarks	N/A	ASB-50	

∞	σ 1 2 3 3 4	£ \$	<u> </u>		Sample Interval Sample Recovery Blows/6 in	NOTES: Sample ASB-51 collected from 2.5-3 ft bgs for VOCs. Composite sample ASB-51 collected from 0-14 ft bgs.		3	Depth to Refusal (ft): N/A Scree	12		BOREHOLE DATA  WELL DATA	DRILLING CONTRACTOR: Aquifer D	PROJECT: Oakwood Beach Phase II - Section A	CLIENT: New York City Department of Design and Construction	New York, New York 10038
Moderate brown (5YR4/4) coarse to fine SAND, little medium to fine Gravel; wet.		Moderate brown (5YR4/4) to moderate yellowish brown (10YR5/4) coarse to fine SAND, some coarse to fine Gravel; wet.	Moderate brown (5YR4/4) coarse to fine SAND, some Silt. little coarse to fine Gravel: wet	Dusky yellowish brown (10YR2/2) coarse to fine SAND, some Silty (roots); moist.  Moderate yellowish brown (10YR5/4) medium to fine SAND some SILT; moist.	PID (ppm)	it bgs for VOCs. rom 0-14 ft bgs.	Slot Size (in): 0.1		ť):	Total Depth (ft): 12	Well Diameter (in):	ush with Macrocore Soil Sampling		ion A	esign and Construction	Page 1 of 2
to fine SAND, little		berate yellowish brown some coarse to fine Gravel;	to line SAND, some Silt,	2) coarse to fine SAND, (5/4) medium to fine SAND,			SURFACE ELEVATION:			CTOR:	DRILLER: 1/2				۲	LOCATION: St
		GravellySand	Gravelly Silty Sand  Sand  Water at 3 ft bgs	Silty Sand	Remarks		ON: N/A	A	A	J. Lacantale	1/25/2008	1/25/2008	3870-LBA-1-5133	BEGS2006004	JG8554	Staten Island, NY

Well Louis Berger & Assoc., P.C. 199 Water Street, 23rd Floor New York, New York 10038 Depth Lith. USCS Interval Rec. Blows ^ PID PROJECT NO.: JG8554 Moderate brown (5YR4/4) coarse to fine SAND, little fine Gravel; wet. Page 2 of 2 Description WELL NO.: BORING NO.: ASB-51 ATWP-51 End of Boring at 12 ft bgs. Sand Remarks

∞			4	Well Construction	NOTES	Depth to Rock (ft):	Depth to Water (ft):	Depth to Refusal (ft):	Total Depth (ft):	Diameter (in):		DRILLING CONTRACTOR:	PROJECT: Oakwood Beach Phase II - Section A	CLIENT:	New New	Lou
	<u>:</u>		, , , , , , , , , , , , , , , , , , ,	Depth	: San	Roc	Wat	Refu	pth (	r (in)		NG	: :	Z.	Yorl	is Ber
	::::::::::::::::::::::::::::::::::::::	<u> </u>		Lithology	iple A	k (ft)	er (fi	ısal (	ft):		EHO	ON	Oakw	w Y	r Stra	ger &
****	·		F	USCS	SB-52 cr	: N/A	·-	ft): N/A	10	10	BOREHOLE DATA	I'RACT	ood Bea	ork City	199 Water Street, 23rd Floor New York, New York 10038	Louis Berger & Assoc., P.C.
				Sample Interval	ASB	1		A		;	TA	OR:	ich Pl	Depa	Floor 0038	P.C.
				Sample Recovery	ed from						1 300	A	hase I	urtme		1
				Blows/6 in	n 4.5- illected	Slo	De	Scr	Tot	W	Jirect	uifer	I - Se	nt of		$\neg$
	<u>^</u>		<u>^</u>	PID (ppm)	5 ft bgs J from (	Slot Size:	oth to	een Le	al Dep	II Dia	Push	Drillin	ction A	Design		
Moderate brown (5YR44) coarse to fine SAND, some Silt, little coarse to fine Gravel; saturated.	Moderate yellowish brown (10YR5/4) coarse to fine SAND some coarse to fine Gravel; saturated.	Dark yellowish brown (10YR4/2) coarse to fine SAND, some coarse to fine Gravel; saturated.	Medium gray (N5) CLAYEY SILT; mois	Description		N/A	: N/A	t): N/A	. N/A	Well Diameter: N/A	il Sampling	_		New York City Department of Design and Construction	Page 1 of 1	
tine SAND, some Silt.	4) coarse to line SAND,	carse to fine SAND, some	'i moist			ELEVA'			CTOR.	DRILLER:		1 1		۱.		BORING ID:
Gravelly Silty Sand Sand End of Boring at 10 ft bgs.		Gravelly Sand	Clayey Silt  Z Water at 1.5 ft	Remarks		ION: N/A	N/A	N/A	I I avantata	1/31/2008	1/31/2008	3870-LBA-1-5133	BEGS2006004	JG8554	N/A Staten Island, NY	ASR-50

× 5	4 13	Well Construction	NOTES:	Depun to Rock (II):	Depth to Water (ft):	Depth to Refusal (ft):	Total Depth (ft):	Diameter (in):	В	DRILLI	DRILLING CONTRACTOR: Aquifer Drilling	DDOTEC	New New	Loui
<del> </del>	::::::::::::::::::::::::::::::::::::::	Depth	Con	KOCK	Wate	Refu	) th	(in)	ORI	VG V	G	N. INC.	York	Ber
SP-SM	::::::::::::::::::::::::::::::::::::::	Lithology	ple A		er (fit	sal (	.  <del>.</del>	"	OHE	ETI	ON.	WI	New	ger &
<u> </u>	WS-18	USCS	SB-53 c	N/A		ft): N/A	1	2	BOREHOLE DATA	HOD:	TRACT	ork City	New York, New York 10038	Louis Berger & Assoc., P.C.
		Sample Interva	ASB			A			TA	Jeop	OR:	Dep	0038	P.C.
		Sample Recover	53 c							robe	12	artm	"	
^		Blows/6 in	ollected	Slot	Dep	Scr	Tota	We		Direct	III - Sec	ent of L		$\dashv$
Δ	Δ	△ PID (ppm)	ft bgs	Slot Size:	th to	een Le	al Dep	Well Diameter:		Push v	orilling	esign		
Moderate brown (5YR4/4) coarse to line SAND, little Sili, some medium to line Gravel; saturated.	debris); wet.  Moderate yellowish brown (10YR5/4) coarse to fine SAND, little Silt, some medium to fine Gravel; saturated.	Description  Dasky vellowish brown (10782/2) Clavey SII T (accents)	Sample ASB-35 collected from 0.5-1 ft bgs for VOCs. Composite sample ASB-53 collected from 0-15 ft bgs.	N/A	Depth to Water (ft): N/A	Screen Length (ft): N/A	N/A	N/A	WELL DATA	DRILLING METHOD: Geoprobe Direct Push with Macrocore Soil Sampline	and Tacting Inc	PROTECTE: Orleand In The Transport of Design and Construction	Page 1 of 2	D_:::::- 7
o fine SAND, little Silt, ted.	(4) coarse to line SAND, wel, saturated.	Claves XII T (opensio		SURFACE ELEVATION:			CTOR:	.		DATE STARTED:	#	FNO:		BORING ID:
	Water at 1 ft bgs  Gravely Silty Sand	Remarks		ION: N/A	N/A	N/A	J. Lacantale	J. Mever	1/31/2008	58/0-LBA-1-5133	BEGS2006004	JG8554	N/A Staten Island, NY	ASB-53

		Well	7		_
14 12 10		Depth	ew Yorl	ouis Ber 99 Wate	
		Lith.	Z	r Sti	
Ä		USCS	New York, New York 10038	Louis Berger & Assoc., P.C. 199 Water Street, 23rd Floor	
	<b>*****</b>	Interva	0038	P.C.	
		Rec.	1"	ā ·	
V		Blows	$\vdash$	Τ	1
Δ		PID		PR	
Moderate brown (5YR4/4) coarse to line SAND, little line Gravel; saturated.		Description	Page 2 of 2	PROJECT NO.: JG8554	
o line SAND, little fine			WELL NO.:	BORING NO.:	
Gravelly Sand Gravelly Sand at 15 ft bgs.		Remarks	N/A	ASB-53	

End of Boring at 10 ft bgs.				∞ ∞	*****	******		
			Δ	= 7 5 %		************		∞
Gravelly Sand	to line SAND, some coarse	Moderate brown (5YR4/4) coarse to line SAND, some coarse to line Gravel; wet.	^	31 31	*****	¥ ************************************		0
	rk yellowish brown some Silt. little coarse to	Moderate brown (10YR4/4) to dark yellowish brown (10YR4/2) coarse to fine SAND, some Silt, little coarse to fine Gravel; wet.	Δ	o + 1> +	*****	<u> </u>		,
Gravelly Silty Sand	rk greenish gray (5GY4/1) ittle coarse to fine Gravel:	Moderate brown (10YR4/4) to dark greenish gray (5GY4/1) coarse to fine SAND, some Silt, little coarse to fine Gravel; wet.		· · · · ·		××××××		4-
Silty Clay, Water at 2.5 ft bgs	LAY; wet.	Medium light gray (N6) SILTY CLAY; wet.	^	277777		S S S S S S S S S S S S S S S S S S S		13
		No Recovery	Δ			××××××××××××××××××××××××××××××××××××××		9
Remarks		Description	PID (ppm)	Blows/6 in	Sample Interval Sample Recovery	USCS	Lithology	Well Construction  Depth
		0-10 ft bgs.	2-2.5 ft bgs cted from	from :	ASB-5	Sample ASB-54 collected from 2-2.5 ft bgs for VOCs. Composite sample ASB-54 collected from 0-10 ft bgs.	Compo	NOTES:
ON: N/A	SURFACE ELEVATION:	N/A	Slot Size:	L		t): N/A	ock (I	
N/A		Water (ft):	Depth to				Vater	Depth to Water (ft):
NA		Screen Length (ft): N/A	Screen L			l (ft): N/A	efusa	Depth to Refusal (ft):
J. Lacanlale	CTOR:		Total Depth (ft):	L		10	th (ft)	Total Depth (ft):
J. Mever		meter: N/A	Well Diameter:			2	in):	Diameter (in):
1/25/2008	DATE FINISHED:	BOREHOLE DATA WELL DATA	S min S		A	BOREHOLE DATA	DREH	В
3870-LBA-1-5133	1	Adulter Drilling and Testing, Inc.	rer Drillir	Aqui	57 2	DRILLING CONTRACTOR:		RILLIN
BEGS2006004	#		Section /	se II -	ha	PROJECT: Oakwood Beach Phase II - Section A		RUJEC
JG8554	ا۳	CLIENT: New York City Department of Design and Construction	of Design	ment	Depart	York City I	New	LIENT:
Staten Island, NY	Z.	Page 1 of 1		L	038	New York, New York 10038	ork,	New Y
N/A	WELL ID:	0						

TW Sta	at 10 ft bgs					****	<b>***</b>	::::	
Mart Hoor   Pit Hilling LOS		greenish gray (5GY4/1) ttle coarse to line Gravel;	Moderate brown (\$YR4/4) to dark coarse to line \$AND, some \$ilt, lit saturated.	^				<u> </u>	×
Well Discrete Plush with Macrosone Soil Sampling   DATE STARTED:	Gravelly Sil Sand, Water at 5.5 ft bgs.	coarse to line SAND, some turated.	Dark yellowish brown (10YR4/2) Silt, little coarse to fine Gravel; sa	Δ			<b>*******</b>	2	6
Vork 10038  Vork 10038  Reach Phase II - Section A  Aguifer Drilling and Construction  Aguage 1 of 1  ACTOR: Aquifer Drilling and Testing. Inc.  DD: Geoprobe Direct Push with Macrocore Soil Sampling  EDATA  Well Diameter (in): 1  IO Total Depth (ft): 10  Screen Length (ft): 10  B-55 collected from 5-5.5 it bgs for VOCs,  sample ASB-55 collected from 0-10 it bgs.  Blows/6 in  PID  Medium gray (N5) CLAYEY SILT; moist.		T saturated.	Medium gray (N5) CLAYEY SIL	<u>^</u>			<b></b>	!!!!!! ≩	
Vork 10038  Vork 10038  Reach Phase II - Section A  ABeaich Phase II - Section A  ACTOR: Aquifer Drilling and Testing. Inc.  DD: Geoprobe Direct Push with Macrocore Soil Sampling  EDATA  Well Diameter (in):  IO  Total Depth (ft):  S.5  Depth to Water (ft):  Soil Size (in):  N/A  Sample Recovery  Biows/6 in  PID  Description  Description  Description  Description  Well Diameter (in):  IO  Total Depth (ft):  Soreen Length (ft):  Depth to Water (ft):  Soil Size (in):  O.1  SurFACE ELEVAT  Medium gray (N5) CLAYEY SILT; moist.							***************************************		
Well Discrete   Well Discret	Clayey Silt	Ti moist.	Nedium gray (NS) CLAYEY SIL	^	S (1983) MATERIA (2017)		***************************************	<u>                                      </u>	
Vork 1003         Department of Design and Construction         WELL ID: LOCATION:           k City Department of Design and Construction         PROJECT NO: FINS ID#: FI	Remark		Description	PID (ppm)	Blows/6 in			Lithology	Construction
WELL ID:   LOCATION:   Page 1 of 1     LOCATION:   PAGE 1 of 1     PROJECT NO:   PAGE 1 of 1     PROJECT NO:   P			gs for VOCs. n 0-10 ft bgs.	ed from	om 5-:	SB-55	sample As	Composite s	
WELL ID:   LOCATION:   WELL ID:   LOCATION:   Page 1 of 1   PROJECT NO:   PAGE 1 of 1   PROJECT NO:   PROJECT NO		SURFACE ELEVATIO		ot Size	2		N/A	OCK (II):	epui to i
Vork 1003         Data Hull LOS         WELL ID:           Vork 10038         Page 1 of 1         LOCATION:           k City Department of Design and Construction         PROJECT NO:           vd Beach Phase II - Section A         FMS 10#:           AACTOR: Aquifer Drilling and Testing. Inc.         WOL #:           OD: Geoprobe Direct Push with Macrocore Soil Sampling         DATE STARTED:           E DATA         WELL DATA         DATE FINISHED:           2         Well Diameter (in):         1         DRILLER:           10         Total Depth (ft):         10         NORTHING:           b: N/A         Screen Length (ft):         10         NORTHING:				epth to	D		5.5	Vater (ft):	epth to
Lard toor         Description         WELL ID:           ork 10038         Page 1 of 1         LOCATION:           City Department of Design and Construction         PROJECT NO:           Beach Phase II - Section A         FMS ID#:           ACTOR: Aquifer Drilling and Testing. Inc.         WOL #:           D: Geoprobe Direct Push with Macrocore Soil Sampling         DATE STARTED:           DATA         WELL DATA           DATE FINISHED:         DATE FINISHED:           DATE STARTED:         DRILLER:           10         Total Depth (ft):         10           LBA INSPECTOR:         LBA INSPECTOR:				reen I	Sc			Refusal (ft)	epth to I
WELL ID: LOCATION: PROJECT NO: ENIS ID#: WOL #: DATE FINISHED: DRILLER:	Lacanlale			tal De	T		1	th (ft):	otal Dep
WELL ID: LOCATION: PROJECT NO: ENS ID#: WOL #: DATE STARTED: DATE FINISHED:	Javar		ameter (in):	ell Dia	¥		2	(in):	iameter
WELL ID: LOCATION: PROJECT NO: ENIS ID#: WOL #: DATE STARTED.	1/2008	- 1	WELL DATA		$\dashv$		E DATA	DREHOL	В
Page   Of   WELL ID:   Page   Of   LOCATION:   LOCATION:   PROJECT NO:   PROJECT NO:	/0-LBA-1-51		with Macrocore Soil Sampling	et Push	Direc	probe	D: Ge	GMETHO	RILLIN
Page   1 of     LOCATION:   and Construction   PROJECT NO:	GS2006004	#:	A Tacting Inc.	ection	II-S	na	ACTO	G CONTI	RILLIN
WELL ID: LOCATION:	8554		n and Construction	Desig	ent of	partin	K CITY D	INCM TOTAL	DO IEC
WELL ID:	iten Island, N		Page 1 of 1		$\vdash$	3	01 100	OI A, INCH	TENT.
	VP-55		Sort Summer			0	Tall Inn	and Now 1	Now 1

End of Boring at 10 ft bgs.					*********	*******		
Gravelly Silty Sand	fine SAND, some Silt,	Moderate brown (5YR4/4) coarse to fine SAND, some Silt little coarse to fine Gravel; saturated.	Δ			_	<u>                                     </u>	∞
	/4) coarse to fine SAND,	Moderate yellowish brown (10YR5/4) coarse to fine SAND some coarse to fine Gravel; saturated.	Δ	,,,,,,		*******	ş,	
Gravelly Sand	oarse to fine SAND, some	Dark yellowish brown (10YR4/2) coarse to fine SAND, some coarse to fine Gravel; saturated.	Δ	,,,,,,	*****	******	::::::::::::::::::::::::::::::::::::::	
						***************************************		4-
Water at 1.5 l			-	<u> </u>		×××××××××××××××××××××××××××××××××××××××		13
Clayey Silt	ľ; moist	Medium gray (N5) CLAYEY SILT; moist	Δ	711111	****	ž ××××××××××××××××××××××××××××××××××××		
Remarks		Description	PID (ppm)	Blows/6 in	Sample Interval	USCS	Depth Lithology	Well Construction
		Sample ASB-56 collected from 1-1.5 ft bgs for VOCs. Composite sample ASB-56 collected from 0-10 ft bgs.	-1.5 ft bg cted from	from 1	ASB-5	ASB-56 co	Sample , Composi	NOTES:
N: N/A	ELEVA'	N/A	Slot Size:	L		: N/A	Rock (ft	Depth to Rock (ft):
	EASTING: N/A	N/A	Depth to				Water (	Depth to Water (ft):
Lacanlale	IOK:	t): N/A	Screen I			- 1	Refusal	Depth to Refusal (ft):
J. Meyer	I DA INSPECTOR :	Total Depth (ft): N/A	Total De	,		10	oth (ft):	Total Depth (ft):
1/31/2008	ISHED:	WELL DATA	Well Di	-	2	er (in): 2	(in):	Diameter (in):
1/31/2008		ROBERTOLE DATA	ect Push	be Dir	copro	HOD: G	OBEH	DAILL
3870-LBA-1-5133		Aquifer Drilling and Testing, Inc.	fer Drilli	Aqui	OR:	TRACTO	NG CON	DRILLING CONTRACTOR:
BEGS2006004		A	Section	ıse II -	ch Pha	vood Beau	T: Oakv	PROJECT: Oakwood Beach Phase II - Section A
JG8554	×	ã	of Desig	tment	Depar	ork City	: New Y	CLIENT:
'A		Page 1 of 1			038	New York, New York 10038	York, Ne	New
ASB-56	BORING ID: AS	Drilling I og				199 Water Street 33rd Floor	Vater Str	199

!!!!					¥	Lithology	NOTES:	Depth to Rock (ft):	Depth to Water (ft):	Depth (ft):	Width (ft):	Length (ft):		EXCA.	EXCA	PROJ	CLIEN	
					 	USCS	ı, s	to Rock	o Wate	ft):	ft):	(ft):	EXCAVATION DATA	EXCAVATOR:	VATIO	ECT: C	T: Ne	1
-	4	ω L	ì	<b>.</b>		Depth (ft)		(ft):	r (ft):				ATIO	۳.	N CO	akwoc	w Yorl	
						PID (ppm)		N/A	12	O,	w	6	N DA	Bac	NTRA	od Bea	City	
			Medium ligi		Dark gray (1 Silt, little co			1					TA	Backhoe	EXCAVATION CONTRACTOR:	ch Phase II	Departmen	0.00
			Medium light gray (N6) CLAY; wet		N3) to very dusky arse to fine Grave				Restoration:	Lifts (ft):	Compaction:	Material:	BA		Environmenta	PROJECT: Oakwood Beach Phase II - Section A	CLIENT: New York City Department of Design and Construction	
			Y; wet.		Dark gray (N3) to very dusky red (10YR2/2) coarse to fine SAND, some Silt, little coarse to fine Gravel, little organic material; wet.	Description			N/A	N/A	Tamping	Excavated Fill	BACKFILL DATA		Environmental Closures, Inc.		Construction	L 466 T 01 T
					fine SAND, some wet.			GROUND E	EASTING (ft):	NORTHING (ft):	LBA INSPECTOR:	OPERATOR:	DATE FINIS	DATE STAF		FMS ID#:	PROJECT NO: JG8554	LOCATION:
Bottom of Pit at 5 ft. bgs.			Clay	Water Level at 2 ft. bgs.	Silty Sand	Remarks		VA.	1	-	TOR:	R: B. Karshick	DATE FINISHED: 2/25/2008	DATE STARTED: 2/25/2008	3870-LBA-1-5133	BEGS2006004	NO: JG8554	N: Staten Island, NY

Louis Berger & Assoc., P.C. 199 Water Street, 23rd Floor New York, New York 10038

Test Pit Log Page 1 of 1

TEST PIT NO.: TP-1

**FMS ID#:** BEGS2006004 **WOL #:** 3870-LBA-1-5133 PROJECT NO: JG8554 LOCATION: Staten Island, NY

,	4-	SM 3 -	2-	SVI	SM Dark gray (N3) to du some Silt, little coars	USCS Depth (ft) PID (ppm)	NOTES:	Depth to Rock (ft): N/A	Depth to Water (ft): N/A Restoration:	Depth (ft): 5 Lifts (ft):	Width (ft): 3 Compaction:	Length (ft): 5 Material:	EXCAVATION DATA	EXCAVATOR: Backhoe	EXCAVATION CONTRACTOR: Enviro	PROJECT: Oakwood Beach Phase II - Section A	
		Medium light gray (N6) to moderate brown (5YR4.4) coarse to fine SAND some Silt, little Clay, little coarse to fine Gravel, moist.		Moderate yellowish brown (10YR5/4) to dark yellowish orange (10YR6/6) coarse to fine SAND, some Silt, little Clay, trace Brick Debris; moist.	Dark gray (N3) to dusky yellowish brown (10YR2/2) coarse to fine SAND, some Silt, little coarse to line Gravel, little Organic Material; moist,	Description			N/A	N/A	Tamping	Excavated Fill	BACKFILL DATA DATE FI		Environmental Closures, Inc. WOL #:		PROJEC
Bottom of Pit at 5 ft, bgs.		D Silty Sand		Silty Sand (Fill)	D, Silty Sand	Remarks		VA.		7	TOR:	OR: B. Karshick	DATE FINISHED: 2/25/2008	DATE STARTED: 2/25/2008		: BEGS2006004	PROJECT NO: JUS534

CTT										,										
					i !		Lithology	NOTES	Dept	Dept	Dept	Widt	Leng		EXC	EXC	PRO	CLI		
			CL			NS.	USCS	ES:	Depth to Rock (ft):	Depth to Water (ft):	Depth (ft):	Width (ft):	Length (ft):	EXCAVATION DATA	EXCAVATOR:	AVATIO	JECT:	ENT: N	New York, New York 10038	Louis Berger & Assoc., P.C. 199 Water Street, 23rd Floor
4	4	3 		J	_		Depth (ft)		k (ft):	er (ft):				VATIC	₽:	ON CO	Oakwo	ew Yor	New Y	ger & A
							PID (ppm)		z	_	S	w	7	N D	Ba	NTR	od Be	k City	ork 10	ssoc.,   23rd F
			Medium ligh			Dark gray () some Silt, li			N/A					ATA	Backhoe	EXCAVATION CONTRACTOR:	PROJECT: Oakwood Beach Phase II - Section A	Department	038	P.C. Toor
			Medium light gray (N6) CLAY; wet.			Dark gray (N3) to dusky yellowish brown (10YR2.2) coarse to fine SAND, some Silt, little coarse to fine Gravel, little Organic Material; wet.	Description			on:		Compaction: Tamping	Material: Excavated Fill	BACKFILL DATA		Environmental Closures, Inc.	- Section A	CLIENT: New York City Department of Design and Construction	Page 1 of 1	Test Pit Log
						ie SAND,			GROUND EL	EASTING (ft):	NORTHING (ft):	LBA INSPECTOR:	OPERATOR:	DATE FINIS	DATE STAR		FMS ID#:	PROJECT NO:	LOCATION:	TEST PIT NO.:
Bottom of Pit at 5 ft. bgs.	×		Clay	water Level at 1 ft. bgs.	И	Silty Sand	Remarks		VA		z	TOR:	B. Karshick	DATE FINISHED: 2/25/2008	DATE STARTED: 2/25/2008	3870-LBA-1-5133	BEGS2006004		Staten Island, NY	O.: TP-3

= 1 5 1	<u>\$</u>	f	2 -	<u> </u>	- S	USCS Depth (ft) PID (ppm)	NOTES:	Depth to Rock (ft):	Depth to Water (ft):	Depth (ft):	Width (ft):	Length (ft):	EXCAVATION DATA	EXCAVATOR:	EXCAVATION CONTRACTOR: Environment	PROJECT: Oakwood	New York, New York 10038	Louis Berger & Assoc., P.C. 199 Water Street, 23rd Floor
	Moderate brown ( fine Gravel; moist	Medium ligh		Moderate yel coarse to fine moist.	Dark gray (N some Silt, lit	ul.		N/A	N/A	5	S	4	DATA	Backhoe	RACTOR:	Banch Bhan II	10038	د., P.C. d Floor
	Moderate brown (SYR4/4) coarse to fine SAND, some Silt, little coarse to fine Gravel; moist.	Medium light gray (N6) CLAY: moist.		Moderate yellowish brown (10YR5.4) to pale yellowish brown (10YR6.2) coarse to fine SAND, some Silt, little Clay, little coarse to fine Gravel; moist.	Dark gray (N3) to dusky yellowish brown (10YR2/2) coarse to fine SAND, some Silt, little coarse to fine Gravel, little Organic Material; moist.	Description			on: N/A	N/A	on:	Material: Excavated Fill	BACKFILL DATA	en a villacium Ciosules, IIIc.	ntol Cloomes	PROJECT: Only Department of Design and Construction	Page 1 of 1	Test Pit Log
				m (10YR6/2) ne Gravel;	to fine SAND.			GROUND E	EASTING (ft):	NORTHING (ft):	LBA INSPECTOR:	OPERATOR:	DATE FINIS	DATE STAR	1.5	PROJECT NO: JG8554	LOCATION:	TEST PIT NO.:
contour of the art of the ogs.	Silty Sand	Clay		Silty Sand (Fill)	Silty Sand	Remarks		LAVE	1	,	TOR:	B Karshick	DATE FINISHED: 2/25/2008	DATE STARTED: 2/25/2008	BEGS2006004	O: JG8554	N: Staten Island, NY	VO.: TP-4

			<u> </u>		<u>    </u>	SM	Lithology	NOTES:	Depth to Rock (ft):	Depth to Water (ft):	Depth (ft):	Width (ft):	Length (ft):	EXC	EXCAVATOR:	EXCAVAT	PROJECT	CLIENT:	New Yo	199 Wa	1
y,	4	υ, 		,			Depth (ft)		ock (ft):	ater (ft):				EXCAVATION DATA		TON CONT	: Oakwood	New York C	New York, New York 10038	199 Water Street, 23rd Floor	
		<del></del>	Medium li			Dark gray some Silt,	TTD (ppm)		N/A	-	5	4	O.	DATA	Backhoe	EXCAVATION CONTRACTOR:	Beach Phase	ity Departme	10038	d Floor	
			Medium light gray (N6) CLAY; wet.			Dark gray (N3) to dusky yellowish brown (10YR2/2) coarse to line SAND, some Silt, little Organic Material; wet.	Description			Restoration: N/A		on:	Material: Excavated Fill	BACKFILL DATA		Environmental Closures, Inc.	PROJECT: Oakwood Beach Phase II - Section A	CLIENT: New York City Department of Design and Construction	Page 1 of 1	Test Pit Log	
						se to line SAND,			GROUND E	EASTING (ft):	NORTHING (ft):	LBA INSPE	OPERATOR:	DATE FINIS	DATE STAR	- 1	FMS ID#:	PROJECT NO: JG8554	LOCATION:	TEST PIT NO.:	
Bottom of Pit at 5 ft. bgs.			Clay	water Level at 1 ft. bgs.	.N	Silty Sand	Remarks		Y.Y.	- 1	(ft): N/A	TOR	B. Karshick	DATE FINISHED: 2/25/2008	DATE STARTED: 2/25/2008	3870-LBA-1-5133	BFGS2006004	O: JG8554	N: Staten Island, NY	NO.: TP-5	

+	s <sub>2</sub>	2 -	£ £	USCS Depth (ft) PID (ppm)		z ·	ater (fr):		Width (ft):	AVAITON		EXCAVATION CONTRACTOR:	PROJECT: Oakwood Beach Phase II - Section A	CLIENT: New York City	New York, New York 10038	199 Water Street, 23rd Floor
	Moderate brown (SYR4-4) coarse to line SAND, some Silt, little coarse to fine Gravel; wet.	intle Clay, little medium to fine Gravel; moist.	Dusky yellowish brown (10YR2.2) coarse to fine SAND, some Silt, little coarse to fine Gravel; moist.	Description		A Nesion atton: N/A		1011.	12	BAC	6	ACTOR: Environmental Closures, Inc.	ch Phase II - Section A	CLIENT: New York City Department of Design and Construction	38 Page Lof 1	loor Test Pit Log
Water Level at 4 ft. bgs.  Bottom of Pit at 5 ft base	Silt, little coarse to Silty Sand	AND, some Silt, Silty Sand (Fill)	[	Remarks	GROUND ELEVATION (ft): N/A		9.	12	OPERATOR: B. Karshick	DATE FINISHED: 2/25/2008	LA	- 1	FMS ID#: BEGS2006004	PROJECT NO: JG8554	LOCATION: Staten Island, NY	TEST PIT NO.: TP-6

4	Ç.		SM Mode	SNI Dusky coars	USCS Depth (ft) PID (ppm)	NOTES:	Depth to Rock (ft): N/A	Depth to Water (ft): 3	Depth (ft): 5	Width (ft): 4	Length (ft): 6	EXCAVATION DATA	EXCAVATOR: Backhoe	EXCAVATION CONTRACTOR:	PROJECT: Oakwood Beach Phase II - Section A	LIENT: New York City Depar	New York, New York 10038	Louis Berger & Assoc., P.C. 199 Water Street, 23rd Floor	
		Moderate brown (5YR4/4) coarse to fine SAND, some coarse to fine Gravel; wet.	Moderate yellowish brown (10YR5/4) coarse to fine SAND, some Sill. little Clay; moist.	Dusky yellowish brown (10YR2/2) coarse to line SAND, some Silt, little coarse to line Gravel; moist.	Description			on:		Compaction: Tamping	Material: Excavated Fill	BACKFILL DATA		OR: Environmental Closures, Inc.	ase II - Section A	CLIENT: New York City Department of Design and Construction	Page 1 of 1	Test Pit Log	
		oarse to fine	ND, some Silt,	some Silt, little			GROUND E	EASTING (ft):	NORTHING (ff):	LBA INSPE	OPERATOR:	DATE FINE	DATE STAI	- 1	FMS ID#:	PROJECT NO: JG8554	LOCATION:	TEST PIT NO.:	
	Water Level at 3 ft. bgs.	Gravelly Sand	Silty Sand (Fill)	Silty Sand	Remarks		VA.	- 1	(ff): N/A	TOR:	R: B. Karshick	DATE FINISHED: 2/25/2008	DATE STARTED: 2/25/2008	3870-LBA-1-5133	BEGS2006004	NO: JG8554	N: Staten Island, NY	NO.: TP-7	

		Lithology	NOTES:	Depti	Depti	Depth (ft):	Width (ft):	Leng		EXC	EXC	PRO	CLI	1,	
	INS	USCS	ES:	Depth to Rock (ft):	Depth to Water (ft):	1 (ft):	h (ft):	Length (ft):	EXCA	EXCAVATOR:	AVATI	JECT:	ENT: N	New York, New York 10038	199 Water Street, 23rd Floor
4 3 12		Depth (ft)		k (ft):	ter (ft):				EXCAVATION DATA	Ř:	ON CO	Oakwoo	ew York	, New Yo	ger & As
		PID (ppm)		N/A	Su	5	S	V.	NDA	Bac	NTR.	od Bec	City	rk 100	23rd F
Medium lig	Dark gray ( some Silt, li			A	Surface				TA	Backhoe	EXCAVATION CONTRACTOR:	ich Phase I	Departmen	)38	loor
Medium light gray (N6) CLAY; wet	Dark gray (N3) to dusky yellowish brosome Silt, little Organic Material; wet				Restoration:	Lifts (ft):	Compaction:	Material:	BAC		Environmental Closures, Inc	PROJECT: Oakwood Beach Phase II - Section A	CLIENT: New York City Department of Design and Construction	P	Tes
(wet.	Dark gray (N3) to dusky yellowish brown (10YR2/2) coarse to fine SAND, some Silt, little Organie Material; wet.	Description			N/A	N/A	Tamping	Excavated Fill	BACKFILL DATA		Closures, Inc.		onstruction	Page 1 of 1	Test Pit Log
	parse to fine SAND,			GROUND F	EASTING (ft):	NORTHING (ft):	LBA INSPECTOR:	OPERATOR:	DATE FINIS	DATE STAF	- 1	FMS ID#:	PROJECT NO: JG8554	LOCATION:	TEST PIT NO.:
Clay  Bottom of Pit at 5 ft. bgs.	Silty Sand Water Level at Surface	Remarks		V		z	TOR	R. Karshick	DATE FINISHED: 2/25/2008	DATE STARTED: 2/25/2008	3870-LBA-1-5133	BEGS2006004	NO: JG8554	N: Staten Island, NY	NO.: TP-8

SM Moderate brown (5YR4/4) co	Si I	4	CL Medium light gray (N6) to gro	) IN	)	Dark gray (N3) to dusky yellowish brown (1	USCS , Depth (ft) PID (ppm)	NOTES:	Depth to Rock (ft): N/A	Depth to Water (ft): 5.5 Restoration:	6	Width (ft): 4 Compaction:	Length (ft): 5 Material:	AVATION DATA	EXCAVATOR: Backhoe	EXCAVATION CONTRACTOR: Environmental Closures,	PROJECT: Oakwood Beach Phase II - Section A	CLIENT: New York City Department of Design and Construction	New York, New York 10038	
Moderate brown (5YR4/4) coarse to fine SAND, some Silt, little coarse to fine Gravel; wet.			Medium light gray (N6) to greenish gray (SGY6/1) CLAY; moist.			Dark gray (N3) to dusky yellowish brown (10YR2/2) coarse to fine SAND, little Silt, some coarse to fine Gravel; moist.	Description							BACKFILL DATA DATE FINI		Inc.			Page 1 of 1 LOCATION:	100
Silty Sand Bottom of Pit at 6 ft. bgs.	Water Level at 5.5 ft. bgs.		Clay			Gravelly Sand (Fill)	Remarks		VA.	1	-	-	R: B. Karshick	DATE FINISHED: 2/26/2008	DATE STARTED: 2/26/2008	3870-LBA-1-5133	BEGS2006001	PROJECT NO: JG8554	N: Staten Island, NY	

	Nedium light gra	رن ــــــــــــــــــــــــــــــــــــ	2 -	 Dark gray (N3) thitle Silt, some o	USCS Depth (ft) PID (ppm)		N/A	Vater (ft): N/A	Depth (ft): 6 1 if		AVATION		ON CONTRACTOR:	PROJECT: Oakwood Beach Phase II - Section A	
	Medium light gray (N6) to greenish gray (5GY6/1) CLAY; moist			Dark gray (N3) to dusky yellowish brown (10YR2/2) coarse to fine SAND, little Silt, some coarse to fine Gravel; moist.	Description			Restoration: N/A	ion:	m	BACKFILL DATA	3	Environmental Closures, Inc.	Design and Construction	1 age 1 01 1
	noist.			to fine SAND,		GROONDE	CROTING (II):	NORTHING (II):	LBA INSPECTOR:	OPERATOR:	DATE FINISHED:	DATE STARTED:	WOI #:	PROJECT NO:	LOCATION:
Bottom of Pit at 6 ft. bgs.	Clay			Gravelly Sand (Fill)	Remarks	GROOM ELEVATION (II): N/A			R		SHED: 2/26/2008	RTED: 2/26/2008	BEGS2006004	NO: JG8554	N: Staten Island, NY

Louis Berger & Assoc., P.C. 199 Water Street, 23rd Floor New York, New York 10038

Test Pit Log

TEST PIT NO.: TP-10

LOCATION: Staten Island, NY
PROJECT NO: JC8554

					ŝ	Lithology	NOTES:	Depth to Rock (ft):	Depth to Water (ft):	Depth (ft):	Width (ft):	Length (ft):	EXC	EXCAVATOR:	EXCAVATION CONTRACTOR:	PROJECT: Oakwood Beach Phase II - Section A	CLIENT:	New Yo	199 Wa
,	y,	4	رى 	12	 ¢	Depth (ft)		ock (ft):	ater (ft):				EXCAVATION DATA	OR:	TON CO	: Oakwo	New You	New York, New York 10038	199 Water Street, 23rd Floor
						PID (ppm)		N/A	3	6	S	5	ON DAT	Backhoe	ONTRA	od Beau	k City I	ork 1003	23rd Flo
Aedium light					Dark gray (N some coarse								ΓA	choe	CTOR:	ch Phase II	Department	šć į	oor C
Medium light gray (N6) to greenish gray (5GY6/1) CLAY; wet					Dark gray (N3) to dusky yellowish brown (10YR2/2) coarse to fine SAND, some coarse to fine Gravel, little concrete and metal debris; wet.	Description			оп:		on:	Material: Excavated Fill	BACKFILL DATA		Environmental Closures, Inc.	- Section A	CLIENT: New York City Department of Design and Construction	Page 1 of 1	Test Pit Log
'6/1) CLAY; wet.					)YR2/2) coarse to fine SAND, d metal debris; wet.			GROUNDE	FASTING (fr.	NORTHING (fr.)						FMS ID#:	PROJECT	LOCATION:	DØ TEST PIT NO.:
Clay  Bottom of Pit at 6 ft. bgs.			⊠ Water Level at 3 ft. bgs.		Gravelly Sand (Fill)	Remarks	SHOOM BEEFALION (II), MA		fr). N/A	7	TOR.	R. R Karchick	DATE FINISHED: 2/26/2008	DATE STARTED: 2/26/2008	3870 L DA 1 5133	REGS2006004	· 1	N: Staten Island, NY	NO.: TP-11

Louis Berger & Assoc., P.C. 199 Water Street, 23rd Floor New York, New York 10038

			§		<u></u>	Lithology	-
						USCS	
	<u> </u>	4	رى ا	2	 ¢	Depth (ft)	-
						PID (ppm)	4
			Moderate brown (5YR4/4) coarse to line SAND, some Silt, little coarse to line Gravel; wet.		Dark yellowish orange (10YR6/6) coarse to fine SAND, some Silt, little coarse to fine Gravel; moist.	Description	
Bottom of Pit at 6 ft. bgs.			Water Level at 3 ft. bgs. Silty Sand		Silty Sand (Fill)	Remarks	

T ALLES D'ALLES D'A		
199 Water Street, 23rd Floor	Test Pit Log	TEST PIT NO.: TP-12
New York, New York 10038	Page   of	LOCATION: Staten Island, NY
CLIENT: New York City Department of Design and Construction	of Design and Construction	PROJECT NO: 168554
PROJECT: Oakwood Beach Phase II - Section A	- Section A	EME INC. 500594
FYCAVATION CONTRACTOR		FMS 1D#: BEGS2006004
EXCAVATION CONTRACTOR:	Environmental Closures, Inc.	WOL #: 3870-LBA-1-5133
EACAVATOR: Backhoe		DATE STARTED: 2/26/2008
EXCAVATION DATA	BACKFILL DATA	DATE FINISHED: 2/26/2008
Length (ft): 5	Material: Excavated Fill	100.
Width (ft):		OF ENATOR: B. Karshick
Part (E)	Compaction: Tamping	LBA INSPECTOR: J. Lacanlale
Depth (It): 6	Lifts (ft): N/A	NORTHING (ft): NEA
Depth to Water (ft): 3	on: NI/A	WAY
	Kestoration: N/A	EASTING (ft): N/A
peptil to wock (it): N/A		GROUND ELEVATION (ft): N/A
NOTES:		