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New York City

Department of Design and Construction

ARCHAEOLOGICAL DOCUMENTARY STUDY SEWER OUTFALL CHANDLER STREET FAR ROCKAWAY, QUEENS

1040

PHASE 1A ARCHAEOLOGICAL ASSESSMENT
CHANDLER STREET SEWER OUTFALL
FAR ROCKAWAY, QUEENS, NY

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I. INTRODUCTION

As part of a program of installation of sewer and water mains at various locations in the Borough of Queens, the New York City Department of Design and Construction (DDC) has proposed the construction of a new sewer outfall in the line of Chandler Street, north of Battery Road in the Bayswater neighborhood of Far Rockaway, Queens (Figure 1). The new sewer outfall would pass through Lots 62 and 68 of Block 15653, an area of City-owned parkland, and into Motts Basin, an arm of Jamaica Bay. These two lots, which will be referred to as the "project site" or the "APE" (Area of Potential Effect), are bounded by Battery Road to the south, McBride Street to the west, additional lots of Block 15653 to the east, and Motts Basin to the north (Figure 2). The proposed route of the new sewer line will run generally northeastward, following the line of Chandler Street north of Battery Road, paralleling the existing sewer. A 35-foot-wide sewer easement through the APE has been proposed, which includes the locations of both the current and proposed sewer lines, and leads to the existing 60-foot-wide sewer easement north of the APE (NYCDEP 2007) (Figure 13).

In accordance with the CEQR Technical Manual (2001), the DDC proposed actions have been reviewed by the New York City Landmarks Preservation Commission (LPC). LPC determined (6/20/06) that the proposed Chandler Street Outfall, required a documentary study to further investigate the archaeological sensitivity of Block 15653, Lot 62. Specifically, LPC noted that a "review of archaeological sensitivity models and historic maps indicates that there is potential for the recovery of remains from Native American occupation on the project site." The following documentary study, often referred to as a Phase 1A, was prepared by Historical Perspectives, Inc. in accordance with the LPC's *Guidelines* (2002). This study is designed to determine the presence, type, extent and potential significance of any archaeological resources which may have been present in the APE, as well as the likelihood that these resources have survived post-depositional disturbances, including construction, regrading, and other land use which may have accompanied subsequent development. If archaeological resources are present and have survived, their archaeological integrity must also be considered.

Methodology

Maps and local histories were examined in the collections of the Local History and Genealogy Division and the Map Division of the New York Public Library, the Long Island Division of the Queens Library, as well as from a number of online sources, including maps from the David Rumsey Historical Map Collection (www.davidrumsey.com); the New York Public Library Digital Collection (www.nypl.org); historical nautical charts from Office of the Coast Survey (historicals.ncd.noaa.gov/historicals/histmap.asp); and aerial photographs from Oasis NYC (www.oasisnyc.net/oasismap.htm) and the New York Public Library (Aerial 1924). These various sources provided an overview of topography and a chronology of land usage for the APE and its vicinity.

A file search for recorded archaeological sites was conducted in the site file inventories of the New York State Museum and the New York State Office of Parks, Recreation, and Historic Preservation. The Phase IA and IB archaeological surveys for the Liberty Pipeline Project, a segment of which was near the current APE was also reviewed for relevant information (Louis Berger 1992, 1994).

On September 21, 2007, a site inspection was conducted and a photographic record was made (Photos 1–10).

II. ENVIRONMENTAL SETTING

Long Island is the top of a Coastal Plain ridge formation that is covered with glacial drift, in reality an elevated sea bottom demonstrating low topographic relief and extensive marshy tracts. In the last million years, as glaciers advanced and receded three times, the surficial geology of the island, including the APE, has been profoundly altered. The glacier was an effective agent of erosion, altering the landscape wherever it passed. Tons of soil and stone were carried forward, carving and planing the land surface. At the margins of the ice sheet massive accumulations of glacial debris were deposited, forming a series of low hills or terminal moraines. (Eisenberg 1978:19)

Circa 18,000 years ago, the last ice sheet reached its southern limit, creating the Harbor Hill moraine that traverses the length of Long Island. The moraine is approximately 7.5 miles north of the APE. Although not covered by the ice sheets, the APE and its vicinity were not unaffected by the glacier. Because vast amounts of water were incorporated into the ice sheets, sea levels were much lower than at present, and a large area of the continental shelf was exposed as dry land. The APE itself would have been many miles inland. As the ice melted and retreated, sea levels rose rapidly, and have continued to rise to the present. Circa 11,500 years ago, at about the time the first humans have been documented in the region, sea levels were approximately 300 feet lower than present levels, and had risen to 30 feet below present levels 5,000 years ago, and about 14 feet below current levels 2,000 years ago (Schuberth 1968:195,199; Louis Berger 1992).

The Rockaway peninsula is a post-glacial barrier beach approximately nine miles long. Such sandy formations along the southern coastline of Long Island are the result of the scouring action of the ocean waves as they break a considerable distance offshore and drop loosened sand just landward of the breaker line.

> Soon a submarine bar of this material is built up parallel to the shoreline. Growing in height with continued deposition of wave-tossed sand, the submarine bar soon appears above the water surface in various places along its length. When these have joined to make one fairly continuous strip of sand, a barrier beach, or barrier island, is formed. Behind the barrier beach lies a lagoon or zone of quiet water [Jamaica Bay] which no longer is part of the open sea. Tidal inlets separate the islands into individual ones (Schuberth 1968:200).

Once formed, barrier beaches such as Rockaway Beach are constantly remolded and altered, as is visible from a comparison of historical maps and accounts (Figures 1, 3). When Indian leaders sold their interest in Rockaway Neck to English settler John Palmer in 1685, the western tip of the peninsula, was "a short distance" west of the present neighborhood of Wave Crest, which is south of the APE's Bayswater neighborhood (Figure 1). By the early-20th century, the western end of the peninsula was 7 miles farther west (Bellot 1917:9-10).

Until the 19th-century development of the Rockaway Peninsula as a beach community, the terrain of the general area was uneven, covered with high sand dunes and low marshy areas (Figure 3). The hollows were overgrown with dense thickets of cedar (Seyfried 1975-1984 V:2). The northern or bay shore of the peninsula in the vicinity of the APE consisted of an elevated neck of land projecting into Jamaica Bay, with its northernmost extremity known as Mott Point (Wolverton 1891). To the east and west were inlets now known as Motts Basin and Norton Basin, respectively. According to the 1899 Jamaica Bay nautical charts, Motts Basin was a shallow inlet, which at its deepest ranged between 4 and 7.8 feet, from low to high tide (USC&GS 1899). Surrounding this central channel was a wider area of mudflats along the shoreline, and in general, shoreward of the mudflats were salt marshes. Several small creeks drained the marshes into the basin (Figure 4).

During this period, and until extensive filling operations between ca. 1909 and 1912 (Bromley 1909; Sanborn 1912), the APE was a periodically inundated location along the southern side of Motts Basin, with an area of salt marsh at its eastern and southwestern sides. The nearest dry, elevated land was at least 750 feet to the southeast (Figures 3, 7). Pre-development maps and charts tend to show the APE as mostly under water (USC&GS 1866) (Figure 3), and the topographical maps of the 1890s seem to agree with this assessment, showing no detail beyond the shoreline marshes. This, however, only indicates that much of the APE location was below "mean Sea level" (USGS 1891, 1899). The 1899 Jamaica Bay chart (Figure 4), with depth soundings based on "mean low water" shows the non-marsh parts of the APE as tidal flat, which, with a fluctuation in water level of approximately 3.8 feet from high to low tide, would have been inundated periodically.

A further feature of the predevelopment APE was a small creek which ran through the center of the APE, on the approximate line of present Chandler Street. The creek began near Mott Avenue (about 1,400 feet south of the APE), and formed a channel through the marsh and tidal flats of the APE to the main channel of Motts Basin. Within the APE it widened substantially (Figures 3, 4). With residential development by 1891, much of the creek had been filled in, but an "ICE POND" had been constructed south of Nameoke Avenue on the location of present Chandler Street, draining into Motts Basin through the creek mouth in the APE (USGS 1891) (Figure 8). The Wolverton Atlas of 1891, which gives a detailed depiction of the APE and its vicinity shows more than 70% of the APE to be part of the creek mouth and basin. Although the remainder of the APE is drawn as dry land, the contemporary topographic maps of the 1890s still record salt marsh there (USGS 1891, 1899).

The 1891 and 1899 topographical maps were drawn with 20-foot contour intervals, and therefore record no contour lines in low-lying Far Rockaway in general (USGS 1891, 1899). The APE was filled in and lotted between 1909 and 1912 (Bromley 1909) (Figure 9). Unfortunately, the earliest numerical elevations for the APE vicinity, from the Queens Topographical Bureau (Figure 5), date from 1921, after the APE had been filled in. The APE is then recorded as lying below the 5-foot contour line.[1] Chandler Street itself lies at the center of a north/south running depression below the 5-foot contour that appears to represent the bed of the former creek. Hassock Street/Horton Avenue was drawn along the shoreline on this official Queens map, but never built.

An aerial photograph from 1924 confirms that the APE had been filled in, and a number of trees or large shrubs can be seen growing there, consistent with a filling date of ca. 1910 (Figure 10). Late 20th-century harbor charts record repeated dredgings of the Motts Basin channel (USC&GS 1968, 2001) (Figure 11), and the expansion of elevated land along and within Motts Basin at the expense of marshland and hassocks, which suggests that the source of the APE fill was likely from the dredging of the basin, which now has a 15-foot deep central channel.

According to the current USGS topographic map (Figure 1), the APE consists of a wetland area between the 5- and 10-foot contour line, where the 5-foot contour line delineates the shoreline. Given the current USGS datum of mean low water, and the tide fluctuation of approximately 4.7 feet, this corresponds quite closely to the 1921 elevations from the Queens Topographical Bureau. The APE slopes down from the partially paved Battery Road northward toward the edge of Motts Basin (Photos 1, 2). Since prior to filling the entire APE was below mean high water (+4.7 feet), this indicates that the entire APE is covered by a modern fill stratum ranging from 5.3 feet thick near Battery Road, and declining to 0.3 feet thick to the north, near Motts Basin.

Current plant cover includes low shrubs, as well as *Phragmites* grass and pockets of *Limonium carolinianum* (sea lavender), plants common in salt marsh and meadow environments (Photos 2-6). Deeply eroded channels extending from Battery Road down to the shoreline indicate that the APE continues to be the route for surface runoff for the surrounding area (Photo 10). Divided from Battery Road by a low guardrail, asphalt from the road also encroaches irregularly on the southern part of the APE (Figure 12, Photo 4).

The existing outfall sewer line extends through the proposed sewer easement and beyond the APE into Motts Basin (Figures 12, 13), which the signage indicates is "New York State Wet Weather Discharge Point #RK-031" (Photos 7-9). Manholes are visible at the intersection of Chandler Street and Battery Road (Photo 1), which confirms that the sewer line follows the line of Chandler Street to the next visible manhole at the shoreline north of the APE (Photo 7), where it is surrounded by an extensive area of asphalt paving. The outfall sewer line continues at the surface, turning to the northwest beyond the shoreline and into Motts Basin (Photos 7-9).

The present shoreline extends approximately 50 to 75 feet north of the mapped northern edge of the APE lots (Figure 12). During the site inspection, which took place at noon on September 21, there was a sharp drop of approximately 2.5 feet at the shoreline, beyond which approximately 8 to 10 feet of mud- or tidal flats covered with tall stands of grass were exposed (Photo 7). Satellite photos (Oasis 2004) (Figure 12), suggest that the mudflats are more extensive during periods of low tide. A comparison of the 1924 and 1996 aerial photographs (Figures 10, 12) also indicates that the present sewer outfall line is partly responsible for the extension of the present shoreline, most likely by trapping silt and soil eroded with water runoff from the shore.

[1]Datum is 2.725 feet above the USC&GS datum, which was mean sea level.

III. PRECONTACT ERA

Precontact Culture Period Overview

The precontact period on Western Long Island and the surrounding area can be divided into three time periods, based on the adaptations of precontact populations to changing environmental conditions. These periods are generally known as the Paleo-Indian (c.12,000 to c.10,000 years ago), the Archaic (c.10,000 to c.2,700 years ago) and the Woodland (c.2,700 to c.500 years ago). These precontact periods are followed by the proto-historic and historical European Contact period, (beginning c.500 years ago), which is distinguished from the precontact by the first Native American interactions with European trade goods, traders, trappers, fishermen, explorers and settlers. From these early contacts we derive much of our firsthand knowledge of Native American culture. In order to be able to assess the APE's potential for precontact exploitation, it is first necessary to review briefly these time periods and their associated settlement patterns.

Archaeologists generally believe that humans migrated from Siberia to Alaska across the Bering Land Bridge during the Late Pleistocene, more than 12,000 years ago. The Paleo-Indian Period, c.12,000-10,000 years ago encompasses the interval between the end of the Pleistocene glacial conditions in eastern North America and the appearance of more modern environments during the present Holocene. A post-glacial conifer cover, consisting mainly of spruce and pine, was gradually augmented by the appearance of hardwoods such as oak and hickory, trees which would have provided greater food resources for humans than would conifers. Another food source, oysters, developed in great numbers on the southern Atlantic Shelf beginning c.12,000 years ago.

The Paleo-Indians hunted the large Pleistocene herbivores, such as mammoth, mastodon, caribou and musk oxen. The diagnostic artifact of the Paleo-Indian period is the fluted projectile point, which was originally attached to a wooden shaft for throwing or stabbing. Gravers, steep-edge scrapers, knives, drills and other unifacial tools were used as well. These nomadic people roamed widely in search of sustenance and their settlement pattern is characterized by small, temporary camps, shellfish processing stations and lithic reduction stations (Lenik 1989:31; Ritchie 1980:7).

The Archaic Period, c.10,000 to 2,700 years ago, is characterized by a series of adaptations to the newly-emerged, modern Holocene environments. As the period progressed, the dwindling meltwater from the disappearing glaciers and the resultant reduced flow of streams and rivers promoted the formation of swamps and mudflats. These new environments were excellent hunting and foraging grounds because they provided 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 rapidly became extinct during the Archaic, forcing humans to become increasingly dependent on smaller game and the plants of the deciduous forest.

Tool kits became more generalized during the Archaic with a wider array of plant processing equipment such as grinding stones, mortars and pestles. Animals were still hunted with spears or javelins, propelled by a spear-throwing device called an *atlatl*. Notched stone sinkers, which appeared during this period, provide the earliest evidence of net fishing (Lenik 1989:29, 30). Toward the end of the Archaic, carved soapstone bowls were introduced as well.

Archaic hunters and gatherers were organized into small bands which occupied locations along the Atlantic coast and estuaries during the warmer months, and moved to the interior during the colder months. Archaic settlements usually consist of small, multi-component sites as well as a number of functional site types. These include spring fishing camps along major streams, fall open-air hunting camps, rockshelter habitations, shellfish collecting and processing stations, mortuary sites, quarry and workshop sites, and semi-permanent villages (Boesch 1997:10).

Between approximately 2,700 years ago and the arrival of the first Europeans, ca. 500 years ago, Native Americans of the Woodland Period on Western Long Island shared many cultural attributes. The period saw the advent of horticulture, and with it the appearance of large, permanent or semi-permanent villages. Plant processing tools became increasingly common, suggesting the extensive harvesting of wild plant foods. Maize cultivation may have begun as early as 800 years ago. The bow and arrow were introduced at this time, as were pottery vessels and pipe smoking. A semi-sedentary culture, the Woodland Indians moved seasonally between campsites and palisaded

villages, hunting deer, turkey, raccoon, muskrat, ducks and other game, and fishing with dugout boats, bone hooks, harpoons, and nets with pebble sinkers. Their shellfish refuse heaps, called middens, sometimes reached immense proportions, covering as much as three acres (Ritchie 1980:80,267). Preferred village/camp sites were in protected, elevated locations at the confluence of two water systems. "Nearly all the permanent sites are situated on tidal streams and bays on the second rise of ground above water" (Smith 1950:101).

Following the earliest recorded visit of Europeans to the New York City area, the exploration of New York Bay by Giovanni da Verazzano in A.D. 1524, descriptions of Native Americans and their settlements were recorded, providing another source of data to buttress archaeological inferences about Indian lifeways in the Contact Period.

Daniel Denton, who lived in Jamaica and Hempstead on Long Island, published his observations of the local Munsee-speaking Delawaran Indians in his *Description of New York* in 1670:

> They live principally by hunting, fowling and fishing, their wives being the husbandmen, to till the land and plant the corn. The meat they live most upon is fish, fowl and venison . . . They build small moveable tents, which they remove two or three times a year, having their principal quarters where they plant their corn; their hunting quarters and their fishing quarters (Quoted in Thompson 1843:I 80).

The cultivation of maize, a previously unnecessary supplement to an already rich diet, and an increasingly sedentary lifestyle became more widespread during the Contact Period, most likely due to trade relations with Europeans. Shell bead and wampum production was intensified, and furs were collected by Native Americans to exchange for European goods. Although there are many ethnohistorical accounts of trade, there is little archaeological evidence of it in the region (Kraft 1991:213). Shellfish remained an important food source. Isaac Jogues, who visited New Netherland (present New York) in 1633-1634, observed the "great heaps" of oyster shells made by the "savages, who subsist in part by that fishery" (Jogues 1862:29).

Apparently, the larger villages of the Contact Period soon developed into permanent settlements, whose populations expanded and contracted with the availability of various natural food resources. Agriculture provided a storable surplus to maintain a smaller population throughout the year. Part of the population continued to migrate between food sources, inhabiting smaller seasonal campsites. Unfortunately, this period of growth was interrupted by epidemics of European diseases against which the Indians had no natural immunity, resulting in the rapid decimation of their populations.

Precontact Archaeological Potential

The earliest accounts (c.1645) of land transactions in the southern part of Queens County record the presence of Native Americans in the vicinity of the project site at the time the first European settlers arrived. These Native Americans were Munsee-speaking Upper Delaware Indians. The place name or toponym Rockaway, from the Delawaran *Rackeaway* or *Rahawacke,* meaning "sandy place," was originally applied to the location, and was later used as a designation for a group of associated, culturally similar peoples. The Rockaway group lived on western Long Island, in portions of southeastern Queens and southwestern Nassau Counties, and their main settlement, *Rechqua Akie*, is believed to have been in Far Rockaway, Queens (Grumet 1981:47).

Settlement pattern data indicate that the Indians occupied different locations in settlements of greater and lesser size depending on available resources, such as shellfish, which were harvested seasonally. Such camps were usually near a harvesting station, and [as with Rechqua Akie,] large Indian villages were inland, within walking distance of shellfish collection stations (Lucianne Lavin to Cece Saunders, personal communication 11/4/86). Sheltered Jamaica Bay provided an ideal environment for clams, mussels, and "oysters [which] live best in certain shallow bays, sounds, creeks, and estuaries where the salinity, temperature, food supply, and bottom provide favorable combination for reproduction or growth" (Kochiss 1974:33).

Historians have long recorded the presence of shell middens on the north shore of the Rockaway Peninsula, which indicates the Native American exploitation of the shellfish beds in adjacent Jamaica Bay. As Rockaway historian Bellot noted in 1917:

> Up to twenty years ago there was a number of shell banks in the peninsula. There are still signs of the banks on the marshes of Woodmere Bay. Other banks existed at Inwood, Hog Island and Far Rockaway.
>
> The Far Rockaway shell bank was enormous and must have contained many thousand tons of clam shells. It was located at Bayswater on Judge Healys' property [about 4,500 feet southwest of the APE], but was carted away and used for filling in purposes and road making (Bellot 1917:90).

Archaeologist Reginald P. Bolton, in his early-20th-century research into Indian sites and paths in Queens County, recorded a Native American trail giving access to the APE and its vicinity. It ended at Inwood on the eastern end of the Rockaway peninsula, "thus reaching Rockaway neck, from which point the long stretch of Rockaway beach would have been accessible by a branch path (Bolton 1922:181). Archaeologist Robert S. Grumet's research on Native American place names and trails continues the path into Far Rockaway, following what appears to be the line of present Gateway Boulevard and then Sea Girt Boulevard to approximately Bay 32nd Street, which would bring the trail to within about 3,500 feet to the south of the APE (Figure 6).

Recorded place names, or toponyms, are also indicators of the Native American presence in the area near the APE. Robert S. Grumet has attached the name ***Nameoke*** to the APE and the adjacent southern shore of Motts Basin, although the most precise locational description is "a locality near Rockaway village" and the first known occurrence of the toponym only dates from 1889. The word has been translated as "fishing place; where fish are taken," and has survived as the name of a street 400 feet south of the APE (Grumet 1981:37) (Figures 5, 6).

Recorded Archaeological Sites – Site File Search Results

The precontact archaeological record of the lands bordering Jamaica Bay indicates a long and complex human exploitation of the northern shore of the bay, and an absence of sites on the peninsula along the south shore of the bay. This may be due to attitudes toward archaeology during the different periods in which the two areas were developed, and also the different types of development which occurred. The peninsula was developed as a resort and residential area during the late-19th century, when Native American remains may have been recognized, but were not systematically excavated or even recorded. On the other hand, archaeologist Ralph Solecki's explorations were centered on the northern shore of Jamaica Bay (the vicinity of Aqueduct Racetrack in particular), partly due to the impending construction of the Belt/Shore Parkway, during the 1930s and 1940s (Solecki 1941).

The NYSM and OPRHP site files record only one site within one mile of the APE. NYSM #4050 refers to a site in present Inwood, Nassau County (Figure 1), for which the museum has "no info." The museum delineates a broad area, the southwestern corner of which borders on the eastern end of Motts Basin, about 160 feet northeast of the APE. The site was recorded by Arthur C. Parker, whose published map of Nassau County records a village site about 5,000 to the northeast of the APE, north of the present Inwood railroad station. He describes the site very vaguely, writing that the Rockaways "had several villages but were principally at Near Rockaway" (Parker 1920: 625, pl. 191). This village seems to correspond to the aforementioned Rockaway village Rechqua Akie. Oddly, Archaeologist Eugene Boesch, in his 1997 overview of Queens precontact sites, connects NYSM #4050 with the shell midden on the Healy property in Bayswater (about 4,500 feet west of the APE, Boesch #52), whereas it actually corresponds to Boesch #50, the shell middens at Inwood (Bellot 1917:90; Boesch 1997).

Avocational archaeologists have also recorded signs of an Indian presence on the peninsula. Steve Feldman noted in 1988 that the Bayswater area along the extreme eastern shore of Jamaica Bay (of which the APE is a part) was still yielding Woodland period ceramics, projectile points, and a possible burial (Kearns, Kirkorian, and Schaefer 1988:9; Boesch 1997:#52),[2] most likely related to the great shell midden that was once there. Another source, Rockaway historian William Soper Petitt, reported in 1901 that seven Native American burials were encountered at roughly the same location, the site of the old Bayswater Hotel, now the intersection of Westbourne Avenue and Waterloo Place, approximately 3,200 feet west of the APE (Louis Berger 1992:18).

Aside from the middens, there are few traces of precontact settlement on the peninsula. This is partly because much of the present peninsula has only been created since the 17th century, and sandy beaches afforded few resources

[2]Boesch's Site #54, not discussed here, is incorrectly described as located in Bayswater. This is a typographical error. "Bayswater" should read "Bayside," which is on the north shore of Long Island, far outside the APE.

aside from fish and shellfish to precontact Americans. A campsite noted at Arverne Avenue[3] [sic], more than 2 miles southwest of the APE, is likely from the contact period, and although there is little description available, it is likely a temporary camp occupied during a hunting/fishing expedition (Kearns and Kirkorian 1986a:8-9; Kearns and Kirkorian 1986c; Boesch 1997:#51).

The most recent archaeological investigation in the vicinity of the APE was performed in 1994 by Louis Berger & Associates, Inc., prior to the construction of the Liberty Pipeline, a segment of which ran along the line of Gipson Street to the Motts Basin shore – designated "Area J," a roughly rectangular area 120 feet north/south by 420 feet east/west – approximately 350 feet west of the APE (Figure 5). This location is not only near, but also similar in its physiographic history to the present APE. It was also a formerly inundated area, apparently within the tidal mudflats outboard of the shoreline salt marshes. The location was filled in during the early 20th century, at about the same time as the APE. Presently Area J slopes down to the shore – the slope is covered by riprap – to a tidal marsh and mudflat. The storm sewers and paving of Gipson Street extend through the center of Area J to the shore. According to the Phase IB report prepared for the same project, Area J was rated as having moderate precontact archaeological sensitivity because of its proximity to wetlands. Despite this rating, no subsurface testing was performed there during the Phase IB investigation, based on the apparent disturbance related to street and adjacent house construction. The reports related to this project did not utilize any subsurface data in reaching this conclusion, so it is not clear how it was known that there were no precontact archaeological resources deeply buried beneath 20th-century fill (Louis Berger 1992, 1994:69-74).

Although well-drained, elevated sites were preferred by the Native Americans for their activity and habitation sites, precontact archaeological potential is not confined to such areas. Often, low-lying and marshy areas adjacent to dry, elevated habitation sites were utilized as shell middens, i.e., garbage dumps for the byproducts of shellfish harvesting. Such behavior has been documented archaeologically, as at Aqueduct in southwestern Queens, where soil borings have identified shell middens buried beneath layers of fill, but also atop layers of peat and organic silt (Pickman 1987:4).

It is important to note that although the midden areas were partially or wholly within marshland, the other physical characteristic is that these dumping locations were adjacent to dry elevated land. Although part of the APE was marshland prior to 20th-century filling activities, it was at least 750 feet distant from the nearest dry land, and part of the APE was the bed and mouth of a small creek, and inundated or tidal mudflats (Figure 3). It is possible that shellfish harvesting activities took place *on* the APE tidal flats, since this is the sort of environment in which hard- and soft-shelled clams are found, and where they would have been dug and collected. As a shellfish harvesting location, it is somewhat unlikely that the APE would have been used as a garbage dump for the byproducts of shellfish processing. Unlike the APE, the great midden on the Healy property in Bayswater, about 4,500 feet west of the APE, was on elevated ground, which provided easy access to Jamaica Bay without having to pass through a marsh.

In addition, at present there is no physical evidence of a shell midden visible on the site itself. As noted in the previous section, the APE is covered by a fill overmantle ranging from 5.3 feet thick along Battery Road, to as little as 0.3 feet thick near Motts Basin on the north. In the areas near Motts Basin and north of the APE where there is little or no fill and the shoreline is subject to erosion from constant tidal action and water runoff, no stratum of shell eroding from the banks is discernable (e.g., Photo 10).

As has been described in the Environmental Setting section of this report, the environment of the project area has not been static since the final retreat of glacial ice. Circa 11,500 years ago, at about the time the first humans are documented in the region, sea levels were approximately 300 feet lower than present levels, and had risen to 30 feet below present levels 5,000 years ago, (Schuberth 1968:195,199; Louis Berger 1992). Sea level rise slowed by about 4,000 to 2,000 years ago, when sea levels had reached about 14 feet below current levels, and has slowed even more to the present.

Given these figures, and the shallowness of the pre-fill and pre-dredging Motts Basin – approximately 7.8 feet at high tide – the predevelopment APE, consisting of tidal flats, would only have been flooded within the last 2,000 years. At some time during this period, the APE as well as areas of similar topography would have been dry land, possibly

[3]Arverne Boulevard.

adjacent to marshes within what is now Motts Basin. If that is the case, the APE may have been attractive to exploitation by precontact humans as a camp or processing site. As the sea level continued to rise, a salt marsh may have gradually formed on APE, which may have been a prime spot for the dumping of the byproducts of shellfish harvesting from the nearby bay, from adjacent elevated land. Eventually these elevated locations also became part of the swamp as it existed prior to development.

Given this scenario, potential precontact archaeological sites may lie deep beneath the current water table, as well as beneath a number of feet of accumulated marsh mat and historical fill. This has been substantiated at a number of locations in coastal New York and Connecticut where submerged precontact sites have been discovered during dredging activities, beneath, or in association with, the peat deposits produced by tidal marshes (Pickman 1987:6). On the other hand, it is difficult to be certain whether marsh formation on, and the inundation of the APE occurred in this way, and whether the preinundation environments would truly have been attractive to exploitation by precontact peoples.

Based on the data presented in this discussion, the APE is considered to have a VERY LOW potential for hosting precontact archaeological materials. Prior to modern regrading and earthmoving activities, the APE was a periodically inundated marsh, tidal flats, and creek mouth. It was not an optimal location for a precontact shell midden, as shown by the characteristics of other shell middens in the region, including the documented Bayswater shell midden, which were on or adjacent to elevated land. In addition, there is no evidence of a shell midden in the deeply eroded areas on or adjacent to the APE. Furthermore, regarding submerged precontact remains deposited prior to modern sea level rise, since little is known of the presubmergence environment, this possibility is at best, speculative.

Disturbance impact on the precontact archaeological potential of the APE, and potential archaeological sensitivity will be discussed in the conclusions section of this report.

IV. HISTORICAL PERIOD

One of the earliest recorded mentions of the Far Rockaway area took place in 1642, when a meeting between 16 sachems representing local Native American groups and a group of Dutchmen headed by [David] DeVries, took place "in the woods" near "Rockaway." The Indians sought redress for wrongs done to them by the Dutch, but received no satisfaction, and violent reprisals were carried out against Dutch settlers that winter. In the spring of 1643, the Indians wanted to end hostilities so that they could plant their corn, and a second meeting was held on Manhattan Island in the spring of 1643, but only two of the Dutch, DeVries and Jacob Olfertsen could be induced to return to Rockaway with them to settle matters. DeVries reported nearly 300 Indians and 30 wigwams at "Reckouwacky" (Bellot 1917:9; Grumet 1981:47).

With New Netherland under English control beginning in 1664, the Rockaway were paying an annual rent of 5 bushels of winter wheat to the English governor for the peninsula. By 1685, however, they had moved their chief settlement to Hog Island (now Barnum's Island) in Woodmere Bay. Indian leaders Tackapousha of Little Neck and Rockaway sachem Paman then sold their interest in Rockaway Neck to English settler John Palmer, for £31 2s. The tract, including the project site, extended to what was then the western tip of the peninsula, "a short distance" west of the present neighborhood of Wave Crest, which is directly south of the Bayswater area. At present, the western end of the peninsula is 7 miles farther west than it was in 1685 (Bellot 1917:9-10).

Governor Dongan licensed and confirmed the sale to Palmer, but both transactions were disputed by the Town of Hempstead. According to the division of Queens County at its creation in 1683, the Rockaway Peninsula had been assigned to Hempstead, and the Town considered it part of its municipal property. Hempstead accused Dongan favoritism toward Palmer, and claimed it had no other pastureland. The latter assertion, at least, was patently untrue, and even Dongan noted that Rockaway was "no pasture at all, being all woodland." Hempstead lost this dispute, and although the peninsula remained under Hempstead jurisdiction, the land remained Palmer's private property (Town Minutes of Hempstead Town quoted in Kearns and Kirkorian 1989; Bellot 1917:10-11).

Shortly after securing his title to the land, Palmer sold it to Richard Cornell[4], an ironmaster from Flushing, in 1687. The parcel totalled approximately 8,000 acres. The Cornell family was one of the wealthiest on Long Island, because in 1670 Richard Cornell had obtained permission to sell liquor and gunpowder to the Indians. In 1690, the Cornells left Flushing and established themselves at Rockaway, building a large wood frame house overlooking the Atlantic Ocean, at present Bay 19th Street between Plainview and Seagirt Avenues, approximately 4,800 feet south of the APE (Bellot 1917:12; Ownership n.d.). When he died in 1693, he left a wife, 5 sons, 3 daughters, and enslaved African servants and farmhands. His will described his "dwelling house with orchard and the pasture thereunto adjoining with the barns and lands in the tillage about it with the gardens & springs and all other outhouses," as well as "my negro man James," and "my negro woman Diana which I give and bequeath to my son William" (Bellot 1917:13).

By the early 18th century, parts of the Cornell lands had been sold, or were occupied by tenant farmers. The early families which settled in the area by this time included the Mott, Hicks, Brower, Smith, and Hewlett families (Bellot 1917:15,16). In 1809, as a result of a partition suit brought by 16 of Richard Cornell's great-grandsons, the remaining property was divided into 46 parcels, and many were sold. An early road, approximating present Rockaway Beach Boulevard marked the dividing line between the beach lots along the Atlantic Ocean, and the 15 marsh lots along Jamaica Bay (*Brooklyn Eagle* 1904). The parcel of which the APE was a part remained in the hands of Cornell family members (Seyfried and Asadorian 2000; Bellot 1917:83).

Far Rockaway owed its discovery as a vacation spot to New York City's cholera epidemic of 1832. Hundreds of refugees fled Manhattan for the more salubrious climate of Far Rockaway, sleeping in barns or wherever they could find shelter. The following year, John Leake Norton, a wealthy New Yorker with excellent social connections – he was married to a sister of New York governor George Clinton – persuaded a number of well-known New York men, including Philip Hone, ex-mayor of New York City; and Governor John A. King to form the "Rockaway Association," which in 1833 purchased the tract which contained the old Cornell house. The Association had the house demolished and on the same location built the Marine Pavilion, Far Rockaway's first resort hotel, at a cost of $43,000 (Bellot 1917) (Figures 4, 7).

[4]Also spelled Cornwell and Cornwall.

The Marine Pavilion, a 3-story Greek Revival building with 160 rooms and a 250-foot ocean-view piazza, opened for boarders in 1834. It became a famous resort, and guests included the cream of New York society, various Astors, Schermerhorns, Morrises, etc., as well as the famous, such as Longfellow, Washington Irving, and artist John Trumbull. The first establishment equipped for bathers to actually enter the surf – private bathhouses with the bathers inside were pulled into the water by horses – was opened there (Hazelton 1925; Seyfried and Asadorian 2000).

The Rockaway Association had also formed the Jamaica & Rockaway Turnpike Company, building a shell road (now Rockaway Turnpike) across the meadows in 1834, shortening the trip from Jamaica by 8 miles (Bellot 1917:85). The main form of transportation to the beach was Brower's Americus Stage Line, which had its offices on Pearl Street in New York City. Each morning a stage drawn by four horses would call at the doors of those wishing to go to Far Rockaway, and take them there via the Rockaway Turnpike (Reminiscences of William Caffrey; *Hempstead Inquirer* from *Brooklyn Union*, 5/18/1883, quoted in Kearns and Kirkorian 1989).

The Marine Pavilion brought national attention to Far Rockaway, and it was about that time that the area came to be called "Far" Rockaway, to distinguish it from "Near" Rockaway in Nassau County, now called East Rockaway. Although the Marine Pavilion burned down in 1864, numerous competing hotels had already been built in Far Rockaway, which was described as a "village of hotels" (Hazelton 1925). Most of the visitors were day excursionists who arrived on steamboats from Canarsie, but in 1869 the South Side Railroad completed a branch line to Far Rockaway via Valley Stream, ending at a station built on 7 acres donated by Benjamin B. Mott, 1,200 feet southeast of the APE (Figures 1, 4). The Long Island Rail Road also began service to Far Rockaway from Hillside (east of Jamaica), in 1872. Although the LIRR wanted to extend its tracks closer to the ocean, wealthy and influential landowner Judge Horace Clark managed to keep the tracks and tourists away from his palatial summer home, and the LIRR tracks ended up parallel to the South Side line, and used the same station on Mott Avenue, where the LIRR station still stands today (Bellot 1917:34-35; Seyfried and Asadorian 2000).

The coming of the trains meant that the trip from Long Island City to Far Rockaway took only about an hour, after a short ferry ride from Manhattan. This increased real estate values and spurred an upscale building boom in Far Rockaway. The first residential development in Far Rockaway was Wave Crest, where construction began in 1880. The development faced the ocean and included lands from the old Marine Pavilion, and the estate of Judge Clark, about 4,500 feet south of the APE. Eighty acres of land were set aside for expensive houses on plots of a quarter-acre or larger, joined by curving, irregular roads within a fenced, gated park. A hotel was also erected, but burnt down in 1889 (Seyfried and Asadorian 2000).

Bayswater, which faced Jamaica Bay between Norton and Motts Basins, and included the APE, was the next upscale development. Developer William Trist Bailey had purchased the tract, half of which was swampland, from J. B. and W. W. Cornell in 1878. He laid out Mott and Bayswater Avenues as the main streets of the community, and added new streets as handsome homes and mansions were erected. In 1880 he built the Bayswater Hotel at what is now the intersection of Waterloo Place and Westbourne Avenue (3,200 feet west of the APE), unusual at that time in that it was built of brick. To give his community extra cachet, Bailey founded the Bayswater Yacht Club in 1889, and began holding regattas. By 1891 there were 100 members, and each was asked to subscribe $1,000 for the construction of a clubhouse. The first Rockaway hunt with hounds was even organized (Seyfried and Asadorian 2000). Among the notable mansions of Bayswater, was the Lewis Solomon residence, called "Solomon's Castle" -- a massive crenellated wooden building on what was formerly Judge Edmund Healy's property, at Bessemund and Gansevoort Avenues, 4,500 feet west of the APE. This was formerly the location of the largest of the Indian shell middens (Bellot 1917).

As transportation links improved during the 19th century, areas farther and farther west along the peninsula were developed with hotels, amusement resorts, and residences. A steam railroad extension was built west from Far Rockaway station in 1872, and most importantly the railroad trestle across Jamaica Bay was completed in 1880, enabling trains to the Rockaway Beach communities to bypass the land route through Far Rockaway altogether. As a measure of its growth, Far Rockaway was incorporated as a village in 1888, and just ten years later, the entire peninsula became part of the Borough of Queens with the consolidation of Greater New York in 1898 (Hazelton 1925).

Although often a forgotten part of the new city, consolidation brought funds for municipal improvements, such as new boardwalks, connection to the New York City water system, and new schools. Rising land values, coupled with greater demand for housing after the two World Wars, brought denser construction, with the first apartment building – for 55 families – erected on "Broadway, opposite Mott Avenue" (Hazelton 1925).

Bayswater and many other communities in Far Rockaway gradually evolved into year-round, middle class, residential communities, a reputation they maintained even after the coming of the subway in 1956. The subway (nearest station at Mott Avenue and Beach Channel Drive, about 1,600 feet south of the APE) (Figure 1) precipitated a housing boom in the Rockaways, with the construction of 2,000 apartment units and several hundred 1- and 2-family houses by 1960, while real estate prices remained among the highest in the city. As summer visitors stopped coming to the resorts and hotels, however, large areas became repositories for the poor on welfare. The City began to construct low-income housing projects in the Rockaways, and when in 1954 a project was announced for a location near Motts Basin adjoining Bayswater, the Bayswater Civic Association, along with the help of the Rockaway Chamber of Commerce protested that theirs was an area of "high type houses," and were successful in having the complex moved to part of the Rockaways with less political clout (Kaplan and Kaplan 2003).

The victory was short-lived, however, since the present Redfern Houses, a group of nine 6- and 7-story buildings, was built from 1952 to 1959, on the former blocks between Redfern Avenue, Beach Channel Drive and the city line, just 400 feet east of the APE (Sanborn 1971:6). The APE was never subsequently developed for residences or bayfront recreational activities.

V. CONCLUSIONS AND RECOMMENDATIONS

Historical Period Archaeological Potential

The review of documentary and cartographic evidence assembled for this report indicates that there was no recorded activity on the APE during the historical period until the 20th century, when the location was filled above the high water mark, and the current sewer outfall was constructed. No buildings or other structures have been recorded there (Figures 1, 8, 9). Therefore, the APE has no potential for historical archaeological remains, and is considered NOT SENSITIVE. No further study or testing for archaeological remains from the historical period is recommended.

Precontact Archaeological Potential Sensitivity

Overwhelming evidence exists that Native Americans exploited the natural resources of western Long Island and the general vicinity of the APE for thousands of years before the arrival of Europeans. Settlement pattern data of the precontact culture periods show a strong correlation between habitation/processing sites and a fresh water source, the confluence of two water courses, proximity to a major waterway, a marsh resource, and/or well-drained, elevated land.

Although at present the Chandler Sewer APE meets many of these criteria – it lies along the shore of Motts Basin, it is adjacent to, and includes areas of salt marsh and meadowland, and a small adjacent creek once drained through it into the basin, this environment was actually the creation of filling operations during the early 20th century. According to the cartographic and documentary evidence assembled for this report, the pre-20th-century APE was a somewhat inhospitable environment, basically an area of periodically inundated mudflats and marshes, with the mouth of a creek at its center.

Based on the evidence and discussion presented in the Precontact Era section of this report, the APE was given a rating of VERY LOW potential for hosting a precontact shell midden. Although a large shell midden once existed about 4,500 feet west of the APE, the pre-fill APE environment was unlike that location or other documented precontact shell middens. Furthermore, there is no visible evidence of a shell midden in the deeply eroded sections of APE.

In addition, the Precontact Era discussion concluded that there is also a VERY LOW potential for deeply buried precontact archaeological remains submerged below the water table. Since ca. 2,000 years ago, sea levels have risen approximately 14 feet, creating the tidal mudflats, marsh, and creek mouth which existed on the pre-20th-century APE. Although it is certain that the environment of the APE and its vicinity was altered with the post-glacial sea level rise, whether or not the APE would have been an attractive location for human occupation and exploitation is purely speculative and cannot be determined with any level of certainty.

Disturbance

Archaeological potential sensitivity is also affected by disturbance impacts, both natural, such as erosion, and manmade, such as excavation and regrading. Sometimes human activities, such as the placing of a fill stratum, preserve potential sensitivity by creating a protective overmantle which may prevent construction excavation from affecting more deeply buried archaeological remains. Based on a comparison of historical and modern maps, it is known that fill was added to the APE during the early 20th century, and the fill stratum has been estimated to range from approximately 5.3 feet thick near Battery Road on the south, declining to approximately 0.3 feet on the northern side of the APE

Two major disturbance impacts on the APE can be identified, although quantification of the disturbance is difficult. The first was the submergence of the APE as sea levels rose following the melting of glacial ice. Given the shallowness of Motts Basin prior to modern dredging activities (4 to 7.8 feet deep), this would have occurred during the last 2,000 years. When the APE became a tidal mudflat, its surface was subject to constant tidal action, which since it "allows time for waves and currents to tear the site apart" is considered to be the most destructive force for submerged archaeological sites, damaging material and destroying the spatial context of artifacts (Stewart 1999:565). Although the tidal action on the APE can hardly be considered "pounding surf," the relentless action of rising and falling tides, and the alternating periods of dryness and wetness can severely impact an archaeological site, particularly the potential sorts of shallowly buried precontact sites expected in this context (Ibid.). In addition, the constant water flow from the creek which ran roughly along the line of Chandler Street and drained the marshlands to the south, encompassing more than 70% of the

APE (Figure 8), would also have adversely impacted potential submerged archaeological resources.

The second major disturbance on the APE was the construction of the current outfall sewer mains, which run along the line of Chandler Street out into Motts Basin, within the current and proposed sewer easements (Figure 13). A 36" sewer line runs northward along Chandler Street, through the APE in the proposed 35-foot sewer easement, and into an outlet chamber just north of the APE (Photo 7, outlet chamber at left). Proposed plans call for the main to be replaced by a 7'6" W by 4' H (78" diam.) line, and also for the outlet chamber to be replaced. If the depth below surface of the present sewer main is estimated at 3 to 4 feet, then the depth of disturbance in this area is approximately 6 to 7 feet below the present surface, which would have penetrated to between 0.7 to 6.7 feet or more beneath the hypothesized 0.3 to 5.3 feet of fill overmantle.

Beyond the outlet chamber north of the APE, a single sewer main, 6'6" W by 8' H (94" SW) extends northwest through the existing 60-foot sewer easement (Figure 13, Photos 7–9). This will be replaced by two 9' 6" W by 4' 6" H (84" diam.) lines. Although the two new lines are only slightly over half the height of the existing sewer (4' 6" vs. 8'), and therefore would not cause the same depth of disturbance impact as the present line, the greater width of the new (9' 6" vs. 6' 6") and the fact that there are two lines, would expand the area of impact. This part of the outfall, however, as can be seen from the photographs, is within an unfilled area, and so built partially above the ground/water surface. The depth of disturbance here is unclear.

Although they are not slated for replacement, three additional sewer lines enter the present outlet chamber and are to be connected to the new chamber (Figure 13). Two sewer lines both 11' W by 4' 6" H (91" SW), join the outlet chamber from the east along Horton Avenue, immediately north of the APE; and a 42" diameter main also enters the chamber from the west, running through the northern part of Lot 68 within the APE. A second 42" main parallels the first, but does not enter the outlet chamber, but continues eastward on Horton Avenue. Given their diameters, and burial from 3 to 4 feet below the surface, excavation for these lines would have been 6.5 to 8.5 feet below the present surface, penetrating the probable 0.3 to 5.3 feet of fill overmantle. Since they will not be replaced, however, it is unlikely that these locations will be impacted by the current project.

Recommendations

Disturbance from creek currents, tidal action, and the installation of existing sewer lines most likely has adversely impacted the APE strata rated as having very low precontact archaeological potential. Construction impact does not extend over the entire APE, although it has occurred in the proposed sewer easement, in which future sewer main installation is likely to take place.

Coupled with the very low rating of precontact archaeological potential, as well as the danger, time, and effort which would be required to identify and recover potential archaeological materials deeply buried below the water table, it is recommended that the Chandler Street APE be considered NOT SENSITIVE for precontact archaeological remains.

No further research, study, testing, or other investigation regarding precontact or historical archaeological remains is recommended.

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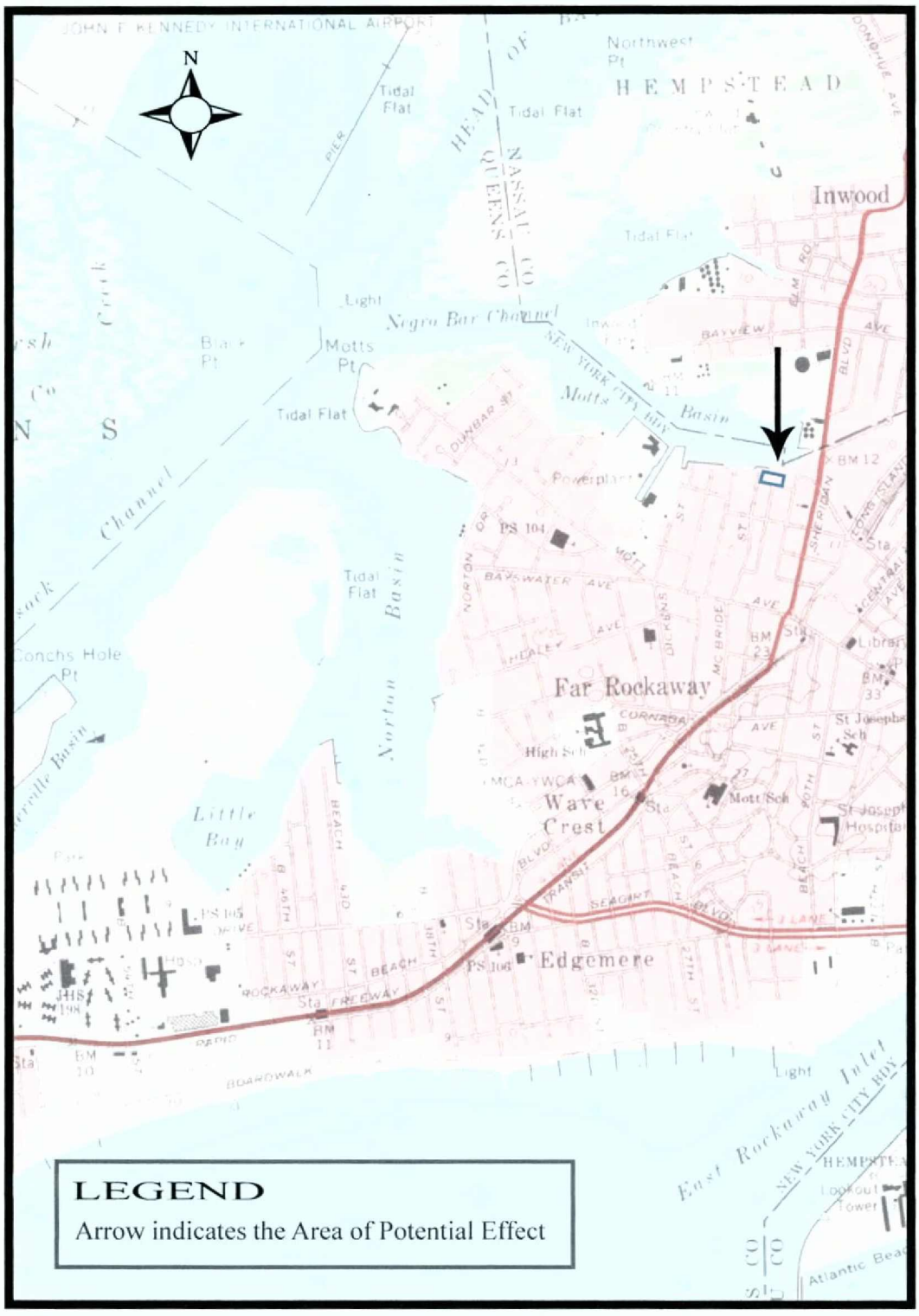

CHANDLER SEWER OUTFALL - FAR ROCKAWAY, QUEENS, NY

FIGURE 1: USGS, Far Rockaway N.Y., 1969

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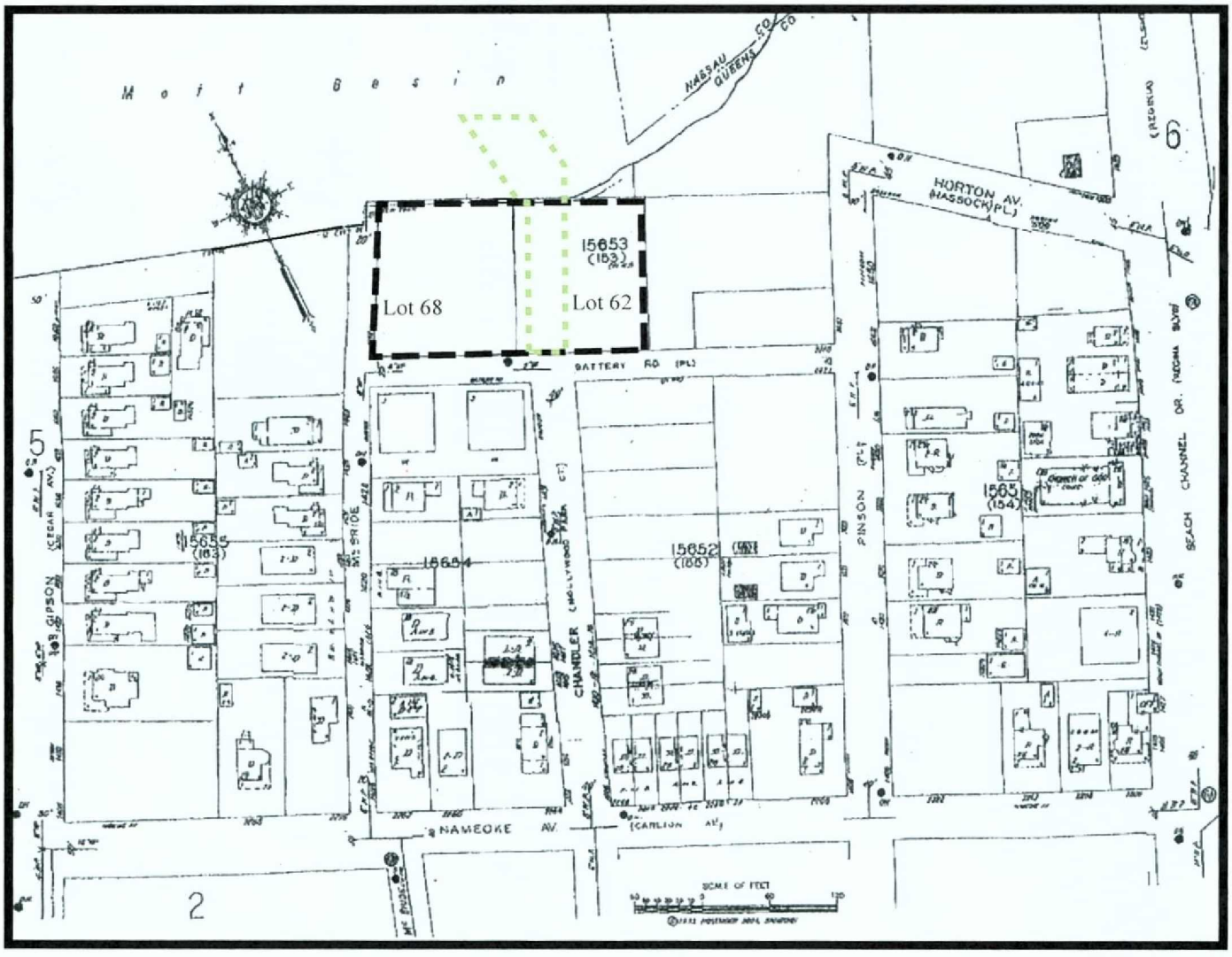

LEGEND

▬ ▬ ▬ ▬	Area of Potential Effect
▪ ▪ ▪ ▪ ▪ ▪ ▪ ▪	Proposed Sewer Route (Current and Proposed Sewer Easements)

CHANDLER SEWER OUTFALL - FAR ROCKAWAY, QUEENS, NY

FIGURE 2: Sanborn, *Insurance Maps of the Borough of Queens*, 2006

LEGEND

Arrow indicates the Area of Potential Effect

SOURCE: David Rumsey Historical Map Collection, www.davidrumsey.com

CHANDLER SEWER OUTFALL - FAR ROCKAWAY, QUEENS, NY

FIGURE 3: USC&GS, Map of New-York Bay and Harbor and the Environs, 1845

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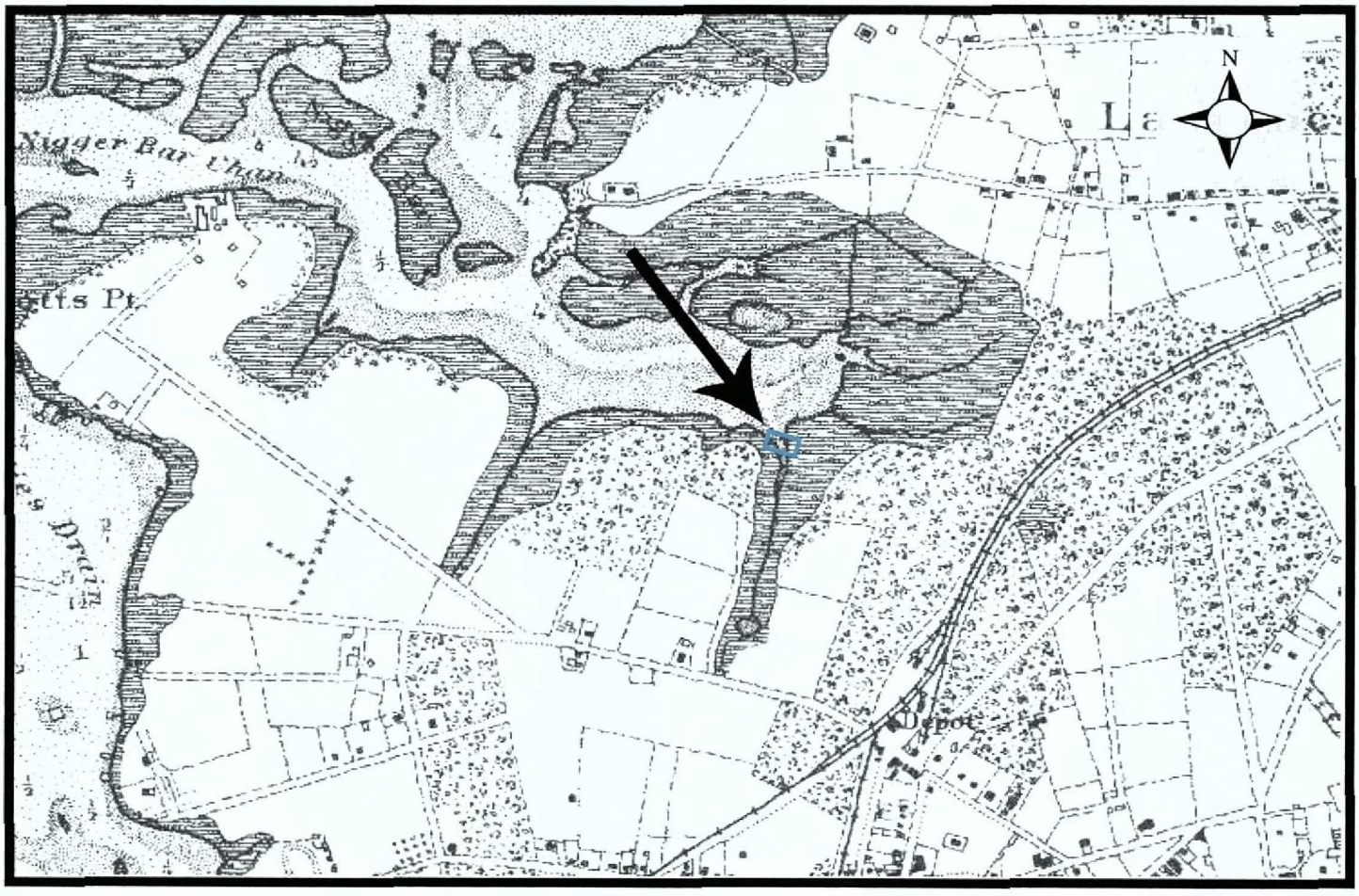

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Arrow indicates the Area of Potential Effect

SOURCE: Office of the Coast Survey (historicals.ncd.noaa.gov/historicals/histmap.asp)

CHANDLER SEWER OUTFALL - FAR ROCKAWAY, QUEENS, NY

FIGURE 4: USC&GS, Jamaica Bay and Rockaway Inlet, Long Island, New York, 1899

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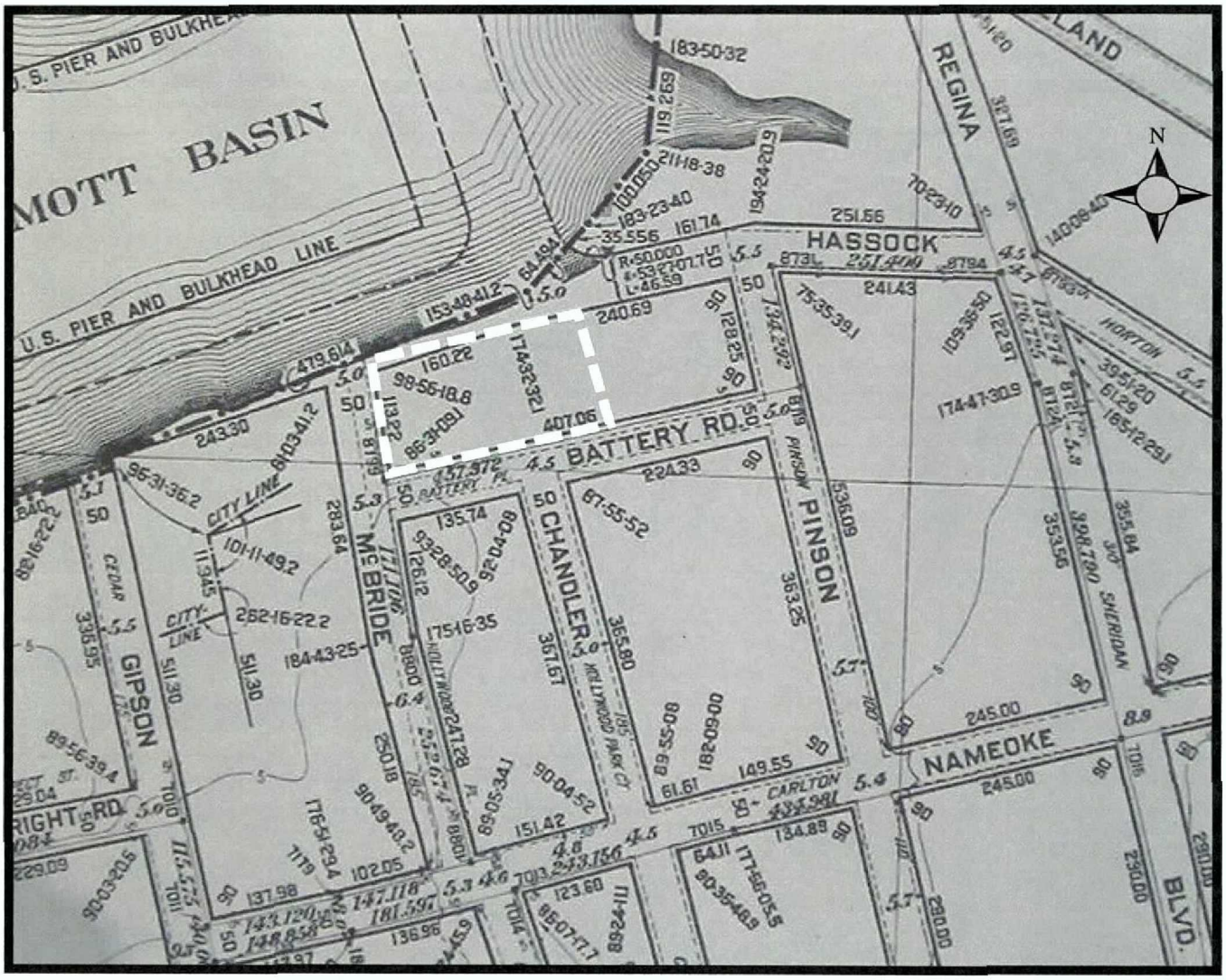

LEGEND

Area of Potential Effect

SOURCE: Map Division, New York Public Library

CHANDLER SEWER OUTFALL - FAR ROCKAWAY, QUEENS, NY

FIGURE 5: Final Maps of the Borough of Queens, 1921

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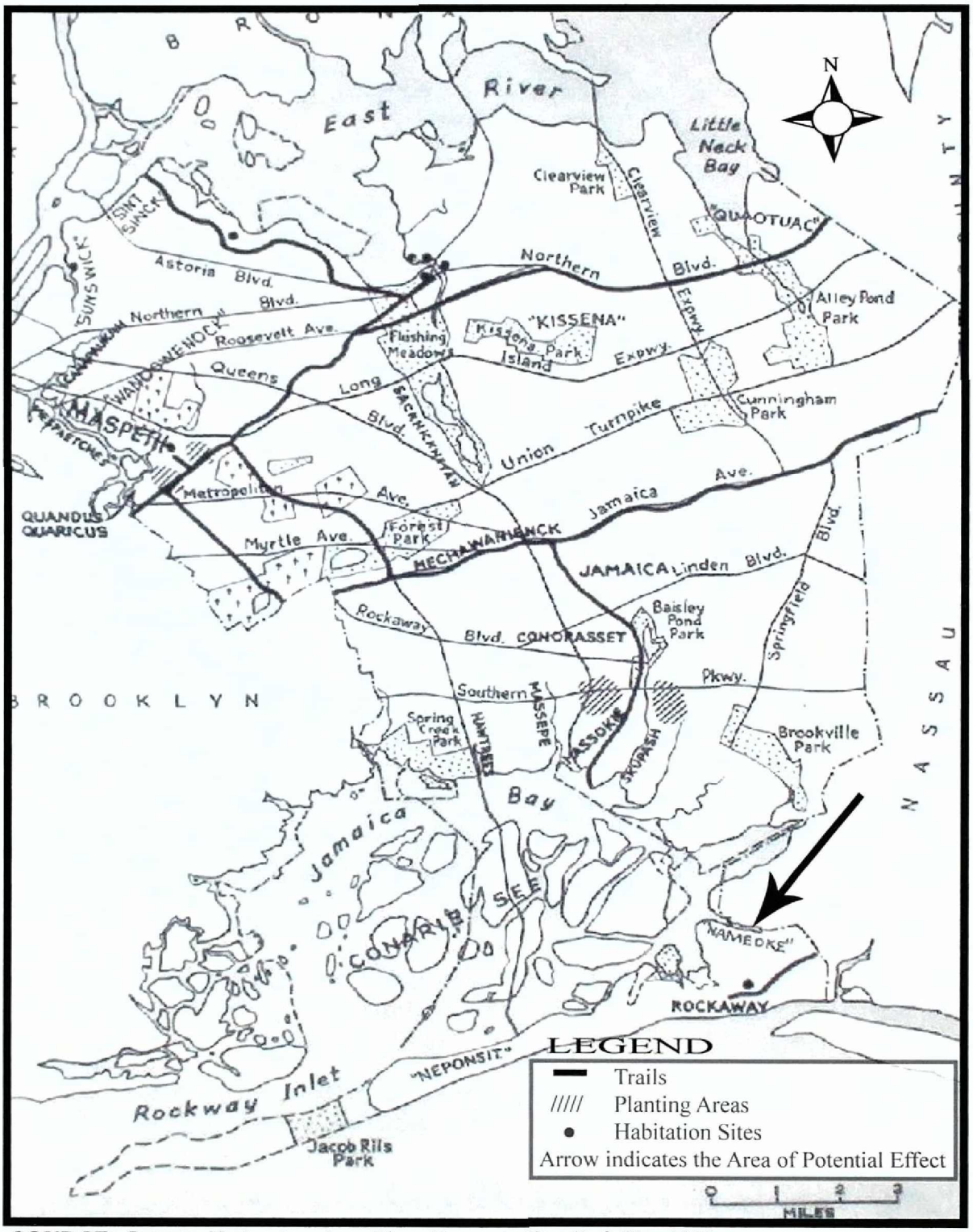
50 0 50 100 150 200 FEET



SOURCE: Grumet, *Native American Place Names in New York City*, 1981

CHANDLER SEWER OUTFALL - FAR ROCKAWAY, QUEENS, NY

FIGURE 6: Grumet, Native American Trails, Planting Areas and Habitation Sites in Queens

SOURCE: Map Division, New York Public Library

CHANDLER SEWER OUTFALL - FAR ROCKAWAY, QUEENS, NY

FIGURE 7: Connner, Map of Kings and Part of Queens Counties, Long Island, N.Y., 1852

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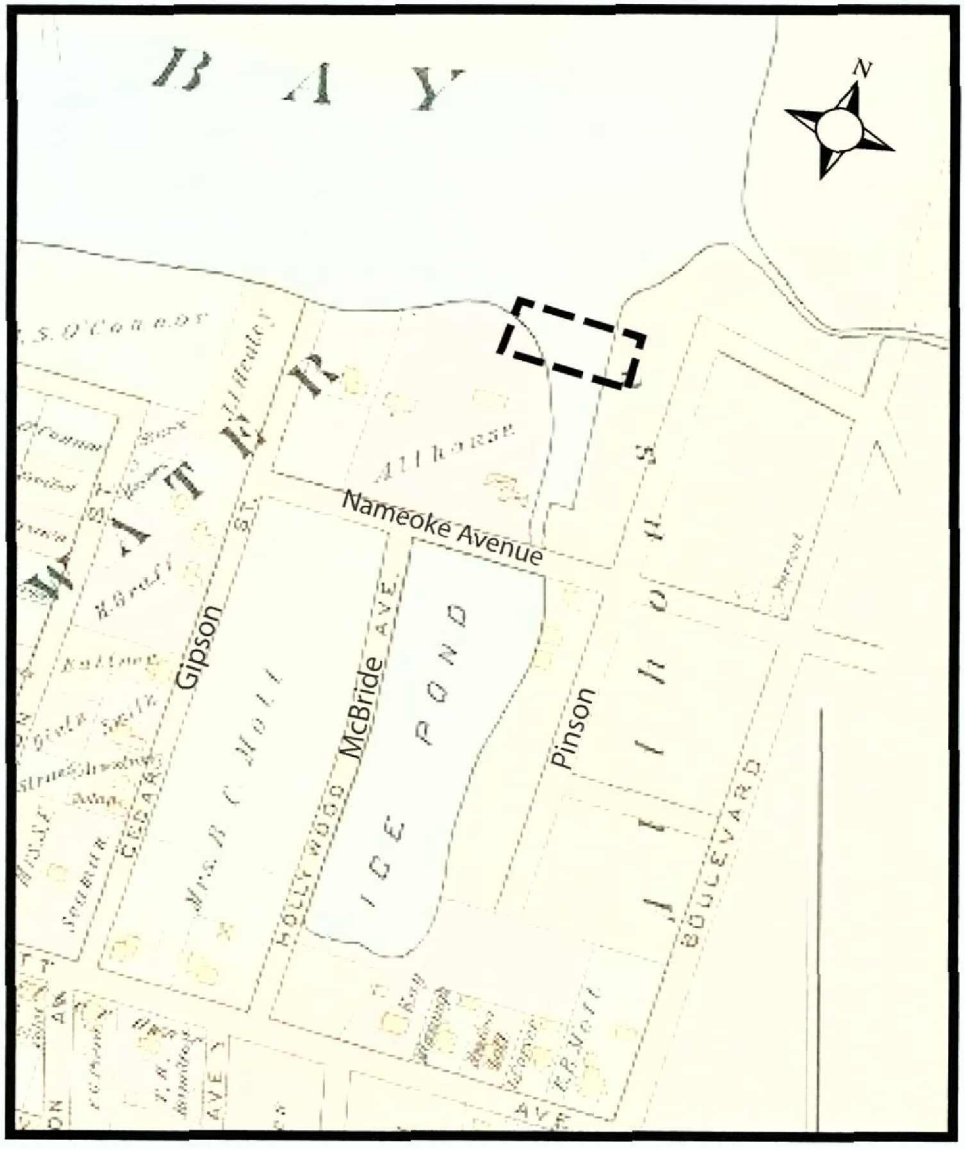


LEGEND

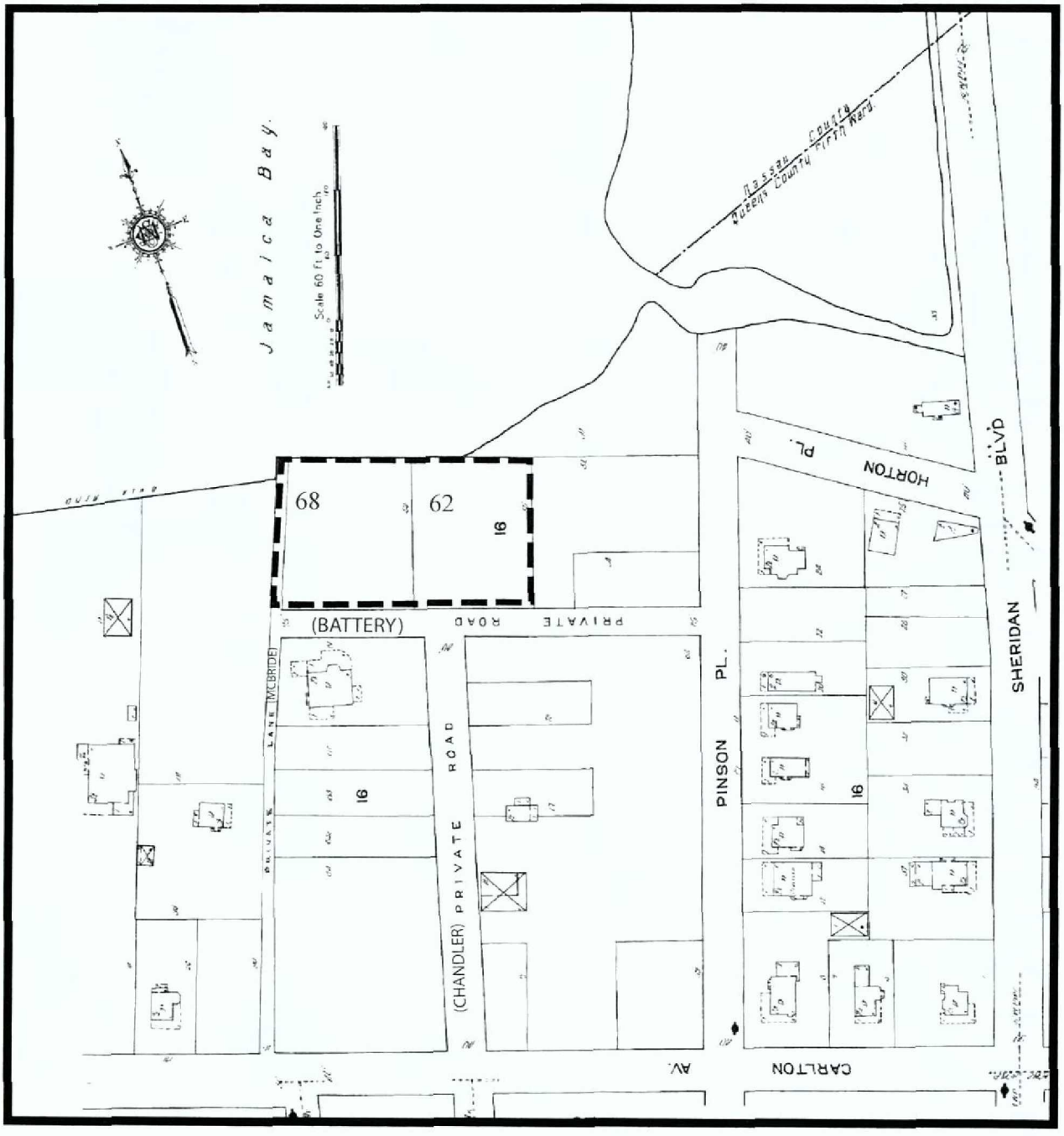
Area of Potential Effect

SOURCE: Map Division, New York Public Library

CHANDLER SEWER OUTFALL - FAR ROCKAWAY, QUEENS, NY

FIGURE 8: Wolverton, *Atlas of Queens County, Long Island, New York*, 1891

100 0 100 200 300 400 FEET



LEGEND

Area of Potential Effect

CHANDLER SEWER OUTFALL - FAR ROCKAWAY, QUEENS, NY

FIGURE 9: Sanborn, *Insurance Maps of the Borough of Queens*, 1912

LEGEND

Area of Potential Effect

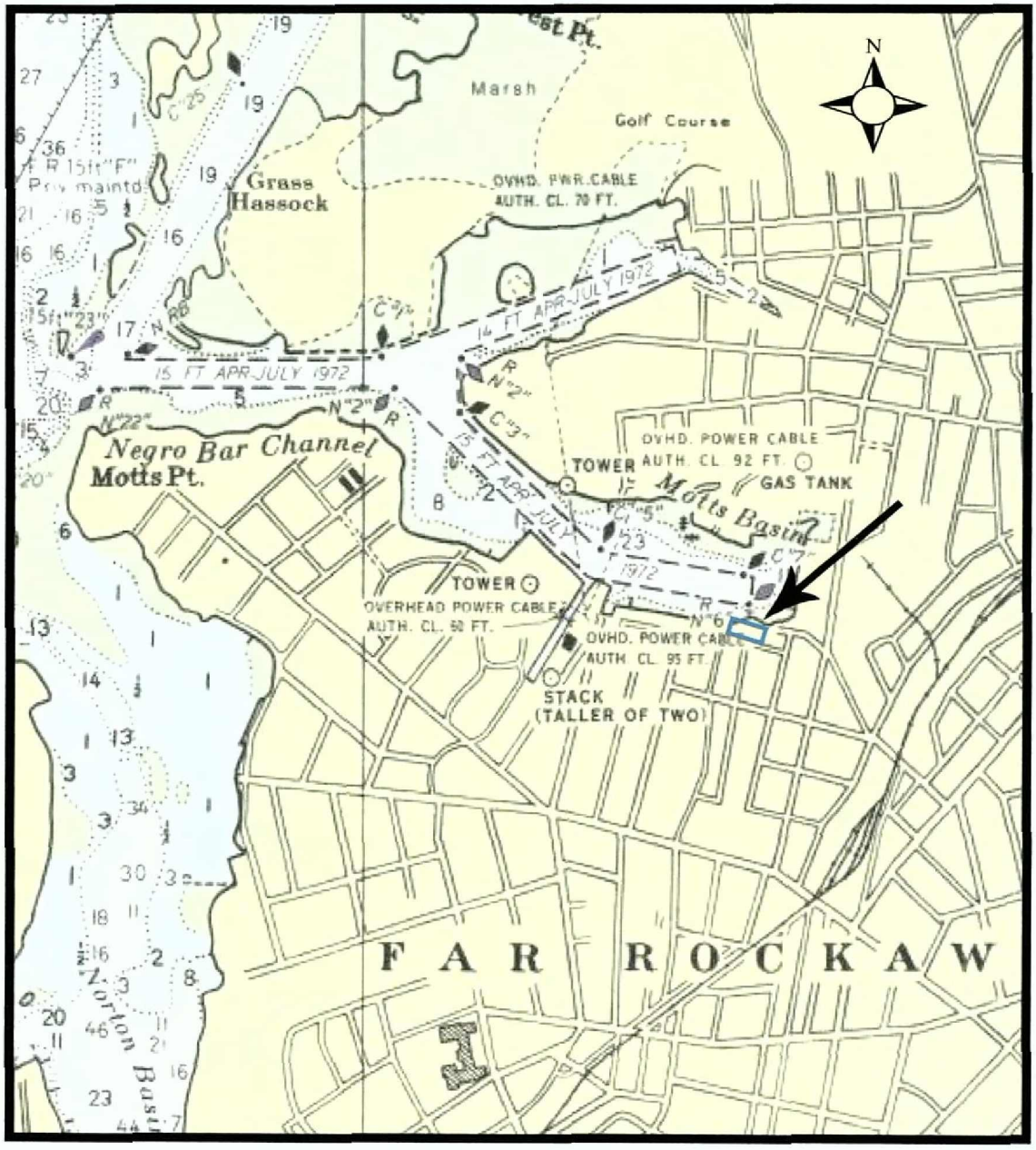
SOURCE: Map Division, New York Public Library (Aerial 1924)

CHANDLER SEWER OUTFALL - FAR ROCKAWAY, QUEENS, NY

FIGURE 10: Sectional aerial maps of the City of New York, 1924

10 0 10 20 30 40 50 METERS

50 0 50 100 150 200 FEET



LEGEND

Arrow indicates the Area of Potential Effect

SOURCE: Office of the Coast Survey (historicals.ncd.noaa.gov/historicals/histmap.asp)

CHANDLER SEWER OUTFALL - FAR ROCKAWAY, QUEENS, NY

FIGURE 11: NOAA, Jamaica Bay and Rockaway Inlet, 1975

500 0 500 1000 1500 2000 FEET

LEGEND

Area of Potential Effect

Current and Proposed Sewer Easements

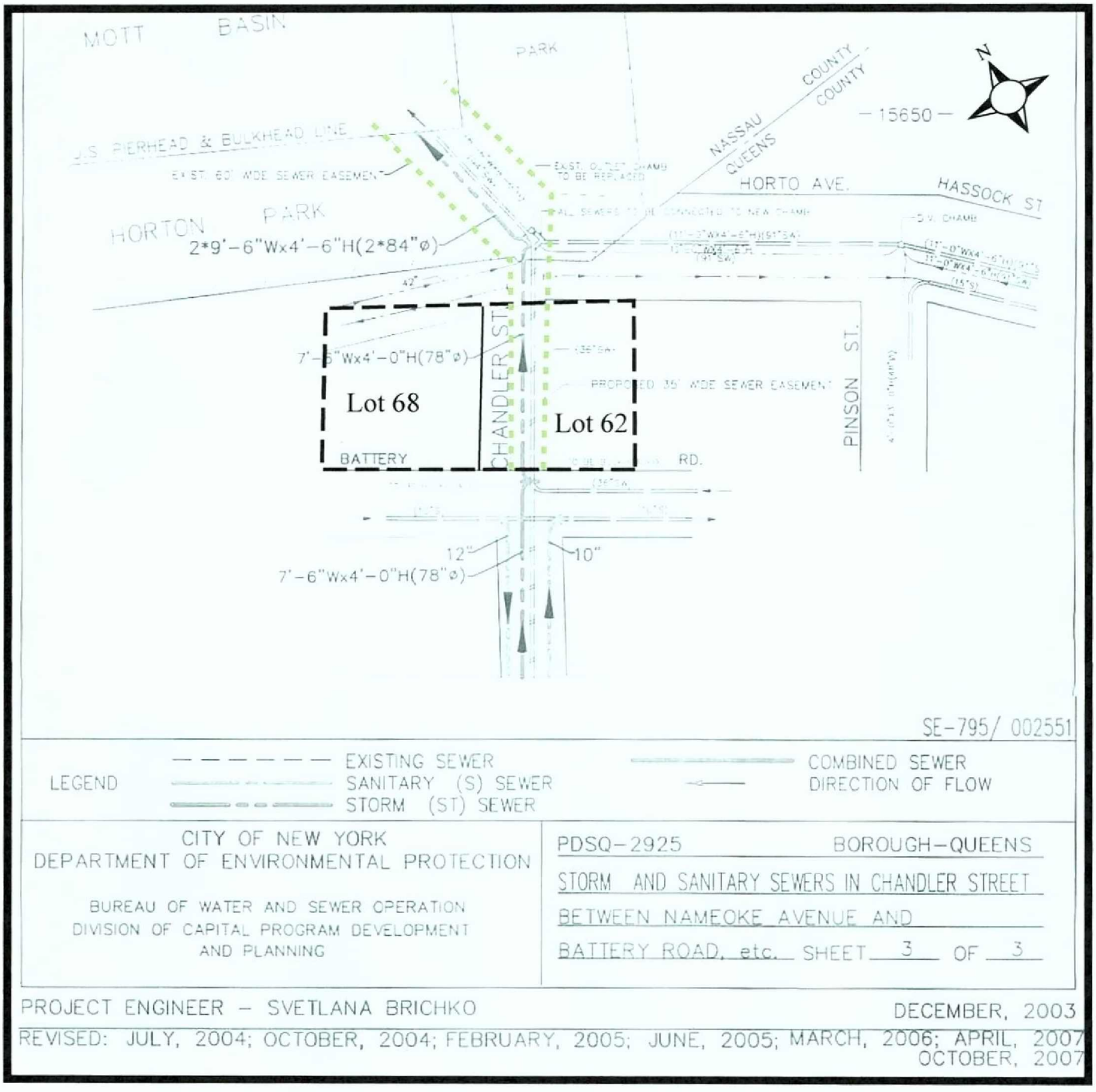
SOURCE: Oasis Map (www.oasisnyc.net/oasismap.htm)

CHANDLER SEWER OUTFALL - FAR ROCKAWAY, QUEENS, NY

FIGURE 12: Aerial Photograph, 1996

10 0 10 20 30 40 50 METERS

50 0 50 100 150 200 FEET



LEGEND

Area of Potential Effect Current and Proposed Sewer Easements

(THIS MAP IS NOT TO SCALE)

CHANDLER SEWER OUTFALL - FAR ROCKAWAY, QUEENS, NY

FIGURE 13: Storm and Sanitary Sewers in Chandler Street, 2007

LEGEND

Area of Potential Effect

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SOURCE: Oasis Map (www.oasisnyc.net/oasismap.htm)

CHANDLER SEWER OUTFALL - FAR ROCKAWAY, QUEENS, NY

PHOTOGRAPH LOCATION MAP (Base Map: Aerial Photograph, 1996)

Photo 1: View north from the southeastern corner of the intersection of Battery Road and Chandler Street. The APE is beyond the metal barrier. Note the three manholes in the intersection.

Photo 2: Looking west from the eastern edge of the APE, along the north side of Batter y Road. Chandler Street is in the middle distance, the APE is at the right.

Photo 3: View north from the northern side of Battery Road, at the southwest corner of the APE.

Photo 4: Looking northward across the APE from the foot of Chandler Street

Photo 5: View northward across Lot 56 of the APE from the southern edge of the APE in the line of Chandler Street.

Photo 6: Looking northwest toward the existing sewer outfall from the northern half of Lot 56, in the line of Chandler Street

Photo 7: Looking northwesterly from the northern edge of the APE (Lot 56), from the eastern line of Chandler Street. Note sewer manhole and paved area at the left, and the edge of the tidal flats exposed at right.

Photo 8: Sewer outfall, looking northwest from approximately 90 feet north of the APE, in line with the western edge of Chandler Street.

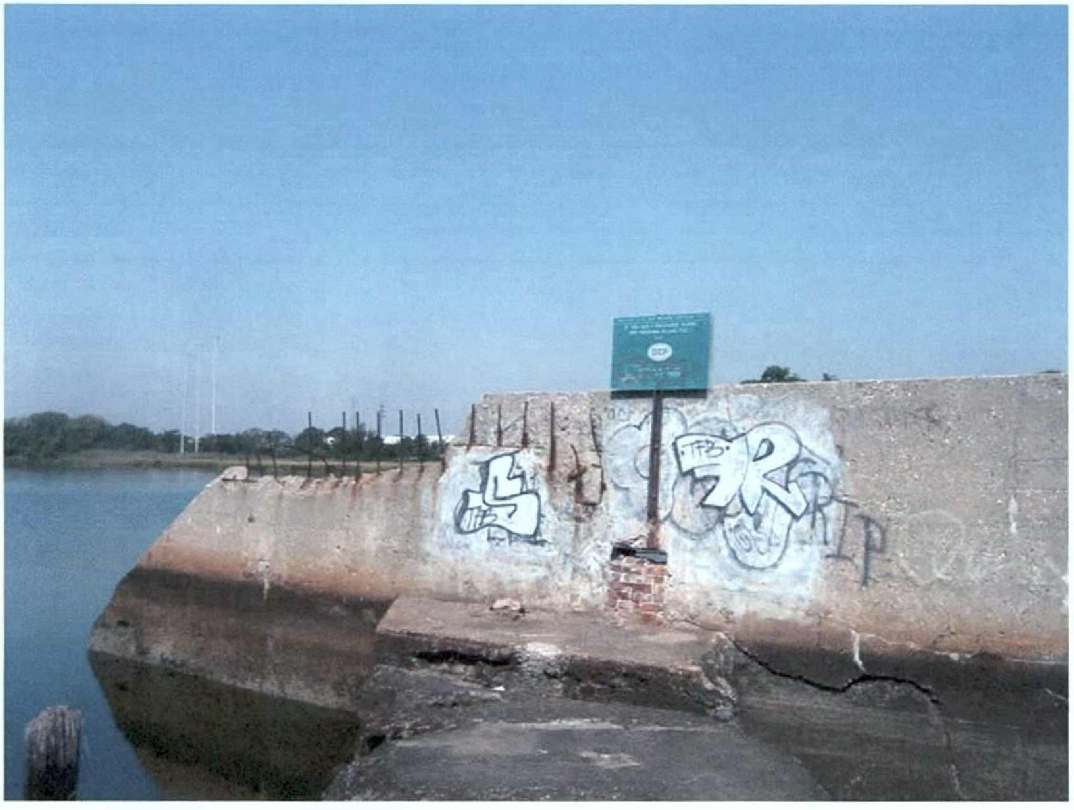

Photo 9: View southeast along the present sewer outfall. The APE begins beyond the tall grasses in the foreground. Chandler Street lies between the houses at the right midground.

Photo 10: Lookng southeast from the center of the APE, at the Lot 56/59 line. Chandler Street is at the right. Note the channel eroded by runoff.