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CULTURAL RESOURCES BASELINE STUDY JAMAICA BAY ECOSYSTEM RESTORATION PROJECT KINGS, QUEENS AND NASSAU COUNTIES, NEW YORK

FINAL REPORT

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July 2003

Panamerican Consultants, Inc.
Buffalo Branch Office
2390 Clinton Street
Buffalo, New York 14227-1735

Prepared for:

Northern Ecological Associates, Inc.
451 Presumpscot Street
Portland, Maine 04103

Under Contract to:

U.S. Army Corps of Engineers
New York District
CENAN-PL-EA
26 Federal Plaza
New York, New York 10278-0090

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FINAL REPORT

CULTURAL RESOURCES BASELINE STUDY
JAMAICA BAY ECOSYSTEM RESTORATION PROJECT
KINGS, QUEENS AND NASSAU COUNTIES, NEW YORK

Michele H. Hayward, Ph.D., Co-Principal Investigator
Arnold Pickman, M.A., Co-Principal Investigator
Mark A. Steinback, M.A., Project Historian
Stephen R. James, M.A., Marine Archaeologist
Edward V. Curtin, Ph.D., Prehistorian
Michael A. Cinquino, Ph.D., Project Director

Prepared by:
PANAMERICAN CONSULTANTS, INC.
Buffalo Branch Office
2390 Clinton Street
Buffalo, New York 14227-1735
(716) 821-1650

Prepared for:
NORTHERN ECOLOGICAL ASSOCIATES, INC.
451 Presumpscot Street
Portland, Maine 04103

Under Contract to:
U.S. ARMY CORPS OF ENGINEERS
NEW YORK DISTRICT
Environmental Analysis Branch
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New York, New York 10278-0090

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July 2003

MANAGEMENT SUMMARY

Project Name. Cultural Resources Baseline Study, Jamaica Bay Ecosystem Restoration Project, Kings, Queens and Nassau Counties, New York.

Project Location and Environmental Setting. The project area comprises 12 restoration sites situated around Jamaica Bay, which spans Kings, Queens, and Nassau counties on the southwest shoreline of Long Island, New York (USACE 1999b). Jamaica Bay is part of the tidal waterway connected to the Lower Bay of New York Harbor by Rockaway Inlet. Large boat channels have been dredged around the rim of the bay with narrower and shallower tidal creeks separating the many salt marsh islands situated in the center of the bay. Elevations within the project area are approximately at sea level.

Purpose and Goals. A cultural resources baseline study was conducted by Panamerican Consultants, Inc. under contract to Northern Ecological Associates, Inc., Canton, New York, and the U.S. Army Corps of Engineers, New York District. The overall objectives of this documentary study are to describe the prehistoric and historic occupation, use and development of Jamaica Bay, with an emphasis on the areas in the vicinity of the restoration activities, and to evaluate the potential of these activities to impact any significant cultural resources.

Regulatory Basis. The U.S. Army Corps of Engineers (USACE), as a federal agency, has management responsibilities concerning the protection and preservation of cultural resources on land it uses. Federal statutes require the USACE to identify and evaluate significant cultural resources on these properties, and include: National Historic Preservation Act of 1966, as amended (16 USC 470 *et. seq.*) through 1992 (which includes Section 106 compliance); the Advisory Council on Historic Preservation Guidelines for the Protection of Cultural and Historic Properties (36 CFR Part 800); as well as National Environmental Policy Act of 1969 (40 CFR Parts 1500-08).

Cultural Resources Survey Work Completed. Archival and documentary research and a walkover reconnaissance of the onshore portion of the project area were conducted as part of the baseline study. Background research included a review of files and documents from the New York State Historic Preservation Office; the New York Public Library, Map, Local History, and General Research divisions; the Queens Borough Public Library, Long Island Division; the New York City Municipal Reference Library; the Brooklyn Public Library, Brooklyn Division; the New York City Municipal Archives; the New York City Landmarks Preservation Commission; and the Cultural Resources Unit, Fort Wadsworth, Gateway National Recreation Area (GNRA), National Park Service, Ms. Felice Ciccione, Curator. No field testing or coring was conducted in the project area as per the scope of work (USACE 1999b).

Location of file copies of report. Copies of this report are on file at USACE, New York District, New York, the New York State Historic Preservation Office, Peebles Island, Waterford, the New York City Landmarks Preservation Commission, and the Cultural Resources Unit, Fort Wadsworth, Gateway National Recreation Area (GNRA), National Park Service.

Survey Results. The review of the environmental and culture history documentation for Jamaica

Bay provided an interpretive context for both the general bay region and each of the twelve restoration areas. From the review it was also possible to decide which of the twelve areas required further study and the form of that investigation.

Conclusions and Recommendations. The results of this baseline study indicate the presence of potentially significant cultural resources within or in the immediate vicinity of ten proposed Jamaica Bay Ecosystem Restoration Project sites. At four locations—Dead Horse Bay, Fresh Creek, Spring Creek, and Motts Point—remains of historic period cultural landscapes are embedded in the existing environment. Dead Horse Bay, Paerdegat Basin and Motts Point exhibit potential for the discovery of additional historic deposits and prehistoric remains. The Hawtree/ Bergen Basin and Gerritsen Creek restoration sites may contain evidence of early twentieth century structures and associated artifact deposits, while possible early twentieth century bulkhead remnants are extant along the Dubos Point project area shoreline. At Dead Horse Bay and Brant Point potentially significant marine resources are present. Actual or inferred cultural resources at these locations should be the subject of further study as outlined below.

No cultural resources have been recorded for two of the three remaining restoration sites: Broad Channel and the JFK Runway By-pass. Past land use history and archaeological sensitivity of Broad Channel indicates low potential for locating unrecorded terrestrial and submerged resources. No further work or monitoring during earth-moving activities is recommended. The JFK Runway By–pass might impact historic resources within the current marshland or even submerged prehistoric remains, with further work considered. No specific locations for the Oyster/Eelgrass Reintroduction test areas have been identified. The Jamaica Bay floor possesses a range of archaeological sensitivities from high to low, carrying a recommendation of deferment until areas have been determined.

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ACKNOWLEDGMENTS

Panamerican Consultants, Inc. wishes to thank Ms. Nancy Brighton, archaeologist at the New York District Office of the U.S. Army Corps of Engineers, for her assistance throughout this study.

Ms. Cynthia Blakemore of the New York State Office of Parks, Recreation and Historic Preservation, Ms. Felice Ciccione, Curator of Gateway National Recreation Area, and Ms. Beth Wellman of the New York State Museum were also of assistance.

Clerical assistance for this report was provided by Ms. Peggie Billittier. Graphics were prepared by Mr. Martin Lewars and Mr. Carl W. Thiel. Mr. Thiel also edited the document. The report was produced under the supervision of Mr. Mark A. Steinback.

1.0 INTRODUCTION

1.1 PROJECT DESCRIPTION

Panamerican Consultants, Inc. (PCI), under contract to Northern Ecological Associates, Inc., Canton, New York, conducted a cultural resources baseline study around Jamaica Bay, Kings, Queens and Nassau counties, New York. The proposed project is being conducted by the New York District Office of the U.S. Army Corps of Engineers (USACE).

USACE, in cooperation with the New York State Department of Environmental Conservation (DEC) and the New York City Department of Environmental Protection (DEP), are evaluating sites and activities to be included in the Jamaica Bay Ecosystem Restoration Project. Panamerican personnel involved with the project consisted of Dr. Michael A. Cinquino, Project Director, Dr. Michele H. Hayward, Co-Principal Investigator; Mr. Arnold Pickman, Co-Principal Investigator and primary author, Mr. Stephen R. James, Marine Archaeologist, and Mr. Mark A. Steinback, Historian. Dr. Edward V. Curtin drafted the paleoenvironment overview, which was reviewed by Dr. Michele H. Hayward.

This cultural resources baseline study is being undertaken to assist the New York District in meeting the requirements of Federal statutes and regulations, including Section 106 of the National Historic Preservation Act as amended through 1992, and the Advisory Council on Historic Preservation Guidelines for the Protection of Cultural and Historic Properties (36 CFR Part 800).

The overall objectives of this documentary study are to describe the prehistoric and historic occupation, use and development of Jamaica Bay, with an emphasis on the areas in the vicinity of the restoration activities, and to evaluate the potential of these activities to impact any significant cultural resources.

The original scope of work for this project included a list of 12 sites at which environmental restoration would be undertaken and six additional sites that were being considered. However, as noted in the scope of work (USACE 1999b:1) these were not the final sites to be selected. As of October 1999 a list of twelve "priority" sites had been chosen and the activities at these sites were described in a USACE New York District memorandum of that date (USACE 1999a). In a November 3, 1999 meeting between PCI project staff and New York District representatives the number of sites and their locations were refined to eleven specific sites (Figure 1), identified as:

1. Dead Horse Bay
2. Gerritsen Creek
3. Paerdegat Basin
4. Fresh Creek
5. Spring Creek
6. Hawtree/Bergen Basins
7. Motts Point (part of Bayswater State Park)

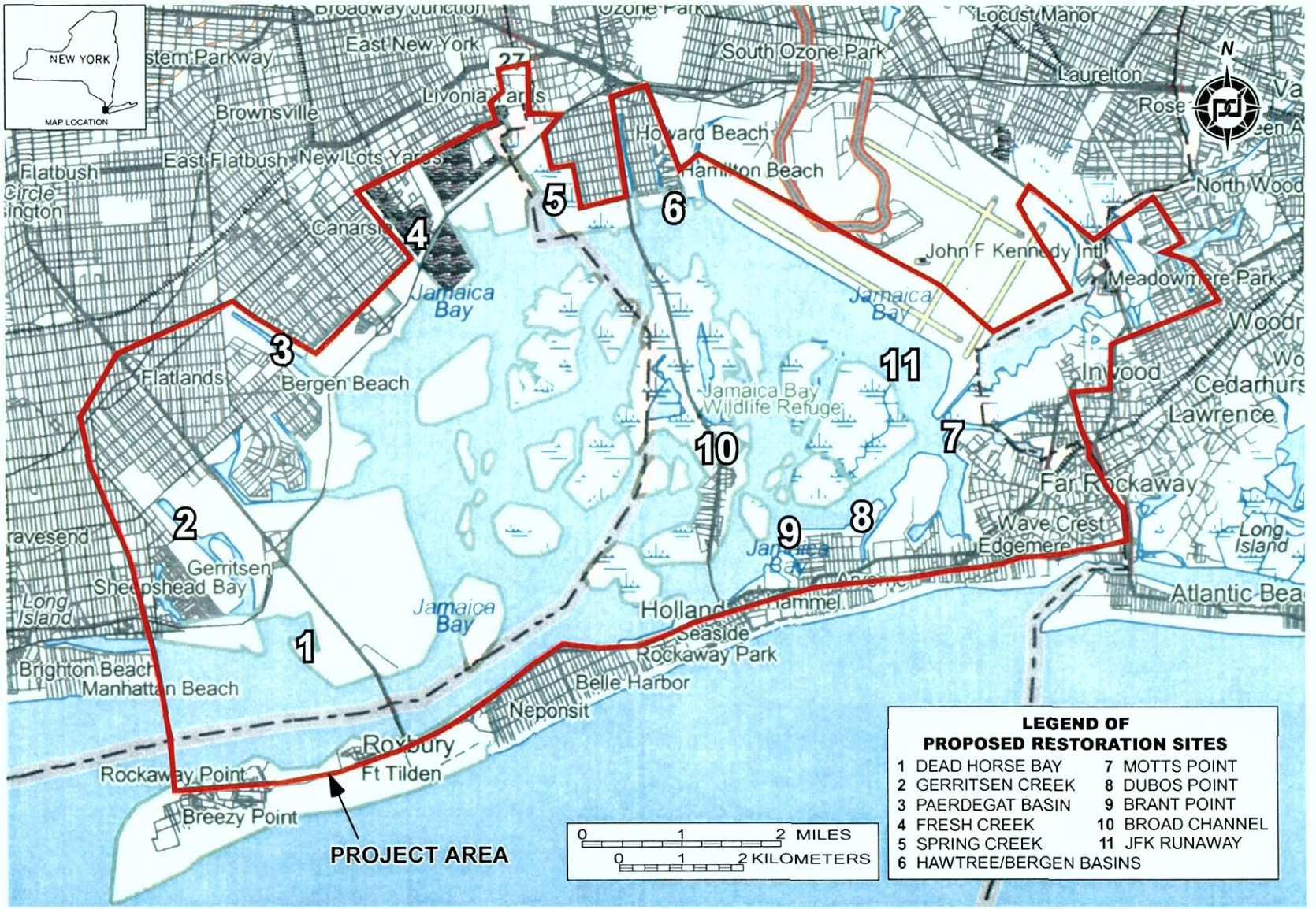


Figure 1. Location of Jamaica Bay environmental restoration sites. Jamaica Bay Restoration Project, Kings, Queens, and Nassau counties, New York *(DeLorme 1993)*.

8. Dubos Point
9. Brant Point
10. Broad Channel
11. JFK Runway By-pass
12. Reintroduction of Oyster Beds and Eelgrass Restoration Areas

Although the full ecosystem restoration project includes parts of Kings, Queens, and Nassau counties (see Figure 1), the eleven specific restoration sites are all within Kings and Queens Counties (the New York City Boroughs of Brooklyn and Queens). Visits to the Jamaica Bay area and the proposed restoration sites were made on December 17, 20 and 30, 1999.

After the completion of the initial site reconnaissance, the proposed activities and their locations within the bay were reconsidered by USACE. As of March 2003, the Gerritsen Creek and Spring Creek sites were being completed as individual projects under their own authorization and reports evaluating the effects of proposed restoration activities on these sites are being prepared separately. Discussion of these sites, however, remain in this document. The eelgrass demonstration also is being conducted as a separate project. The other eight restoration sites remain pertinent to the present report, although boundaries and activities have been revised (Ms. Nancy Brighton, USACE, personal communication 2003; Barry A. Vittor & Associates, Inc. 2003). These revisions are referred to where necessary throughout the text and are fully incorporated in the Recommendations section. The revisions are provided in Appendix A.

1.2 Previous Cultural Resource Studies

An overall history of the bay was presented in the Jamaica Bay Historic Resource Study conducted for the Gateway National Recreation Area (GNRA; Figure 2) (Black 1981). Prior to the Black study, John Milner Associates (1978) compiled an inventory of specific cultural resources within the recreation area.

Also examined were the files of the New York City Landmarks Commission and the New York State Historic Preservation Office to identify cultural resources investigations which may have been conducted within or in the immediate vicinity of the eleven specific environmental restoration sites described above. These reports include:

A. An archaeological assessment for a proposed New York City DEP water quality facility located between Flatlands Avenue and Paerdegat Basin, immediately north of the Paerdegat Basin environmental restoration site (Kearns et al. 1993).

B. Two studies in the vicinity of the proposed Fresh Creek restoration site. One of these was conducted for a development parcel located northwest of the corner of Farragut Road and East 105th Street, approximately ½ mile northwest of the Fresh Creek restoration site (Pickman 1999). The second study focused on the potential for

prehistoric archaeological sites within an approximately 13-square block urban renewal area located about ½ mile northeast of the Fresh Creek site (Pickman 1995).

C. A cultural resources survey of a 230-acre development parcel north of the Belt Parkway bordered easterly, in part, by Fountain Avenue (Historical Perspectives 1993). This tract is located 900 feet west of the northern portion of the Spring Creek restoration site.

D. An archaeological assessment of a 225-acre parcel bounded in part by the Metropolitan Transportation Authority (MTA) tracks on the west and Bergen Basin on the east (Kearns et al. 1991). This tract includes most of the portion of the Hawtree/Bergen restoration site located east of the MTA tracks and now excluded from consideration.

E. An archaeological assessment of a development parcel located between Vernam and Barbadoes Basins and another located immediately southwest of Barbadoes Basin on the Rockaway Peninsula (Historical Perspectives 1988). The former area is located across Vernam Basin, approximately 1,100 feet from the Brant Point site.

F. A cultural resources survey of the Arverne Urban Renewal Project, which extended from Beach 84th Street to Beach 32nd Street and from the MTA tracks to the ocean, also on the Rockaway Peninsula (Historical Perspectives 1986). This tract is located approximately one-half mile south of the Brant Point and Dubos Point sites.

G. An historical and archaeological survey of the route of the Liberty Pipeline Project (Berger 1992). A portion of this route ran along Healy Avenue and Bay 32nd Street, some two-thirds of a mile south of the Motts Point site.

These reports, especially Black's Jamaica Bay history (1981), provided valuable background information for the present study. In most cases, however, relevant primary historical sources were reviewed rather than relying on the narratives included in these cultural resource investigations.

No terrestrial or remote sensing surveys have been conducted within the eleven specified locations. One exception noted above under Heading D of the MTA assessment for the Hawtree/Bergen restoration site is now in the category of an adjacent project area survey.

Figure 2. Extent of the Gateway National Recreational Area at Jamaica Bay. Jamaica Bay Ecosystem Restoration Project, Kings, Queens, and Nassau Counties, New York *(National Park Service 1998).*

2.0 DESCRIPTION OF THE PROJECT SITES AND THE PROPOSED RESTORATION ACTIVITIES

2.1 POTENTIAL RESTORATION ACTIVITIES THAT MAY RESULT IN GROUND DISTURBANCE

Techniques to be used in environmental restoration and possible methods that could be implemented at various sites around Jamaica Bay were discussed in a report submitted to the New York District in 1997 (Louis Berger & Associates 1997). A brief description of each of the sites and the proposed restoration activities, based on descriptions contained in the October 20, 1999 USACE memorandum, the 1997 report, and on-site visits conducted for this study follows. The selected restoration sites (see Section 1.1) are shown on USGS topographic maps (Figures 3 through12). Estimates of distances and the areas to be affected by the project are based on these maps. A recent conceptual plan report (Barry A. Vittor & Associates 2003) presents an existing conditions map and the restoration goals for each of eight sites within the project area (i.e., Dead Horse Bay, Paerdegat Basin, Fresh Creek, Spring Creek, Hawtree Point, Bayswater State Park (Motts Point), Dubos Point, and Brant Point; see Appendix A).

Restoration Site 1 - Dead Horse Bay

Dead Horse Bay extends southeastward from Gerritsen (formerly Dead Horse) Inlet, which in turn extends northward from Rockaway Inlet. The restoration site is located west of Flatbush Avenue in the Borough of Brooklyn and consists of undeveloped parkland within the Gateway National Recreation Area (GNRA) maintained by the National Park Service (NPS).

This proposed restoration site is composed of two parts (Figure 3). The northern portion is located southeast of the Belt Parkway, west of Flatbush Avenue and north of an inlet extending eastward immediately north of Dead Horse Bay known as Deep Creek. The major restoration effort will be the excavation and removal of existing fill containing the invasive plant *Phragmites australis* (Common Reed). After removal, the fill, if sufficiently clean, will be placed along the Belt Parkway at the edge of the site to act as an upland buffer from the surrounding developed land (and possibly as a base for wildlife observation platforms at selected sites). Excavation and grading would vary from below mean low water (MLW) to several feet above mean high water (MHW) depending on location. A tidal creek, and possibly tributaries, will be extended from existing open water to the northern extremity of the site, utilizing existing topography (i.e., lowest elevations). Selected areas in the created intertidal zone will be planted with appropriate species of salt marsh vegetation. The area of the intertidal zone that supports *Spartina alterniflora* (Smooth Cordgrass) (approximately mid-tide) will be maximized to the extent possible. Areas directly adjacent to low marsh (upper intertidal zone) will be planted with high marsh species. Adjacent upland areas within the site boundaries will be graded/manipulated to remove undesirable plant species and the latter will be replaced by higher wildlife value species. Surface soil may be removed and new soil brought into certain areas.

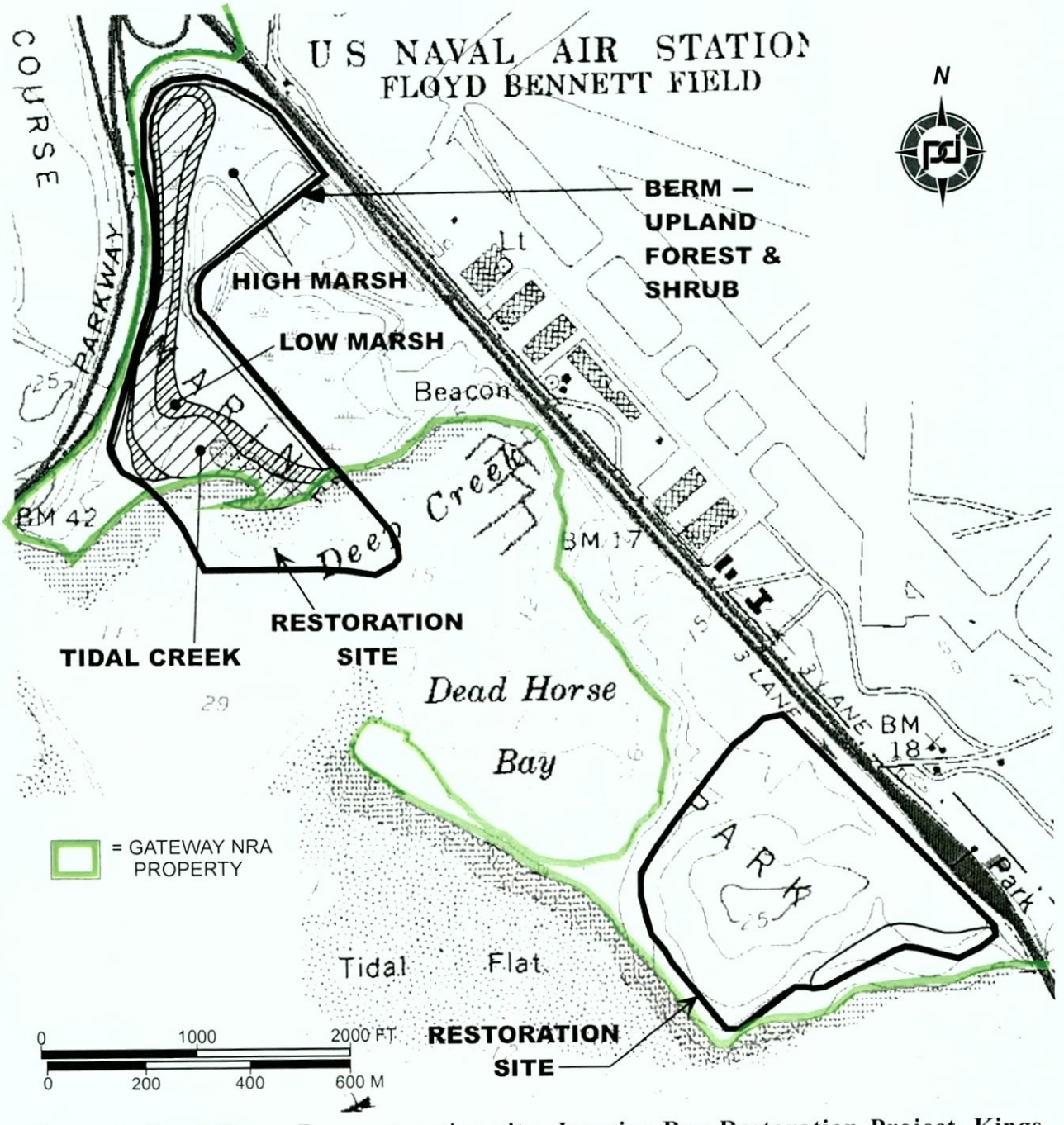


Figure 3. Dead Horse Bay restoration site. Jamaica Bay Restoration Project, Kings, Queens, and Nassau Counties, New York *(USGS 7.5' Quadrangle, Coney Island NY, 1979 [1966]).*

In the southern portion of the site the shoreline consists mostly of a narrow sandy beach. A bluff approximately five feet high extends along the western shoreline. Restoration will be undertaken in three locations. Upland restoration (Phragmites and mugwort removal; regrading and replanting with high habitat value grassland and forest vegetation) will be done in the area indicated on Figure 3 along and in the vicinity of the southern shoreline of Dead Horse Bay. In the southwestern portion of the site along the shoreline of Gerritsen Inlet, garbage from a former landfill is eroding from the bluff and needs to be stabilized by regrading and planting appropriate species or by utilizing minimal structural stabilization. Also, a relatively small area adjacent to Flatbush Avenue, in the southeastern portion of the site will be regraded/prepared, sand added, and dune/grassland habitat established.

Restoration Site 2 - Gerritsen Creek

The proposed restoration site (Figure 4) is within the boundaries of Marine Park and the adjacent Marine Park Golf Course which are managed by the New York City Department of Parks and Recreation (NYCDPR). Restoration activities will conform to NYC parks plans for this area and complement their efforts.

A relatively small area along the northeastern shoreline of Gerritsen Creek's eastern branch (also known as Mill Creek) will be graded, established at the lower elevations, and an upland grassland/ scrub/shrub/forest established at the more inland higher elevations. The site consists of filled-in former marsh land, most of which is now covered with Phragmites vegetation.

Restoration Site 3 - Paerdegat Basin

Paerdegat Basin is a channelized former tidal creek in the Flatlands section of Brooklyn and consists of an open channel, 14 feet deep at MLW. The basin is bordered by Canarsie Beach Park (GNRA) to the northeast and Joseph Thomas McGuire Park to the southwest. The adjoining properties are mostly vacant uplands in addition to several marinas. City-owned land adjacent to the northwestern end of the basin has been developed for use by the New York City Department of Environmental Protection and Bureau of Highways. The vacant upland parcels along Paerdegat Avenue on the north and Bergen Avenue on the south are bordered by residential properties.

Portions of the Paerdegat Basin shoreline are bordered by narrow bands of low marsh less than ten feet in width with some small, open sandy beaches along the shoreline. Old dilapidated wood piles are present at some locations. With the exception of the marinas noted above, most of the shoreline, which quickly rises into adjoining upland areas, is undeveloped.

The northern part of the proposed restoration site will extend approximately 2,800 feet from the northernmost end of a marina, located between the lines of Avenues M and N, to a point near the line of Avenue J (Figure 5). Here, the basin will be re-contoured, which will involve filling the existing basin with clean dredged material to a depth to be determined (likely 2 to 4 feet) from the results of the NYCDEP HD/WQ modeling. The re-contouring should reduce residence time and thus improve

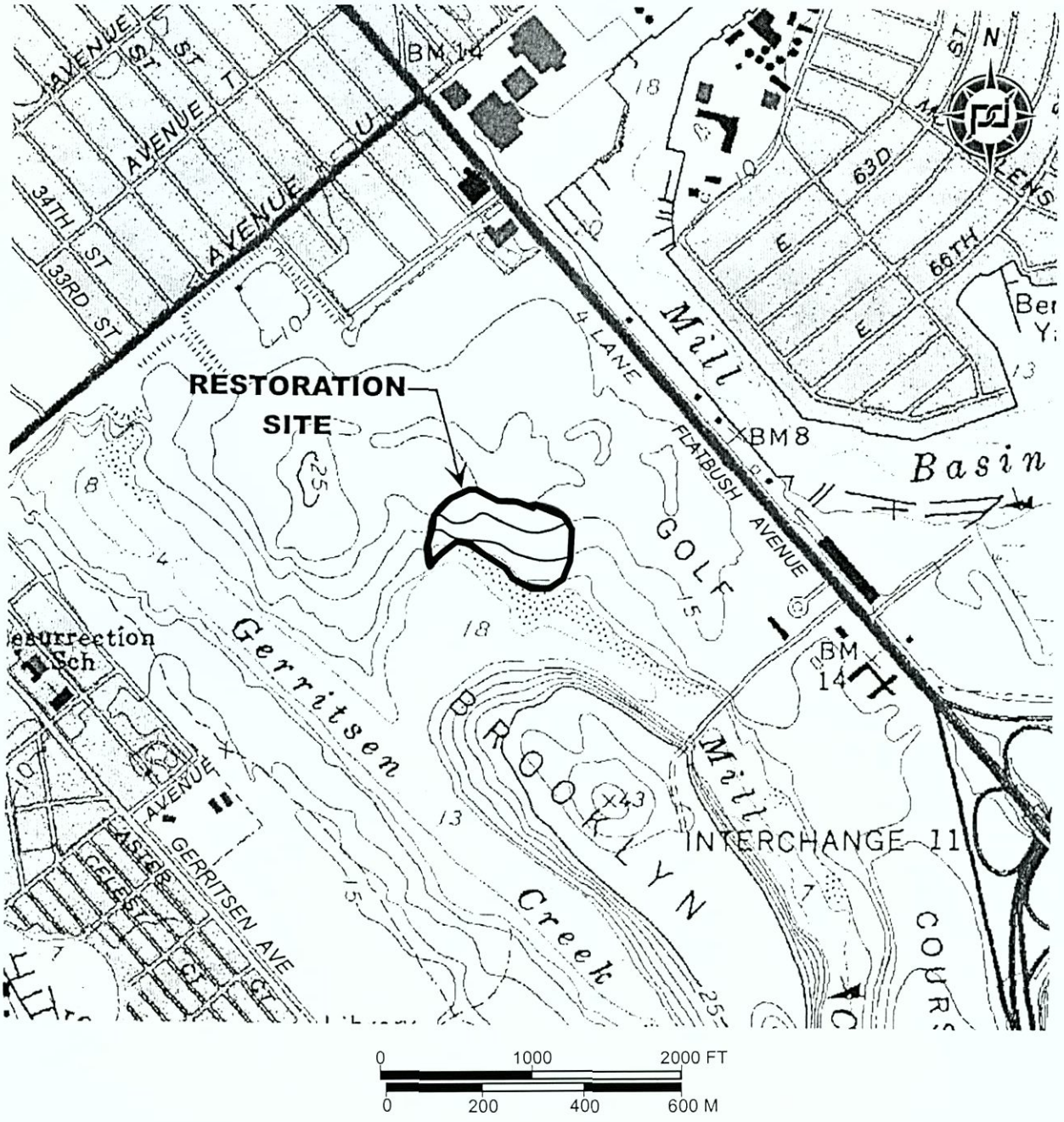


Figure 4. Gerritsen Creek restoration site. Jamaica Bay Restoration Project, Kings, Queens, and Nassau counties, New York *(USGS 7.5' Quadrangle, Coney Island NY, 1979 [1966]).*

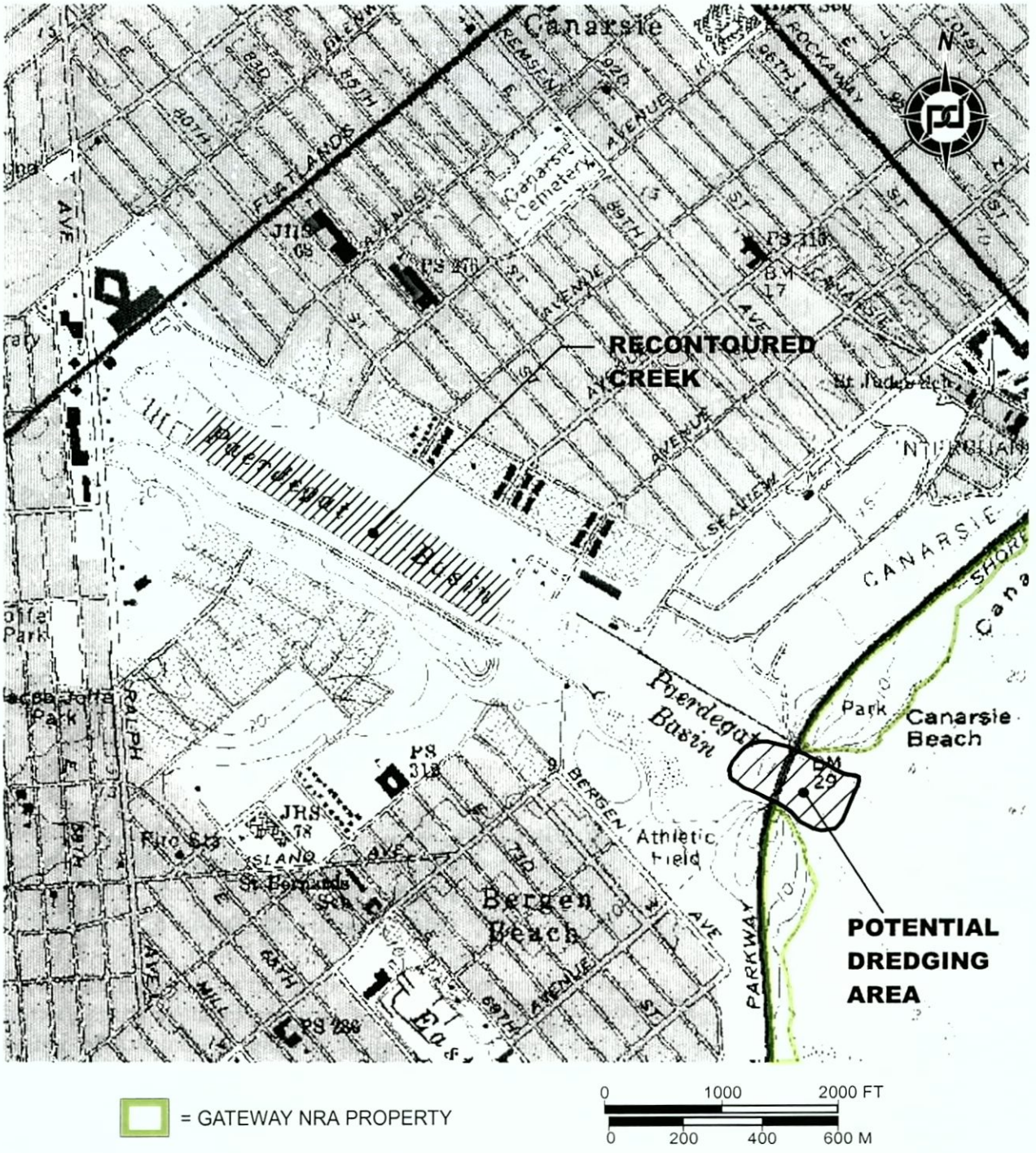


Figure 5. Paerdegat Basin restoration site. Jamaica Bay Restoration Project, Kings, Queens, and Nassau counties, New York *(USGS 7.5' Quadrangles, Brooklyn and Coney Island NY, 1979 [1966]).*

flushing and hence water quality. Land on either side of the re-contoured portion of the basin will be graded to soften the shoreline and a fringe *S. alterniflora* marsh will be established. At adjacent higher elevations, high value upland forest and scrub shrub will be established to complement NYC Parks' habitat improvement for this area. Excavated material may have to be removed and disposed of off site, although if clean and suitable, might be used for re-contouring the basin. The existing Paerdegat Basin sill at the Belt Parkway Bridge (see Figure 5) may need to be dredged to get the desired residence time reduction effect (also to be based on NYCDEP's modeling). The presumably coarse sediments dredged from the sill could be used for partial re-contouring of the northern portion of the channel (as described above) if needed.

Restoration Site 4 - Fresh Creek

Fresh Creek is a tidal creek on the northeast border of the Canarsie section of Brooklyn. As with Paerdegat Creek, parts of Fresh Creek have been channelized and the shoreline bulkheaded, while other areas remain largely undisturbed. Much of the adjacent land is undeveloped parkland under the jurisdiction of the NYCDPR. Residential buildings border open water areas of Fresh Creek at the northern and southern ends of its western shoreline. The northeast portion of the site along Louisiana Avenue between Seaview Avenue and Twin Pines Drive has been landscaped and developed into an interpretive trail with viewing platforms. Residential areas, including Starrett City, border the site on the west and east and are separated from Fresh Creek by local roads.

The restoration activities at this site (Figure 6) are similar to those planned for Paerdegat Basin. At Fresh Creek the re-contoured portion will extend from the approximate location of Avenue M to the head of the basin at Flatlands Avenue. The upland area to be established will be located in the southeastern portion of the site, southwest of Louisiana Avenue and northwest of the Belt Parkway. Sill dredging similar to that described for the Fresh Creek site will occur in the vicinity of the Belt Parkway.

Restoration Site 5 - Spring Creek

Spring Creek is a tidal creek that, in part, has retained its meandering pattern and serves to separate Kings and Queens Counties. The creek channel has a depth of four to five feet below the adjoining marshes. At low tide, mud flats are present in its upper portions. Property adjacent to the creek include low and high marsh and filled upland. The proposed restoration plan (Figure 7) has two components. In the northern portion, owned by NYCDEP and NYCDPR, selected low-lying phragmites-dominated areas directly adjacent to the creek will be excavated and regraded/re-planted with S. alterniflora and high marsh species. If the city approves, excavated material will be disposed of on site to fill areas of stagnant fresh water.

The southern component of the site consists of National Park Service property. At the extreme southern end of this area, which adjoins Jamaica Bay, restoration will involve adding sand to create a native grassland/dune area supportive of wildlife. Some regrading and phragmites control/ removal will be necessary. Much of the rest of the south portion of the site will receive extensive

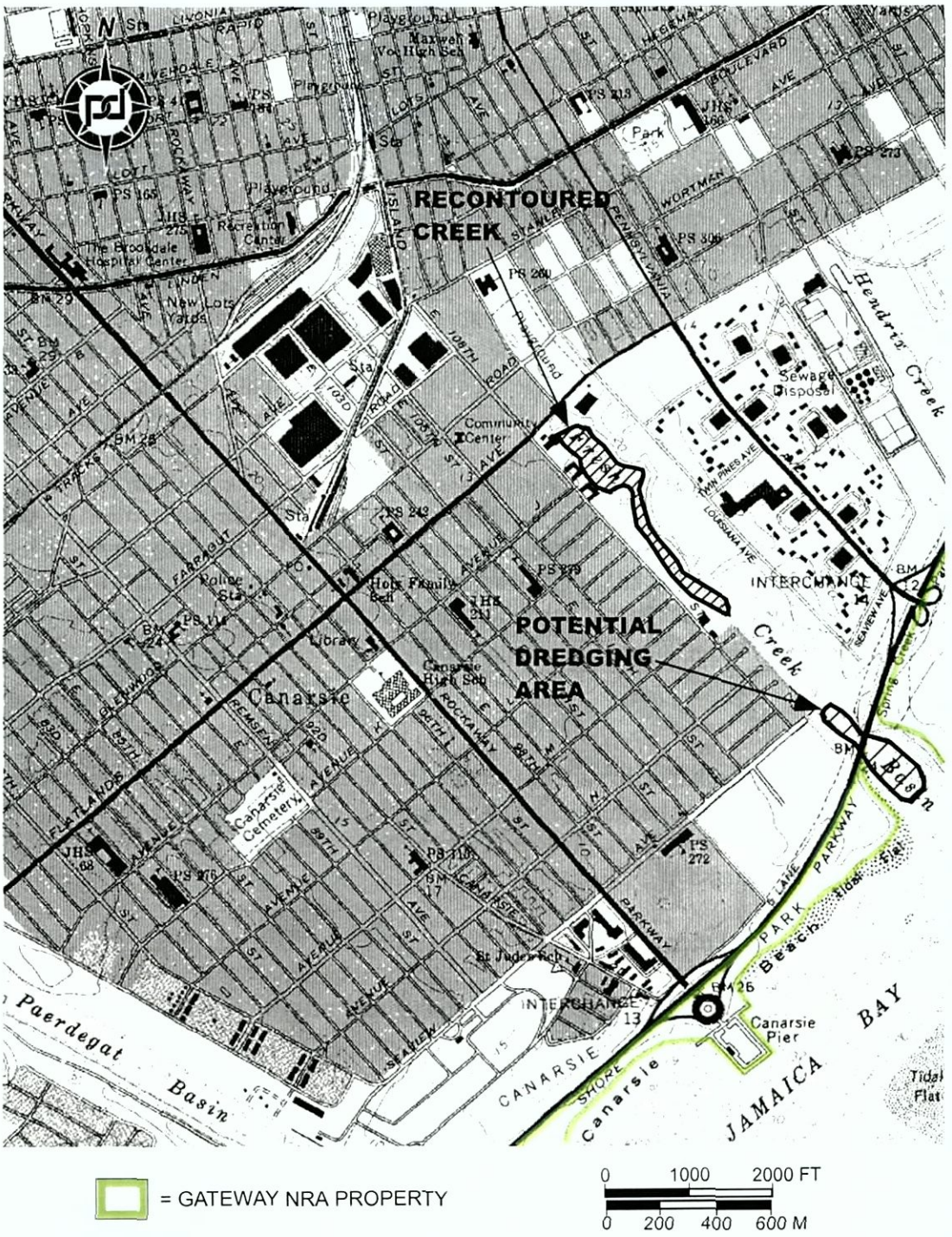


Figure 6. Fresh Creek Restoration site. Jamaica Bay Restoration Project, Kings, Queens, and Nassau counties, New York *(USGS 7.5' Quadrangle, Brooklyn NY, 1979 [1966]).*

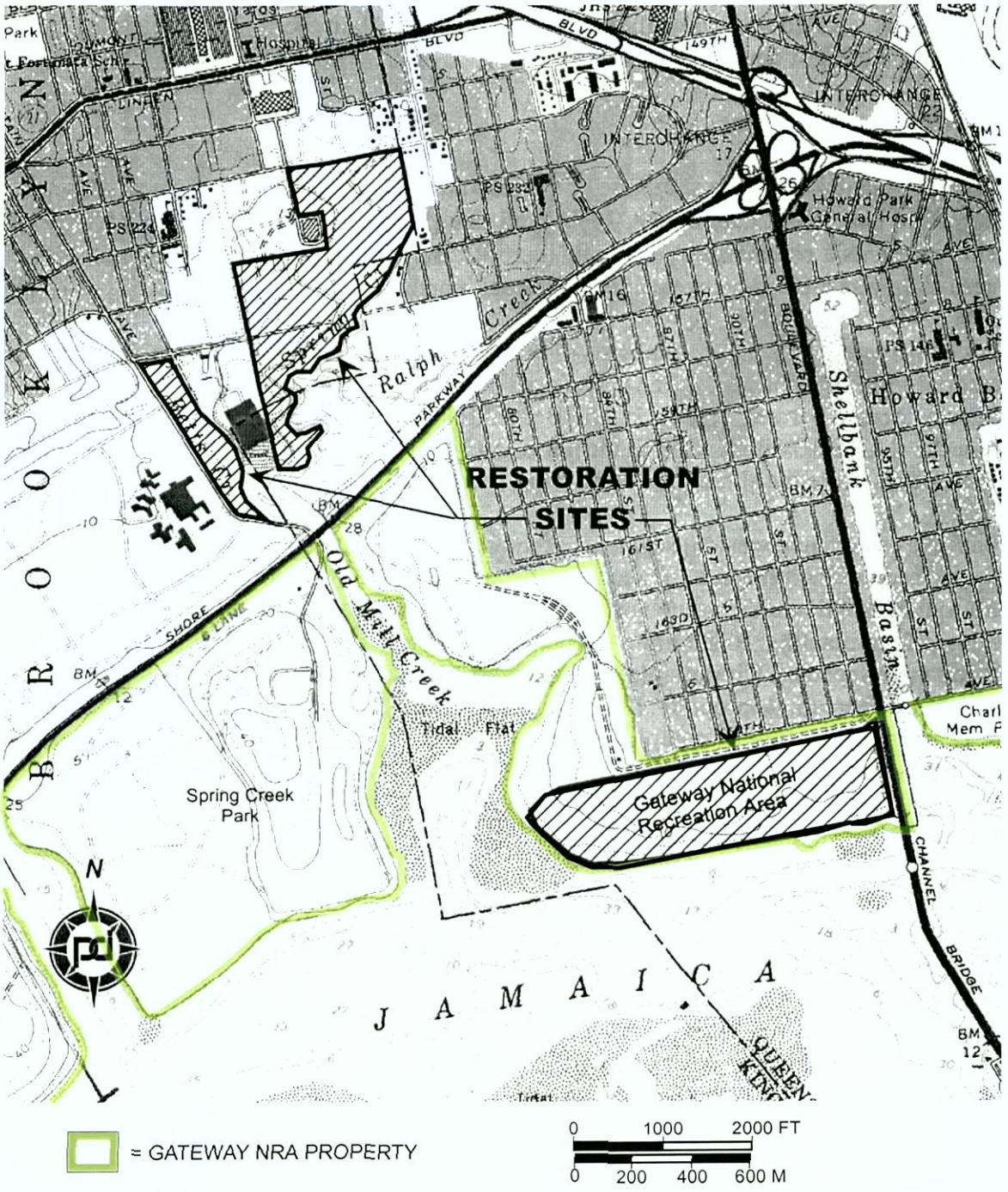


Figure 7. Spring Creek restoration site. Jamaica Bay Restoration Project, Kings, Queens, and Nassau counties, New York *(USGS 7.5' Quadrangles, Jamaica NY, 1979 [1966]).*

phragmites control/removal, extensive regrading, probably the importation of topsoil, and extensive replanting of upland forest, scrub shrub and grassland.

The southern component of the project will also involve the creation of a small salt marsh in Old Mill Creek (the portion of Spring Creek south of the Belt Parkway) opposite the Fountain Avenue landfill. This will be accomplished by excavating phragmites/fill and replanting with salt marsh vegetation. Excavated material will probably be disposed of on the adjacent degraded upland or reused by the NPS, if appropriate.

Restoration activities for this site are now proposed only for the area south of the Belt Parkway (see Appendix A).

Restoration Site 6 - Hawtree/Bergen Basins

This site is located along the shoreline of the Howard Beach section of Queens County, on both sides of the New York City transit (i.e., Metropolitan Transportation Authority) rail line (Figure 8). Like Paerdegat Basin, Hawtree Basin represents a channelized former tidal creek. Bergen Basin, which borders the site on its eastern side, was created by excavation of former marshland.

The western segment of the site consists of undeveloped land belonging to the Frank M. Charles Memorial Park (part of the GNRA). The eastern segment is a vacant parcel owned by the Port Authority located between the tracks and Bergen Basin. An area of unfilled marsh and mudflats border the shoreline, with landfill to the north. A circular brick water tank stands at the mouth of Bergen Basin while the shoreline opposite has been bulkheaded.

In both the eastern and western segments of the site, environmental restoration efforts will occur in the immediate shoreline area, extending a maximum of 250 feet north of the shoreline. Charles Memorial Park will undergo dune/grassland restoration and sand will be added with minimal re-grading and re-planting. Restoration east of the rail line will include re-grading and re-planting with salt marsh species. It is possible that the Port Authority will allow appropriate disposal of this rubble somewhere on its property. If not, the rubble will have to be removed and disposed of off-site. This restoration activity complements the port authority's own efforts on the adjacent upland (most likely forest/scrub shrub restoration).

Restoration activities for this site are now proposed only for the area west of the New York City Transit line (see Appendix A).

Restoration Site 7 - Motts Point

Motts Point is located on the northwest shoreline of the Rockaway peninsula within the Bayswater section of Queens County (Figure 9). The restoration project has three main elements. The first is the removal of a dilapidated and non-functional seawall located along the western edge of the

Figure 8. Hawtree/Bergen Basin restoration site. Jamaica Bay Restoration Project, Kings, Queens, and Nassau counties, New York *(USGS 7.5' Quadrangle, Jamaica NY, 1979 [1966]).*

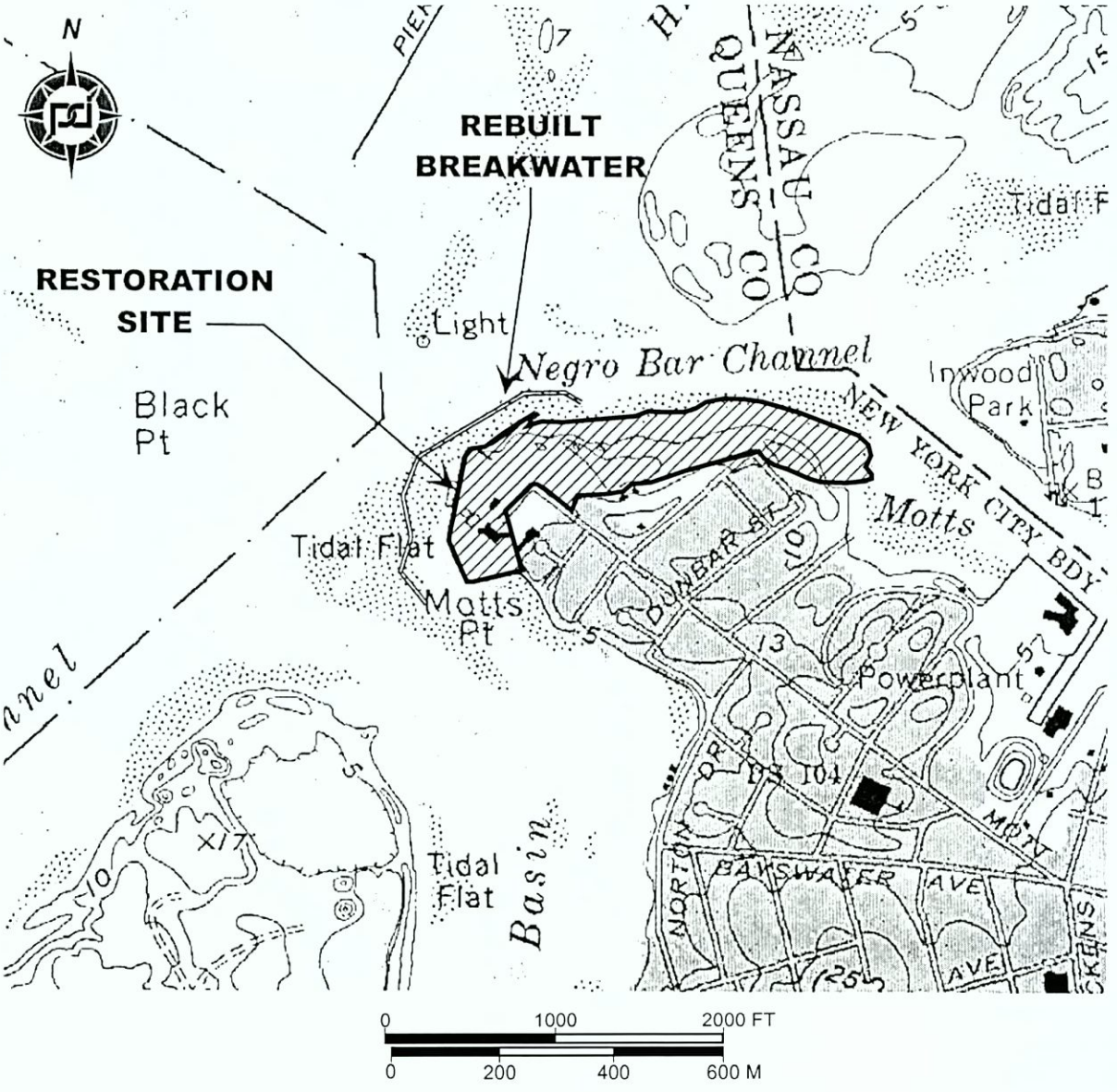


Figure 9. Motts Point restoration site. Jamaica Bay Restoration Project, Kings, Queens, and Nassau counties, New York *(USGS 7.5' Quadrangle Jamaica NY, 1979 [1966]).*

site to be replaced by a new offshore breakwater. This breakwater will be built in sections which will allow water and sediment to pass through at various locations and nourish the area of the existing seawall with sediment. Sand will be deposited between the breakwater and the existing shoreline where needed. Planting of salt marsh grass will be done on the newly deposited sediments if necessary. The second element is an extensive tidal creek widening, phragmites control/removal, and upland re-grading/re-planting effort. The third element is a more extensive removal of phragmites and upland re-grading/re-planting efforts.

The northern edge of the site has a significant robust stand of S. alterniflora which is somewhat protected from the full fetch of Jamaica Bay. Immediately landward of this marsh is a large area of phragmites which will be excavated and brought to S. alterniflora elevation, with the excavated soil to be used to create a berm along the inland edge of the marsh for the purpose of establishing an upland buffer habitat (and which will incidentally protect local residents living just outside the park boundary from tidal flooding). As an alternative, the excavated material may have to be removed offsite. The upland forested area will be left alone for the most part.

Tidal creeks will be created to allow for open water marsh management (creation of tidal flow into the interior of the newly created marsh to keep it as tidally influenced and saline as possible). The upland portion of the site will be re-graded as required, phragmites controlled or removed and high habitat value native grassland/scrub shrub/forest planted. New soil may be needed as cover.

Restoration Site 8 - Dubos Point

This site is located in the Arverne section of the Borough of Queens, on a small peninsula bounded by Grass Hassock Channel and Sommerville Basin. It consists of undeveloped park land owned and maintained by NYCDPR. The land adjacent to the peninsula on its southern side contains commercial and residential properties. The shoreline of Dubos Point is bordered by approximately 50-foot-wide bands of low marsh. Old wood piles are present along the marsh edge at some locations, particularly on the western and northern shorelines of the point.

Restoration efforts at this site (Figure 10) include unclogging small tidal creeks and creation of new tidal creeks on the north side of the site where needed. Phragmites removal will be undertaken to re-establish as much salt marsh as possible. One of the tidal creeks will have to cut through an existing berm which is currently ponding fresh water and is dominated by phragmites. In selected upland areas of the site, phragmites will be controlled or removed and appropriate high value upland forest and scrub shrub species will be planted, pursuant to guidance from NYCDPR, which owns the property.

Restoration Site 9 - Brant Point

This site is located on the north shore of the Rockaway peninsula in the Arverne section of Queens and consists of vacant, undeveloped land. The irregularly-shaped restoration site (see Figure 10) extends south of the shoreline for a maximum of 575 feet to a line approximately midway between

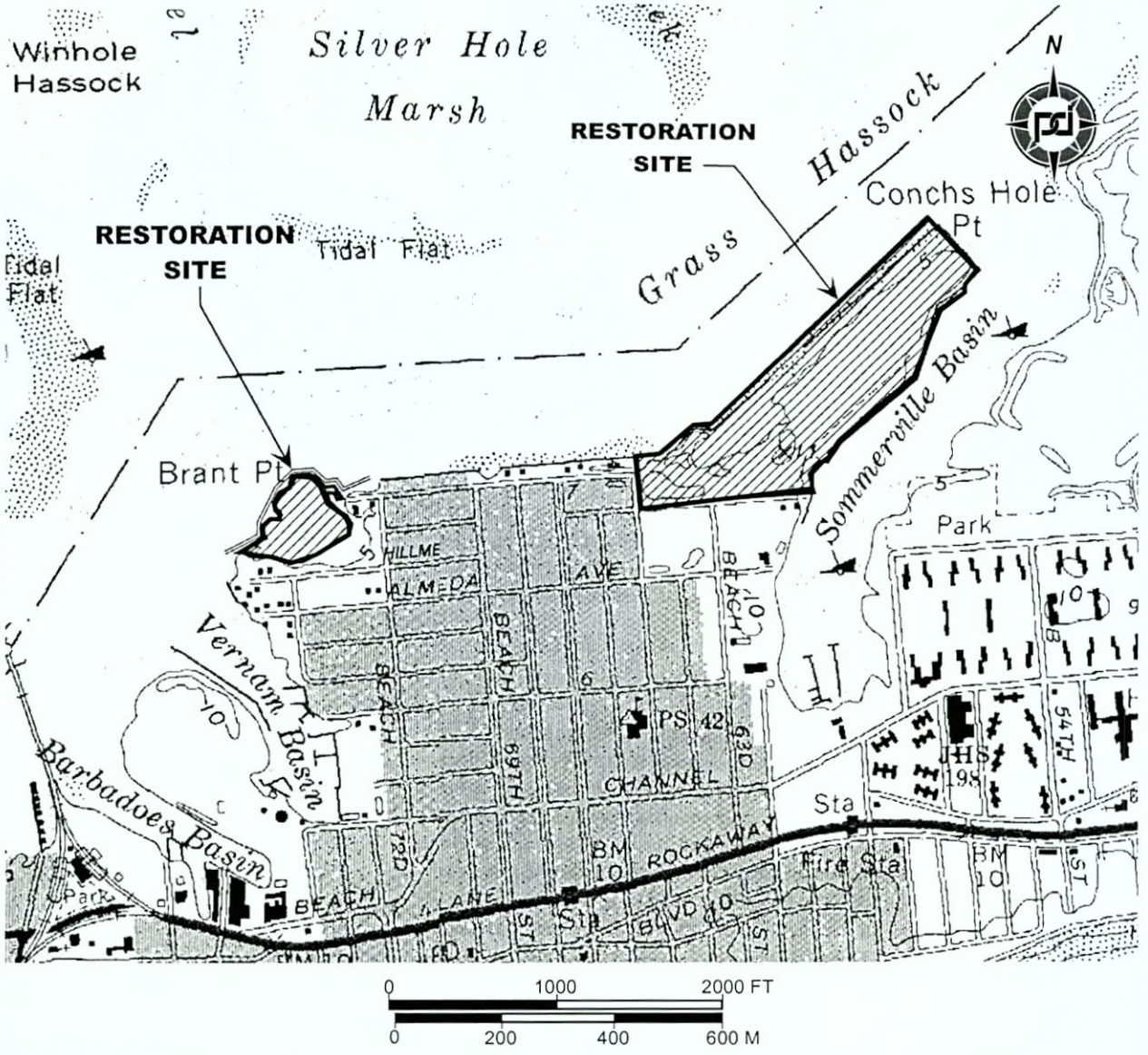


Figure 10. Brant Point and Dubos Point restoration sites. Jamaica Bay Restoration Project, Kings, Queens, and Nassau Counties, New York *(USGS 7.5' Quadrangle, Jamaica NY, 1979 [1966]).*

DeCosta and Hillmeyer Avenues. Its maximum eastern extent reaches a point some 250 feet west of Beach 72nd Street. On the water side, the point is bordered by Broad and Grass Hassock channels. The site is bordered on the southwest and northeast by clusters of single family homes. The adjacent parcels of land in other areas are vacant.

The north side of this site is exposed salt marsh and is severely eroded. A breakwater will be built to control wave action. The entire north end of the site will need to be protected in a manner similar to the western side of Bayswater State Park. An existing sunken barge in the southwestern corner of this site has accumulated sand and unintentionally promoted sediment accumulation which has protected the eroding marsh. Selected areas of phragmites and other low value upland plant species will be removed from the upland portion of this site with minimal or no regrading, and replaced by higher habitat value vegetation.

Restoration Site 10 - Broad Channel

The Queens County community known as Broad Channel is located on what was formerly a marshy island in the center of Jamaica Bay. The restoration site area is bordered by Goose Pond marsh on the west and by Broad Channel on the east (Figure 11). There is a culvert under Cross Bay Boulevard which drains the existing salt marsh between the MTA causeway and the boulevard.

This project involves the construction of a new culvert under the MTA causeway at Broad Channel to connect the portions of Jamaica Bay east and west of the causeway and subsequently improve local water quality. Short tidal creeks will need to be constructed at both ends of the culvert. Excavation will be to approximately mean low water to allow for continued functioning and minimal impact on the surrounding existing marsh. Significant water quality improvements are expected in Goose Pond marsh. The excavated soils and marsh plants could be used in other areas of Jamaica Bay for restoration/habitat improvement efforts. Since the amount of excavated material that will not be reused to build marsh elsewhere will be small, it may possibly be disposed of on nearby uplands.

Restoration Site 11 - JFK Runway By-pass

This site is located at the end of the south runway extension at John F. Kennedy International Airport (Figure 12), on the northern edge of an island known as Jo Co Marsh. At present, the JFK runway isolates the eastern portion of Grassy Bay from its western portion, preventing tidal flow between these two bodies of water. Since the construction of a culvert under the runway does not appear to be feasible, the project will probably involve the excavation of a cut through the salt marsh at the south end of the runway, utilizing the existing tidal creeks to the extent practicable to minimize marsh loss. The depth of the cut would likely be 15 feet below MLW unless hydrodynamic modeling suggests otherwise. Several scenarios are being evaluated in terms of the width of the channel needed to achieve a significant degree of local water quality and habitat improvement. The cross-sectional area of the cut is directly related to the potential tidal flux

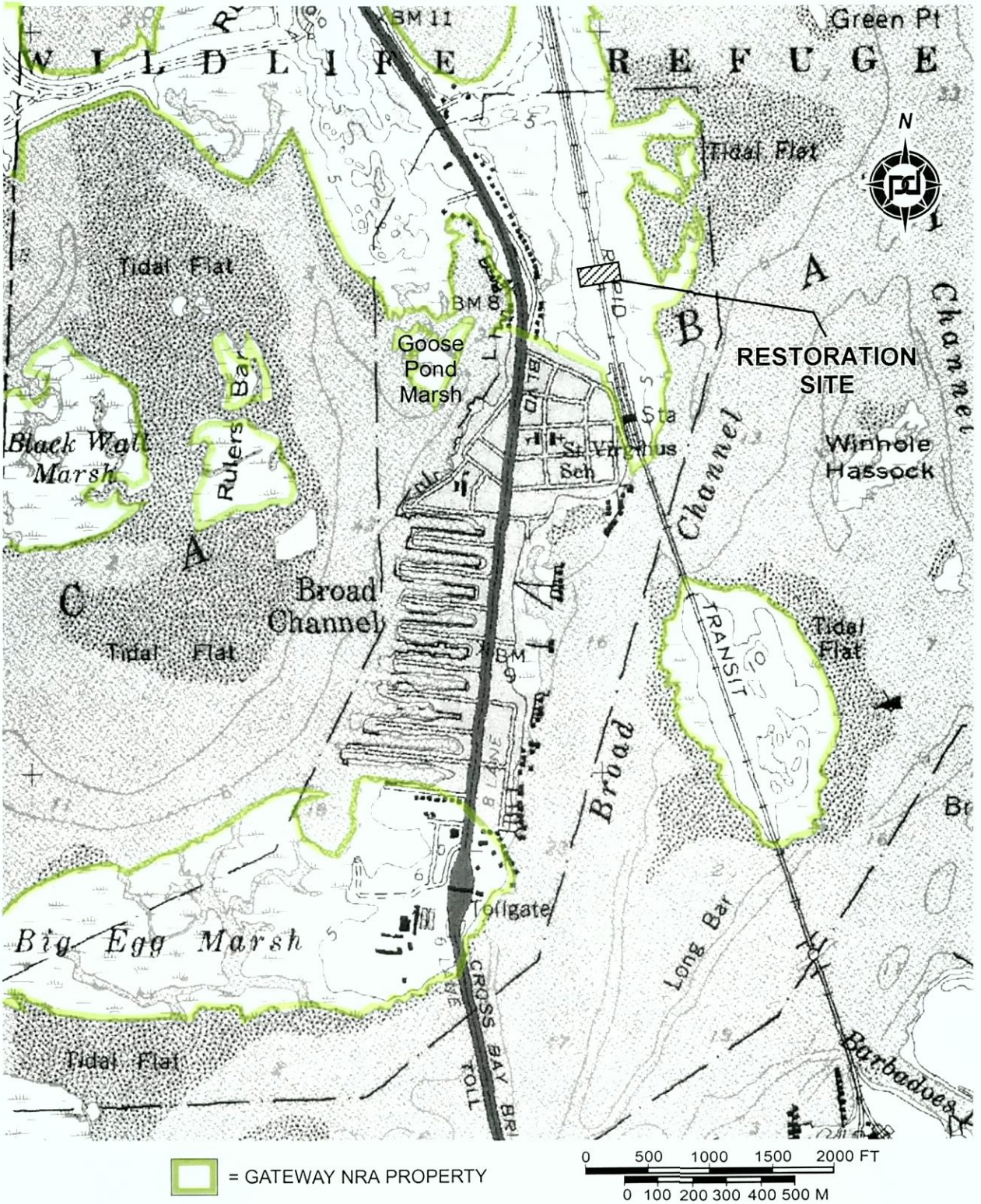


Figure 11. Broad Channel restoration site. Jamaica Bay Restoration Project, Kings, Queens, and Nassau Counties, New York *(USGS 7.5' Quadrangle, Jamaica NY, 1979 [1966]).*

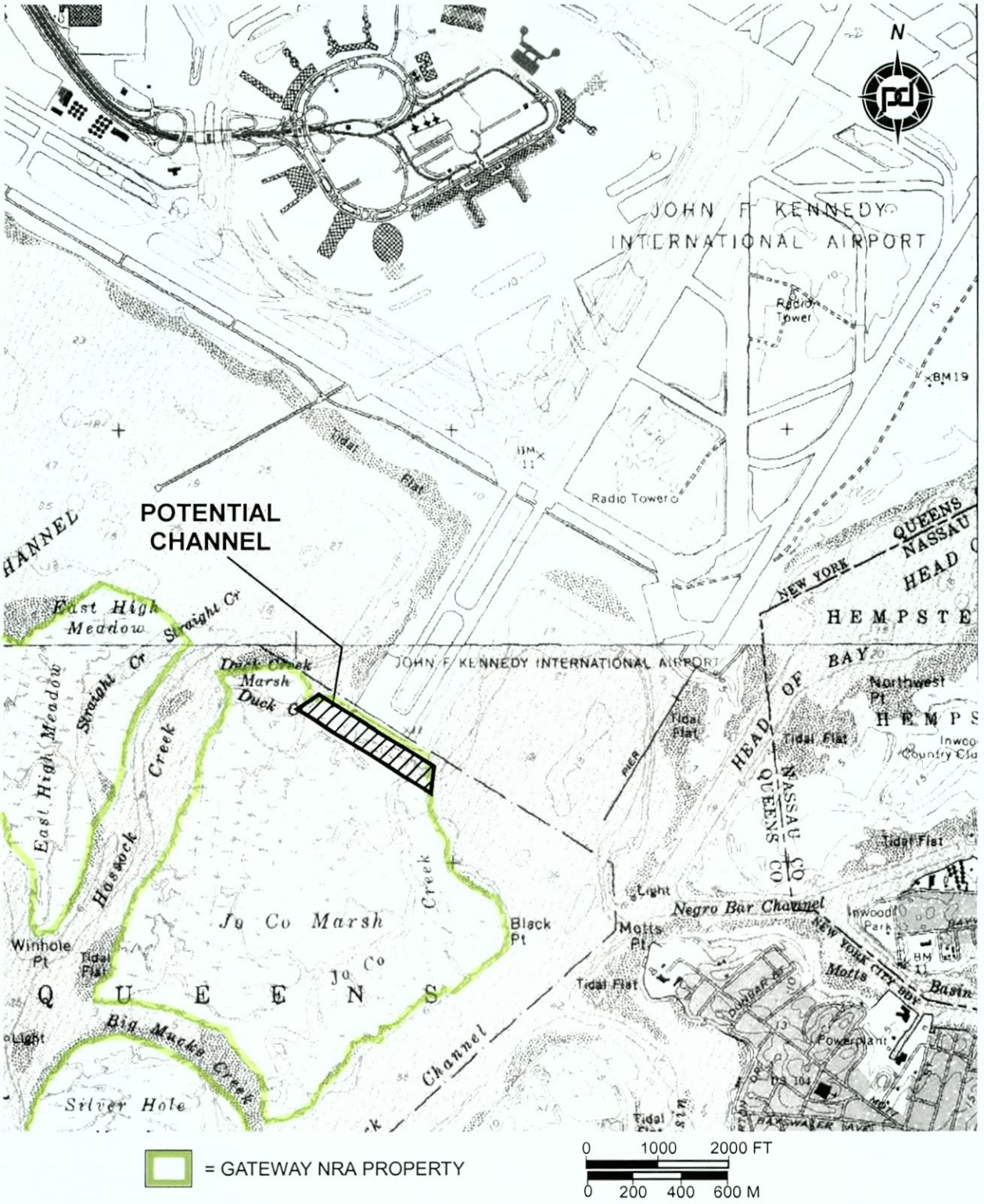


Figure 12. JFK Runaway Bypass restoration site. Jamaica Bay Restoration Project, Kings, Queens, and Nassau Counties, New York *(USGS 7.5' Quadrangle, Jamaica NY, 1979 [1966]).*

between the eastern and western portions of Grassy Bay. There will be an upper limit to the size of this cross-section, however, in order to minimize marsh loss.

Restoration Site 12 - Oyster/Eelgrass Restoration Demonstration

Demonstration projects will be done in appropriate high water and sediment quality areas of Jamaica Bay to determine the efficacy of restoring eastern oysters (*Crassostria virginica*) and eelgrass (*Zostera marina*). The oyster demonstration project would probably be modeled after those done in Chesapeake Bay. Appropriate clean, relatively cohesive sediments or rock/clean rubble would be placed on the bottom and oyster shells placed on top to avoid the higher oyster larvae predation zone of the ambient bay bottom. The shells may or may not be seeded with oyster clutch depending on the specific objectives of the demonstration project and permitting restrictions/requirements. The eelgrass demonstration project would involve selecting an appropriate area of the bottom where eelgrass could be reintroduced to the bay. The eelgrass demonstration project would most likely be accomplished on National Park Service bay bottom and conducted by them. Both demonstration projects would require permits from the NYSDEC and both would be monitored for the level of survival, productivity and overall success, so that the results of these demonstration projects could be applied to other areas of Jamaica Bay and New York harbor, if appropriate.

3.0 ENVIRONMENTAL SETTING

Jamaica Bay is a tidal waterway connected to the Lower Bay of New York Harbor by Rockaway Inlet. The bay is located 17 miles south and east of the Battery, New York City and is 8 miles long, 4 miles wide, and covers an area of approximately 26 square miles. It contains numerous small meadows, hassocks and marshes which reduce the actual water surface to about 20 square miles. Large portions of its northern and eastern shores are bordered by marshlands, which extend inland for a short distance. Several small tidal creeks, most of which have been channelized, enter the bay through these marshlands (USACE 1965a). Large boat channels have been dredged around the rim of Jamaica Bay with narrower and shallower tidal creeks separating the many salt marsh islands situated in the center of the bay.

Jamaica Bay spans the southern portions of Kings, Queens and Nassau Counties. A number of communities have developed along its shoreline, a large portion of which has been filled in and built upon. The John F. Kennedy International Airport is situated along the northeastern shoreline of the bay. The Gateway National Recreation Area (GNRA), under the direction of the National Park Service, encompasses more than 26,000 acres of marshes, wildlife sanctuaries, and sandy beaches, as well as historic structures, old military installations, airfields, a lighthouse and adjacent waters around New York Harbor. Several City parks are also located within Jamaica Bay and parts of some of the planned restoration sites are within the boundaries of these parks (see Figures 2, 7, and 8). The present environmental conditions of eight of the proposed restoration sites are illustrated in the recent conceptual plan report (Barry A. Vittor & Associates, Inc. 2003) and are presented in Appendix A.

Geological Summary. The study area lies within the Atlantic Coastal Plain geological province, which extends along the eastern margin of the United States and consists of "loose unconsolidated Cretaceous to Recent sediments resting on the deeply buried crystalline rock floor" (USACE 1974). The Coastal plain slopes gently to the southeast, extending beneath the Atlantic Ocean about 100 miles offshore to the edge of the continental shelf, at which point the ocean bottom drops abruptly from approximately 100 fathoms to much greater depths.

The southern shore of Long Island is underlain by eight geological units of unconsolidated deposits and bedrock. The surface material is "beach and eolian sand, medium to coarse grained, and [including] scattered shell fragments" (Dvirkin and Bartillucci 1985). These and other Holocene deposits are underlain by Pleistocene deposits and earlier Cretaceous material. During the successive Pleistocene glaciations, sedimentation within the project area corresponded to alternating periods of marine transgression and regression across the project area. The southern half of Queens and Kings Counties represents a low outwash plain sloping gently southward towards the ocean and lying south and southeast of the terminal moraine formed during the final, Wisconsin stage of Pleistocene glaciation. No large streams developed on this plain due to the permeable nature of the subsurface deposits (USACE 1965b; 1974).

The Pleistocene glacial outwash deposits consist of sand mixed with some gravel. This material rests directly upon Cretaceous deposits. The subaerial portion of the outwash plain "merges into the tidal marshes of the shallow bays and the barrier beaches along the shore of Long Island" (USACE 1965b).

Rockaway Beach and Jamaica Bay represent one of a series of barrier island/lagoon systems which extend for a distance of 87 miles along the southern shore of Long Island from Southampton to Coney Island. These islands have been formed by a reworking of sediment deposits by ocean currents and waves (USACE 1973:A2; Dvirkin and Bartillucci 1985). "The barrier islands are constructional landforms built up over the past several thousand years by sand from the sea floor and by sand transported westward along the Long Island shoreface by wave-generated longshore currents" (Williams 1976:15).

Although considered as part of the series of Long Island barrier islands, Rockaway Beach is actually a landform known as a barrier bar, rather than a barrier island, since it is attached to the mainland at its eastern end (Yasso and Hartman 1975:14).

The islands within Jamaica Bay and areas adjoining its shoreline represent salt marsh deposits which have developed within geologically 'recent' time. Large portions of these marsh areas are covered by landfill, mostly deposited during the Twentieth century.

Paleoenvironment. Models derived from floral remains and Pleistocene fauna suggest that the last glacial ice (the Wisconsinian) in southeastern New York State had disappeared earlier than 15,000 years ago (Funk 1993:43-44; Marshall 1982:17). Tundra-like conditions probably existed near the terminal moraine in western Long Island as the land responded to changing drainage patterns in the wake of the receding glacier. As a result of the advances and retreats of glacial ice, several ridges were formed on Long Island as well as numerous kettle ponds, eskers and barrier beaches (Cressey 1977:19-23, 43).

Grassy tundra environments like those that would have been found in higher elevations during the late Pleistocene were preferred by mammoths and caribou who were primarily grazers. Conversely, mastodons were browsers who preferred wooded spruce areas located at lower elevations in the valleys (Funk 1972:11; Marshall 1982:18). There is evidence that proboscidians were still present by the time Paleo-Indians arrived in the Northeast. "Contemporaneity of early Paleo-Indian hunters and these animals has been established by radiocarbon-dated remains of the megafauna excavated from areas in northern New Jersey, New York, and Pennsylvania" (Marshall 1982:18; Gramly and Funk 1990).

During the late glacial/early post-glacial period, caribou likely were hunted by the Paleo-Indians (Funk 1976). Caribou bone found at the Dutchess Quarry Cave No. 1 site, in Orange County, New York, was in association with a fluted point (a primary diagnostic artifact of the Paleo-Indian period). The bone was radiocarbon dated to 10,580 BC $\pm$ 370 (I-4137). Additional fluted points were found at Dutchess Quarry Cave No. 8. However, the caribou may have preceded the fluted points at the Dutchess Quarry Caves. Funk and Steadman (1994:53) have pointed out that the

caribou bone and fluted point found at Cave No. 1 were in the same stratum but not otherwise in close association. With deglaciation, the megafauna began to decline and were replaced by more temperate species that migrated into the area. Caribou herds probably survived in southeastern New York beyond the time of the megafauna extinction. As time passed, human subsistence shifted from large Pleistocene game like caribou to more familiar, modern, mid-latitude species such as white-tailed deer (Eisenberg 1978). Fish, crustaceans and plants were also abundant in the wetlands/coastal environment during the early post-glacial period.

Following the Pleistocene era, environmental conditions ameliorated leading to the reforestation of the northeast and the gradual emergence of modern types of forest about 10,000 years ago. Between 8,000 and 10,000 years ago, the hills and mountains were overgrown with pine, hemlock and oak, while forests in the coastal areas were chestnut and oak (Funk 1976:209-210; Marshall 1982:21; Kraft and Mounier 1982:59-60). The retreating glacier caused a rise in sea levels forcing people to move inland.

Following the glacial retreat, coastal New York was a mosaic of tundra and forests composed of a mixture of coniferous and hardwood trees, dominated by pine, arctic willows, spruce and fir. This mixture eventually yielded to oak and birch, and by 8,500 years ago to oak and chestnut (Marshall 1982:17; Funk 1972:10; Salwen 1975; Kraft and Mounier 1982:59).

Pollen analysis of samples from the Shawnee-Minisink site near the Delaware Water Gap has revealed the presence of many edible plants. Paleo-Indian tools were found in association with fish bone fragments and wild hawthorn plum seeds along with charcoal which dated to 10,590 BC $\pm$ 300 (Salwen 1975:45). Carbonized seeds were recovered by flotation (Kauffman and Dent 1982), and were identified as representing such plants as goose foot (*Chenopodium* sp.), ground cherry, blackberry, hawthorn plum, pokeweed, pigweed (*Amaranthus* sp.), smart weed (*Polygonum* sp.), wild lettuce, grape, hackberry, and meadow grass (Kraft 1986:41).

At the end of the Pleistocene era, western Long Island was cut in half by the Wisconsin terminal moraine. The late-Pleistocene tundra or park tundra environment provided important habitats for large mammals and other game potentially significant for human subsistence. Pleistocene megafauna included such species as mammoth, mastodon, great beaver, fossil bear, and northern species like fox, seal, moose and caribou. A variety of other species like fossil peccary, white-tailed deer, elk, bison and horse roamed the northeast as well (Marshall 1982:17-18; Funk 1972:11, 1976:208-210; Ritchie 1980:10-11).

Immediately prior to the arrival of Europeans, local forests supported numerous animal species, both large and small. A number of deer, bear, raccoon, otter, and bobcat shared the forests and streams with smaller animal populations, including chipmunk, squirrel, wild turkey, and muskrat. Migratory birds also made their seasonal appearances. The region's intertidal zone and marshy areas provided a rich variety of fish and crustaceans.

Present Climate. Although lying within the province of a maritime climate, Kings and Queens Counties have weather patterns more closely resembling a continental variety, since fronts and

storms that affect the area generally arise from the interior of the United States and Canada. However, these weather patterns can be modified or displaced by systems from the tropics, as evidenced by the incidence of Nor'easters during the winter and the occasional tropical storm in the late summer. During the winter, cold air masses from Canada prevail, affecting the area to a greater extent than during the summer. While winter temperatures average 33°F (1°C), low temperatures can dip into the teens for extended periods, with January and February being the coldest months. Average seasonal snowfall amounts hover around 30 inches (76.2 centimeters), although single snow fall amounts occasionally reach double digits.

During the warm, humid summer, the area's average temperature is 69°F (20°C), although summer temperatures can reach over 100°F (38°C) for extended periods, especially in late July and August. While the bay region suffers from strong late afternoon thunderstorms during the summer, the area's proximity to the Atlantic Ocean allows for good wind circulation. Annual precipitation averages about 41 inches (104 cm), with a fairly even distribution of moisture throughout the year.

4.0 CULTURAL HISTORY OF THE PROJECT AREA

4.1 GENERAL PREHISTORIC CULTURAL BACKGROUND

The prehistory of northeastern North America is marked by three major periods spanning about 12,000 years. The earliest of these periods is the Paleo-Indian which lasted from 10,000 to 8000 BC. Living in seasonal camps near fresh water sources and lithic workshops, Paleo-Indians subsisted by hunting and gathering. The Paleo-Indian period was followed by the Archaic period which lasted from 8000 to 1000 BC and was characterized by seasonally occupied campsites and later by seasonal villages. The Archaic subsistence system was hunting and gathering with possibly incipient horticulture toward the end of the period. After 1000 BC, Native Americans of the Woodland period lived in seasonally occupied villages and campsites and subsisted by hunting, gathering and horticulture by AD 1000. During this period ceramics were first made in northeastern North America. These periods are described in more detail below.

Paleo-Indian Period. Paleo-Indian cultures were adapted to a late-Pleistocene tundra or park tundra environment. Paleo-Indians were highly mobile people who needed to travel over long distances to obtain food. About 12,000 years ago, the coastal New York environment was a mosaic of tundra and forests that were predominantly arctic willows, pine, spruce and fir which eventually gave way to birch and oak (Funk 1972; Marshall 1982:17). The emergence of oak stands and subsequent increase in resource availability allowed greater human population density toward the end of the period.

Pleistocene megafauna, including mammoth, mastodon, great beaver, fossil bear, and northern species like fox, seal, moose and caribou roamed the northeast. Other species like fossil peccary, white-tailed deer, elk, bison and horse had also adapted to the region (Funk 1972:11; Ritchie 1980:10-11). Mammoths, who were primarily grazers, preferred grassy tundra environments like those that would have been found in higher elevations during the late Pleistocene. On the other hand, mastodons preferred wooded spruce areas located at lower elevations in the valleys (Marshall 1982:18; Funk 1972:11). Dent suggests that both mammoth and mastodon were extinct 1,000 years before humans arrived in the Upper Delaware Valley and that the tundra environment had succumbed as well (Dent 1991:136). This hypothesis also may be true for coastal New York. However, according to Marshall, megafauna were still around when the Paleo-Indians arrived in the area. "Contemporaneity of early Paleo-Indian hunters and these animals has been established by radiocarbon dated remains of the megafauna excavated from areas in northern New Jersey, New York, and Pennsylvania" (Marshall 1982:18). Caribou herds probably extended into the Middle Atlantic region beyond the time of the megafauna extinction. During the late glacial/early postglacial period, caribou likely were hunted by the Paleo-Indians as evidenced by caribou bone found at the Dutchess Quarry Cave No. 1 site in association with a fluted point (a primary diagnostic artifact of the Paleo-Indian period). The bone was radiocarbon dated to 10,580 $\pm$ 370 BC. Additional fluted points were found at Dutchess Quarry Cave No. 8. Funk and Steadman (1994:53) have recently pointed out that the caribou bone and fluted point found at Cave No. 1 were in the same stratum, but not otherwise in close association. The caribou may have preceded the fluted points at the Dutchess Quarry Caves. With deglaciation, the megafauna began to decline and were replaced by more temperate species that migrated into the area. During the 2,000-year

Paleo-Indian period, human subsistence shifted from large Pleistocene game, like caribou, to more modern, mid-latitude species, such as white-tailed deer (Eisenberg 1978).

In addition to hunting, fish and plant foods were available to Paleo-Indian groups. Pollen analysis of samples from the Shawnee-Minisink site near the Delaware Water Gap has revealed the presence of many edible plants. Carbonized seeds were recovered by flotation. Some of the plants identified by these means included goose foot (*Chenopodium* sp.), ground cherry, blackberry, hawthorn plum, pokeweed, pigweed (*Amaranthus* sp.), smart weed (*Polygonum* sp.), wild lettuce, grape, hackberry, and meadow grass (Kraft 1986:41).

Early Paleo-Indian chipped-stone artifacts include fluted points—thin, lanceolate-shaped bifacial implements fluted down the center for hafting—unifacial end- and side-scrapers, utilized flakes, and waste flakes (Marshall 1982:13). Cryptocrystalline stones like jasper and chert were the preferred raw materials of Paleo-Indian tool makers. Cherts, including Normanskill, Deepkill, Fort Ann, Eastern Onondaga, Helderberg, Esopus, Pennsylvania jasper, and those from Delaware and Maryland, are found on archaeological sites in Southern New York. Fluted points and other Paleo-Indian artifacts made from Pennsylvania jasper and various cherts were found at the Port Mobil site on Staten Island (Kraft 1977, 1986:34; Ritchie 1980:3). Fluted points gradually decreased in size as larger game animals moved north or became extinct (Kraft 1986:47). Fluted points were eventually replaced in the late Paleo-Indian/ Early Archaic transition (8000-6000 BC) with unfluted triangular points, stemmed points and Plano points. The last are lanceolate-shaped points without flutes. In Monmouth County, New Jersey, Late Paleo-Indian artifacts including unfluted triangular points, and Hardaway Dalton points were found at the Turkey Swamp site which dated to between 7041 and 5939 BC (Marshall 1982:33). These dates demonstrate an overlap between the Paleo-Indian and Early Archaic periods. According to Kraft (1986), the transition from Paleo- Indian to Early Archaic is not clearly delineated in the Middle Atlantic region.

Archaic Period. The Archaic period, which began after 8000 BC developed out of the late Paleo-Indian. Between 8000 and 6000 BC the hills and mountains were overgrown with pine, hemlock and oak while forests in the coastal areas were populated with chestnut and oak (Kraft and Mounier 1982:59). The retreating glacier caused a continuing rise in sea levels forcing people to move away from the coast.

Aside from occasional technological changes and gradual environmental transformation, life continued as in the previous period. People still lived in small territorial bands that hunted, fished, and gathered plant foods. With the exception of the dog, they had no domestic animals. People of the Early Archaic period subsisted on anadromous fish, shellfish, berries, roots, tubers, eggs, nuts, and deer (Kraft 1986:51). They probably moved when food supplies dwindled. The small encampments close to rivers, swampy areas or ponds that are typical of Early Archaic sites reflect this mobility (Kraft and Mounier 1982:76; Nicholas 1988).

The Early Archaic tool kit consisted of projectile point forms related to those of the Carolina Piedmont (Brennan 1977; Ritchie and Funk 1971). These include Hardaway Dalton points, Palmer corner-notched, Kirk corner-notched, Kirk stemmed, and bifurcate base points like Amos corner-

notched and LeCroy, both of which frequently had serrated edges in the Southeast. Serrated edges occurred much less frequently in the Northeast. People of the Early Archaic also used end scrapers, sidescrapers, spokeshaves, drills, gravers, choppers, hammers, and anvil stones. During this period, a shift in raw material preference to non-cryptocrystalline stones like argillite occurred.

Several Early Archaic sites have been found on Staten Island and produced projectile points like those mentioned above. The earliest of these sites are Richmond Hill, near the center of Staten Island where a hearth was dated to 7410 BC $\pm$ 120 (I-4929), and Ward's Point, near Tottenville, dating to 6300 BC $\pm$ 140 (I-5331). These are among the earliest Archaic dates in the Northeast (Ritchie and Funk 1971).

The Middle Archaic period lasted from 6000 to 4000 BC. People of the Middle Archaic subsisted on chestnuts, acorns and anadromous fish, as well as the abundant forest animals. Oak, chestnut and hemlock dominated the landscape causing animal populations to increase in the forests because of the abundance of mast foods produced by the trees. Heavy woodworking tools, along with netsinkers, and fish remains found on archaeological sites suggest a riverine or estuarine adaptation (Kraft 1986:56). The climate was warm and moist by 5000 BC, and water levels continued to rise forcing groups to move inland.

People began to develop woodworking tools during the Middle Archaic using coarse-grained stones and river cobbles for their raw materials. These stones were commonly available in large sizes and allowed tool makers to reserve high quality lithic materials for finely flaked tools. New shaping techniques were developed in order to work these coarse-grained rocks. The primary technique was pecking and grinding which was used for shaping axes, adzes, gouges, choppers and other woodworking or rough stone tools. These heavy woodworking tools may have been used for canoe building. In addition to these implements, the Middle Archaic tool kit included anvil stones, choppers, netsinkers and an array of projectile points. The most commonly used raw materials included chert, jasper, argillite, shale, and rhyolite. Neville points are found on Middle Archaic sites as well as Stanley Stemmed which are similar to Early Archaic Bifurcate Base points (Kraft 1986:58).

The environment during the Late Archaic (4000-2000 BC) was similar to that of today. Hunting, fishing, and gathering were still the principal daily activities although greater emphasis was placed on small game, shellfish, nuts and wild cereal grains. This shift in subsistence strategies made higher population densities possible. As population increased, camps became larger and more numerous. While principle settlements were located near major rivers, people still lived in bands whose territories may have been well-defined. Moving seasonally or when resources dwindled, Late Archaic groups probably congregated occasionally for exchange and socialization. Houses of this period may have been circular and oval measuring 36 to 66 feet (11 to 20 meters) in diameter with overlapping entranceways. One such house pattern was found at the Wapanucket No. 6 site in Massachusetts (Robbins 1960). The Lamoka Lake site in western New York contained rectangular house patterns 14 to 16 ft (4.3 to 4.9 m) long and 7 to 13 ft (2.1 to 4 m) wide (Ritchie and Funk 1973). A Late Archaic house pattern was found near Long Island Sound in a "gently-rising, wooded ground on the east side of a northward-flowing stream emptying into an

estuary and thence into Long Island Sound" (Gwynne 1984:1). This pattern suggests a round or oval shape but size could not be determined (Gwynne 1984:6).

Heavy grinding implements like mullers, mortars and pestles provided new means of preparing food from seeds, nuts, dried berries and meat. These implements were made of sedimentary and metamorphic rock like sandstone and argillite. Late Archaic people also used bifacial, chipped-stone knives, semilunar knives which were often made of slate, the atlatl or spear thrower, bolas, and plummets. Traces of the Laurentian tradition, a Late Archaic culture which is characterized by ground slate ulus, plummets, and gouges, are found on some coastal New York sites including the Stony Brook site. Long, narrow-stemmed or narrow, weakly notched projectile points like Poplar Island, Bare Island, Lackawaxen-stemmed, and Normanskill were characteristic of the Piedmont or Small Stemmed Tradition, which originated in the Southeast (Kraft 1986:73). These projectile points were not often reworked into scrapers, drills and gravers because of their size and shape. Narrow-stemmed projectile points were found at the Bowmans Brook site on Staten Island.

A major component of the Late Archaic Piedmont Tradition, the Sylvan Lake complex, was found at the Wading River Site on Long Island. Sylvan Stemmed points were a part of the Sylvan Lake complex which dates to 2500 BC. Features of this culture include the use of small-stemmed points and atlatls for hunting. Flintworking, butchering, and woodworking were other common activities of Sylvan Lake people.

Nut-bearing trees like oak, hickory, chestnut, and beech dominated the eastern forests during the Terminal Archaic (2000-1000 BC). Sea levels continued to rise causing increased salinity in estuaries, including the lower Hudson River (Kraft 1986; Snow 1980). People of this period subsisted on deer, black bears, small mammals, wild turkeys, pigeons, shellfish, fruits, roots, nuts, and anadromous fish.

Large, broad-bladed, skillfully made spearpoints of the Susquehanna broadspear tradition began to appear on archaeological sites from this period and were spread along the Atlantic coast from Georgia to Maine. According to Kraft, this tradition probably originated in the southern Piedmont and was related to the Koens-Crispin culture (Kraft 1986:84). The Koens-Crispin culture is represented by broad-stemmed points, scrapers, atlatl weights, celts and adzes. Koens-Crispin points are similar to Savannah River, Lehigh Broad, and Snook Kill points which implies widespread travel and trade among Terminal Archaic people. According to Mounier, the "complex is associated with an elaborate pattern of mortuary ceremonialism which emphasized the practice of cremation, the ritual use of red ocher, and the often lavish inclusion of grave goods" (Kraft and Mounier 1982:82). The Koens-Crispin site in Medford, New Jersey, and the Savich Farm Site in Marlton, New Jersey, both revealed such practices. The Savich Farm Site dates between 1900 BC and 2300 BC. (Kraft 1986:80). The Snook Kill phase is an early part of the Susquehanna tradition and is characterized by broad-bladed, contracting-stemmed Snook Kill points. Another innovation was steatite or soapstone pots which facilitated cooking and food preparation.

Woodland Period. The introduction of pottery marks the beginning of the Woodland period. Pottery is significant because it "improved the efficiency of food preparation" (Curtin 1996:6). Several different cultures can be recognized in the Early Woodland period which lasted from 1000 BC to 1 BC. Orient Fishtail points replaced the broadspears of the Terminal Archaic during the Orient phase. These points were used as knives and spears, and were reworked into drills, scrapers, strike-a-lights, and gravers (Kraft 1986:91-92). Orient people still used soapstone pots but also used clay pots tempered with crushed steatite. These pots, called Marcey Creek Plain, were similar in shape to steatite pots. Another early type of ceramic was Vinette-1 which was cone-shaped with cord-marked impressions on the inside and out. The Orient culture derives its name from complex burial sites on northeastern Long Island, made of large communal pits on hilltops. Many of the burials were accompanied by Orient Fishtail points, soapstone fragments or "killed" soapstone pots, and red ochre. "The typical grave lot therefore provided for hunting game, kindling fire, and cooking food, with a cosmetic kit thrown in" (Ritchie 1980:177). According to Smith, the Orient culture was "the burial complex of the people responsible for the North Beach focus" on Long Island (Smith 1950:150). Orient sites have been found all over Long Island, in upper New York City, on Staten Island, and in the Hudson Valley (Ritchie 1980:165).

The Middle Woodland period lasted from AD 100-900 and was characterized in coastal New York by the Windsor Northbeach focus (or phase) and then the Windsor Clearview focus which overlapped the former. The Clearview focus preceded the Bowmans Brook phase on western Long Island and Manhattan Island (Ritchie 1980; Ritchie and Funk 1973).

The Windsor Clearview phase was followed in the Late Woodland period by the Windsor Sebonac focus. The Sebonac phase is characterized by relatively large villages of possibly a hundred inhabitants, located in areas rich in shellfish (Ritchie 1980:266). In addition to shellfish gathering, Sebonac people hunted, fished, and engaged in horticulture as evidenced by carbonized corn found at the Sebonac site on Long Island by Harrington (1924:249-253). Homes of this period were circular and 10 to 20 ft (3 to 6 m) in diameter.

Utilitarian artifacts of the Sebonac phase include broad, thin, triangular Levanna points often made of white quartz. Bone harpoons and fish hooks along with netsinkers were used for fishing. Woodworking tools like grooved and notched axes, celts, and plano-convex adzes were used (Ritchie 1980:267-268). Ritchie described the commonly shell-tempered Sebonac pots as elongated and cone-shaped at the base with a straight or inward-slanting collarless rim. The exterior surface was decorated by brushing with scallop shell or fabric but was sometimes cord-marked or plain. The interior was smoothed possibly with a scallop shell to create striations. Scallop shells were also used to decorate the area from the shoulder to the lip with linear, criss-crossed or rectangular designs that were combed or stamped. Occasionally, triangular or circular punctations occur with raised interior rim bosses (Ritchie 1980:268).

Non-utilitarian artifacts include stone pendants with holes drilled through the center or side, and sometimes with incised designs. Although bone and shell beads are found only rarely, stone and ceramic pipes are found, and the latter are decorated with stamped or incised designs.

Sebonac people buried their dead flexed or folded without grave goods in pits already in use for other purposes, such as cooking. Evidence for the use of charnel houses during this period is scant.

The Late Woodland is a period of significant cultural change. During this period, the subsistence system shifted its emphasis from gathering wild foods to growing domesticated plants. This change was made possible sometime between AD 500 and 1000 by the development of Northern Flint corn, which is a cold-resistant strain that diffused broadly after its first appearance, probably in the Midwest (Fritz 1990). According to Cassedy et al. (1993), early maize cultivation began about AD 900 in the mid-Hudson drainage. Corn associations with radiocarbon mean dates between AD 850-950 are also reported from coastal Connecticut and the Susquehanna and Hudson drainages (Cassedy et al. 1993). Maize from the Bowmans Brook Site on Staten Island was dated to 390 +60 BP (Beta 15769) or AD 1270-1410 (Ceci 1990). Information from a variety of sources consistently documents the presence of corn in the Long Island Sound region with a large number of radiocarbon dates before European contact (Cassedy et al. 1993).

The introduction of corn horticulture was accompanied by settled village life, population growth, an enriched religious and ceremonial life, and warfare among some cultures, such as the Iroquois in upstate New York (Bender and Curtin 1990; Cronon 1984; Handsman 1980; Kraft 1986). Some interesting mortuary practices began to occur during the Late Woodland involving dog ceremonialism. According to Strong (1985:36), two themes can be seen. One, which dates back to the Late Archaic, involves the dog's relationship to "home and hearth" as reflected by dog burials found in villages near hearths. Strong speculates that dogs may have been sacrificed to protect the household. The second theme, which is more prevalent in the Late Woodland, is the burial of dogs in association with humans. It is possible that age, sex, and cause of death of humans were factors in dog sacrifice. Dog burials have been found on sites occupied during the Bowmans Brook phase of the East River Tradition in the early Late Woodland.

Bowmans Brook sites are found along "tidal streams or coves" (Ritchie 1980:269) and often contain pits filled with shell. Shellfish gathering was an important activity along with fishing, horticulture and hunting. Utilitarian artifacts include broad triangular Levanna points made of quartz or other stone, antler and bone-flaking tools, netsinkers, bone awls, hammerstones, anvils, grooved axes, abrading stones, tools made of beaver incisors, and ceramics.

Ritchie (1980) believes the Bowmans Brook culture entered coastal New York from New Jersey. Bowmans Brook incised pottery was found at the Abbott Farm Site on the Delaware River in New Jersey. Bowmans Brook Stamped pots are tempered with grit and have an elongated body, cone-shaped base, a "straight or flaring rim, and cord-malleated exterior and smooth interior surfaces, and cord-wrapped stick decorations in simple linear, chiefly horizontal, patterns" (Smith 1950: 191-192). Bowmans Brook Incised pots are sometimes shell-tempered with an in-sloping rim and a mostly smooth exterior surface. The rim is decorated with triangular or rectangular incising. "The herringbone motif is common and a few vessels of this type have stylized human faces formed by three punctates placed on raised nodes about the rim" (Ritchie 1980:270). East River Cord Marked pottery is a third type common to this culture. It, too, is elongated with a cone-shaped base, but the exterior surface is cord-marked and sometimes smoothed over.

Non-utilitarian artifacts include "a bone pin with a carved head, a fragmentary rectangular pendant, and a hematite paintstone" (Ritchie 1980:269). Cut and drilled deer bones may have been ornaments worn on clothing, while plain or stamped ceramic pipes have been found on a few sites.

Bowmans Brook people buried their dead flexed or folded without grave goods in pits already in use for other purposes, such as cooking, or in a cemetery near the village. Bundle burials and dog burials have also been found as noted above.

The Bowmans Brook phase was succeeded by the Clasons Point phase of the East River Tradition. Dating about AD 1300, Clasons Point sites are usually located on terraces above tidal inlets and often contain numerous pits used for cooking, storage, trash disposal, and graves. Clasons Point people buried their dead flexed in storage pits or in shallow graves. Shellfish remains are found in very high frequencies on these sites while the remains of other animals are found much less frequently. People of this culture also engaged in gathering and horticulture as evidenced by the presence of corn, hickory nuts, walnuts, and sweet-flag roots (Ritchie 1980:271).

Clasons Point people continued to use Levanna points but also began using antler and bone projectile points. According to Ritchie, "a long-bone dagger with serrated edges occurred on one of the sites" (Ritchie 1980:271). Netsinkers were used in fishing as well as bone hooks. Stone hoes, mortars and pestles, mullers, and turtle shell dishes have been found. Wood-processing tools in the form of three-quarter grooved axes, celts, antler-tine wedges, beaver incisor scrapers, gravers and chisels, and flake scrapers were used (Ritchie 1980:271). Triangular, stemmed, and lanceolate stone knives were used along with drills, nutting stones, hammerstones, anvilstones, sinewstones, bone awls, perforated mat needles, and antler tool handles (Ritchie 1980:271).

Ceramics of this period were characteristically one-to-two-gallon vessels with the same shape as the types mentioned above, and mostly shell tempered with straight or flaring rims and exterior cord- impressed decoration. Vessels from the latter part of the period became more globular with rounded bases and collared rims that have been turned out. The body is smooth or cord-marked and the rim and collar are incised. One such type, Van Cortland Stamped, is similar to the Owasco Corded Collar type found to the north. Eastern Incised, which has an incised collar, is similar to Chance Incised and Deowongo Incised Iroquoian types.

Non-utilitarian artifacts include stamped or incised elbow-shaped clay pipes, bone beads, shell beads, and wampum beads, which, according to Ritchie, were "a European-trade-inspired commodity" (Ritchie 1980:271). However, Ceci (1990:23) suggested that wampum or proto-wampum played an important role in the development of sedentary or semi-sedentary villages and in trade between villages and large centers in the Midwest before European contact. "The decline of midwestern centers led to a breakdown of exchange systems in the Northeast ca. AD 1400" (Ceci 1990:23). According to Ceci, the exchange system was then reactivated around AD 1550-1600 when the first Europeans arrived. Moreover, "native cultural development continued for over a half century after the arrival of Europeans and the same factors that drew the American Indian to the mouth of the Hudson also attracted the Dutch" (Schuyler 1977:1).

Sociopolitical aspects of the Clasons Point Phase peoples included the speaking of Algonkian languages and belonging to the Metoac Confederacy. The Canarsie and the Rockaway, located in western Long Island, were among this affiliation's thirteen subgroups. The Canarsie primarily occupied lands in King's County, while the Rockaway did likewise in Queen's County (Black 1981:8). Significant sites with documented artifacts include the Canarsie, Winnipague and Ryders Pond for the Canarsie natives and the Aqueduct site for the Rockaway Indians (Bolton 1934; Black 1981:7-10). All of these sites have been destroyed by subsequent construction. These two groups also lost outright ownership or use of this area to the Dutch beginning in 1636 with the process virtually complete by 1667 (Black 1981:7, 10, 12).

4.1.1 Prehistoric Sites

Most of the known prehistoric sites near the shoreline of Jamaica Bay were noted in compendia prepared in the early twentieth century by Bolton (1920, 1922, 1934) and Parker (1922). Earlier, Harrington (1909) published a list of shell heaps in the New York City area. These accounts include maps showing the approximate locations of sites. The 1934 Bolton map and those produced by Parker and Harrington are included here as Figures 13, 14, 15 and 16. Most of the information included in these accounts were obtained from reports made in the nineteenth and early twentieth century by collectors and avocational archaeologists, prior to later twentieth century development which has obliterated surface indications of these sites. Thus, in most cases, only limited data are available as to the exact location, extent, functional nature or temporal affiliation.

The sites included in the files of the New York State Museum are mainly those noted in the Parker compendium. Parker, however, recorded a few sites for the State Museum files which were not included in his 1922 publication. Another source of information about Jamaica Bay sites consists of Solecki's (1941) account of sites examined by the Flushing Historical Society in the 1930s.

Recently, Boesch (1997) has compiled a listing of prehistoric sites in the Borough of Queens for the New York City Landmarks Preservation Commission. This study largely draws on the sources noted above. While most of the known sites are included in these compendia, there are other published (see Section 1.2) and unpublished accounts which have been examined for this study noted below.

The following sections will discuss prehistoric archaeological sites and other archaeological explorations in the vicinity of each restoration site (see Figure 1 for site locations). A brief discussion of other sites along the shores of Jamaica Bay is also included. Finally, possible locations of unreported sites will be considered as well as a discussion of possible submerged sites in the bay.

1. Dead Horse Bay. While most of Barren Island consisted of marshland, there was apparently a small area of upland which may have been attractive to Native Americans. Black (1981:13) writes that "only at Canarsie was there any sizable stretch of upland adjacent to the bay. Smaller parcels of solid ground existed at Bergen Island and the southern and eastern shore of Barren Island."

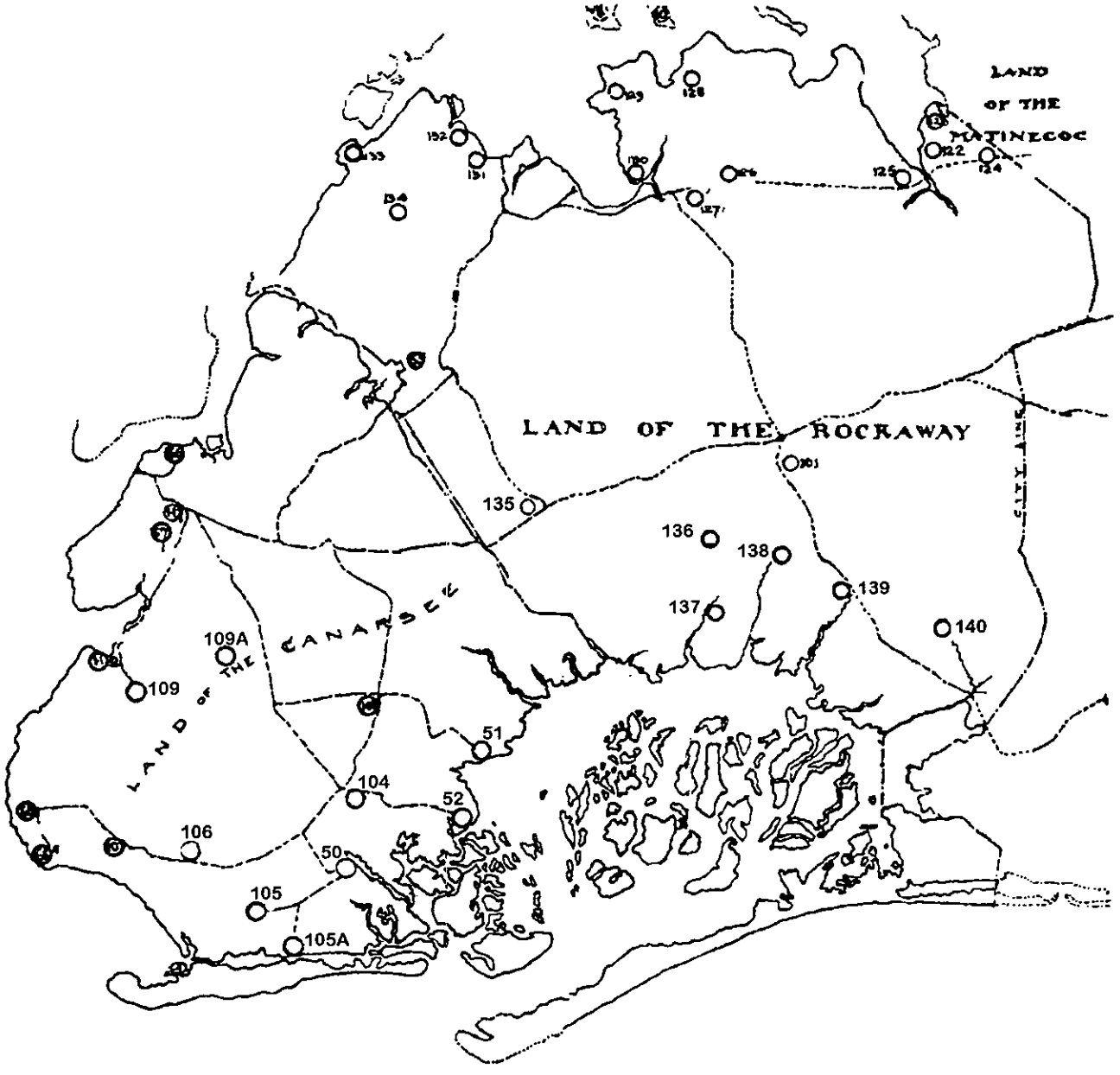


Figure 13. Location of prehistoric sites in Kings and Queens Counties, New York. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Bolton 1934:144, 148).*

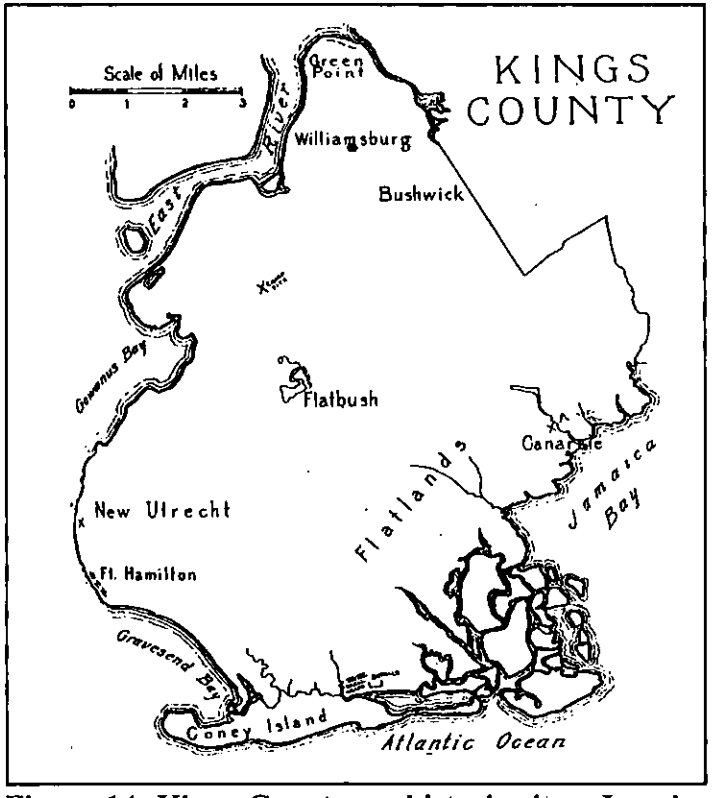


Figure 14. Kings County prehistoric sites. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Parker 1922:Plate 179).*

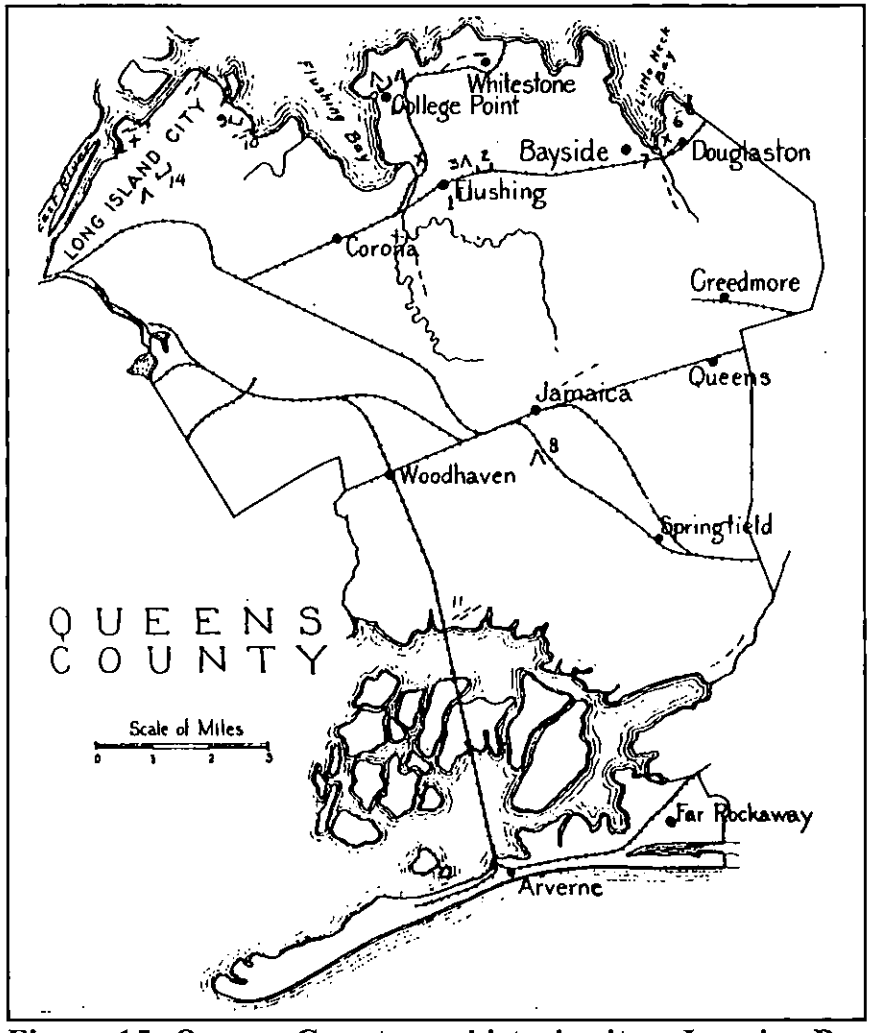


Figure 15. Queens County prehistoric sites. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Parker 1922:Plate 208).*

Figure 16. Locations of New York City shell heaps. Jamaica Bay Restoration Project, Kings, Queens and Nassau counties, New York *(Harrington 1909:178)*

No prehistoric sites have been reported on Barren Island. Milner (1978:111) mentions a site referenced as 'Equendito' located there, but 'Equendito' was a Native American place name for Barren Island and adjacent islands, not a specific locus of occupation.

Seitz and Miller (1996:228-230; cited in Ricciardi and Loorya 1999) describe Barren Island as a "center of the wampum industry." Stayton (1999:77, also cited in Ricciardi and Loorya 1999) mentions that "members of the Schenck family. . .built a mill on the Island and a bridge to the mainland." These authors apparently are confusing Bergen and Mill Islands with Barren Island.

A large prehistoric site with extensive shell deposits (NYSM Site 7391) has been reported from Bergen Island and Bolton (1922:151) in fact refers to this site as a "factory of wampum." The Schenck mill stood on Mill Island, not Barren Island (Black 1981:16).

2. Gerritsen Creek. One of the major prehistoric sites at Jamaica Bay was located on the west side of Gerritsen Creek. The Gerritsen Creek site, also referenced in the literature as the Ryder's Pond site, is indicated on Bolton's map (see Figure 13, Site # 50). The site is included as # 3608 in the New York State Museum site files. Parker (1922) does not show this site on his map, but does list it in his compendium as Kings County site # 4. Based on an 1898 article in the *American Archaeologist*, Parker describes this site as a "burial place in South Brooklyn found in 1897 on Avenue U and near Ryder's pond and Sheepshead Bay. Deep beds of oyster shells had the outer side of the shells uppermost. Pottery was found and over a dozen skeletons. There were a few other shells and fragments of bone."

According to Bolton (1922), the site included occupational refuse as well as burials, which were uncovered during the grading of Avenue U. He describes the site as "a large Indian village and burying-ground on the shore of the Strome kill, Gerritsen Basin, or Ryders Pond, Flatlands. Explored by D.B. Austin. Many objects plowed up in the course of cultivation in the vicinity are in possession of Mr. Ryder, resident nearby" (Bolton 1922:228).

Bolton identifies the site with a tract in the Flatlands sold by Native Americans in 1664 and referred to in the documents as "shanscomacocke, 'a much enclosed place'" (Bolton 1922:159). The recovery of contact period material from this site (see below) suggests that Bolton's inference may, at least in part, be correct.

Bolton's detailed map of the site (Figure 17) shows locations of find spots and features, including burials. These are shown extending along the west side of Gerritsen Creek, also known as Ryders Pond and Strome Kill, from the vicinity of Fillmore Avenue southward to the vicinity of Avenue U. Bolton (1922:160) described the site as being located on "the upland above the beach" which bordered the west side of the creek. He also reported the presence of a spring in the area which would have provided the site's occupants with fresh water.

Artifacts collected from this site in the late nineteenth and early twentieth century have been analyzed and reported in the literature (Lopez and Wisniewski 1971, 1972). The site was bounded by the present location of Avenue R, East 32nd Street, Avenue W, and Stuart Street. They describe the site as extending further to the south than shown on Bolton's map. The artifact collection suggests that the site was occupied during the Archaic and Woodland periods and up to the time of Native American-European contact in the early seventeenth century. The location as noted above indicates that the site extended for a considerable distance on a spit of land extending into the marshes on the west side of Gerritsen Creek, from the southern portion of the spit northward to a location closer to the head of the creek.

In 1979, H. Arthur Bankoff and Frederick Winter of Brooklyn College excavated at the Ryders Pond site. Three undisturbed shell midden deposits were discovered, with all of the recovered material dating to the Late Woodland period (Bankhoff and Winter 1979, cited in Ricciardi and Loorya 1999). In 1997 a Brooklyn College field school undertook excavations at the site of the Marine Park environmental center, located immediately south of Avenue U at the present head of Gerritsen Creek. At the time of the site visit for the present study the center was still under construction. At least some of the environmental center site would appear to have been at the location of Gerritsen Creek prior to twentieth century landfilling; other portions would most likely have consisted of marshland. The 1997 excavations appear to have encountered landfill and other disturbed contexts. No Native American artifacts were recovered (Ricciardi and Loorya 1999).

Although none of the above sources discuss deposits east of Gerritsen Creek, Bolton's 1922 site map (Figure 18) shows a shell deposit located on the east side of the creek between Avenues T and U and East 34th and East 35th Streets. Van Wyck cites a member of the Lott family as mentioning

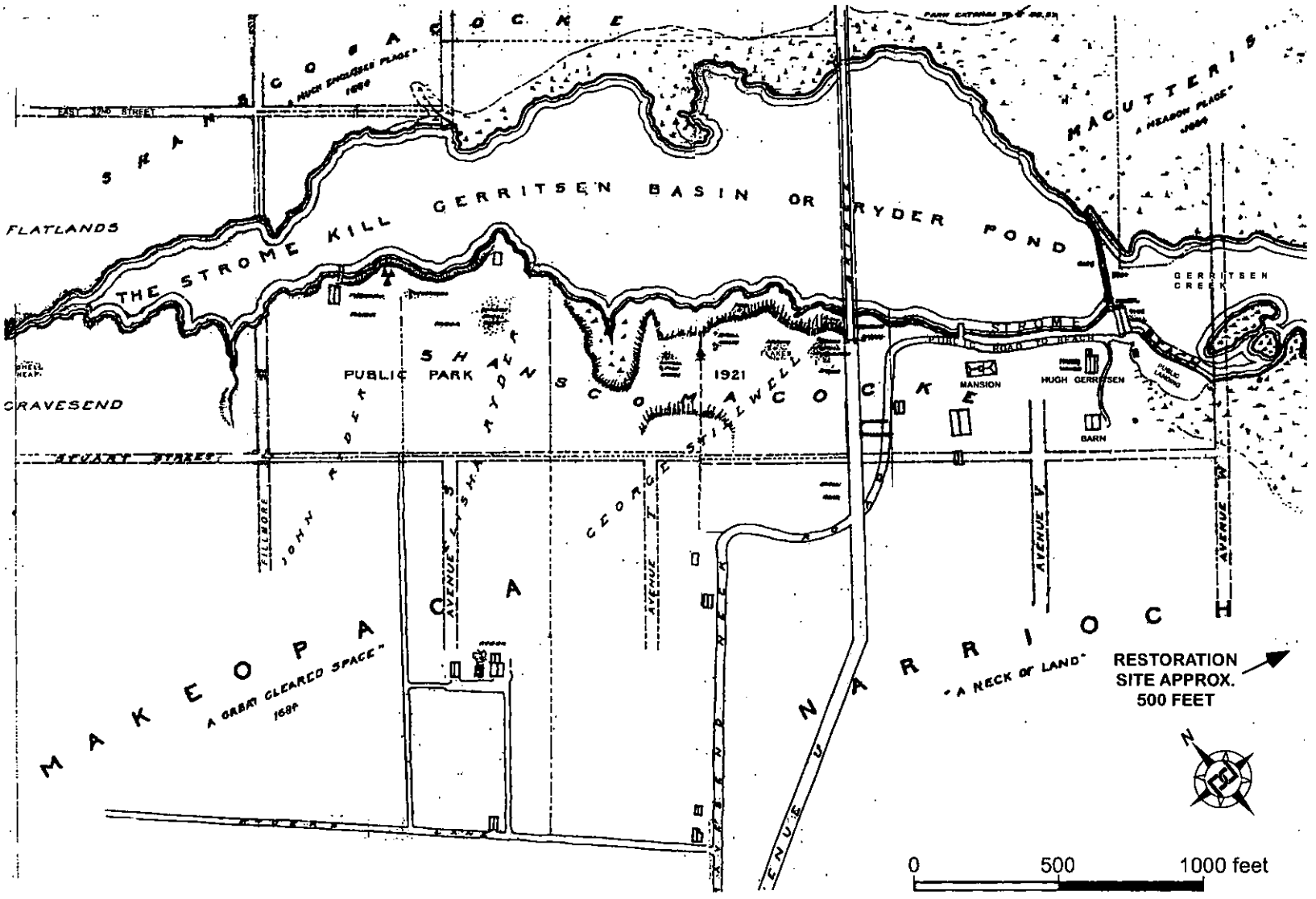
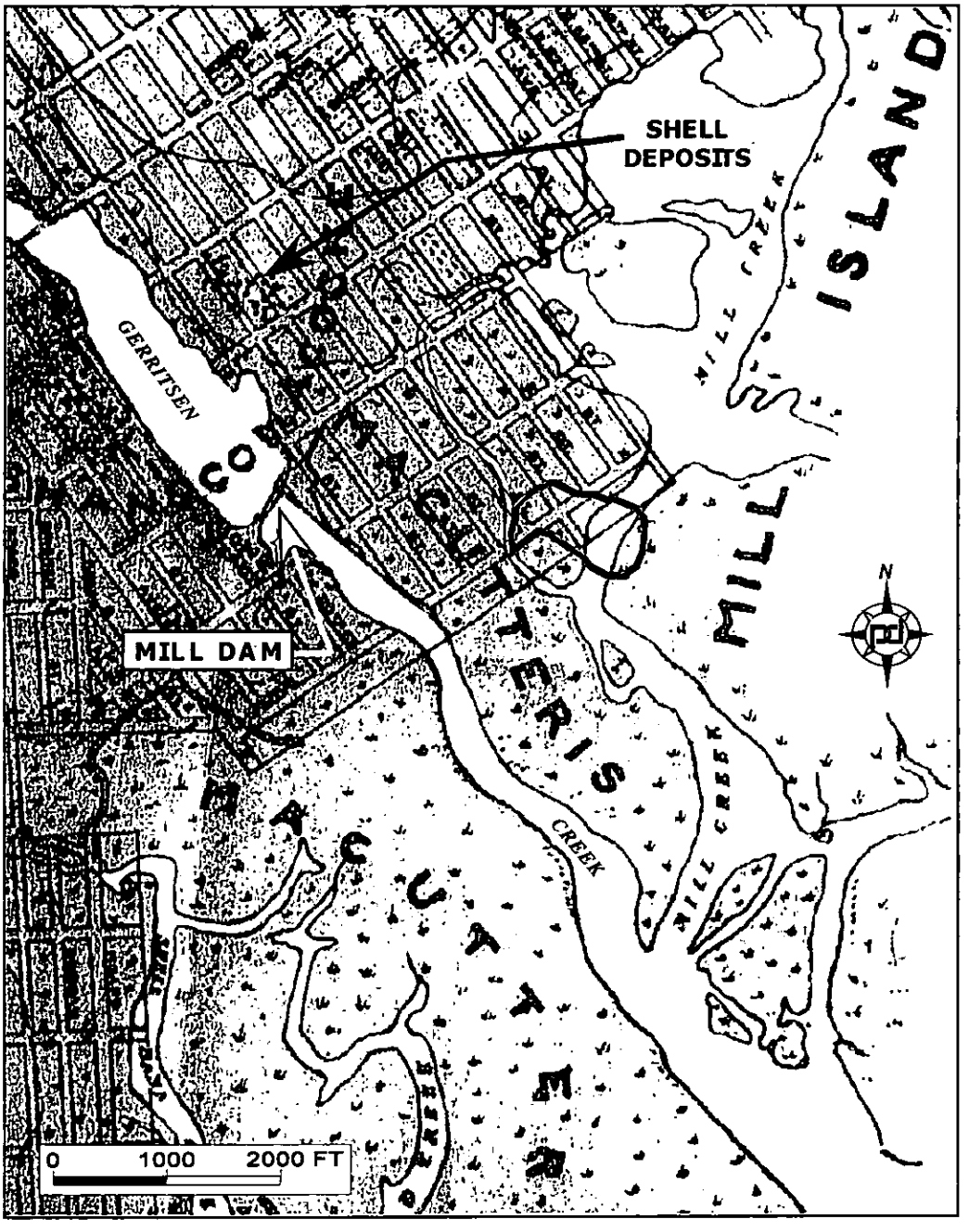


Figure 17. Detail of Ryder's Pond prehistoric site, near Gerritsen Creek. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Bolton 1922: Map IX).*



APPROXIMATE LOCATION OF RESTORATION SITE

Figure 18. Detail of map showing prehistoric sites near Gerritsen Creek. Jamaica Bay Restoration Project, Kings, Queens and Nassau counties, New York *(Bolton 1922: Map VIIID).*

> quantities of arrow heads are found in the fields on the westerly side of the mill pond, whereas few if any are found on the easterly side .... [however] .... when Avenue U was graded on the easterly side of the mill pond about twenty-two to twenty-four years ago, human bones were found in the upland covered with quantities of large unopened oyster shells .... the fields on the easterly side of Gerritsen's Mill Pond are still (1922) very highly cultivated ... [and during cultivation] ... it is not uncommon to disturb the unopened oyster shells that lie in quantities above and around human bones [Van Wyck 1924: 649-650].

A newspaper article reports that human remains were uncovered by construction workers in Marine Park. Although the location of these finds is not recorded, it was apparently north of Avenue U since the article states that "the construction site is normally home to baseball and softball fields" (Laboy 1990). It is unclear whether the remains were *in situ* or whether they derived from Native American burials. These finds, however, at least raise the possibility that burials and other remains are still located in the area.

The Ryder's Pond site and the deposits reported above on the eastern side of the Mill Pond, like the other sites discussed below, were located on dry ground adjacent to marsh areas. The proposed environmental restoration site is located in a former marsh area, east of the original location of Gerritsen's Creek. Its location places it some 2,500 feet east-southeast, and on the opposite side of the creek from the closest point of the Ryders Pond site as described by Lopez and Wisniewski. The restoration site would also be located some 2,000 feet south-southeast of the shell scatter shown on the east side of the creek on Bolton's 1922 map.

3. Paerdegat Basin. According to Bolton, the place where Flatlands Neck Road crossed the Paerdegat was known as Muskytehool. Although Bolton shows this location as Site #108 (Figure 19, far left), he makes it clear that this was a place name, not an actual Native American site. He states that the term is related to the Native American word "musquetaug ... a place of rushes" which, he adds, "very well describe[s] the characteristic feature of the Paardegat" (Bolton 1922:237). A significant Native American site (Bolton's Site # 51) was located on dryer land farther to the east, between Paerdegat and Fresh Creeks. This site will be discussed below, in conjunction with the Fresh Creek restoration site.

Historic period maps reviewed for this study confirm that the land around Paerdegat Creek was entirely marshy with no areas of dry ground. Borings taken in and around the construction site of a Department of Energy Conservation water quality facility at the head of Paerdegat Basin—at the intersection of Ralph and Flatlands Avenue—revealed the presence of some 10 to 15 feet of fill overlying the organic peats and silts representing tidal marsh deposits (see Kearns et al.1993:11).

4. Fresh Creek. The major prehistoric site in the vicinity of Fresh Creek appears to be that identified by Bolton as # 51 (see Figures 13 and 19). The site was also recorded by Parker (1922) and is included in the files of the New York State Museum as site #7390. The NYSM files describe this site as being characterized by "immense shell heaps." Bolton (1934:146) described this as "a village site, and extensive planting field, [which] extended back from Canarsie Beach Park as far as Avenue J, centered on East 92nd Street." Grooved axes "and other artifacts" had been recovered earlier from this site, leading Bolton to assume that it was "probably the principal village-site of the

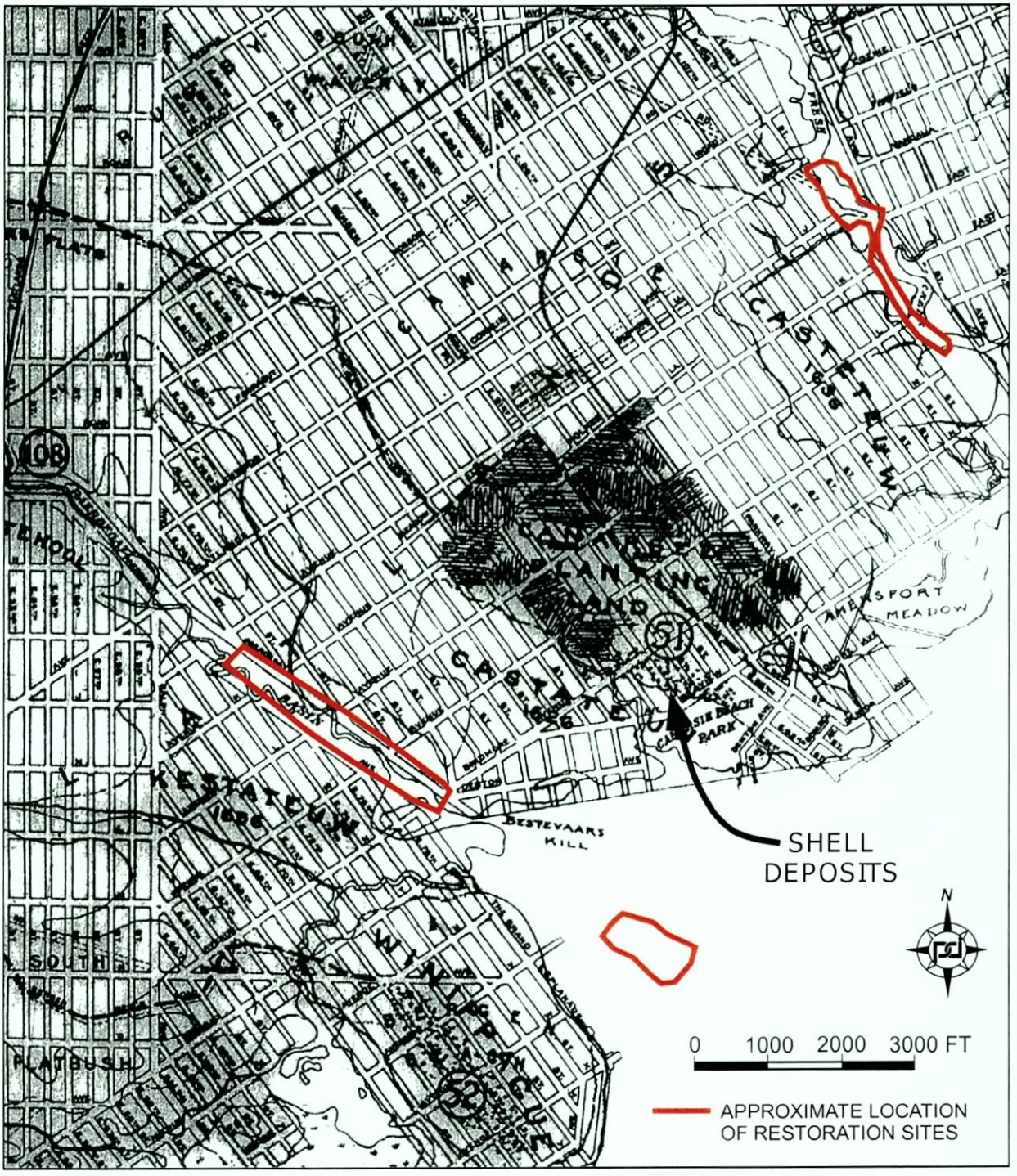


Figure 19. Native American sites near Paerdegat Basin and Fresh Creek. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Bolton 1922:Map VIIID)*

tribe of the same name" (Bolton 1920:89). There is no archaeological data proving that this site was actually occupied during the Contact period.

Figure 19 shows that the site, labeled "Canarsee Planting Land," extended from the vicinity of Seaview Avenue on the south to Avenue J on the north and from East 85th Street on the west to Rockaway Parkway on the east. Shell deposits were concentrated in the southern portion of this area. The site would have been situated on a spit or neck of dry ground which extended southward between the marsh areas adjoining Paerdegat Creek on the west and Fresh Creek on the east. The eastern portion of the overall site area indicated by Bolton would appear to be four or five blocks west of the marshes adjacent to the western side of Fresh Creek, and some 3,000 feet west of the Fresh Creek restoration site. The western edge of the Canarsie site would be located some 2,300 feet east of the Paerdegat Basin restoration site.

Other data suggest that there were additional Native American remains in the Fresh Creek region, outside the area indicated on Bolton's map. Solecki (1994) conducted surface explorations in the vicinity of the Canarsie site in the 1930s and noted "a site at East 107th Street and Flatlands Avenue," but provides no further information. The reported location was adjacent to the marshes adjoining Fresh Creek and would have been located at the end of a smaller neck of land extending into the marshes east of the one on which Bolton's Canarsie site is located. This neck is located closer to the head of Fresh Creek than the one containing the Canarsie site. The site mentioned by Solecki may actually be an extension of the Canarsie site, or it may represent a separate occupation. Its location would be about 500 feet west of the restoration site.

In addition to the Canarsie site, the New York State Museum lists three sites near Fresh Creek reported by Arthur C. Parker in 1922. One of these is a "camp" site on the west side of Fresh Creek (NYSM Site #3610). This site may be the same one recorded by Solecki, although, as plotted by the Museum, it is centered on the intersection of Avenue M and East 104th Street, some 3,500 feet southwest of Solecki's and approximately 1100 feet west of the restoration site.

Parker reported two other sites east of Fresh Creek. One of these was described as a "village" site (NYSM Site #3609) and the other consisted of "shell middens" (NYSM site #3607). The "village site" would appear to be the unnumbered site shown near Canarsie on Parker's 1922 map (see Figure 14). As plotted on maps by the New York State Museum these sites would have been located on a neck of land which extended into the marsh. The Museum centers the "village" site (#3609) on the lines of Georgia Avenue and Avenue K, approximately 450 feet east of the Fresh Creek restoration site. Site #3607 is located further to the east, between Fresh and Spring creeks.

5. Spring Creek. Neither the Bolton nor Parker maps nor the New York State Museum Site files indicate sites in the vicinity of Spring Creek. However, survey notes dated 1938, previously supplied by Dr. Ralph Solecki (see Pickman 1980b), report that a concentration of shells and several prehistoric artifacts were found near Spring Creek at the end of Crescent Avenue at Fairfield (now Flatlands) Avenue. This location was near the southern end of a spit or neck of land projecting into the marshes west of Spring Creek, some 1,500 feet northwest of the Spring Creek restoration site.

6. Hawtree/Bergen. One of the major prehistoric Jamaica Bay sites, probably representing a permanent or semi-permanent occupation, is the Aqueduct site, located immediately north of the Belt Parkway near Hawtree Creek in Queens County. The site is included in Bolton's compendia as Queens site #136. Shell deposits shown in this approximate area on Harrington's 1909 map (see Figure 16) most likely represent this site.

Excavations at the Aqueduct site were conducted in 1939 by a field survey party of the Flushing Historical Society. In addition to refuse middens, a burial pit was encountered and excavated (Solecki 1947). Based on his analysis of material from the site, Smith (1950) assigned its occupation to the terminal prehistoric Classons Point focus of the Late Woodland Period. The portion of the site excavated was apparently immediately south of North Conduit Avenue. Belt Parkway plans and historic maps, as well as the results of archaeological borings taken in 1980 (Pickman 1980a), reveal that the ground at this location was approximately at the 16-foot contour, sloping downward to the northern edge of the marshes bordering Jamaica Bay. The edge of these marshes was immediately north of the Belt Parkway, some 200 feet south of North Conduit Avenue. The ground also sloped downward to the east to a location near the head of Hawtree Creek which, as shown on early twentieth century maps, was located several hundred feet east of the site boundaries as defined based on the 1980 borings (Pickman 1980a). It is possible, however, that the site was actually closer to the creek as it existed in prehistoric times.

The borings provided indications of the presence of refuse midden deposits overlying the marsh surface at the northern edge of the Belt Parkway. These prehistoric deposits are now overlain by some eleven feet of fill. The data suggest that the occupation area was located on higher ground to the north and that the site occupants disposed of refuse in low ground at the edge of the marsh (Pickman 1980a). The Aqueduct site was located approximately one mile north of the proposed Hawtree/Bergen restoration site.

Parker's 1922 map (see Figure 15) has become a source of confusion regarding sites in the vicinity of the Hawtree/Bergen project site. Parker's published description of his Queens County Site #11 and the general location shown on his map suggests that it is the Aqueduct site. However, Parker describes this site as a "village site and shell heap near Hook Creek station on the road to Far Rockaway." Hook Creek was located at the eastern end of Jamaica Bay, in Nassau County, several miles east of the Aqueduct site. The sites reported by Parker and listed by the New York State Museum include a camp site in the general vicinity of Hook Creek, NYSM # 4050.

Complicating matters is the fact that Parker's Site #11, included in the New York State Museum files as site #4534, is not placed at the location of the Aqueduct site by the Museum, but immediately north-northeast of the eastern portion of the Hawtree/Bergen restoration site and extending eastward into the Kennedy airport property. Boesch (1997) compounds the confusion by showing this site (which he also lists as #11) between Shellbank Basin and Hawtree Creek.

Bolton also reported a site in the Hawtree Creek area (Site #137 on Figure 13) just south of the Aqueduct site (listed as #136) "on Hawtree Creek Road, at Flynn Avenue, where pottery sherds and a stone dish or mortar were found" (Bolton 1934). Nineteenth and early twentieth century maps

identify Flynn Avenue as the present 160th Street. Hawtree Creek Road was at the approximate present location of Lefferts Boulevard. This location places Bolton's Hawtree site some 3,500 feet north of the restoration site.

7. Motts Point/Bayswater. None of the above sources include sites on the Rockaway Peninsula, the closest being NYSM # 4050 located in Inwood. In the early twentieth century, however, prehistoric sites were reported near the Motts Point restoration site at Bayswater. Pettit (1901:5) noted that "prehistoric relics and ... seven giant Indian skeletons, [were] recently found in Bayswater ... in the vicinity of the Bayswater Hotel and golf grounds probably on the hill where the golf club house stands."

Bellot (1918:90) recorded the presence of extensive shell deposits at Bayswater: "The Far Rockaway shell bank was enormous and must have contained many thousand tons of clam shells. It was located at Bayswater on Judge Healy's property, but was carted away and used for filling-in purposes and road making." The Healy shellbank was also mentioned in the Queens County Historical Collections (WPA 1938: Vol I:173) which also adds that "there were other shell banks in the marshes all around."

The location of these reported Bayswater sites can be determined with reference to late nineteenth and early twentieth century maps. The Healy house was situated along the Bayswater shoreline between Bessemund and Ocean Avenue, some 4,000 feet south of the restoration site at Motts Point. The Bayswater Hotel was located east of Westbourne Avenue south of its present intersection with Waterloo Place. This site is approximately 1,300 feet south of the restoration site at Motts Point.

A local collector, Steve Feldman, reported in 1988 that "the extreme eastern shore of Jamaica Bay (Bayswater) is still yielding Woodland Period ceramics, projectile points, and a possible burial" (Historical Perspectives 1988:12). While the location of these finds was not specified, it is possible that they are associated with the remains of the site(s) recorded in early twentieth century sources.

8, 9 and 10. Dubos Point, Brant Point and Broad Channel sites. There are no reported Native American sites in the vicinity of these restoration sites. Examination of various maps (see Section 4.2.1) reveals that these areas remained as marsh land until the twentieth century.

11. JFK Runway Extension. Less thorough reports of prehistoric occupation have been noted near other Jamaica Bay tidal creeks formerly located within the present boundaries of JFK airport and filled in when the airport was built. East of the Aqueduct site, Bolton's site #138 (see Figure 13), described as "probably a fishing station," was located "at the head of Bergen Creek" (1934:151).

Museum Site files indicate a site (#154x) at Bergen's landing (approximately ½ mile south of Southern Parkway) where eleven whole or fragmentary projectile points were recovered (reported by Harris in Rothschild and Pickman 1978). This latter site was apparently located on a space of drier ground within the extensive area of marsh along the north shore of Jamaica Bay, approximately

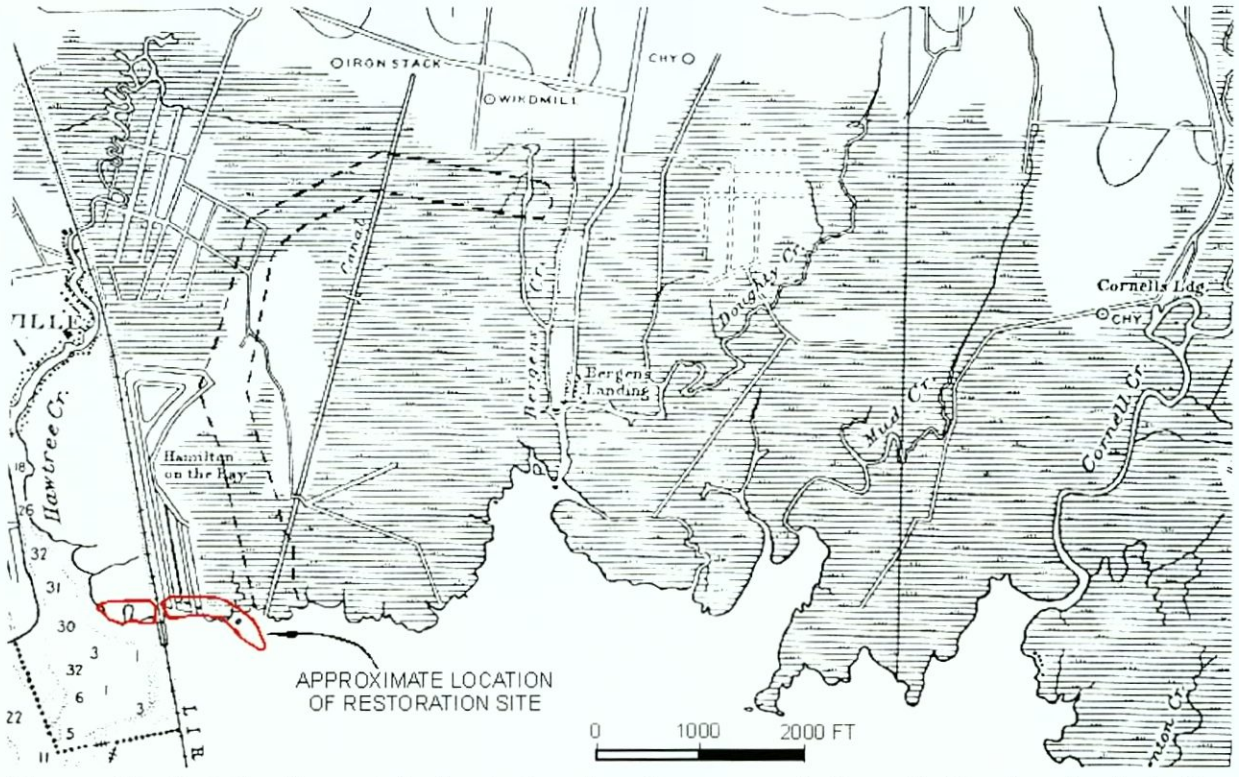


Figure 20. Detail of coastal chart showing Bergen and Cornell Creeks. Dashed line approximates location of present-day Bergen Basin. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(USCGS 1926).*

one-half mile south of the Belt Parkway. It should be noted that Bergen Creek and Bergen's landing were not at the present location of Bergen Basin. The 1926 U.S. Coast and Geodetic Survey(USCGS) chart (Figure 20) shows Bergen's Creek approximately one mile east of Hawtree Creek. The present Bergen Basin is a totally artificial waterway created between 1947 and 1951 (Kearns et al. 1991).

Other Native American sites have been reported on dry ground in the vicinity of two former tidal creeks which were at the present location of JFK airport. Bolton's site #139 (see Figure 13, described by him as "probably a fishing or oystering place ... [which yielded] ... a red stone pipe" (1934:151) was located near Cornell Creek. Located "on the Higbie Farm" would place the site "approximately 1,200 feet south of the Ridgewood Aqueduct [the approximate location of the Belt Parkway] on either side of 150th Street" (noted by Harris in Rothschild and Pickman 1978). Site #140 was located at the head of Hassock Creek (also known as Thurston's Creek), west of Springfield Road and slightly north of Rockaway Boulevard (noted by Harris in Rothschild and Pickman 1978) at the northern edge of JFK airport. "Pottery, stone implements and knives, [and] pitted hammer and flaked stones" were recovered from this site (Bolton 1934:151). The Cornell and Hassock Creek sites would have been located approximately 2 miles northwest and 2½ miles northeast, respectively, of the JFK runway restoration site (see Figure 12).

4.1.2 Analysis of Site Location Characteristics

Although the Native American sites near Jamaica Bay's southern shore in Brooklyn and Queens have only been sketchily described, the reported locations suggest that sites were situated in order to exploit the subsistence resources to be found in tidal marshes and the adjacent open bay waters. The marshes would have provided a convenient nearby source of shellfish and a habitat favored by waterfowl and small mammals. The abundance of reeds and marsh grasses would have represented a source of useful fibers as well as edible plants. Tidal creeks penetrating the marshes would have provided access by canoe to open water fishing.

Most of the major creeks extended well north of the high tide line. These creeks probably had their origins in fresh water springs. Over the years runoff from these springs would have eroded channels in the soil. As sea levels rose, the southern portions of these channels would have been inundated by the tides, with the tidal scour widening and deepening the channels. Occupation sites, which require a nearby source of fresh water, would have been located above the tidal portion of the creeks, where fresh water was available, and at locations which were also close to the resources of the marsh areas. Smith (1950:101) observed that in coastal New York "nearly all of the permanent settlement sites are situated on tidal streams and bays on the second rise of ground above the water." Deposits associated with such sites have also been found on lower ground.

Other sites were located on the spits or necks of land extending southward into the marshes. Unless fresh water springs were located on these necks, such sites would not have been close to a fresh water source. These were most likely shellfish gathering stations, as suggested by Bolton.

The two extensive site areas located west of Fresh Creek and Gerritsen Creek (discussed above) may have incorporated both functional site types, with occupation areas closer to the creek heads and shellfish gathering areas further south on the land spits extending into the marshes.

Most areas in the vicinity of the tidal creeks were possibly utilized at various times during the prehistoric period. The reported site locations as discussed above may be an artifact of the locations of cleared land, activities of nineteenth and early twentieth century collectors, and the effects of twentieth century construction which led both to exposure and destruction of sites.

Despite the reported recovery of Archaic period artifacts from the Ryder's Pond site, it would appear that most of the remains recovered from these sites date to the Late Woodland period. Earlier in the prehistoric period, when sea levels were lower, shoreline sites would necessarily have been located farther to the south. Such sites would now be at the location of the tidal marshes or even on the drowned Continental shelf.

4.1.3 Additional Possible Site Locations

Most of the reported Native American sites on the shores of Jamaica Bay were located on higher ground bordering on marshland. This higher ground often took the form of peninsulas extending into the marsh or islands completely surrounded by marsh. Early-twentieth-century topographic

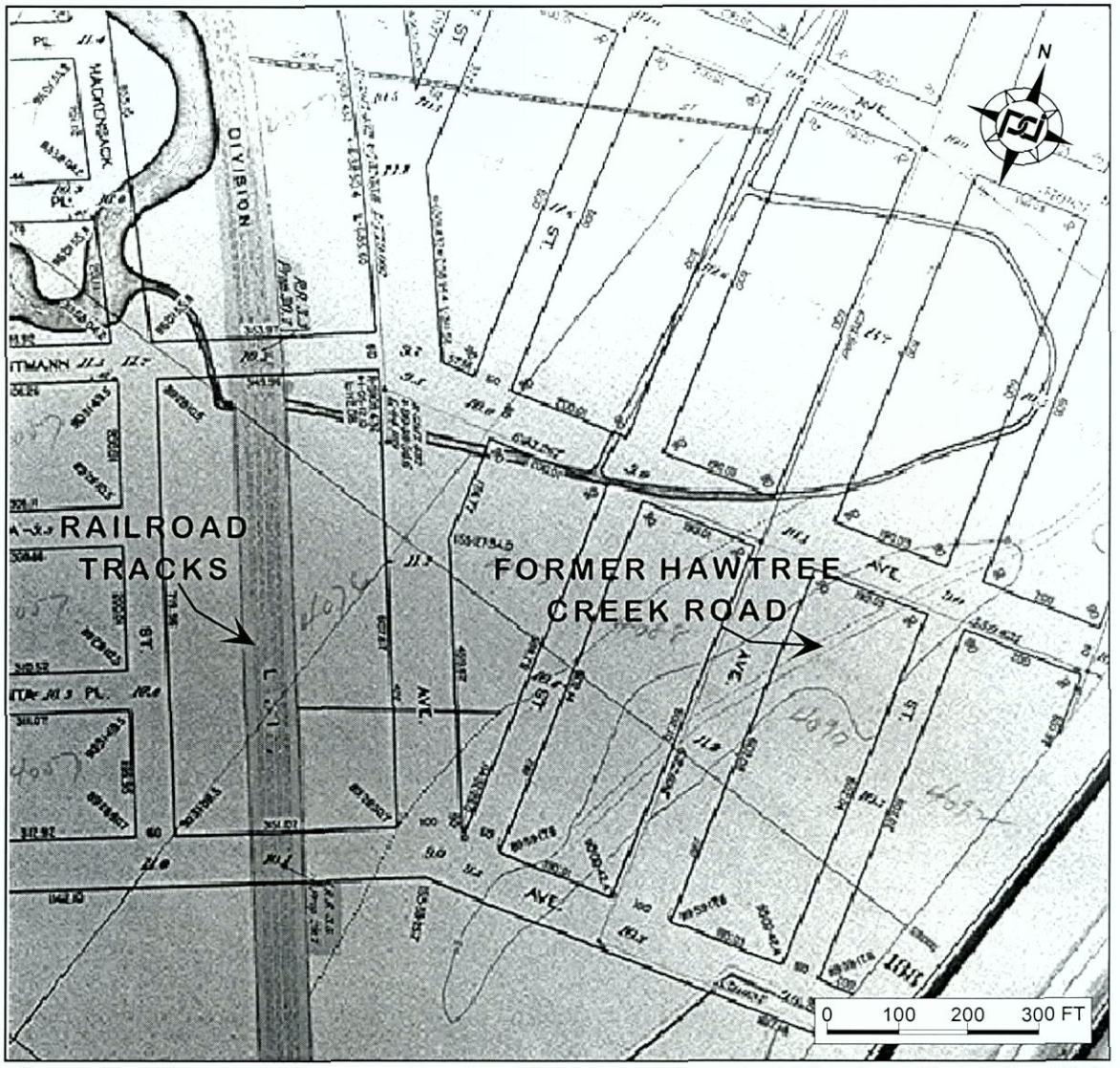


Figure 21. Topographic map showing high ground east of Hawtree Creek in 1915. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Borough of Queens 1915b).*

maps of the Borough of Queens, as well as other maps, show areas of higher ground surrounded by marsh in the vicinity of the Hawtree/Bergen and Spring Creek restoration sites.

Hawtree/Bergen Area. A 1915 topographic map (Figure 21) shows a narrow strip of land above the five-foot contour east of the railroad tracks. The road, indicated by dotted lines, that traverses this strip is the former Hawtree Creek Road. The southernmost mapped street crossing the upland area corresponds with the present 163rd Avenue. The restoration site is approximately 1,500 feet to the south. This high ground is similar to a somewhat larger strip of land further to the north at the location of Bolton's Hawtree site (site #137, see above). It is possible that the southernmost area of higher ground at 163rd Avenue, now covered by a thick layer of fill, may also have been utilized by local native Americans. This strip of land is approximately 1,500 feet north of the restoration site.

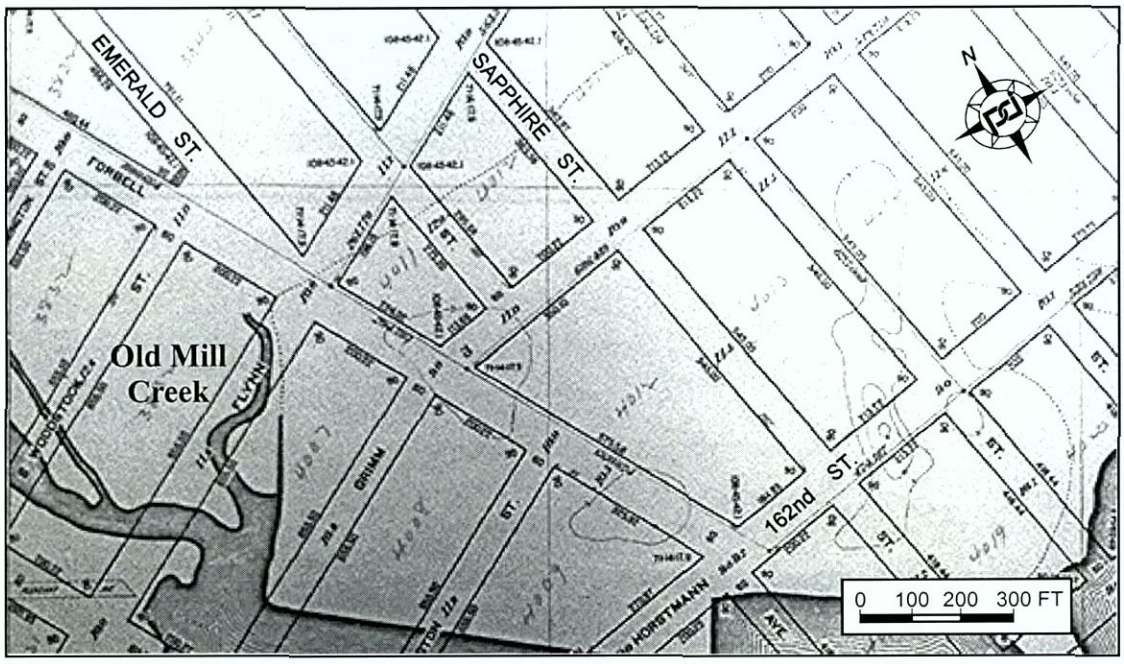


Figure 22. Areas of higher ground east of Old Mill Creek in 1915. The restoration sites are to the northwest and south of the map. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Borough of Queens 1915a).*

Spring Creek Area. The topographic map from 1915 (Figure 22) shows an area of higher ground along the eastern side of Old Mill Creek above the five-foot contour, with a smaller area above the 10-foot contour and a high point above 15 feet. The southwestern portion of this area is just south of the line of 162nd Avenue at the line of Sapphire Street (78th Street), and it extends northeastward, 300 feet east of the restoration site. Another smaller area of dry ground is shown above the five-foot contour just north of the line of 162nd street extending east of the line of Emerald Street (76th Street). These upland areas probably resulted from landfilling which occurred circa 1900 (see Section 4.2.4) and are well outside the sites of proposed restoration activities to the northwest and to the south.

Motts Point/Bayswater State Park. The 1916 Queens Borough topographic map (Figure 23) shows that the five-foot contour interval in the northeastern portion of the restoration site is at the approximate location of the present five-foot contour. During the field reconnaissance fill was observed to have been placed in a former marsh area north of the five-foot contour (Figure 24).

Examination of Motts Point and analysis of other maps suggests that most of this present upland area represents unfilled land. During the prehistoric period this headland may have represented an advantageous resource-gathering location. The topographic contours in the Bayswater area suggests that the site reported on the former Bayswater Hotel grounds (see Section 4.1.1) would be at or near the local height of land. This site, on high ground in a more sheltered inland area, may have represented a permanent or semi-permanent occupation site, as suggested by the reference to burials at this location. The more exposed high ground along the shoreline at Motts Point could have been an advantageous location for resource procurement camps.

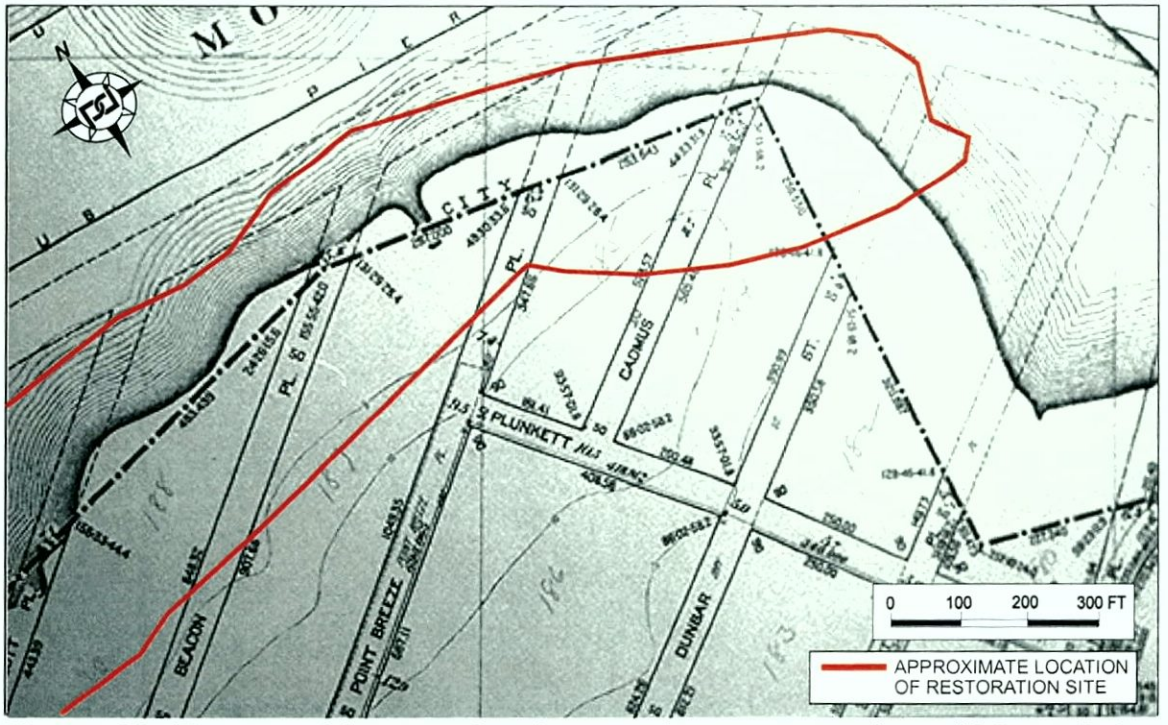


Figure 23. Topographic map showing northeastern portion of Motts Point restoration site in 1916. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Borough of Queens 1916).*

Figure 24. Shoreline of the northeastern portion of Motts Point showing placement of fill, facing west from approximate line of Point Breeze Place. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Pickman 1999).*

4.1.4 Possible Submerged Sites

During the final glaciation (Wisconsin) sea water was tied up in glacial ice and sea level was as much as 400 feet lower than at present. The shoreline lay at the outer edge of the continental shelf, about 100 miles from the present shoreline, with a major estuarine embayment at the location of the submerged Hudson River Canyon (Belknap and Kraft 1977; Kraft et al. 1983).

Since the end of the Wisconsin glaciation, approximately 10,000 years ago, sea level has risen as the glaciers melted (Williams and Duane 1974:17). However, large portions of the continental shelf remained available for human occupation and utilization during most of the Holocene. The retrieval of fossil remains of Pleistocene and early Holocene megafauna, including mammoth, mastodon and ground sloth, from the continental shelf off the coast of New Jersey and Long Island suggests that it was indeed exposed during early prehistoric times. Most of these remains were found by scallop and surf-clam fishermen, most frequently in locations where the water depths are about 250 feet (Edwards and Emery 1977; Edwards and Merrill 1977).

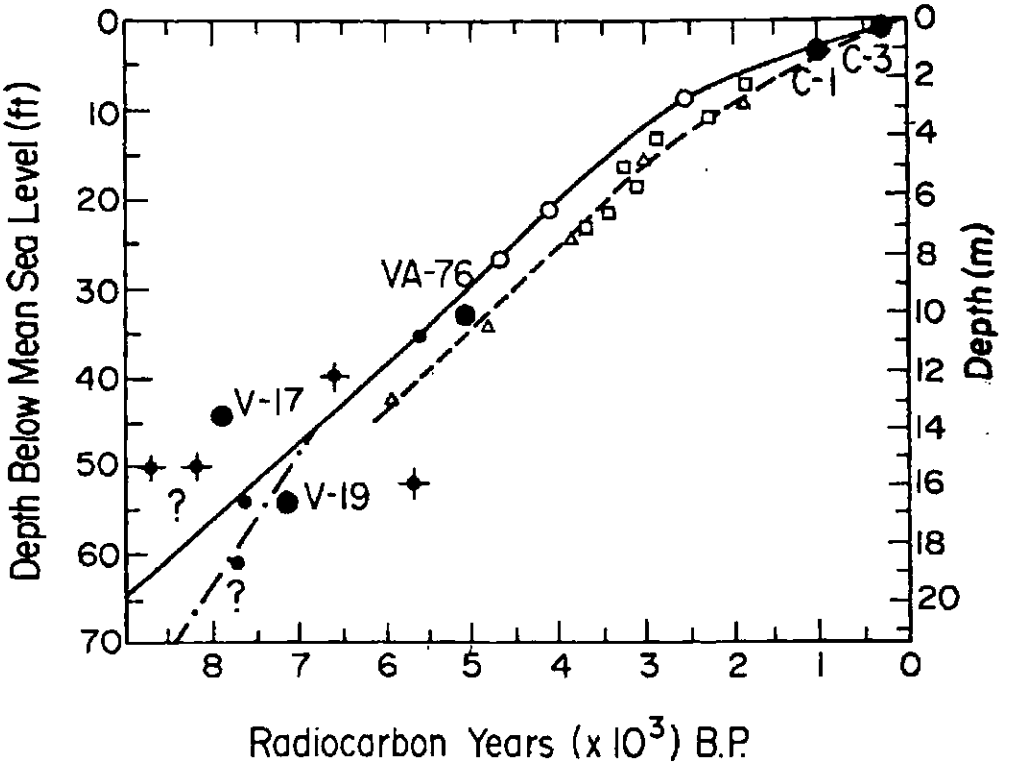
While no sites of the early prehistoric Paleo-Indian and Early Archaic periods are known from Long Island, isolated finds of artifacts attributable to these periods have been found (see Saxon 1973). These sites may have been located close to former shorelines and are now submerged (Emery and Edwards 1966).

Few archaeological sites have been found on the continental shelf. However, several prehistoric artifacts have reportedly been recovered by clam dredgers off the New Jersey coast, including a granite mortar recovered at a depth of 50 feet, about seven miles southeast of Manasquan (NJSPMP 1981:II:100).

As sea level rose during the Holocene, the shoreline migrated northward eventually forming the existing chain of barrier islands and associated lagoons and marshes which extend along the south shore of Long Island. Prior to this time, the area now covered by Jamaica Bay and the associated marshlands would have been dry land and available for occupation by prehistoric humans. Jamaica Bay represents a lagoon which developed behind the geologically recent barrier beach now known as Rockaway Beach. The marsh deposits which border the shores of the bay and also form islands within its waters represent deposits of mud and marsh vegetation which were created during the process of siltation of the lagoon.

A number of curves have been constructed which show sea level elevations in the New York-New Jersey area at various times in the past. Such curves are constructed by radiocarbon dating of peat or other organic sediments immediately overlying pre-inundation surfaces. By correlating the age of various samples with the depth below present sea level from which each was obtained, curves of sea level rise through time are constructed.

The most relevant curve for the study area was published by Rampino and Sanders (1980; Figure 25). The curve incorporates data obtained from organic material recovered from cores taken near Fire Island as well as other data from the Long Island area. This curve shows an overall steady rate



—Submergence curve for southern Long Island during the past 8000 years (solid curve). The curve is based on radiocarbon-dated samples reported in this paper (large solid circles) and on previously published dates from northern Long Island (Caldwell and Sanders, 1973; Williams, 1976) (crossed solid circles), southern Long Island (Kumar, 1973; Williams, 1976) (small solid circles), and Iona Island, New York (Newman and others, 1969) (open circles) The dashed and dotted curve indicates possible submergence rates of ~50 cm/100 years prior to 7000 YBP suggested for adjacent areas (Curray, 1965; Kraft, 1977). The dashed curve is drawn through points of dated samples from New Jersey (Stuiver and Daddario, 1963) (triangles) and Cape Cod, Massachusetts (Redfield and Rubin, 1962) (open squares). An assumption of relatively smooth change in sea level has been made in constructing these curves.

Figure 25. Submergence curve for southern Long Island during the past 8,000 years (*Rampino and Sanders 1980:1074*).

of sea level rise between ca. 7000 B.P. and 3000 B.P., with a slowing rate of increase after the latter date. Prior to ca. 7000 B.P, the rate of sea level rise may have been more rapid, although the small number of data points from this early period makes possible alternative interpretations.

The location of borings taken for the New York City Department of Environmental Protection Water Quality Facility at the head of Paerdegat Basin represents an area at the northern edge of the former marshlands bordering Jamaica Bay (see Kearns et al. 1993:11; Appendix B). These borings indicate the base of the layer of peat and organic silt at a depth of approximately 6.0 feet. Formation of these organic deposits began when inundation of the lagoon reached the site of the borings approximately 1500-2000 years B.P. It is most likely that areas located further to the south would have been inundated earlier in the prehistoric period.

Fuller (1914:185) provides a description of the marsh formation process.

> the marshes begin to form wherever the water is shallow enough for eel grass to obtain a foothold, usually a foot or two below low-water mark, and where no strong currents are flowing. The dead grass and the fine silt entangled with it gradually accumulate until the ground rises well above low water mark and marsh grass takes root upon it. The upbuilding continues until the marsh reaches a level covered only by occasional high tides.

This oversimplified description demonstrates that in a period of continuously rising sea levels the marsh will continue to form, with the marsh surface at any period being at, or slightly above, the level of high water. It also demonstrates that for marshes to form, the inundation by rising sea levels would have to be gradual. Thus, any prehistoric sites present at these locations are likely to have remained substantially undisturbed.. The 2001 Jamaica Bay Blue Ribbon Panel report provides more recent and technical information on marsh formation (see also Murphy 1990).

4.1.5 Other Shoreline Locations

Prehistoric deposits and artifacts have been found beneath or in association with peat deposits during dredging activities and in archaeological excavations at a number of locations along portions of the coastal New York and New England shoreline not exposed to open ocean conditions (see Salwen 1968; Bourn 1972; Glynn 1953; Powell 1965).

Of particular interest are the results of the Nassau County Museum's test excavations of shell heaps located on Cedar Creek, a tidal creek in Wantagh, Nassau County. Three shell heaps were located in an area where a water pollution control plant was constructed in the 1960s and is now buried under fill. Information about these shell heaps was provided by Ron Wyatt, director of the Museum (personal communication 1982).

The shell heaps were located on the western shore of Cedar Creek. The largest heap measured approximately 1,000 by 200/250 feet. The other two measured approximately 250 by 200 feet. The shells were fragmentary. Narrow lenses of soil with a high charcoal content were observed. The Nassau County Museum tests yielded about a dozen chert and jasper flakes. Wyatt maintains that since villages along the south shore of Long Island are located well north of the water, the prehistoric inhabitants of the area had to make special trips to the coast to collect fish and shellfish. The shellfish were apparently shelled at the collection stations and then carried back to the village. This led to the accumulation of large shell heaps and is in keeping with the relative scarcity of artifacts found in these deposits.

Also of note is the fact that all except the uppermost portion of the Cedar Creek shell heaps were below the surface of the marshes bordering the creek, which ranged from 3 to 15 feet in depth. The heap was tested to a depth of ten feet but extended below this level. The likelihood is that the base of the heap rested on the sand underlying the marsh deposits. One possibility is that accumulation of the midden began before the inundation of the land and continued as the marsh accumulated. Since the description of the heap suggests that it became smaller with increasing height, however, the more likely explanation is that the entire heap accumulated prior to inundation of the land and

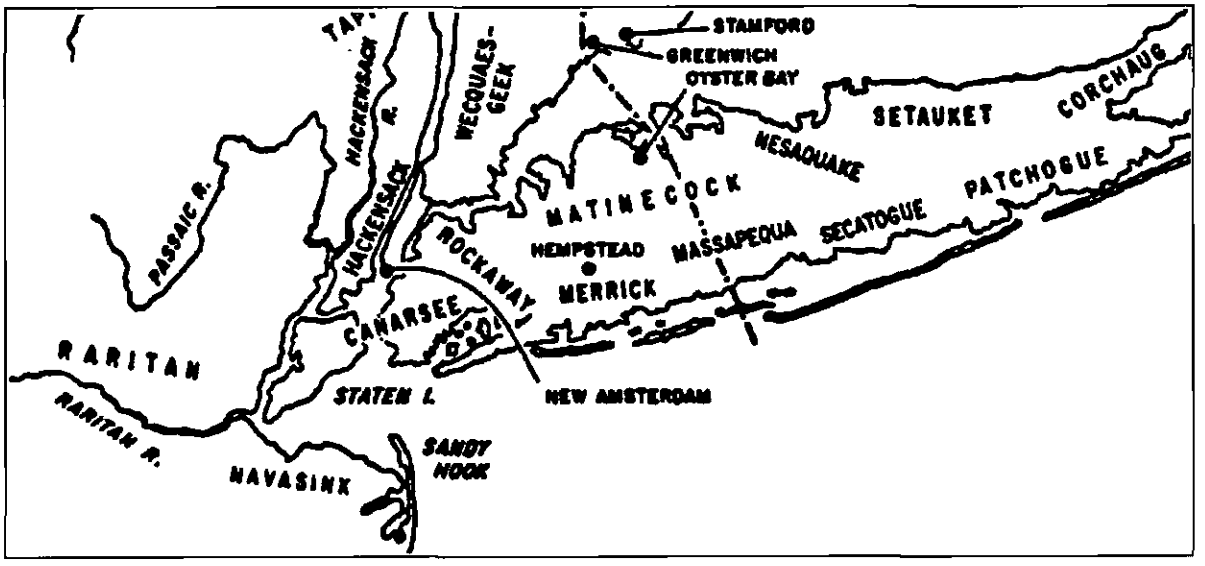


Figure 26. Location of Native American groups in eastern New York and vicinity during the Contact Period. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Trelease 1960:6).*

the marsh deposits accumulated around the heap as the sea level rose. Radiocarbon dates obtained from shell within the heap were all restricted to the first millennium A.D.

Shell heaps have been reported along other tidal creeks in Nassau County, as well as the marshy islands in Hempstead and South Oyster Bays (Pickman 1982). With the exception of the shell heaps reported in the Bayswater area, no reports of this type of site in the Jamaica Bay area have been filed. Submerged shell heaps, as well as other types of sites, could remain obscured beneath marsh or overlying fill deposits in undredged portions of the bay. The locations of any such deposits are normally confirmed by subsurface probes and possibly by side-scan sonar remote sensing.

4.2. HISTORIC PERIOD

4.2.1 Contact Period

Various groups of Native Americans occupied the study area when Europeans first settled here in the early seventeenth century; all were apparently speakers of the Algonquian language. The northern shoreline of Jamaica Bay was occupied by the Canarsie group. The Rockaway, who mainly occupied Nassau County and the eastern portion of Queens County, would have controlled at least the eastern portion of the Rockaway peninsula (Trelease 1960; Figure 26).

Based on references in early colonial documents, it has been inferred (Bolton 1922, Van Wyck 1924) that a major Canarsie settlement was located at Flatlands. Although Indian burials were reportedly found in the graveyard of the Dutch Reformed Church at Flatlands during excavation of European-American graves (DuBois 1884, Armbruster 1919, O'Halloran 1950), the presence

of Native American occupational refuse at this location had not been noted (Pickman 1994). Bolton (1920) declared that the principal Canarsie village sites were at Ryder's Pond and Canarsie, # 50 and # 51 (see Figure 14). As noted previously, some contact period material was recovered from the Ryder's Pond site. No analysis of material from the Canarsie site has been reported.

The Town of Flatbush included the portion of Kings County known as New Lots until 1852, when it became a separate community. The boundary between Flatlands and New Lots was located a short distance to the west of Fresh Creek, placing the Fresh Creek restoration site within the latter town. Ownership of the salt marsh between the boundary and Fresh Creek had been a matter of dispute between the two towns. As Black (1981:13) observes, "the controversy over this rather small parcel demonstrates the value attached to the bay's meadowlands."

The Flatlands town center was near the present location of Flatbush Avenue and Kings Highway. Canarsie was a village which subsequently grew up within the Town of Flatlands. Its center was in the vicinity of the present Rockaway Parkway between Flatlands Avenue and Glenwood Road. The town center of New Lots was along New Lots Avenue. All of these areas of settlement were well north of the Jamaica Bay marshes and the restoration sites.

Queens County. The portion of the Jamaica Bay shoreline within Queens County was part of the Town of Jamaica, although the Jamaica Bay shoreline was some 2½ miles south of the original settlement. The first settlers moved here from Hempstead, incorporating the Village of the Jamaica, originally given the Dutch name Rustdorp, in 1656. Although they obtained grants from the Dutch, and later the English Colonial governments, the Jamaica proprietors also made purchases from Native Americans. The land which included the north shore of Jamaica Bay within Queens County was purchased in 1655 and 1662. The latter transaction was entered into by Waumitumpack, the 'Sachem of Rockaway' (Munsell 1882:193-195, cited in Kearns et al. 1991). This land would have included the Spring Creek and Hawtree/Bergen project sites.

The portion of Jamaica bordering the Bay came to be known as 'Jamaica South.' In the early days of the town the marsh lands were apparently held in common. The three communal meadows bordering the bay were known as East Neck, Long Neck and Haw Trees Neck. The Jamaica settlers were organized into teams and assigned the task of "mowing" marsh grasses from one of these meadows (Black 1981:20).

In 1685 the Rockaway deeded a large tract of land including what then constituted the Rockaway Peninsula to John Palmer, who had obtained a grant to this land from the English Governor, Thomas Dongan. In 1687, Palmer sold the tract to Richard Cornell (also spelled Cornwell or Cornwall), "an ironmaster of Flushing." This tract included the three restoration sites located on the Rockaway peninsula.

Richard Cornell is generally considered to be the first settler in the Rockaway area. His house was east of the project area, at Far Rockaway. At his death in 1693, his land was divided among his heirs. In 1809, as a result of a petition by descendants of the original Cornell heirs, the Rockaway tract was separated into two divisions. Rockaway's eastern portion, located within the second division, was divided into fifteen separate plots. Lack of accurate surveys made the location of the

various plots difficult, though by the mid-nineteenth century nearly all of the eastern division was owned by John L. Norton. Norton died in 1848, and his heirs sold much of this land to Samuel L.B. Norton, Henry Mott and others. Throughout this period the Rockaway peninsula was part of the Town of Hempstead.

4.2.2 Early Historic Period Land Use. Despite the acquisition of the land bordering Jamaica Bay by European settlers during the seventeenth century, most of this area, largely comprised of marshland, remained unoccupied through the early nineteenth century. Still, they utilized the resources abundant in and around the bay.

One valuable resource was the marsh vegetation, evident from a description of the Flatlands in a 1679 journal:

> [T]here is toward the sea (the bay), a large piece of low flat which is overflown at every tide ...which produces a species of hard salt grass or reed grass. Such a place they call *valey* and mow it for hay, which cattle would rather eat than fresh hay or grass (Dankers and Sluyter 1867:124-26, quoted by Black 1981:13)

The settlers also made use of the bay area's fish, shellfish and wildlife as sources of food. However, until the mid-nineteenth century these activities were carried out for recreation or subsistence, rather than commercial ventures (Black 1981:24-26).

Agriculture was the main economic activity for the early communities around Jamaica Bay. Mills for processing grain were built on upland areas of the tidal creeks adjacent to the bay. Grist mills stood along three of the waterways in the vicinity of the proposed ecosystem restoration sites—Gerritsen Creek, Fresh Creek and Spring Creek. These mills are shown on the 1781 Taylor and Skinner map (Figure 27), the earliest to show details of the Jamaica bay shoreline including adjacent structures. Depicted is Gerritsen Creek Mill and the mill dam adjacent to the west side of the creek with the marshes extending to the south. Vanderveer's mill on Fresh Creek was located on an area of upland adjacent to the creek's west side. A lane is shown extending to the northwest from the mill site. The Van Wicklen mill at Spring Creek is also located west of the creek with a lane to the north. These mills are mentioned in various documentary sources and their location is given with more detail on the nineteenth century maps referenced in Section 4.2.3.

These mills were apparently tide mills utilizing water power created by construction of a dam across the tidal creeks. After the rising tide filled the pond behind the dam the gates were shut, trapping the water in the pond. When the tide fell sufficiently, the gates were opened and the water released through a mill race turning the mill wheel. Approximately five hours milling time would have been available for each of the two daily tides (Hampshire County Council 1999).

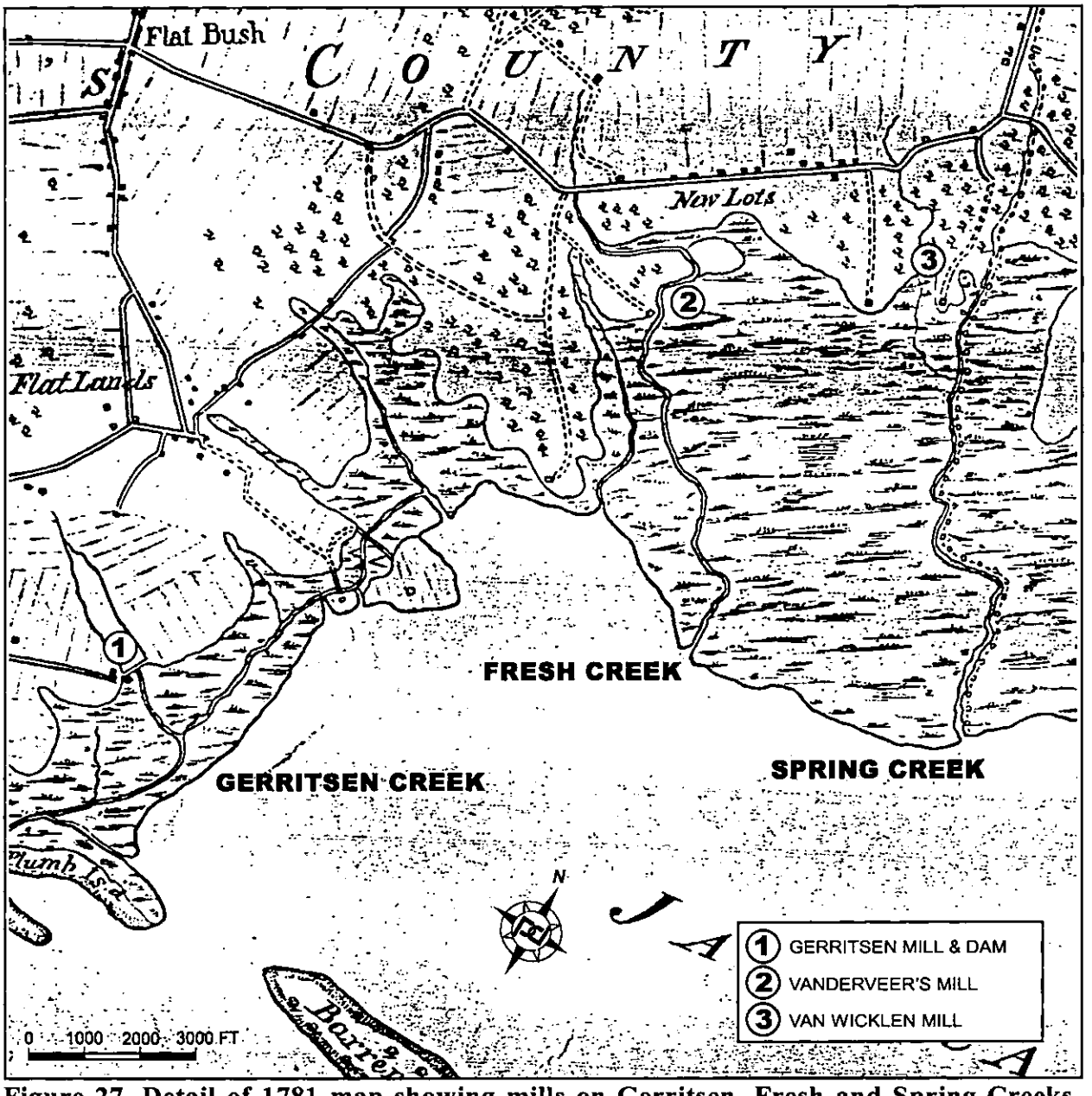


Figure 27. Detail of 1781 map showing mills on Gerritsen, Fresh and Spring Creeks. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Taylor and Skinner 1781).*

4.2.3. Study Area Tide Mills

The Gerritsen Mill. The mill on Gerritsen Creek was constructed and owned by members of the Gerritsen family. It may have been constructed as early as 1645, at which time a Native American deed mentioned that Hugh Gerritsen owned this property. The mill remained in the Gerritsen family until 1876 at which time the property came into the ownership of two daughters of Samuel J. Gerretsen, Mary C. Polhemus and Hellen Herriman (Ricciardi and Loorya 1999).

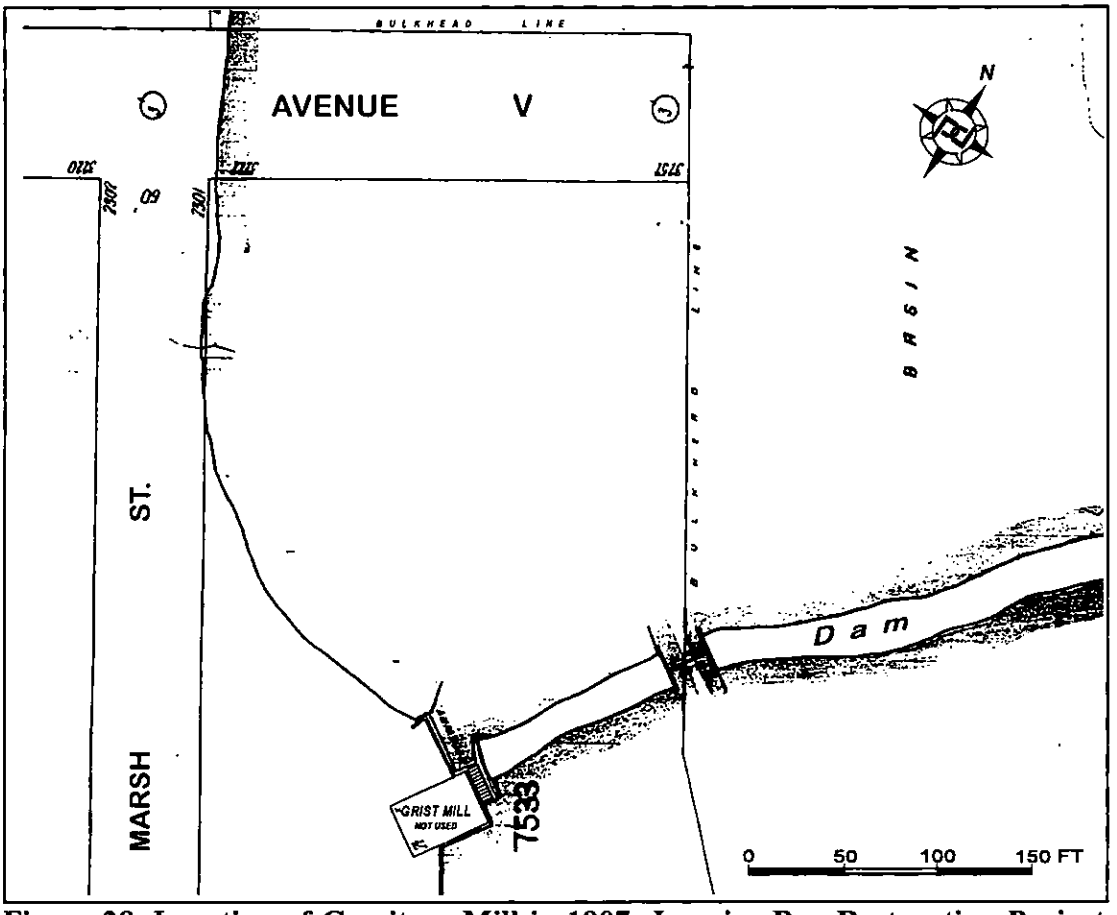


Figure 28. Location of Gerritsen Mill in 1907. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Sanborn 1907:Vol. 15: 83).*

The mill reportedly operated until 1889, but it remained standing for some time. It is shown on various nineteenth century and early twentieth century maps and is identified as a tide mill on Bolton's 1922 map (see Figure 18). This map and the 1907 Sanborn map (Figure 28) indicate the position of the mill wheel and the mill dam and gate. The Gerritsen mill was reportedly destroyed by fire in the late 1920s or early 1930s (Ricciardi and Loorya 1999; New York City 1986.).

Remains of the mill and dam are supposed to be visible at extreme low tide on the western side of Gerritsen Creek and extending across it (Ricciardi and Loorya 1999; Ricciardi et al. 2000; New York City 1986). These remains were not seen during field reconnaissance of the Gerritsen Creek restoration site, which took place near high tide. The detailed 1907 Sanborn Map (see Figure 28) locates the mill on the west side of the creek some 300 feet south of the line of Avenue V and some 350 feet northeast of Burnett Street. The mill dam extended northeastward of this location for some 600 feet to the approximate line of East 32nd Street, as shown on the 1890 Robinson map (Figure 29). These features would have been located more than 2000 feet northwest of the location of the Gerritsen Creek restoration site, which is located south of the line of Avenue X and between the approximate lines of East 35th Street and Ryder Street (not shown on Figures 28 or 29).

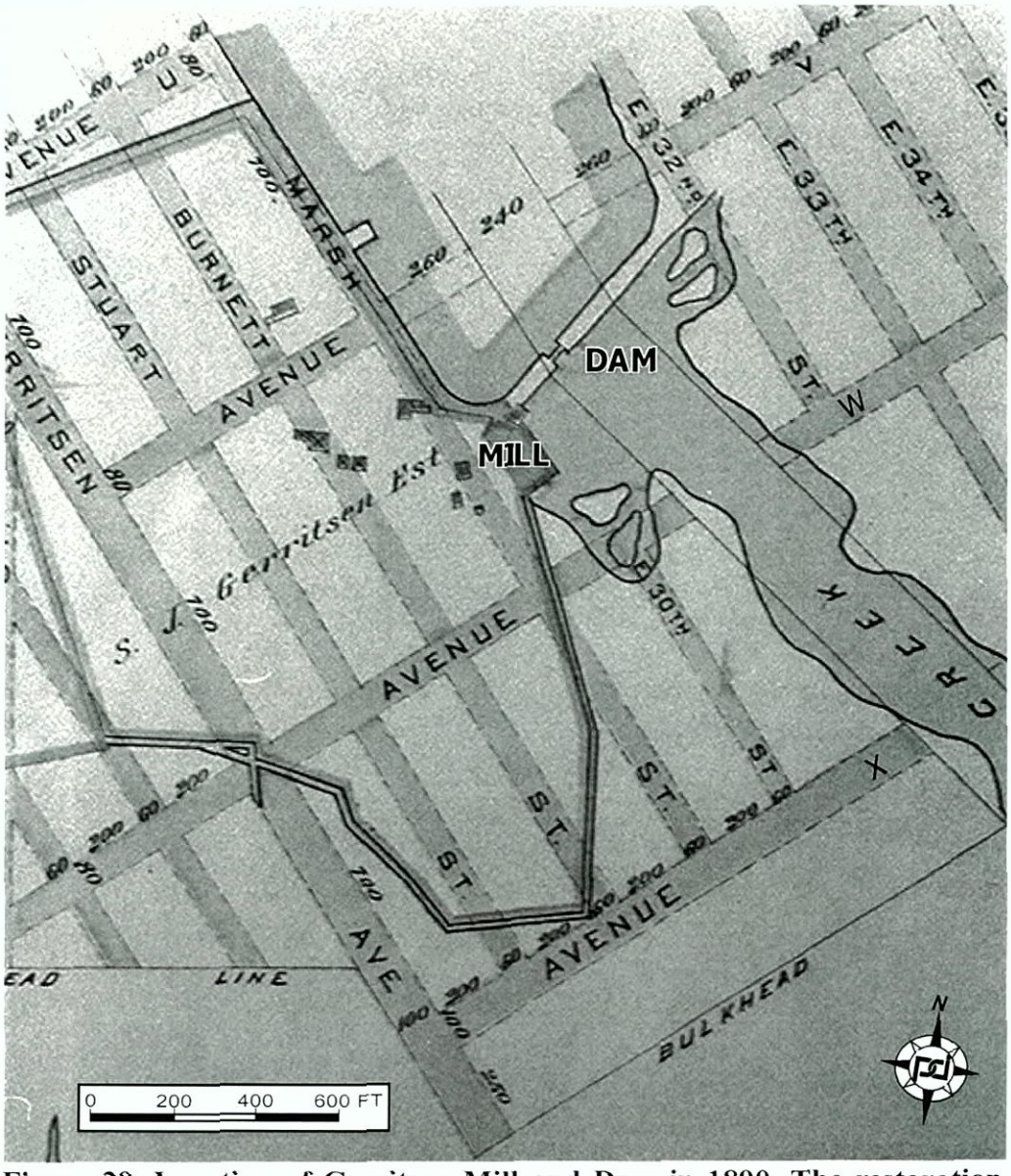


Figure 29. Location of Gerritsen Mill and Dam in 1890. The restoration site is approximately 2,000 feet east of the mill. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Robinson 1890:Plate 27).*

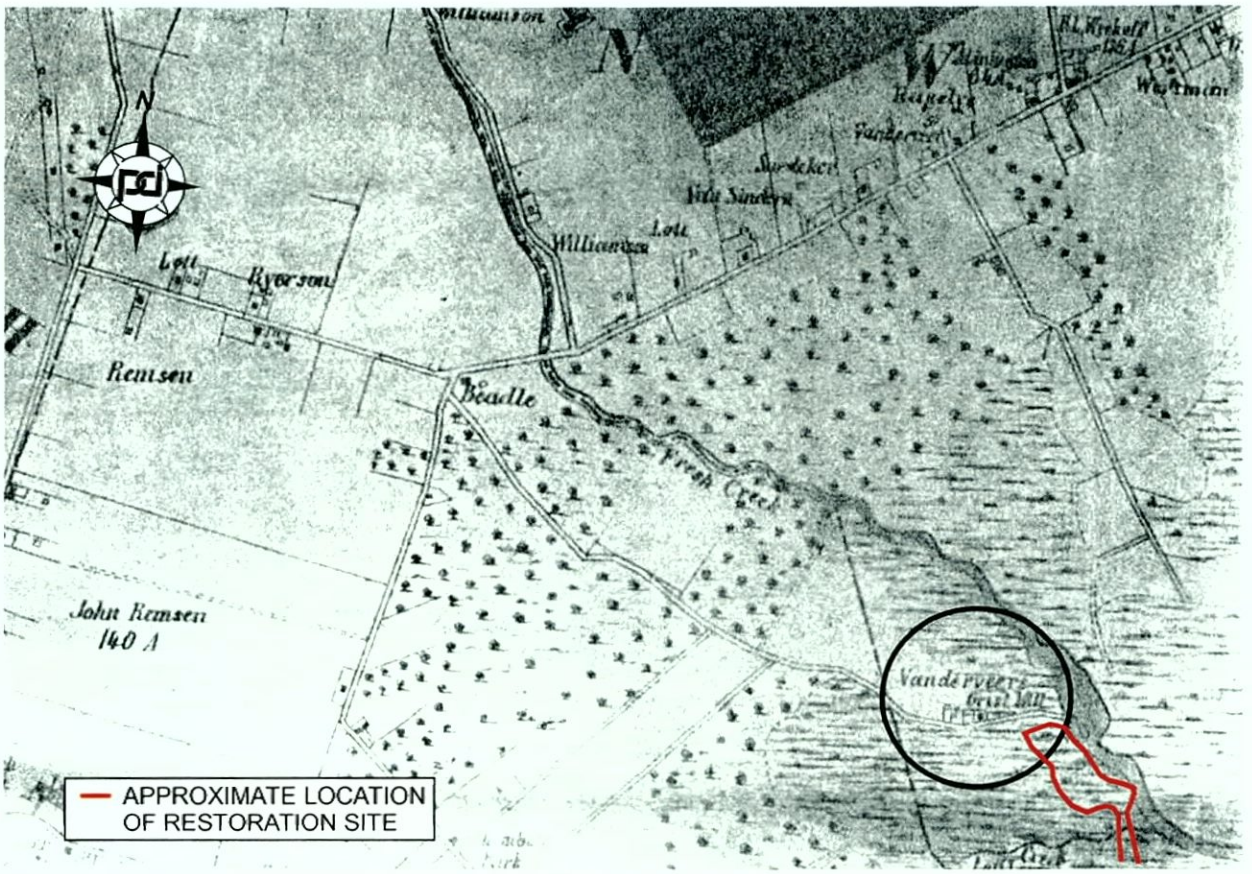


Figure 30. Vanderveer's Mill and lane on west bank of Fresh Creek in 1852. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Dripps 1852).*

Vanderveer's Mill. Located on the west side of Fresh Creek, the mill was constructed on one of a number of large tracts of Kings County land owned by various members of the Vanderveer family, descendants of Cornelius Vanderveer, who settled in Flatbush in 1659 (Landesman 1977:74). In the nineteenth century, the mill site was part of a farm owned by Charles B. Vanderveer (born 1796), the sixth generation of the Vanderveer family to have owned and occupied the property.

Vanderveer's Mill, also known as the "Red Mill," was apparently built in the mid-eighteenth century (Landesman 1977:77). "The farmers not only took their grists to be ground into flour there, but it was a popular meeting place for men of the community" (Landesman 1977:77). According to Armbruster (1942:340) the mill "was operated about 1770 by Dominicus Vanderveer."

The mill is shown along the west side of Fresh Creek on eighteenth and mid-nineteenth century maps (see Figures 27 and 30) and several photographs of the structure are extant (e.g., Figure 31). Armbruster (1942:340), writing in 1928, noted that the mill stood "at Flatlands Avenue and about East 109th Street ... [and that] ... the remains of the Red Mill were still visible a few years ago. The adjacent land has since been filled in."

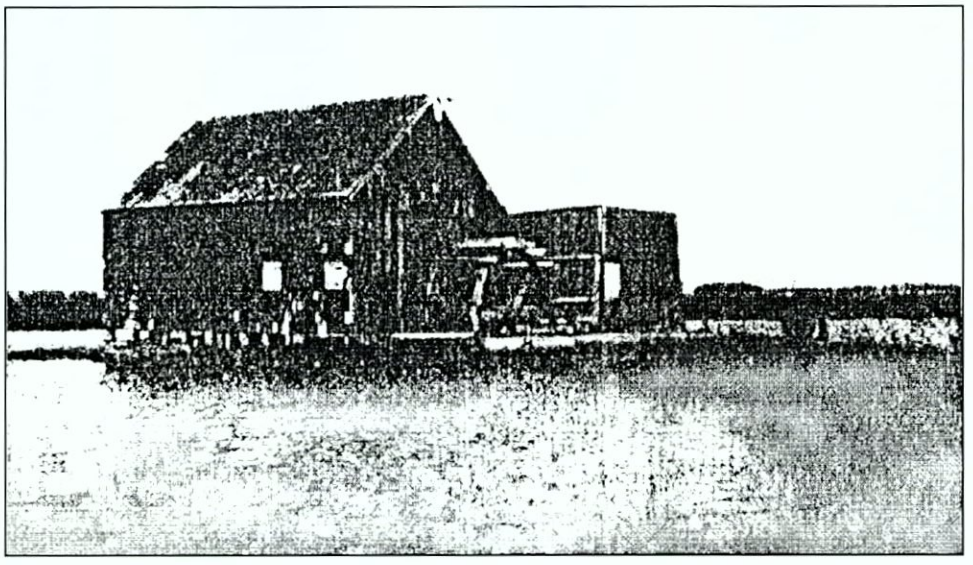


Figure 31. Vanderveer's Mill on Fresh Creek, 1907. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Bolton 1922: Plate XX).*

The 1899 Hyde map (Figure 32) shows the mill just north of Flatlands Avenue, on the line of East 109th Street approximately 200 feet west of the present East 108th Street. It is also shown in this approximate location on a 1907 Sanborn map, but by the 1920s, it is no longer depicted. (See Section 4.2.5 for discussion and additional illustrations of each restoration site. Remains possibly associated with the Vanderveer Mill are also discussed in Section 4.2.5.) The site of the mill building is now occupied by an apartment complex, apparently built on landfill retained by a bulkhead along the west side of Fresh Creek.

The Van Wicklen Mill. According to Armbruster (1942:340), in the nineteenth century the mill at Spring Creek stood

> at the foot of Crescent Street, on the east side of the roadway. The mill was owned by L. Van Wicklen and is still by many called Van Wicklen's Mill .... The old Van Wicklen house is standing a little distance to the north on the east side of the street. Van Wicklen's hotel, a two-story and attic frame structure, was standing near the mill on the west side of the road. In former days old-time prize fights were held here. Fire destroyed the old structure on December 30, 1924, together with several buildings standing also on the west side of the roadway. These had been formerly known as the cottages. The hotel and cottages had been standing vacant for years.

The location of the mill is depicted on several nineteenth and early-twentieth-century maps (e.g., Figures 33 and 34). By 1908 (see Figure 34) the mill was no longer in operation and was being used for storage. It is shown at the mapped location of Vandalia Avenue (the line of the present 157th Avenue), just east of its intersection with Crescent Street. The mill dam would have extended to the east-southeast for a distance of some 375 feet. The mill and dam sites were located a short distance northwest of the present Environmental Protection Agency facility and some 2,000 feet northwest of the current northern border of the Spring Creek restoration site (see Appendix A).

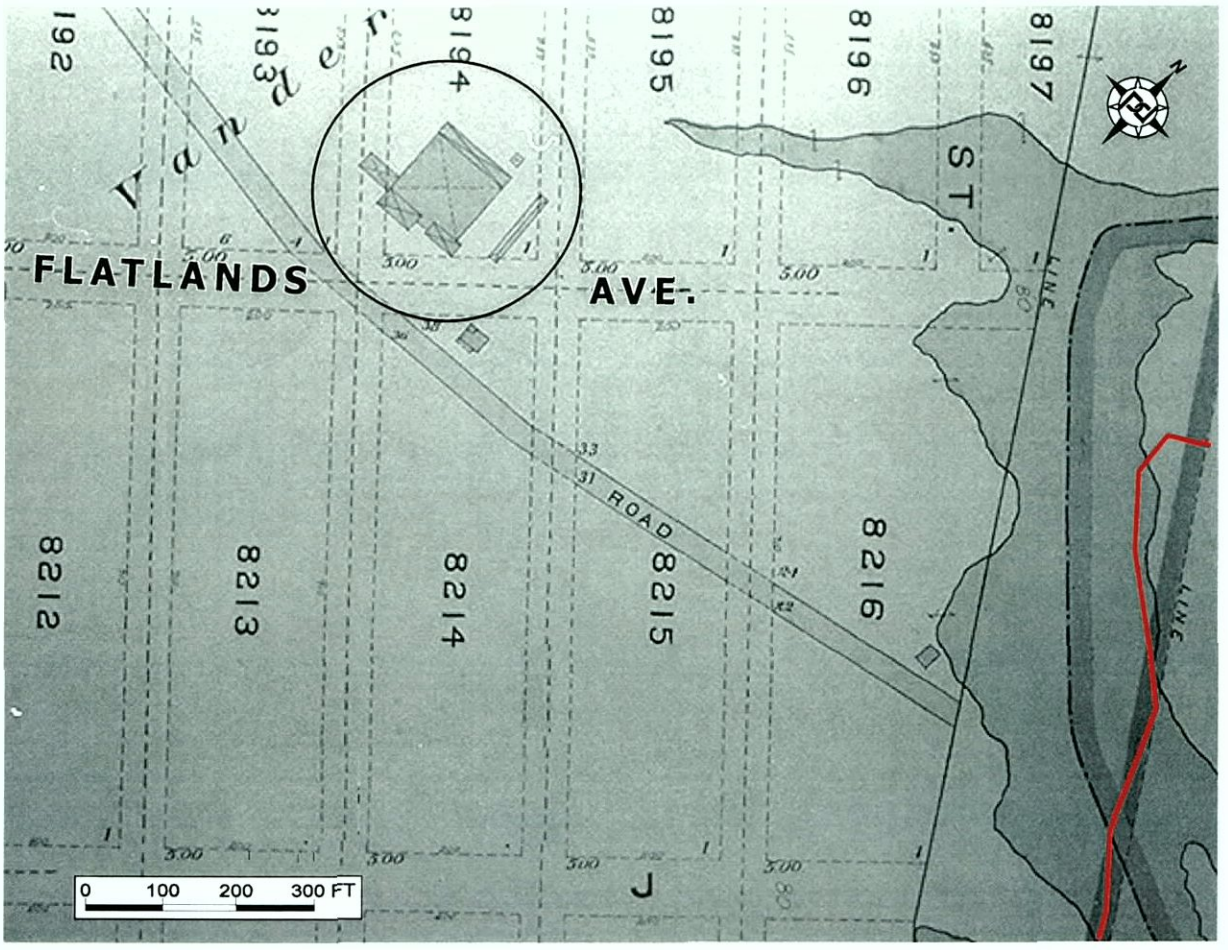


Figure 32. Site of Vanderveer Mill on Fresh Creek in 1899. The restoration site is at right. Note: street above Block 8216 is East 108th Street. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Hyde 1899: Plate 28).*

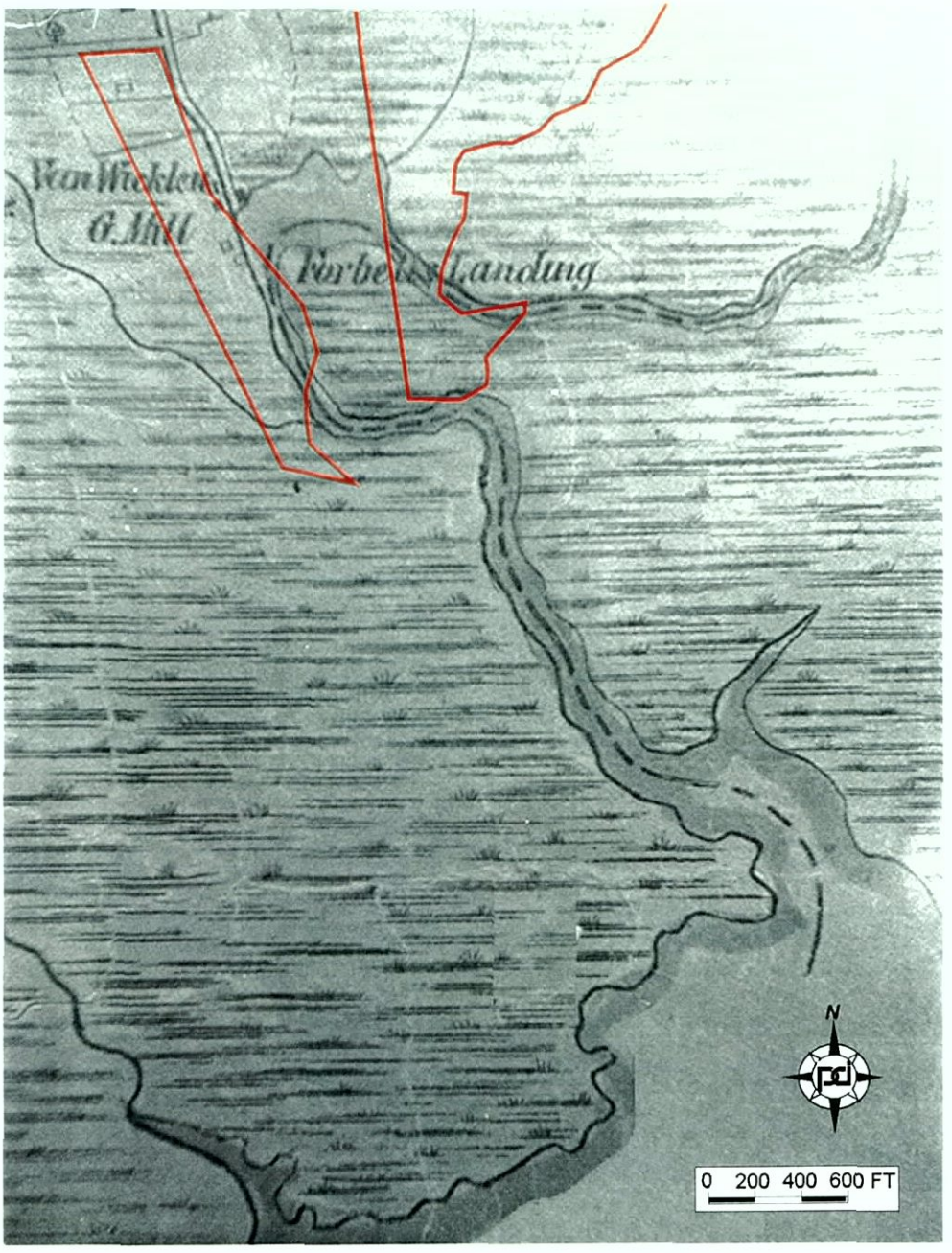


Figure 33. Detail of 1852 map showing Van Wicklen Mill on Spring Creek. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Dripps 1852).*

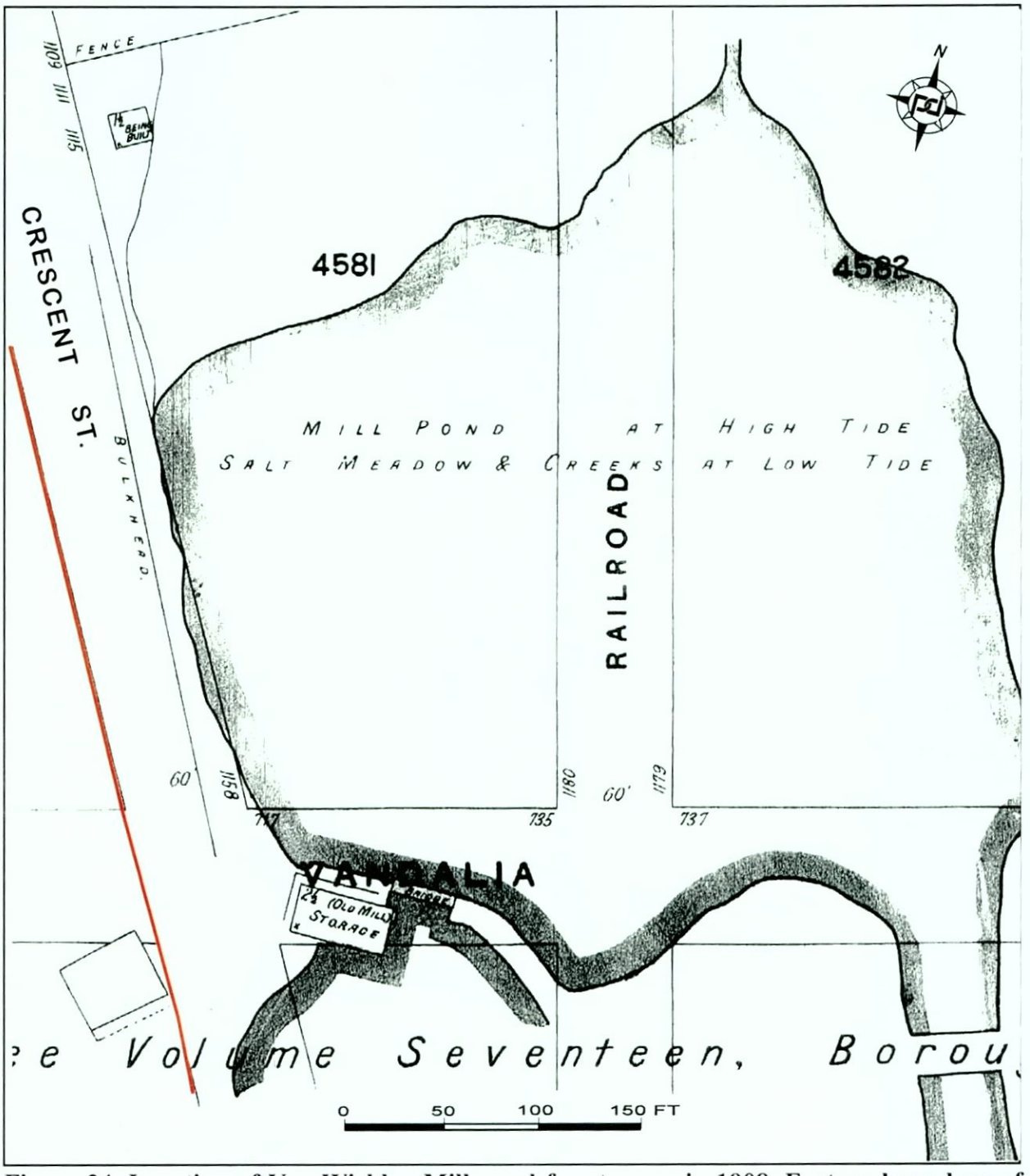


Figure 34. Location of Van Wicklen Mill, used for storage, in 1908. Eastern boundary of restoration site is at left. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Sanborn 1908:Vol. 8: 117).*

Armbruster (1942:340) maintained that the location of the Old Mill was not its original site.

> What is now known as the Old Mill was established on the Bull Creek about 1770 by one Van Brunt, at the same period when the Red Mill, across the Flatlands town line was built. Until 1810 the Bull Creek Mill stood at the second floodgate about a half mile south of the present site. In that year the mill was taken down and the present structure was built from timbers of the original mill at the foot of Crescent Street, on the east side of the roadway.

Although Armbruster does not state on which side of the creek this earlier mill was located, the 1781 Taylor and Skinner map (see Figure 27) shows it on the west side. The location one-half mile south of the later Crescent Street site would place the mill at the present location of the Fountain Avenue landfill.

Mill Production. Landesman (1977:77) researched the production of the Vanderveer and Van Wicklen grist mills.

> The State Census of 1845 and 1855 reported the existence of two gristmills in New Lots. According to the 1845 Census, the manufactured products of the two mills amounted, one to $4,770 and the other to $3,200. According to the 1855 Census, the two mills were about equal in their production. The John Van Wicklen flour mill ground 8,000 bushels of wheat (values $12,000), producing 1,600 barrels of wheat flour worth $15,500. It employed two persons who received an average monthly wage $50. The Charles Vanderveer flour mill also ground 8,000 bushels of wheat (valued at $12,000), producing 1,600 barrels of wheat flour valued at $15,750. It employed one person whose average monthly wage was $45.

4.2.4. Historic Period: Late-Nineteenth Century to Twentieth Century

Utilization of Jamaica Bay during the first half of the nineteenth century remained essentially unchanged (Black 1981), but beginning in the latter half of the nineteenth century, and continuing with an accelerated pace during the twentieth century, a number of technological, demographic and economic trends led to substantial changes in the bay.

The first large scale commercial exploitation of Jamaica Bay occurred during the second half of the nineteenth century with the development of a shellfish harvesting industry. This industry lasted until the 1920s when pollution brought about the demise of the shellfish beds. Other nineteenth century commercial uses of the bay shores was focused on the Barren Island fertilizer and fish oil industries.

Between 1897 and 1936 the bay came under the jurisdiction of the New York City Department of Docks. During this period schemes for large scale dredging and development of port and industrial facilities around Jamaica Bay were developed, but never fully implemented. During the twentieth century the bay became a dumping ground for refuse from the growing city, leading to the filling-in of large portions of the bay's shoreline. Paradoxically, the same period saw development of parkland around the bay shores, largely through the efforts of Robert Moses of State Park Commission fame (Black 1981).

With the increase of leisure time among the working and middle classes of the City, the construction of a railroad trestle across the bay to the Rockaways in 1880 and the subsequent opening of Cross Bay Boulevard, areas around Jamaica Bay such as the Rockaways, the Bay

islands, and Canarsie became attractive spots for sport fishing, bathing and other recreational activities. Access to the shore was facilitated further by the opening of the Belt Parkway. Construction of the section of this roadway east of Fort Hamilton occurred between 1936 and 1940 and it formally opened on June 21, 1940. The road was widened from four to six lanes after World War II (Black 1981:76).

During the twentieth century the burgeoning population of New York City also led to the development of permanent housing on filled-in marshland adjacent to the shores of Jamaica Bay.

At the beginning of the Twenty-first Century, the Jamaica Bay Ecosystem Restoration Project reflects a desire to undo the changes to the shoreline and restore the natural environments which formerly existed around the bay. These general trends are reflected in the specific histories of the portions of the bay in the vicinity of the restoration sites.

4.2.5 Locations of Jamaica Bay Ecosystem Restoration Project Sites (see Figure 1)

1. Dead Horse Bay. The southern portion of the Dead Horse Bay restoration site is located in a former marsh area which constituted a portion of Barren Island. According to Van Wyck (1924:13) this island was originally known by the Dutch name of "Beeren Eylant" which translates into English as Bears Island. The name Barren Island is a corruption of the original Dutch name. It is also referenced as "Bearn Island" in seventeenth century documents quoted by Van Wyck.

William Moore, in a 1762 petition to the British Governor Moncton asking for a patent for Barren Island, described the island as vacant and "containing about thirty acres of upland and by computation about seventy acres of marsh or salt meadow land which at spring tides is overflowed by the sea" (quoted in Van Wyck 1924:207).

Early maps show Barren Island with a different configuration than that shown on late-nineteenth and early-twentieth century maps. The 1781 Taylor and Skinner map (see Figure 27) depicts the island as a long, thin body of land oriented northeast/southwest. The 1779 Sauthier map (Figure 35), however, as well as maps from the 1840s and 1850s (Figures 36 and 37), show Plumb Island and Barren Island attached, rather than separated by Gerritsen Inlet as at present. By 1873, Dead Horse (now Gerritsen) Inlet had formed, separating the two islands (Figure 38). The 1873 map also shows Dead Horse Bay, then labeled "Dead Horse Harbor."

Until the middle of the nineteenth century Barren Island was used mainly for pasturage of cattle and horses. Reportedly, at the end of the eighteenth century

> a rude house at the east end, where fishermen and sportsmen were entertained, was occupied ... by one Dooley .... afterwards this house was kept by Johnson .... A Yankee named Cherry, with his large family, lived in a dug-out at the west end for a long time, until he succeeded to the public house, which he kept as late as 1860 (Dubois 1884:78).

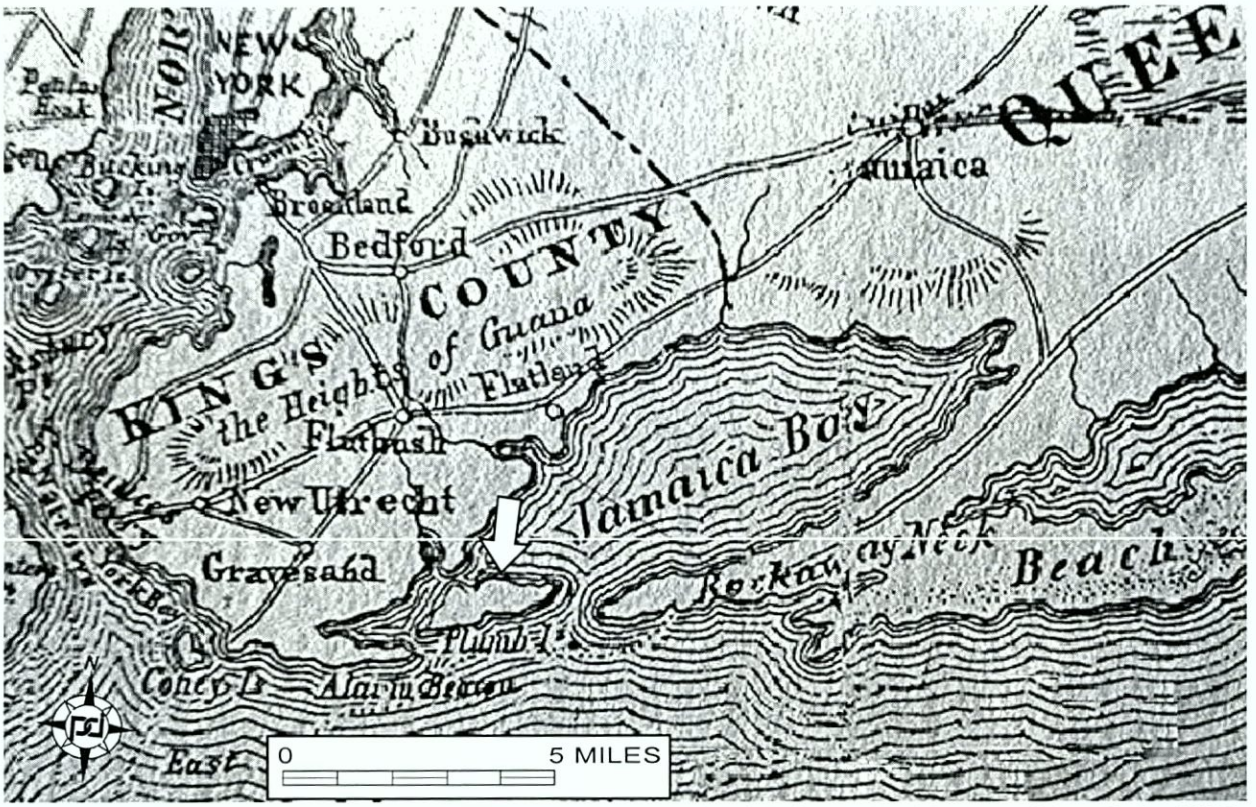


Figure 35. Detail of map showing Plumb Island (which includes Barren Island) in 1779. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Sauthier 1779).*

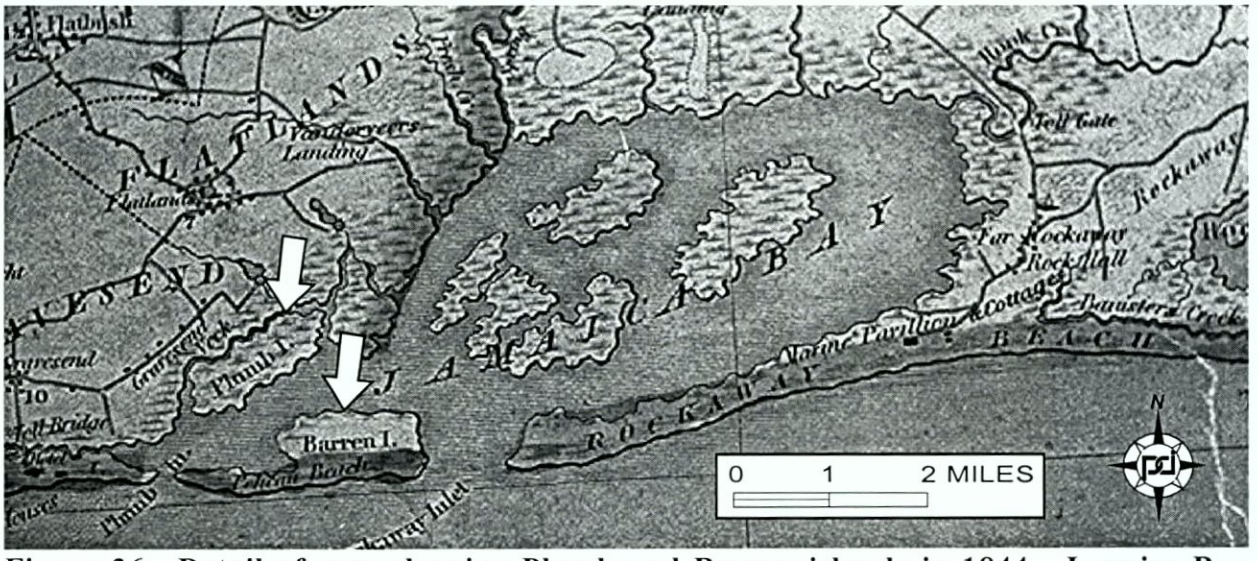


Figure 36. Detail of map showing Plumb and Barren islands in 1844. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Calvin Smith 1844).*

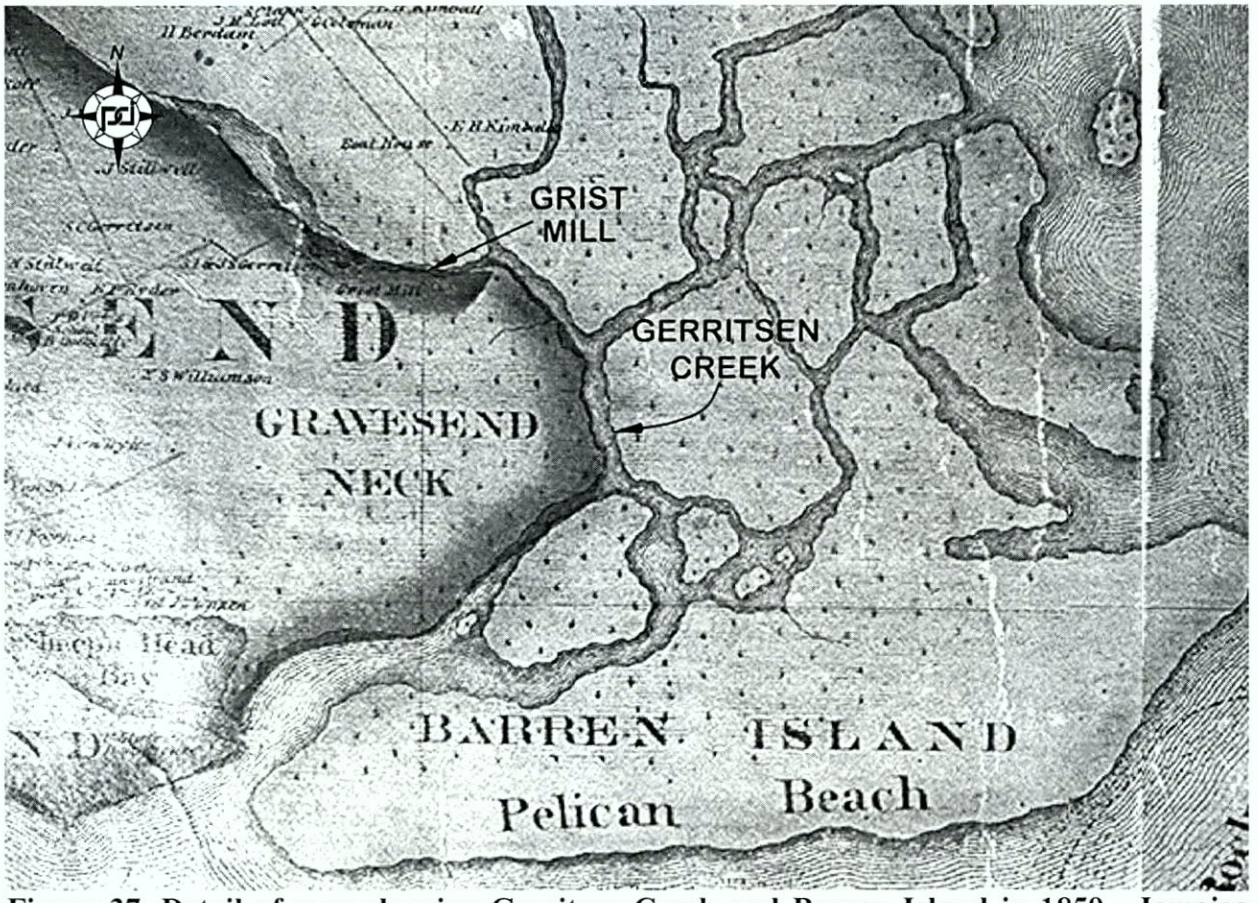


Figure 37. Detail of map showing Gerritsen Creek and Barren Island in 1859. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Walling 1859).*

Figure 38. Detail of map showing Dead Horse Inlet separating Barren and Plumb Islands, 1873. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Beers 1873).*

The "west end" in the quotation refers to the segment of Barren Island, then known as Pelican Island (or Pelican Beach) and later Plumb Island (or Plumb Beach), which was attached to Barren Island in much of the nineteenth century.

In 1830 a fugitive pirate named Gibbs allegedly stayed at the public house and buried "a large number of Mexican Dollars" in the sand (Dubois 1884:78). On an 1899 map (not illustrated here) the present Dead Horse Bay is labeled as "Dooley's Cove," apparently after the former pub keeper.

The first factory established on Barren Island was a "bone boiling establishment ... erected on the north side about 1845 by Wm. B. Reynolds. It was occupied afterwards by Frank Swift" (Dubois 1884:78). At this facility, as well as others which were subsequently established on the island, dead animals from New York and Brooklyn were processed into fertilizer and other products. The Swift factory was destroyed by a windstorm and replaced in 1866 by R. Recknagle (Dubois 1884: 78).

Another factory, "the great Rendering and Fertilizer Factory of P. White & Sons" was built in 1868 and destroyed by fire in 1878. It was replaced by five new buildings which were standing when Dubois wrote his account ca. 1884. This complex reportedly covered about four acres, including docks (Dubois 1884:78). A third fertilizer factory, operated by E. Frank Coe, was established in 1877 at the west end and described as "an immense building, 360 x 224 feet with yards and dock ... [and] ... a 160 horse power engine and 80 men (sometimes more) are employed" (Dubois 1884:78). The dead animals processed at the Barren Island fertilizer plants were delivered from New York City by boat to docking facilities at the factories (Wurm 1985:6)

By the 1880s the fertilizer factories had been joined by five fish-oil factories. The first was constructed circa 1860 by Smith & Co. "on the north side of the island" (Dubois 1884:78). Another such factory was built "on the east end" by Vanantine (sic) Coon and subsequently operated by C. De Homage, M.D., who built a new building near the original site. A second fish oil factory, the Barren Island Menhaden Company, located near the Coon/Homage facility, was established in 1868 by the Goodking Brothers. It occupied three 100-x-70-foot buildings. Both of these establishments used steam engines and each also apparently utilized its own "steamers" to catch the Menhaden. Two other factories, a fish rendering plant operated by Jones & Co. and the Hawkins Brothers Fish Oil and Fish Guano factory were built "at the west end" (Dubois 1884:78).

Brockett (1884:756-757) presented a slightly different history of the Barren Island factories. He maintained, for example, that the first fertilizer factory was established in 1855 by Lefferts R. Cornell and that the Reynolds factory was established in 1856, rather than 1845, given by Dubois.

By the late nineteenth century, the menhaden processed by the fish oil factories had become scarce. The fish oil factories were succeeded by a plant which burned garbage delivered from the City daily by scow (Wurm 1985:6). In 1904, the "horse factories" as well as the garbage disposal plant continued to operate on Barren Island. A community of some 1,400 persons had also developed on the island by this time, most of whom worked in the factories (Queens Borough Public Library 1904). The garbage disposal plant was operated by the New York Sanitary Utilization Company.

The buildings were apparently located on the northeastern corner of the island and apparently constructed at the site of the earlier fish processing factories (Figure 39). A new building under construction in 1907 and a pier at which the garbage scows tied up were washed away by the Rockaway Inlet tidal currents in 1907 (Queens Borough Public Library 1907).

Based on the sources cited above as well as others, Black (1981) compiled a listing of various companies known to have been in operation on Barren Island (reproduced here as Table 1).

Table 1. Barren Island Industries
Source: Black (1981: 33)

Name	Activity	Dates	Location	Comments
Cornell East	Fertilizer	1859	(unknown)	Destroyed by fire; moved to Flatbush
West Factory	Fertilizer	1859-60	(unknown)	Owner may have been William Reynolds
Smith & Company	Menhaden	1868-71	(unknown)	
Steinfield & Company	(unknown)	1869-73	(unknown)	
Simpson	(unknown)	1869	(unknown)	
Goodkind Brothers	Menhaden	1872-77	(unknown)	
Swift & White	Fertilizer	1870-81	(unknown)	Closed 1873-4; taken over by P. White
Hawkins Brothers	Menhaden	1872-88	Lot #4, West. Div.	
Jones & Company	Menhaden	1872-81	(unknown)	
Valentine Koon	Menhaden	1872-74	(unknown)	
Barren Island Manufacturing	Fertilizer	1875-88	Lot #4, West. Div.	Taken over by White and then by Barren Island Oil & Bone
Thomas A. Shae	Fertilizer	1875-81	(unknown)	
E. F. Coe	Fertilizer	1878-95	Lot #5, West Div.	
Barren Island Bone	Fertilizer	1884-93	Lot #4, West. Div.	
P. White & Sons	Fertilizer	1884-	South Shore	
Robinson	(unknown)	1886-87	(unknown)	
Barren Island Fertilizer & Oil	(unknown)	1890-95	Lot #4, West. Div.	
Andrew Wessel	(unknown)	1895	Lot #1, East. Div.	
Read & Company	(unknown)	1879-83	(unknown)	
Wimpfeimer	Fertilizer	-1890	East Shore	Destroyed in land slide
R. Recknagle	(unknown)	(unknown)	(unknown)	
Louis C. De Homage	(unknown)	(unknown)	(unknown)	
Barren Island Oil and Bone	(unknown)	1889-	(unknown)	
Menhaden Company	Menhaden	1881-	(unknown)	
N. Y. Sanitary Utilization Co.	Disposal	1905-19	East Shore	
Products Manufacturing	Disposal	-1934	(unknown)	
Vanderstine & Sons	Hides	1910	South Shore	
Cove Chemical	(unknown)	1911	South Shore	

The odors emanating from the Barren Island factories were so powerful that they could be smelled even in the Rockaways. In the latter years of the nineteenth century and during the early twentieth century, residents of various communities bordering the bay formed an "Anti-Barren Island League" and after numerous efforts the plants were eventually closed down (Brooklyn *Daily Eagle* 1899; Young 1956b).

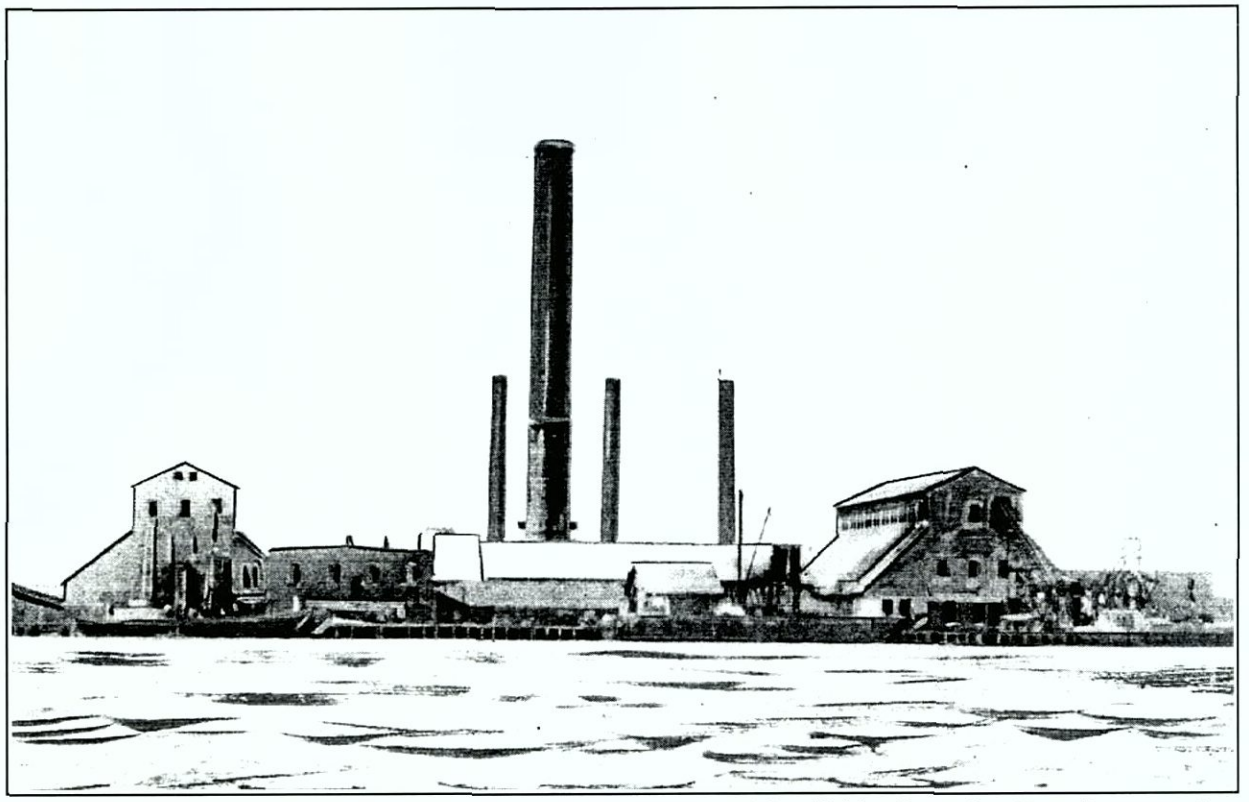


Figure 39. Garbage processing plant on Barren Island in 1911. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Brooklyn Public Library 1911).*

The last facility to remain in operation on Barren Island was the garbage processing plant. In 1933 this plant, then operated by the Products Manufacturing Company, was taken over by the City of New York, which operated it for a year and a half before closing it in 1935. All of the abandoned factory buildings on the island were dismantled shortly thereafter (Black 1981:36).

In the late 1920s, an airport, which eventually became Floyd Bennett Field (Wurm 1985:60), was established on Barren Island. This airfield, on the east side of Flatbush Avenue and located east of the restoration site, was significant in aviation history. It operated commercially between 1931 and 1941, making it New York City's first municipal airport. The U.S. Navy acquired the airfield in 1941 and kept it in operation until 1972, when it was incorporated into the Gateway National Recreation Area. The Floyd Bennett Field Historic District, comprising a portion of the original 387-acre airfield, is listed on the National Register of Historic Places (SRI International 1998).

The Marine Parkway Bridge linking the Flatbush Avenue extension with the Rockaways was constructed in 1936-1937 (WPA 1939:505). Due to its architectural and engineering merits the bridge was determined to be eligible for listing in the National Register of Historic Places in 1997 (SRI International 1998).

In the late 1930s, Barren Island was described as

> a small community immediately south of Floyd Bennett Field, and an island in name only, [it] resembles an isolated village in some remote countryside. A cluster of patchwork houses, whose occupants earn their livelihood as housewreckers, huddle around a dirt path leading from Flatbush Avenue. To the south, on Dead Horse Inlet, are the ruins of a fertilizer factory where the families of Barren Island once found employment (Works Progress Administration 1939:504-505).

The majority of the Barren Island community were evicted in 1936 when construction began on the Marine Parkway Bridge (*Brooklyn Eagle* 1936, *New York Times* 1942). When the Navy acquired Floyd Bennett field in the early 1940s it purchased the remaining tracts of private land and the last inhabitants were removed in 1942 (*New York Times* 1942). Maps from 1911 and 1926 (Figures 40 and 41) show the Barren Island community along the strip of upland extending westward from what was then the garbage processing facilities on the eastern shore of the island.

Until the opening of the railroad trestle across Jamaica Bay in 1880, much of the travel to the Rockaways was by means of ferries which ran from various points on the north shore of the bay. Ferry service continued through the 1930s, after the opening of Cross Bay Boulevard and the Marine Parkway Bridge. These ferry services are listed in Table 2. Five of these ferries are recorded as having made stops at Barren Island, the earliest beginning operation in 1905.

Table 2. Ferry Service, Jamaica Bay
Source: Black (1981:70)

Operator/Owner	From	To	With Stops at	Years in Service
Brooklyn & Rockaway Beach Railroad	Canarsie	Rockaway		1866-1905
McAvoy, Arthur	Canarsie Landing	Roxbury Hotel,	Barren Island Rockaway Point	1905-!930s
Warner, William	Canarsie Landing	Bergen Beach, Ave. X		1905-1915
Boegle, Frederick	Canarsie Landing, Rockaway Ave	Bergen Beach		1911-1921
Bergeson, John	Bergen Beach	Rockaway, Lewis Dock		1905-1907
Reid, P. Howard	Sheepshead Bay	Rockaway - various points	Plum Beach, Barren Island, points in Jamaica Bay	1906-1916
Steinhaus, Archie	Sheepshead Bay	Rockaway Point	Various places	1914-1918
Steinhaus, Archie	Sheepshead Bay	Rockaway Beach	Plum Beach, Barren Island	1915
Langston, Frederick	Canarsie, Rockaway Avenue	Rockaway Park	Barren Island	1915-1918
New York City	Flatbush Avenue	Beach 169th St.	Barren Island	1927-1937
Steele, William F.	Sheepshead Bay	Points in Jamaica Bay		1909
Riparian Land & Improvement Company	Rockaway Beach, various points	Barren Island		1906

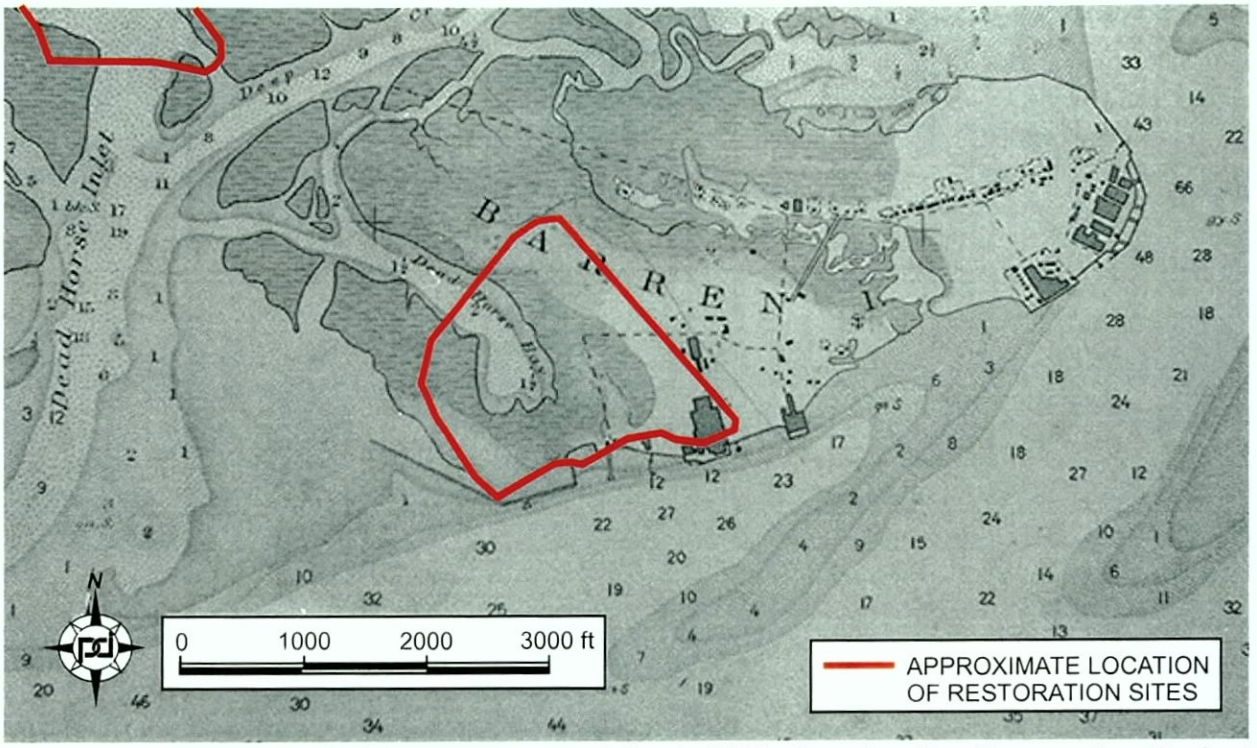


Figure 40. Processing facilities on Barren Island, 1911. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(USCGS 1911).*

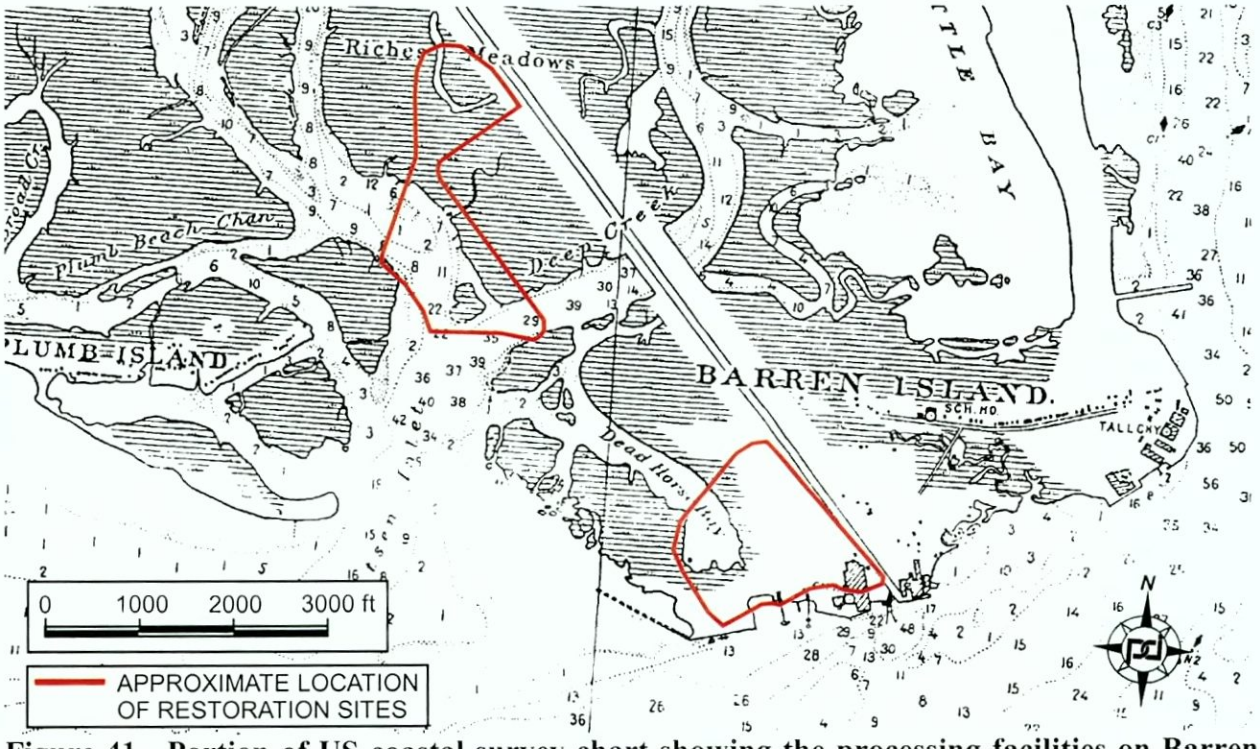


Figure 41. Portion of US coastal survey chart showing the processing facilities on Barren Island in 1926. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(USCGS 1926).*

The location of the facilities and changes in the configuration of Barren Island and Dead Horse Bay can be seen on a number of maps dating to this period. Maps depicting the island in the 1850s (e.g., Figure 37) fail to show the factories mentioned by Dubois and other sources. However, an 1878 coastal survey chart (Figure 42) shows these facilities in some detail. Most of the buildings were located on upland areas on the southeast shores of Barren Island. An additional facility on the east side of the island appears to have been constructed on a bulkheaded section along the shoreline of a marshy portion of the island.

Two maps from 1909 and 1911 (Figures 43 and 40) show complexes of buildings at the eastern and southern ends of Barren Island in the approximate locations of the facilities as shown in 1878. The garbage processing facility discussed above is on the eastern end of the island. The plant shown at the southern end was apparently the animal processing plant, which was still in operation at that time. Black (1981:34) identifies this facility as probably the one operated by Thomas White. Comparison of the 1911 map with the 1878 chart (see Figure 42) suggests that the same building may have stood at this site throughout this period.

Piers are shown on the 1909 and 19ll maps west of the location of the White factory, and bulkheading and a breakwater or pier had been constructed at the southwest corner of the island. Pilings were noted at these locations during the site reconnaissance (Figure 44). These facilities may have been constructed to accommodate the ferries which began stopping at the island in 1905. Their location would have been some distance from the Barren Island community.

Flatbush Avenue was extended across Flatlands Bay to Barren Island by 1923 (Black 1981:79). Figure 40 shows a large factory building a short distance west of Flatbush Avenue on the southern end of the island. The 1911 and 1926 maps show that the shoreline in front of this factory had been bulkheaded. Pilings most likely representing the bulkhead remains were noted during the reconnaissance (Figure 45). A 1929 map (Figure 46), however, shows the "Plant for Disposal of Dead Animals" just east of Flatbush Avenue, with the piers serving the Rockaway Ferry west of the roadway. A coastal chart from 1941 (Figure 47) identifies "ruins" at this location.

The present environmental restoration plans will affect the breakwater/pier and piling remains, as noted above (see Appendix A).

Landfilling. The 1941 coastal chart (see Figure 47) presents Dead Horse Inlet and the surrounding marshland as having approximately the same configuration as noted on maps drawn earlier in the twentieth century. Most of the marsh area and the southern portion of the open water as illustrated has since been covered by landfill. Dead Horse Bay was apparently part of the large area filled-in by the Parks Department in the 1950s. Topographic maps show that the landfilling took place between 1948 and 1955 (Figures 48 and 49). The fill used is described as "great mounds of garbage from Queens and Brooklyn [flattened] into compact layers with sand carpeting one to two feet thick" (Raidy 1957). The bay is broader and does not extend as far to the south as shown earlier. The shoreline now curves more gradually to the southwest from the location of the existing marina at the former location of Deep Creek. Figure 49 also shows a narrow spit of land extending northward from the west shore of Barren Island, forming the western shore of Dead Horse Bay. The bulk of this spit of land is present only in the form of sand flats at low tide.

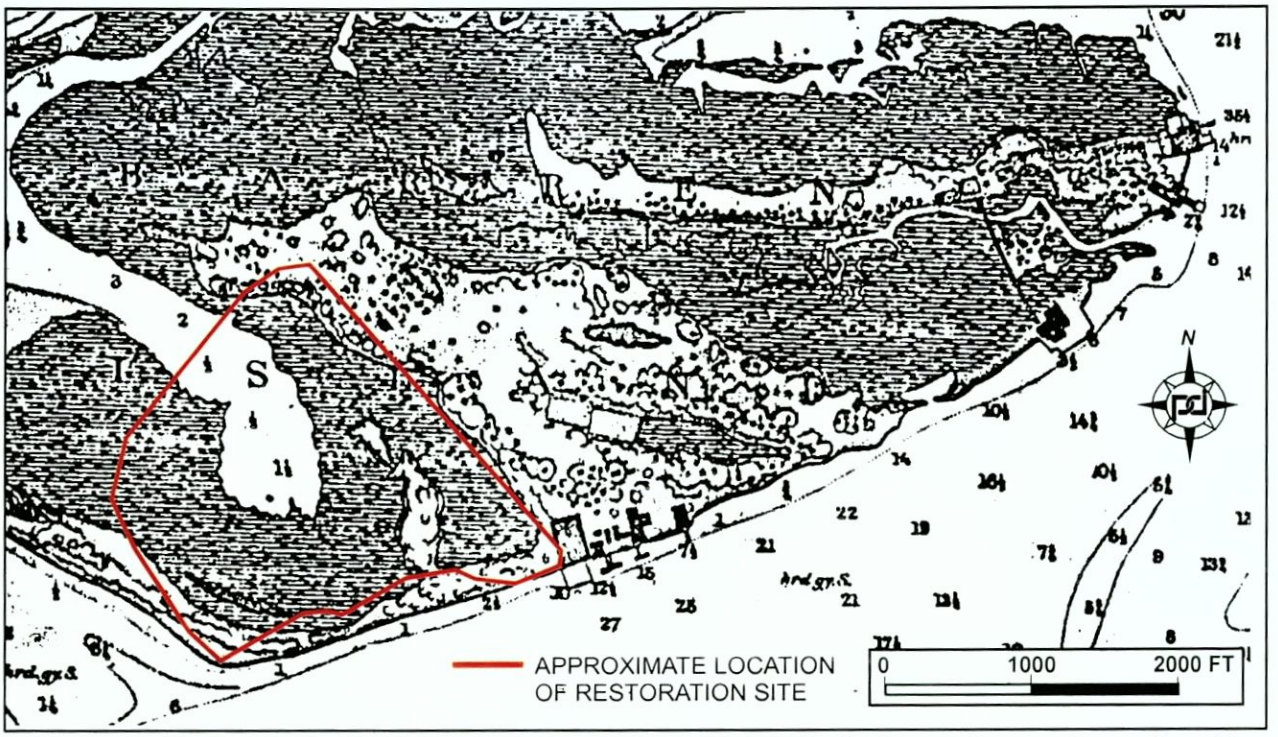


Figure 42. Detail of coastal chart showing structures and facilities at the southern shoreline of Barren Island, 1878. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(U.S. Coast Survey 1878).*

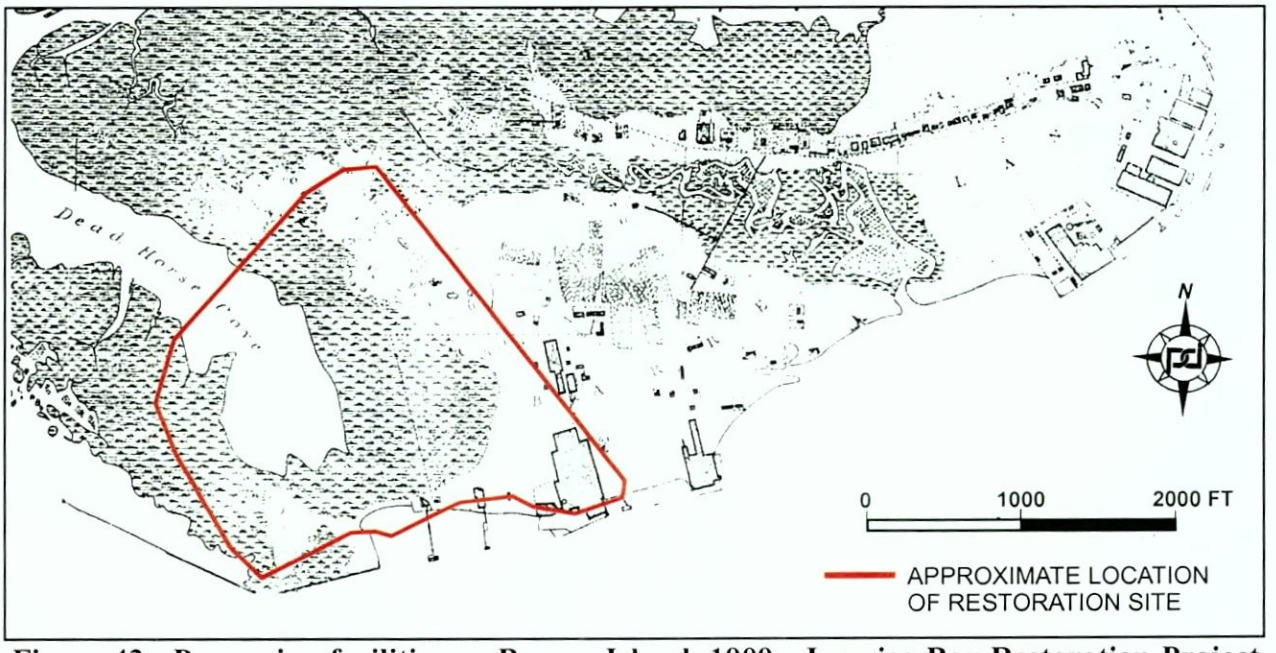


Figure 43. Processing facilities on Barren Island, 1909. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Jamaica Bay Improvement Comm. 1909c).*

Figure 44. Remains of breakwater/pier at the southwest corner of Barren Island, facing west. Jamaica Bay Restoration Project, Kings, Queens and Nassau counties, New York *(Pickman 1999).*

Figure 45. Remains of bulkheading on south shore of Barren Island, near the White factory site, facing east. Jamaica Bay Restoration Project, Kings, Queens and Nassau counties, New York *(Pickman 1999).*

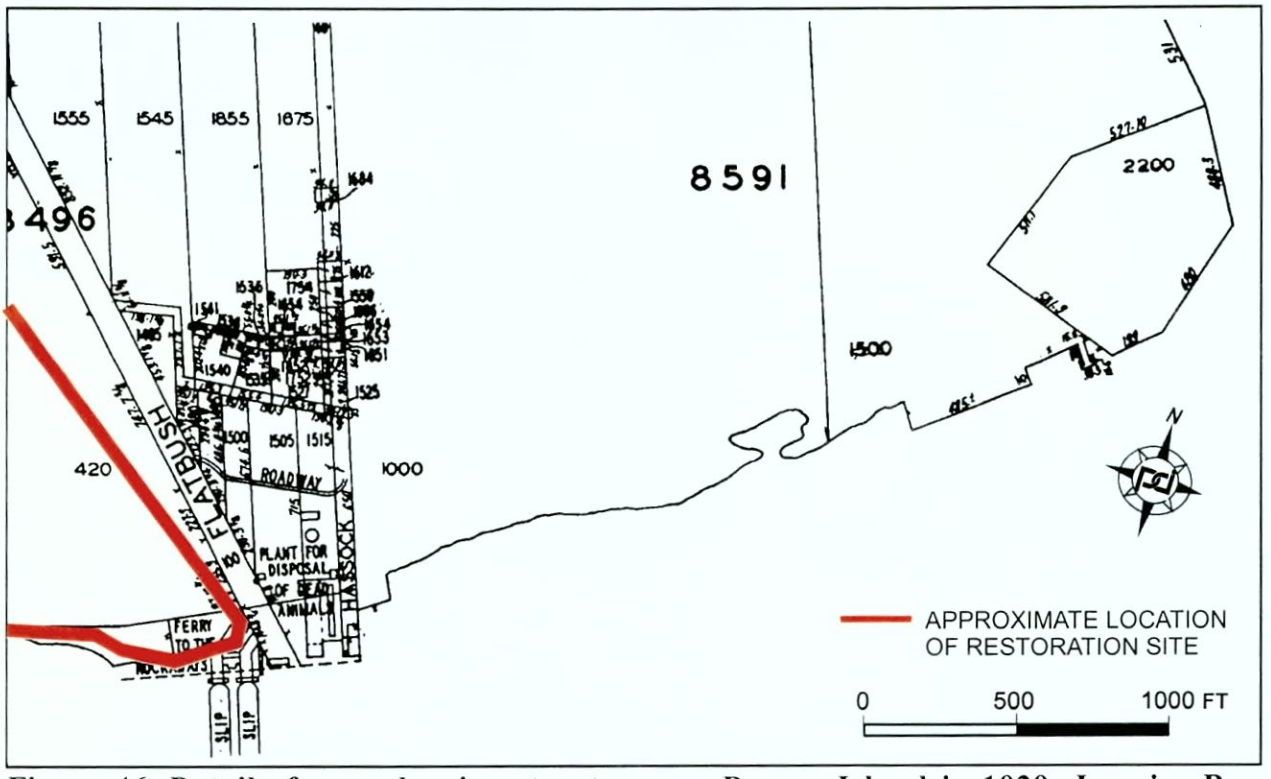


Figure 46. Detail of map showing structures on Barren Island in 1929. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Hyde 1929:4:262).*

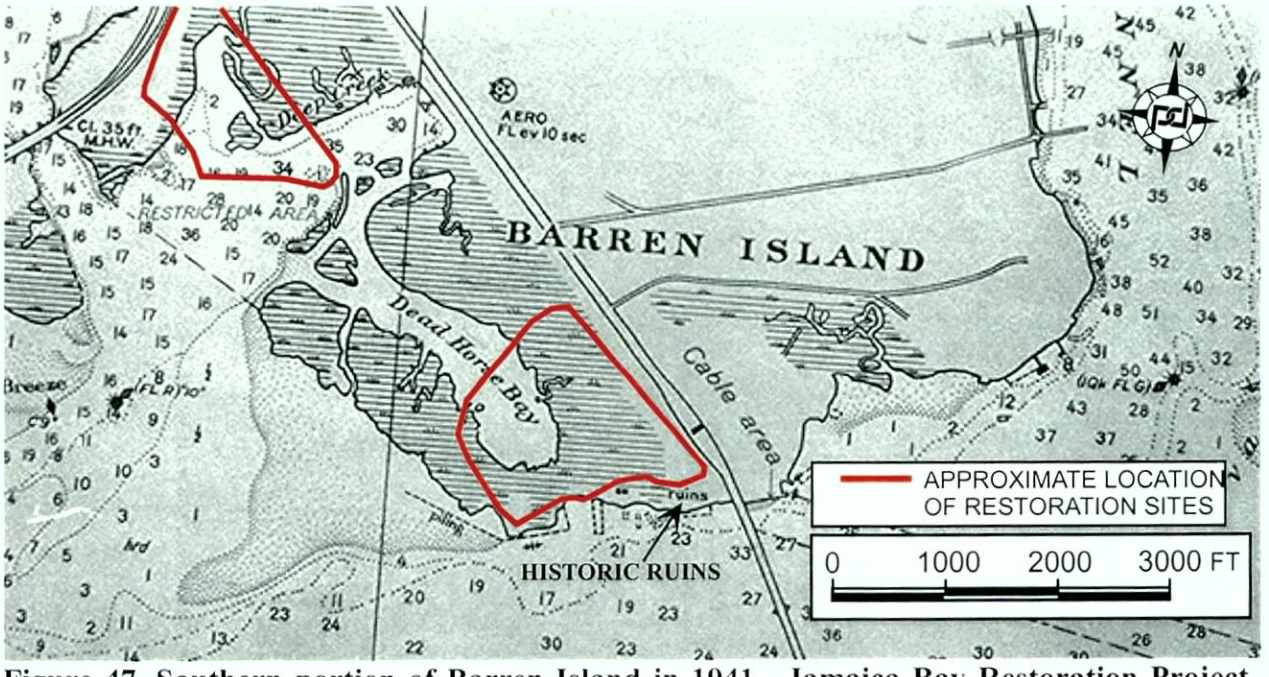


Figure 47. Southern portion of Barren Island in 1941. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(USCGS 1941).*

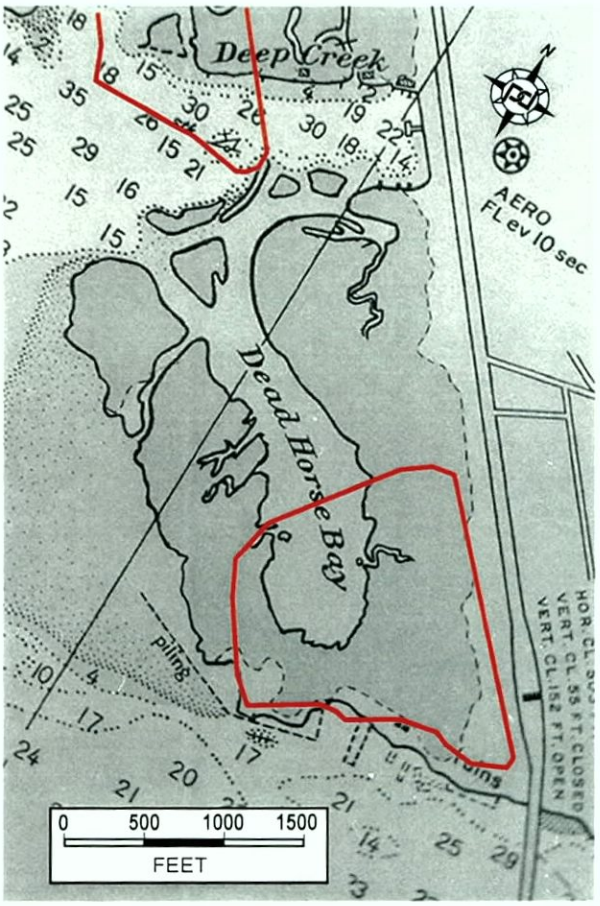
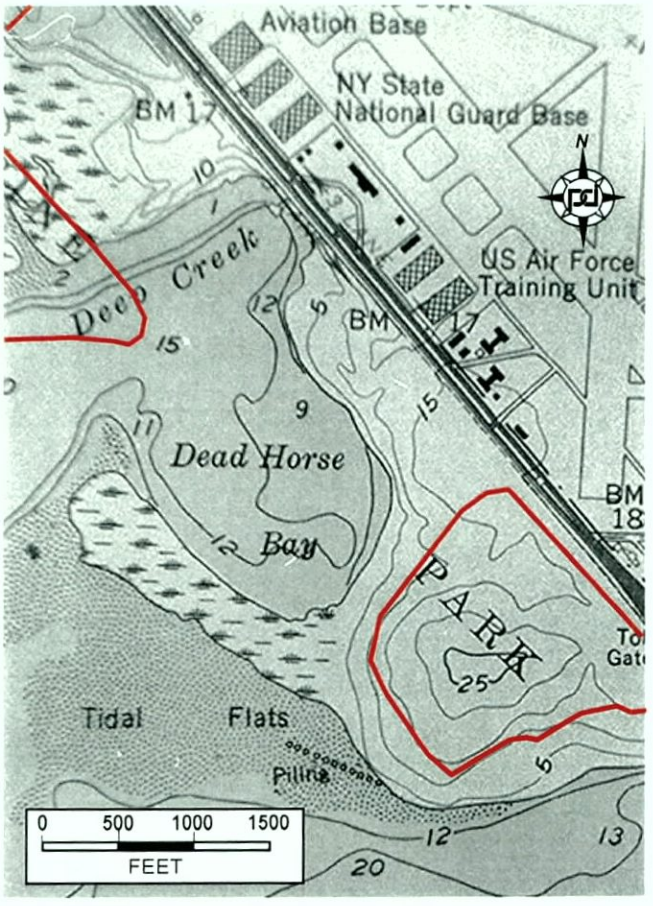


Figure 48. Detail of coast survey chart of Barren Island, showing Dead Horse Bay in 1948. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(USCGS 1948).*



APPROXIMATE LOCATION OF RESTORATION SITES

Figure 49. Evidence of landfilling in Dead Horse Bay and Barren Island in 1955. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(USGS 7.5' Series, Coney Island, 1955).*

During the site reconnaissance, artifacts deposited with the landfill were observed eroding out of the bank along the western shoreline of the island (Figure 50). The artifacts included a great number of bottles, ceramics, clothing, metal and other refuse of everyday life. One to three feet of garbage fill, overlain by one to three feet of clean sand, accords with the process of landfilling described above. Stabilization of the eroding bank will be undertaken as part of the proposed ecosystem restoration work.

The Northern Site. The northern portion of the Dead Horse Bay restoration site is located on the north side of Deep Creek. This was formerly an area of marsh known as Riches Meadows or Riches Point Meadows (see Figure 41). The 1941 coastal chart shows that the area remained marshland even after the landfilling associated with the construction of the Belt Parkway to the northwest in the 1930s (see Figure 47). Filling in of this area apparently occurred during the 1950s in connection with the construction of Marine Park (see Figure 49).

Figure 50. Eroding bank and refuse deposits on west shore of Barren Island, facing northeast. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Pickman 1999).*

2. Gerritsen Creek. In colonial times the body of water later known as Gerritsen Creek was known as the Strome Kill. The creek, whose upper portion consisted of a freshwater stream, originally extended twice as far inland as today. The portion north of Avenue U was filled in and the stream north of this point converted to an underground storm drain in the 1920s (Van Wyck 1924; New York City 1986).

As mentioned in Section 4.2.2, Gerritsen's Mill was located on the west side of Gerritsen Creek. The mill and mill dam were located between Avenues V and W, approximately 2,000 feet northwest of the location of the restoration site.

Maps dating to the late eighteenth and mid-nineteenth centuries (see Figures 27 and 37) show an area of dry land extending southward into the marshes northeast of Gerritsen Creek. The dry ground can be seen to extend southward to a location aligned with or slightly to the north of the mill site.

The 1877 Dripps map (Figure 51), which also shows the street grid, more accurately shows two areas of upland penetrating southward into the marshes with their southern ends between Avenues V and W. The environmental restoration project site, which is located south of the line of Avenue X and between the approximate lines of East 35th Street and Ryder Street, is at the former location of the marshland, approximately 700 to 1,200 feet south of these upland areas as depicted on the various maps. Most of the marshland was owned by the Lott family. The Hendrick I. Lott house, listed on the National Register of Historic Places, is located at 1940 East 36th Street, between Fillmore Avenue and Avenue S, some 4,500 feet north of the restoration site.

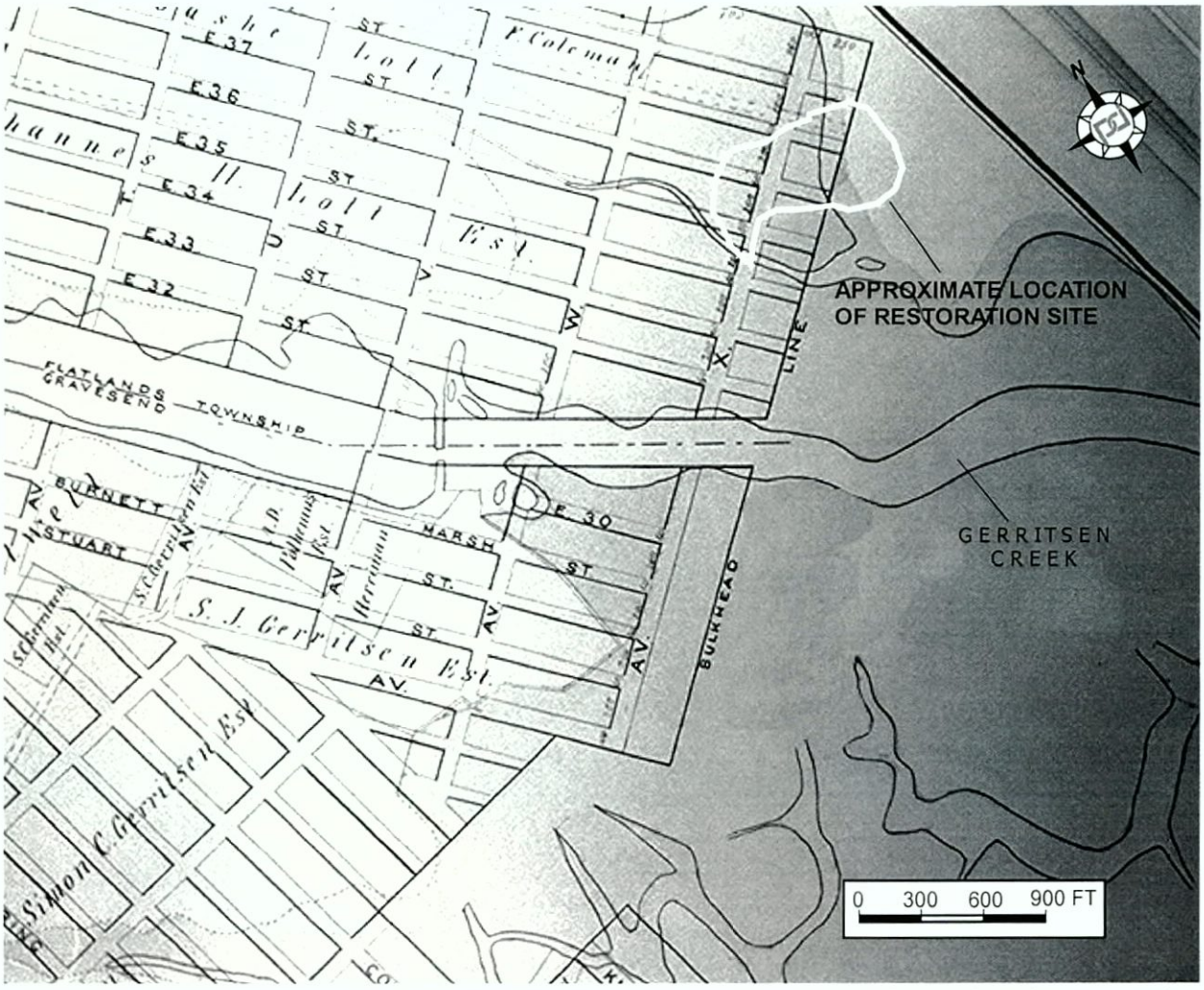


Figure 51. Detail of atlas showing upland northeast of Gerritsen Creek in 1877. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Dripps 1877).*

Late-nineteenth and early-twentieth-century maps (Figures 52 and 53) show that, prior to the twentieth-century landfilling, a tidal creek known as Mill Creek intersected Gerritsens Creek approximately one-half mile south of the line of Avenue X and extended to the north. A portion of the proposed project site appears to be located at the site of this creek.

Ditmas (1909:37) observed that the road depicted on turn-of-the-century maps as Kimball's Lane (on Figure 53, the lane is shown between the present lines of East 38th and Ryder streets) led to "a thriving fishing village called Hemlock City." Maps of this period show this settlement at the end of a spur of upland in the vicinity of the line of Avenue W. The 1907 Sanborn map (Figure 54) reveals that by the latter year, the Watkins Hotel had been built on the shoreline of Mill Creek at the edge of the marshland, south of this fishing community. This structure was located on the south side of the line of Avenue X and just east of the line of East 38th Street. A boardwalk built over the marshland connected the hotel with the dry land to the north. This hotel, apparently built on pilings driven into the marshland, may have been an inn frequented by fishermen. The "float" shown on Mill Creek, probably used to dock boats, was connected to the hotel by a boardwalk.

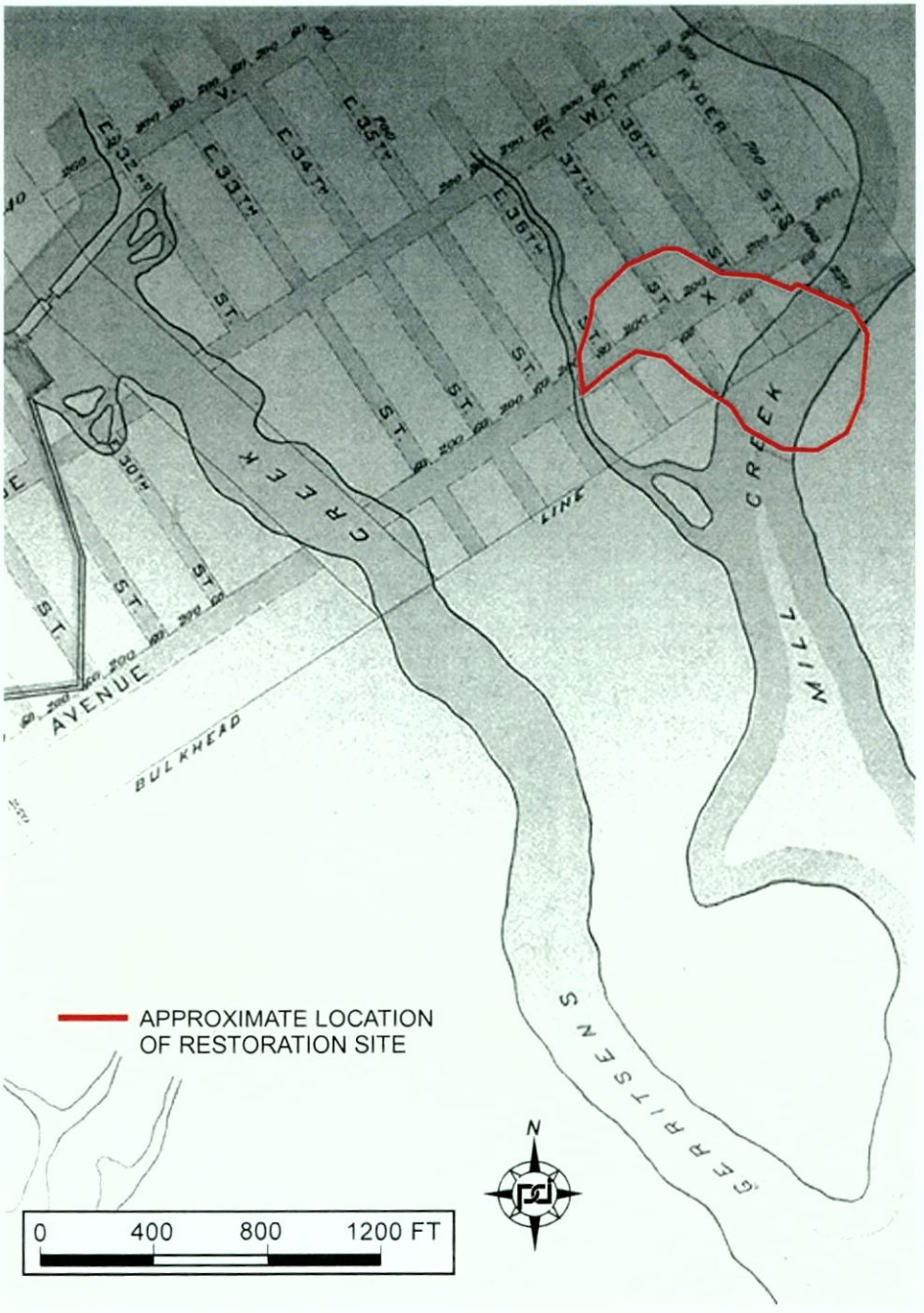


Figure 52. Gerritsen and Mill Creeks in 1890. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Robinson 1890:Plate 27).*

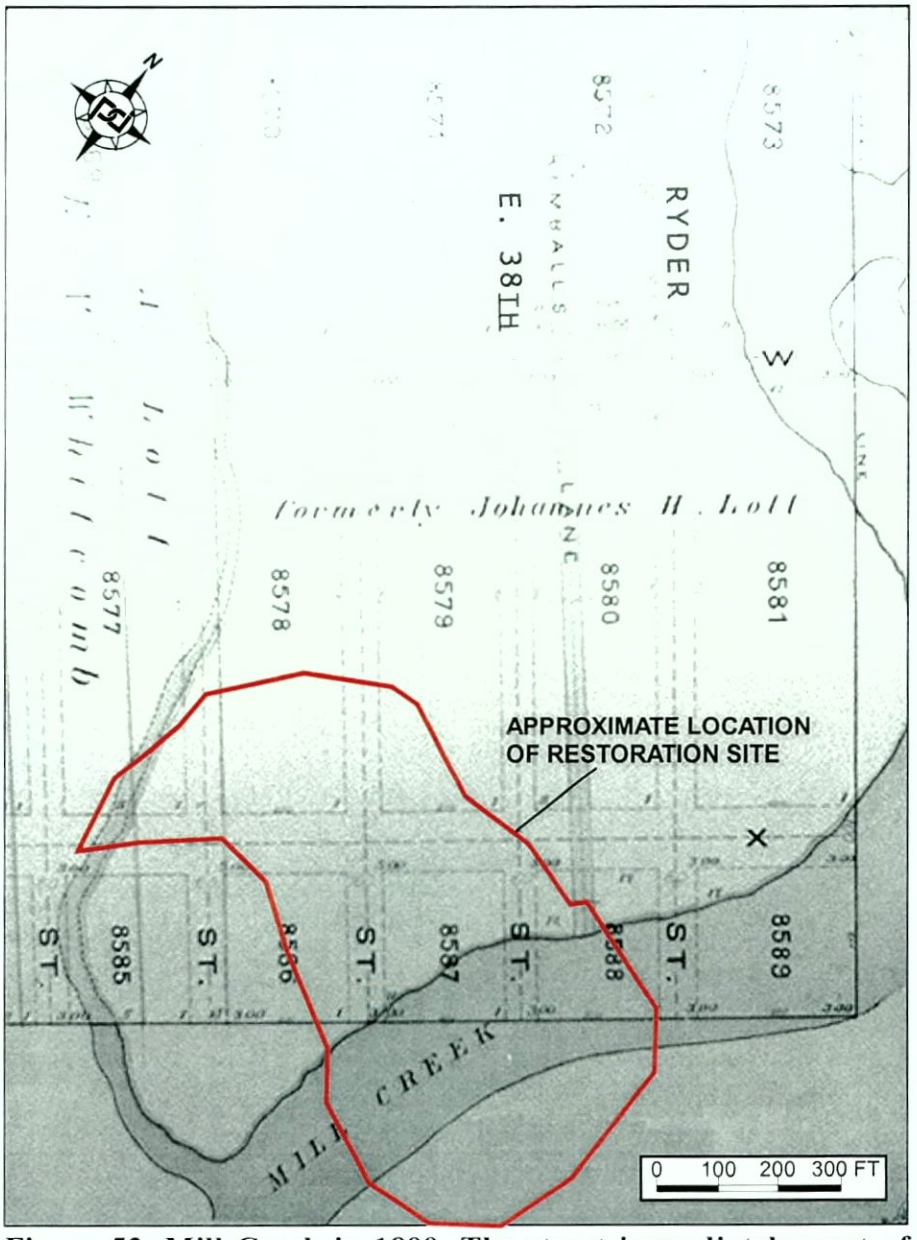


Figure 53. Mill Creek in 1899. The street immediately west of Kimball's Lane is East 38th Street. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Hyde 1899:Plate 17).*

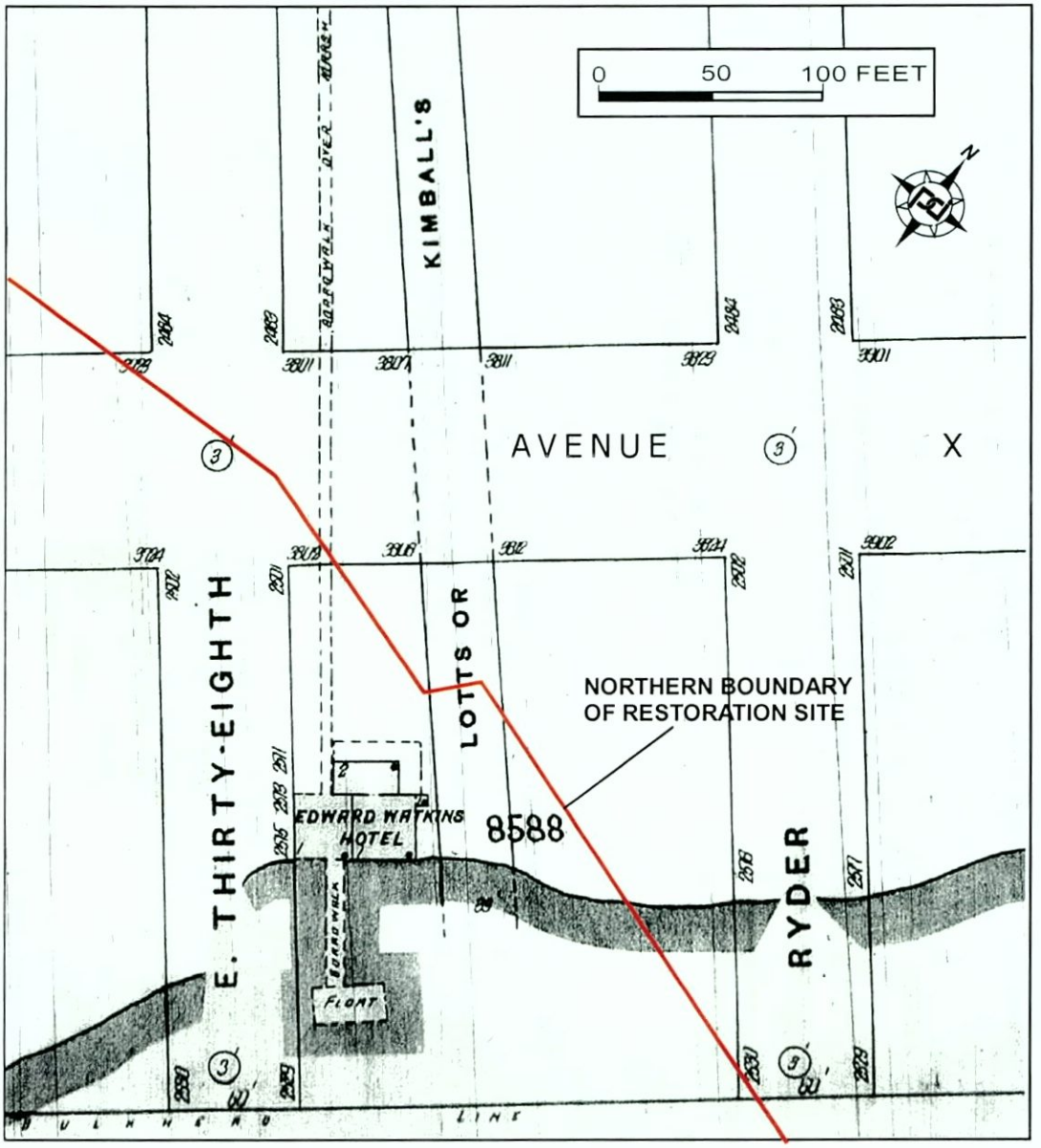


Figure 54. Map of Brooklyn depicting Watkins Hotel in 1907. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Sanborn 1907:Vol. 15: 89).*

The Watson Hotel building continued to stand at the edge of Mill Creek in 1930, but the Sanborn map (Figure 55) identifies it as the Edward Watkins Boat House. By 1930 this establishment was accompanied by several small wooden structures that stood on pilings over the marshes a short distance to the north and accessible by boardwalks.

Other wooden structures illustrated on the map were apparently built to the east on pilings in the water of Mill Creek itself. These buildings were also identified as "on posts" and were reached via row boat. Avenue X and the other streets shown on the map had not yet been constructed; notations point out that these avenues were "impassable" in August 1930. The maps (see Figures 54 and 55) situate the Watkins Hotel at the southeast corner of Avenue X and East 38th Street (superimposed on Figure 54), within the eastern portion of the proposed restoration site. Some of the structures shown just north of the Watkins building on the 1930 map (at Ryder Street) may also be within the project area. The structures on Mill Creek would appear to be located east of the restoration site.

Plans for the establishment of a port at Jamaica Bay saw speculators buying land along the waterfront after the turn of the century. In order to preserve the marshland around Gerritsen Creek, Alfred T. White and Frederic B. Pratt offered to give the City of New York 140 acres for use as a park in 1917. After some delay the city accepted the offer (New York City 1986) and purchased additional land; filling had begun in the 1930s (*Newsday* 1991). While this enabled the expansion of the park to 1,822 acres by 1937, it also destroyed much of the original marshland environment. As of 1939, however, little work had been done in creating park facilities (WPA 1939:505).

In 1939, Marine Park was described as "a two-thousand-acre tract of marshland, cut by sluggish creeks lined with houseboats on stilts and boat landings connected with Flatbush Avenue by long wooden catwalks" (WPA 1939:503). A newspaper article from the 1960s (Kings County Parks n.d.) refers to 300 or more squatters who were being evicted from "houses-on-stilts" to make room for the expansion of Marine Park. These structures were probably those represented on Figure 55. The article describes one of the structures as a "part time abode" for a man who was engaged in "selling bait to amateur fishermen and tending boats on Jamaica Inlet."

A 1941 USC&GS map (Figure 56) shows that the portion of Marine Park which includes the study area had not yet been filled in and Mill Creek continues to be shown on this map. By 1966, as seen on a USGS map, the northeastern portion of Mill Creek had been filled in, White Island had been created and Mill creek had been rechanneled into its present course to rejoin Gerritsen Creek west of the project site (Figure 57).

Landfilling for construction of the Marine Park Golf Course began in 1953. This included the dumping of 1,000 barge loads of garbage in the area bounded by Flatbush Avenue, Avenue U and the Belt Parkway. Opening in 1963, plans were made to extend the golf course by constructing an additional nine-hole course on White Island (Walling 1963). In preparation for the new facility a wooden bridge had been constructed from the golf course to the island. A 1957 newspaper article reported that "Many fishermen already fish in Jamaica Bay waters from a new 500-foot wooden bridge which arches from the former marshland at Marine Park to a man made island" (Raidy 1957).

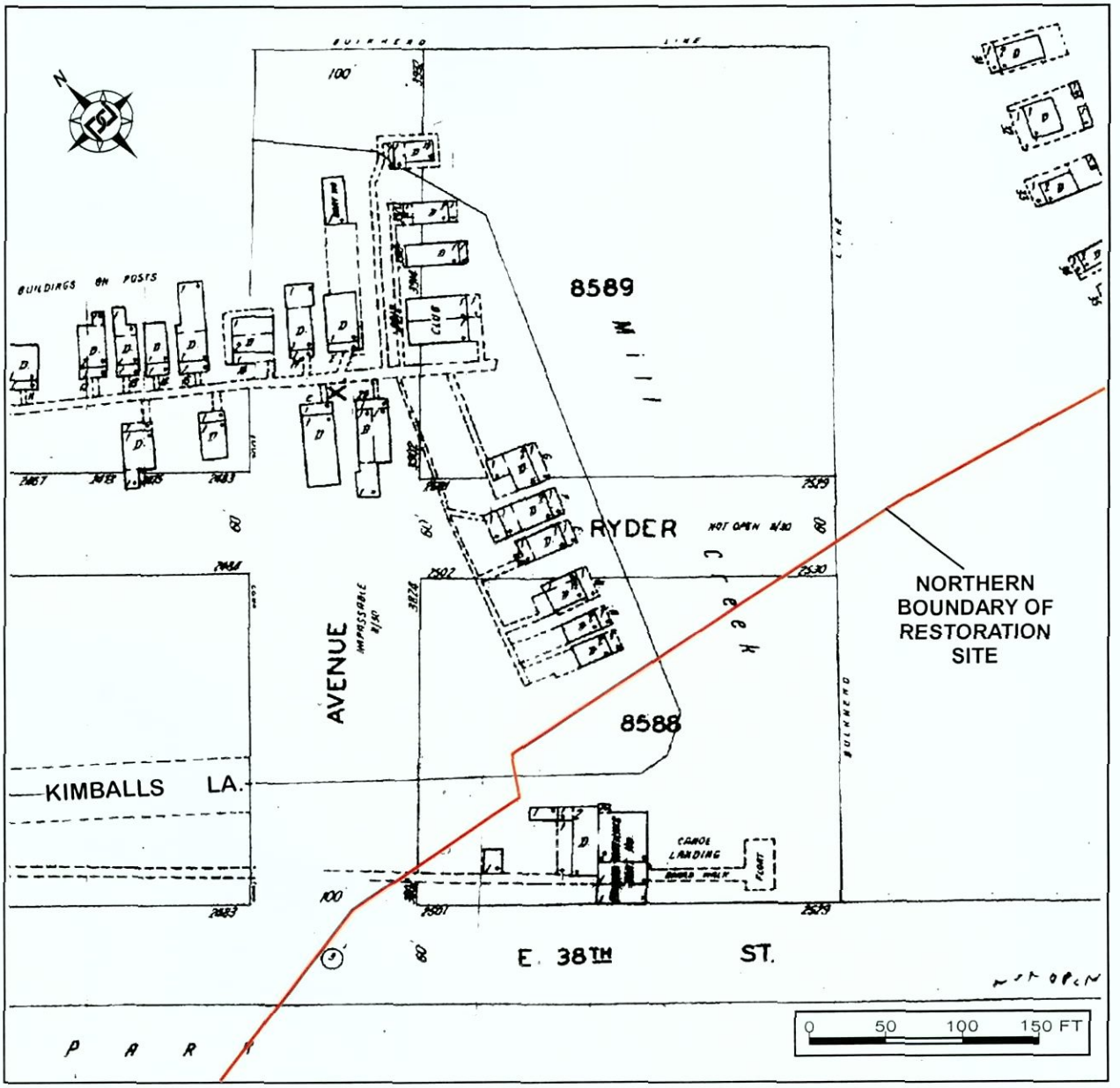


Figure 55. Map of Brooklyn depicting Watkins Boat House and other structures in 1930. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Sanborn 1930:Vol. 19:72).*

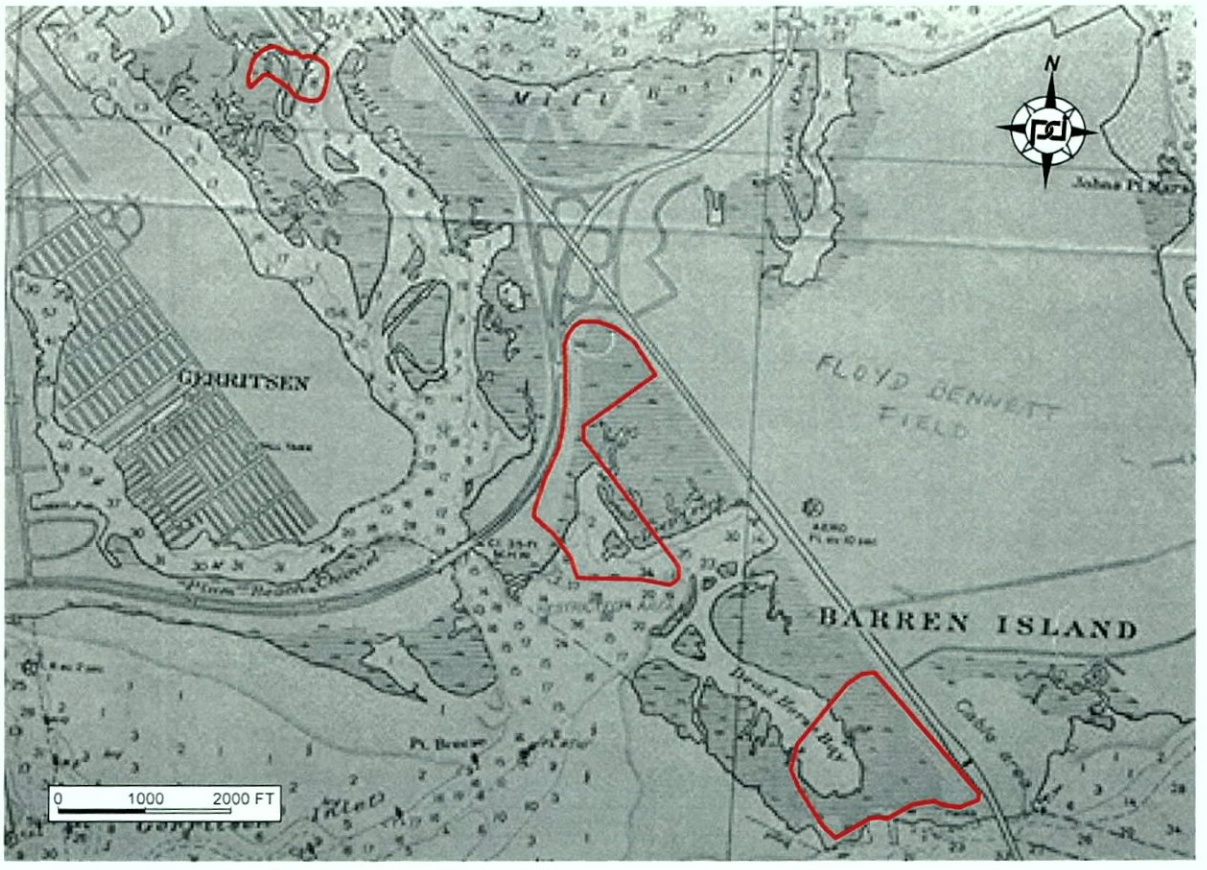
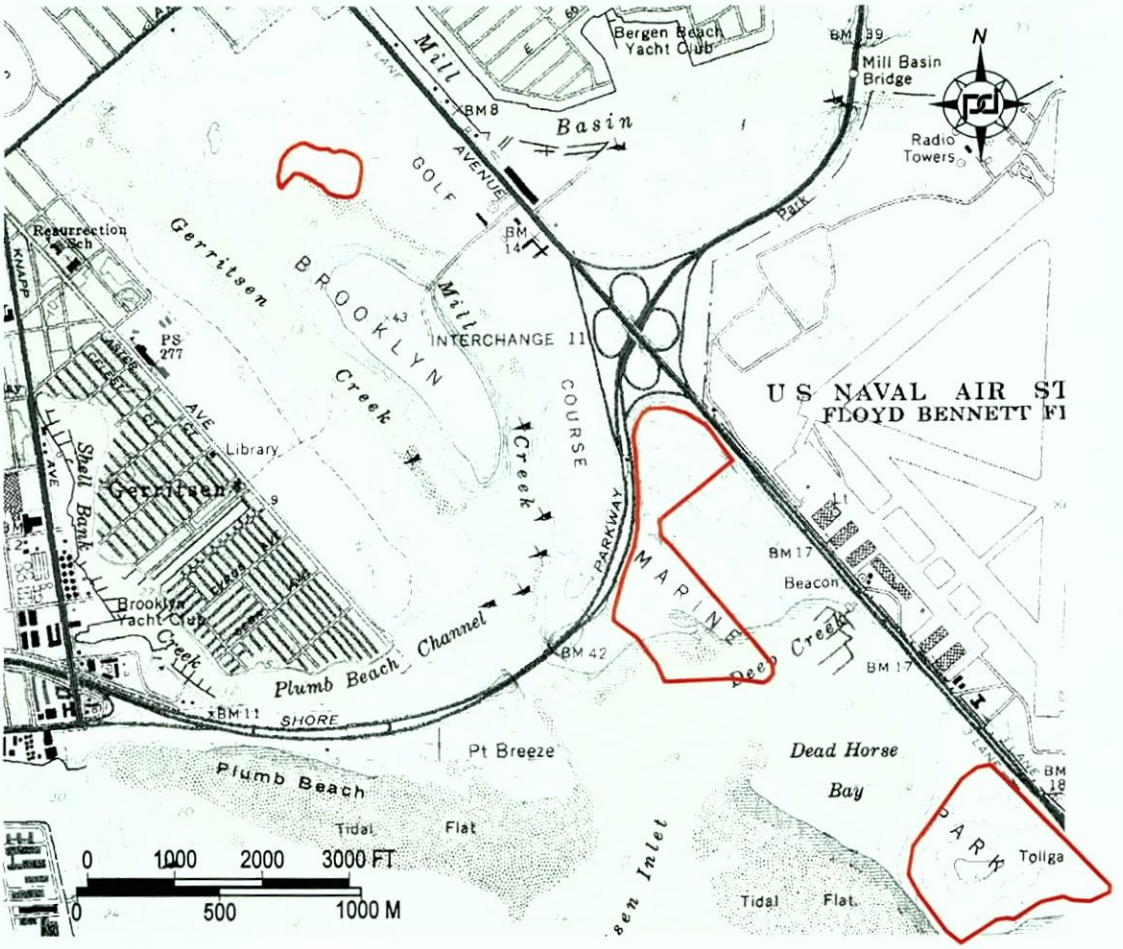


Figure 56. Detail of coastal chart showing Gerritsen Creek and Dead Horse Bay in 1941. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(USCGS 1941:Chart 542).*



LOCATION OF RESTORATION SITES

Figure 57. Detail of topographic map showing modern alterations to Dead Horse Bay and Mill Creek and creation of White Island (unidentified). Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(USGS Coney Island Quadrangle 1966, photorevised 1979).*

The nine-hole course was never constructed; the remains of the bridge can be seen approximately 1,500 feet south of the proposed restoration site (Figure 58). The City eventually transferred 1,024 acres to the National Park service for inclusion within the Gateway National Recreation Area, reducing the size of Marine Park to 798 acres (New York City 1986).

3. Paerdegat Basin. The name "Paerdegat" originally referred to a large freshwater pond and its outlet stream, which extended from the pond to Kings Highway. This connected with a tidal creek known as Bestaver's Kill or Bedford Creek, which extended southward to Jamaica Bay. This tidal creek is the present location of Paerdegat Basin (Van Wyck 1924:18).

Maps dating from the late-eighteenth through the late-nineteenth century show a band of marsh land adjacent to both sides of the stream along its entire length. An 1873 map (Figure 59) illustrates a spit of upland extending into the marshland more than 400 feet east of the creek. The 1877 Dripps map (Figure 60), which displays the street grid, confirms that this upland was east of Paerdegat Avenue. By then, the basin, as well as the present Paerdegat Avenue, had been laid out, although it had not yet been constructed; the creek is still shown in its natural course.

As of 1926, Paerdegat Basin had still not been constructed, as evidenced on a coastal chart (Figure 61), although the Jamaica Bay shoreline from the mouth of Bedford Creek eastward to Canarsie landing has been bulkheaded and presumably filled in. A 1924 aerial photograph (Figure 62) shows what appears to be a dredged channel extending southward from the mouth of the creek into the bay.

Early twentieth century plans for developing Jamaica Bay into a port called for dredging a ship channel around the bayshore, as well as creating bulkheaded basins along most of the tidal creeks. Although the overall plan for the port was never completed, dredging was begun for sections of the channel; that west of Fresh Creek was dredged between 1910 and the 1930s. The annual report of the Department of Docks and Ferries for 1915 (DDF 1915) mentions expenditures for dredging in Jamaica Bay between Mill Creek and Fresh Creek as part of this project (Black 1981:78).

Bulkheading of Paerdegat Basin had been completed by 1930 as evidenced on Figure 63 ("bulkhead line"). In 1932, the uppermost 2,000 feet of Paerdegat basin "had been dredged to 16 feet below mean low water, creating a channel ... 6,675 feet long" (Kearns et al.1993:18). Kearns et al. (1993:17) cite a 1956 newspaper article about squatters having occupied one-story dwellings built on piles between Avenues U and V, at least since the 1930s. This location lies at or near the project area's southeast boundary.

Figure 63 also depicts a few additional dwellings and a boat builder's shop adjacent to the Basin between Avenues W and X. This location, west of the sill dredging area, would most likely have been disturbed by the construction of the Belt Parkway in the 1930s.

Figure 58. The Gerritsen Creek restoration site with White Island and bridge in background, facing south. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Pickman 1999).*

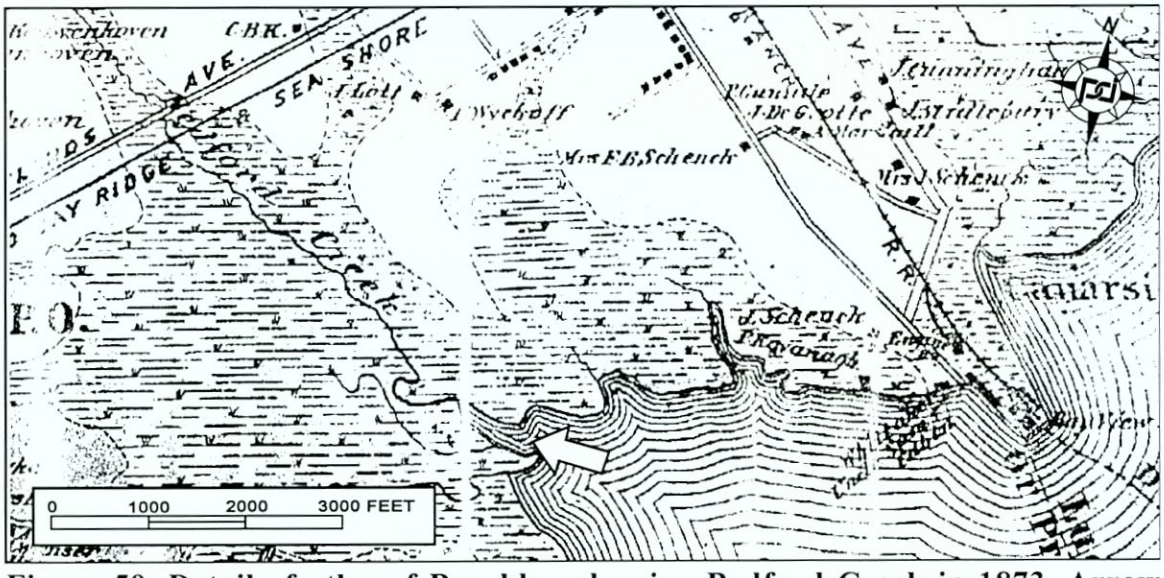


Figure 59. Detail of atlas of Brooklyn showing Bedford Creek in 1873. Arrow indicates approximate location of the restoration site. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Beers 1873:35).*

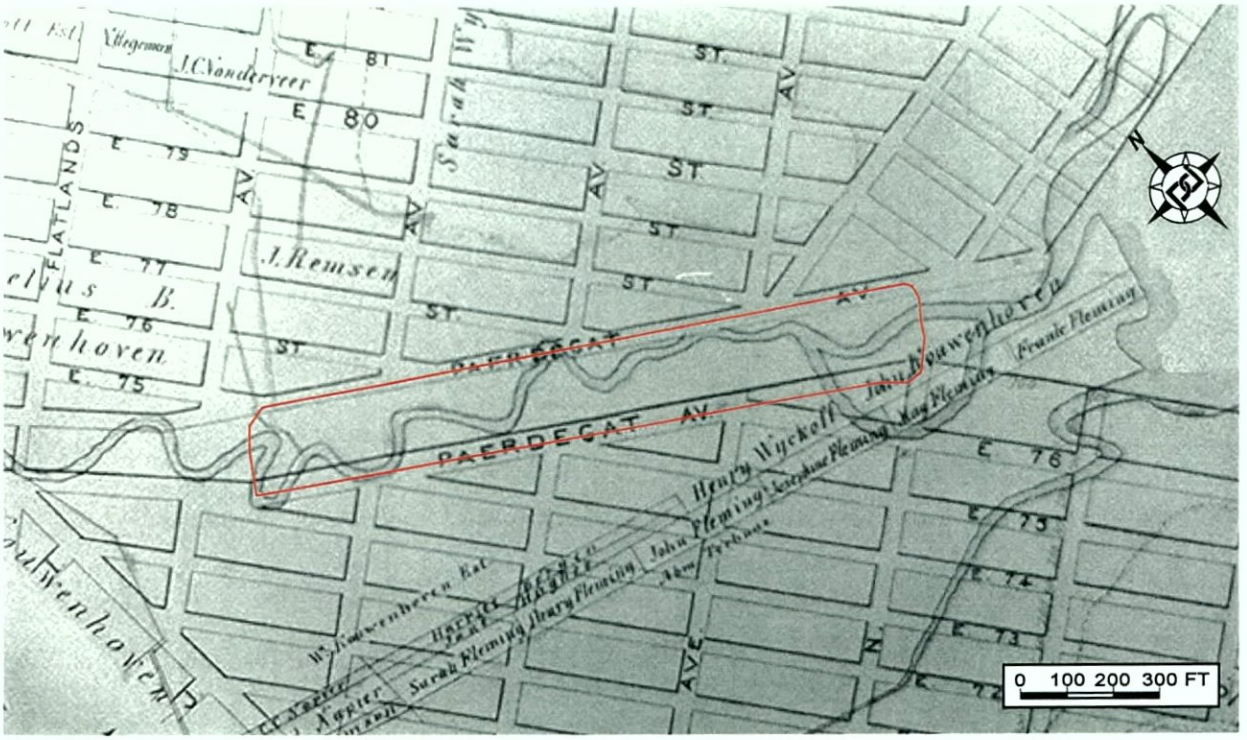


Figure 60. Detail of Kings County atlas showing Bedford/Paerdegat Creek and Paerdegat Avenue in 1877. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Dripps 1877).*

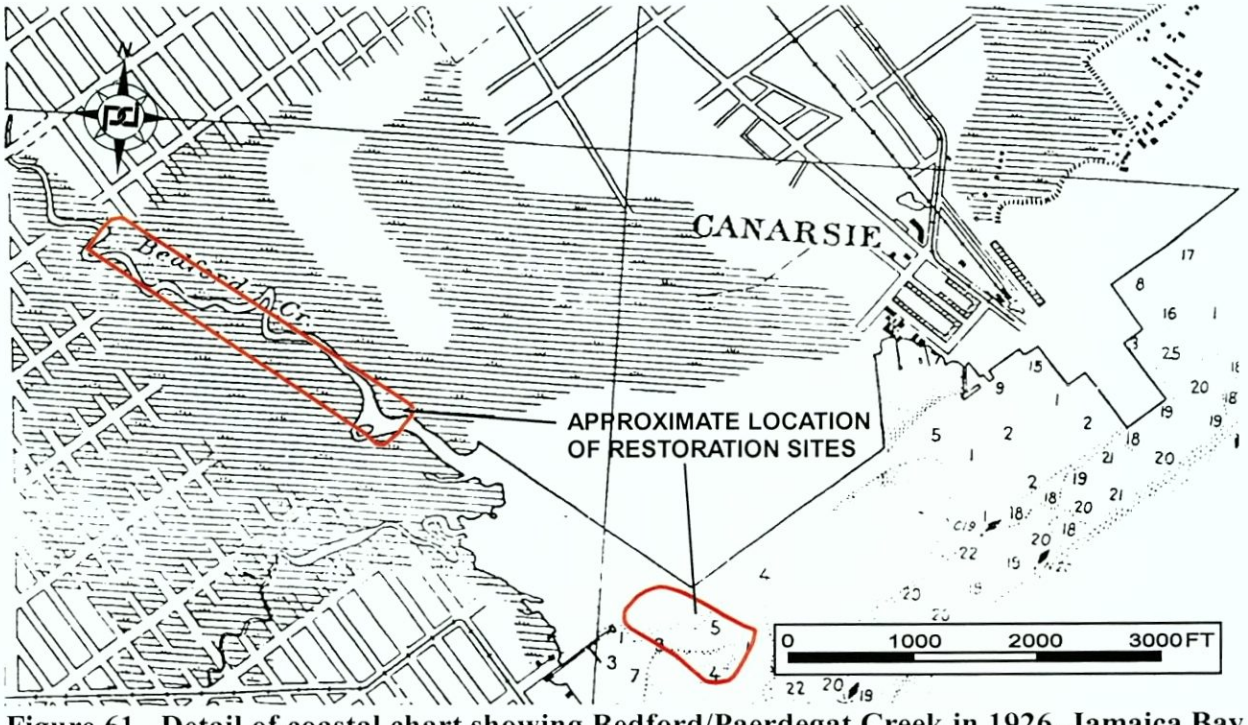


Figure 61. Detail of coastal chart showing Bedford/Paerdegat Creek in 1926. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(USCGS 1926).*

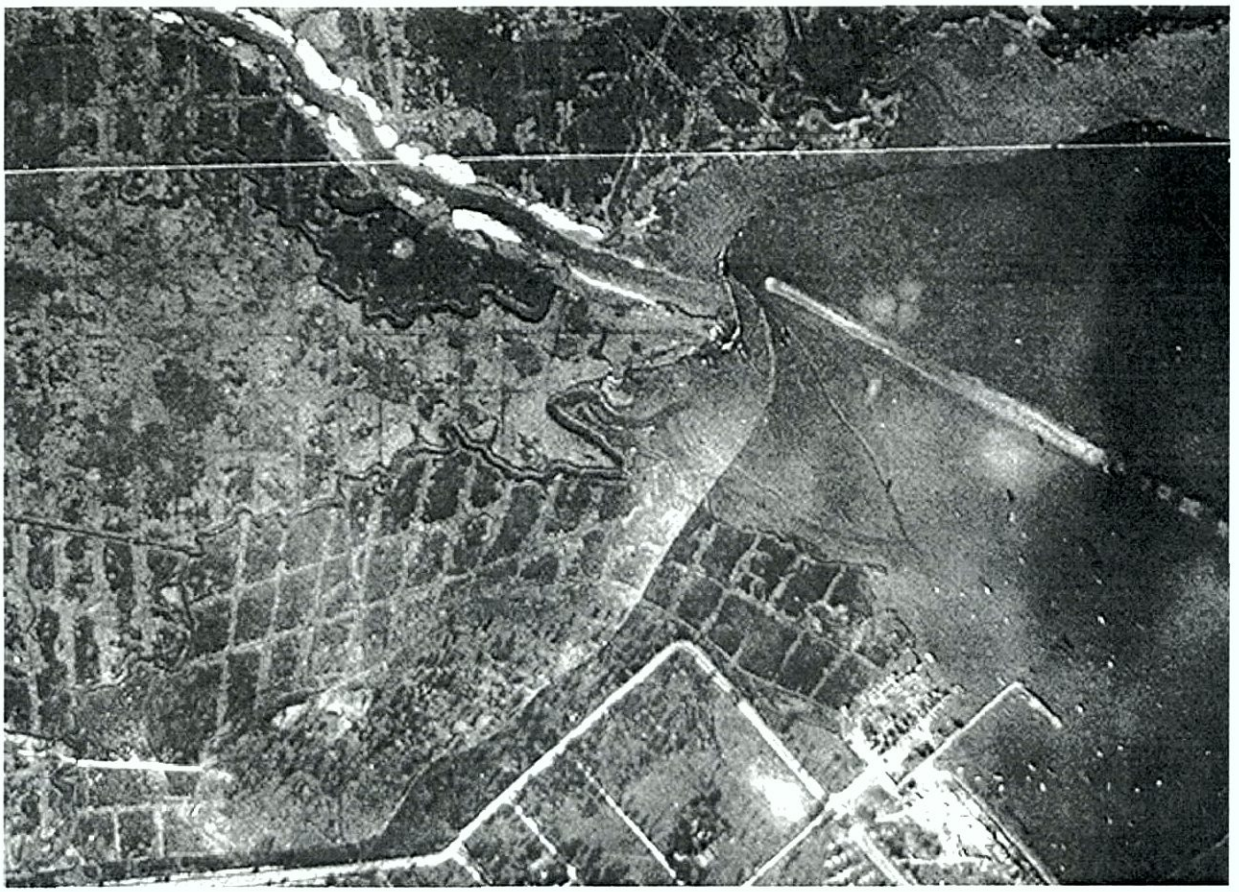


Figure 62. Aerial photograph showing dredged channel at mouth of Paerdegat/Bedford Creek in 1924. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Fairchild 1924:Section 23D).*

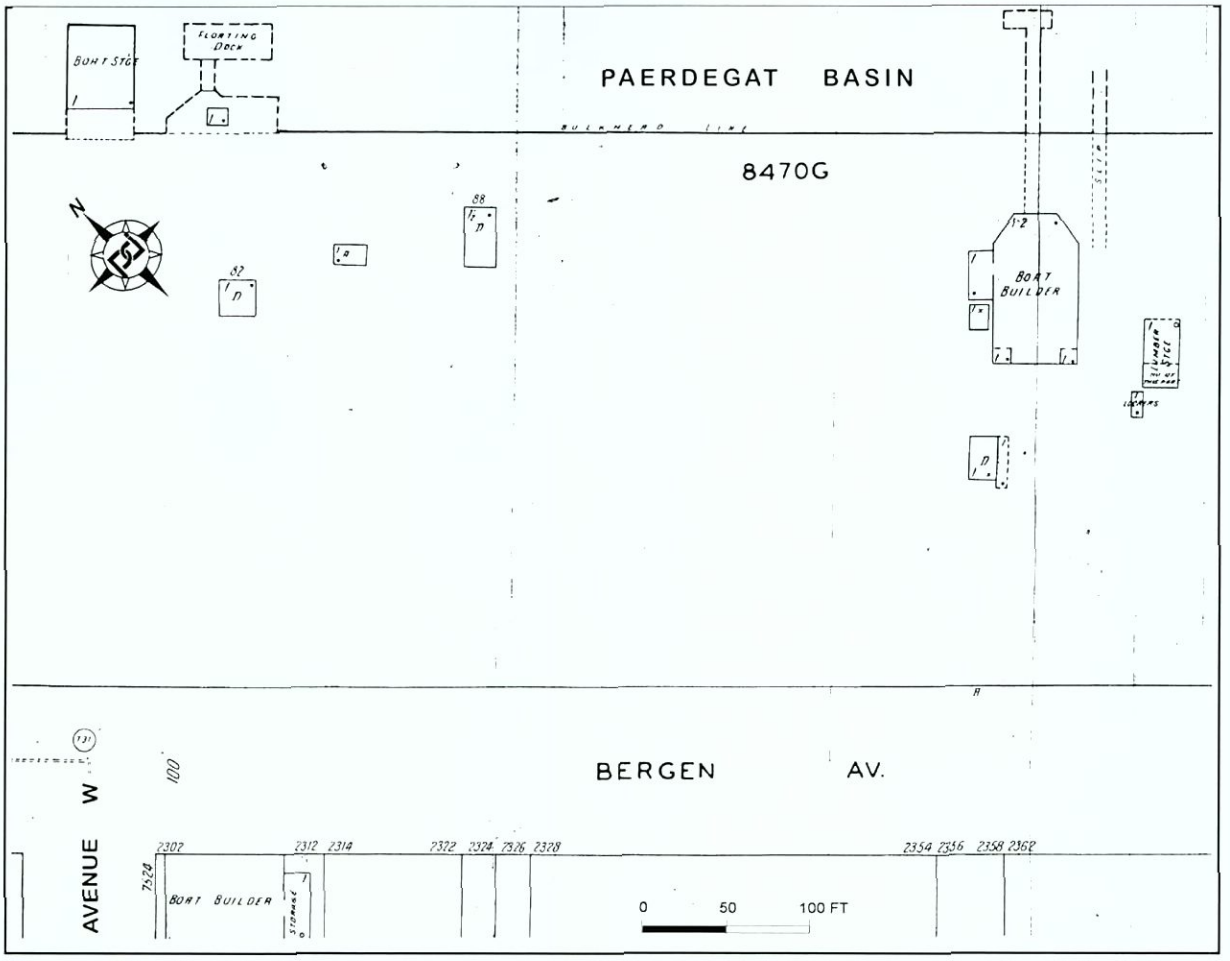


Figure 63. Detail from insurance map of Brooklyn showing west bank of Paerdegat Basin in 1930. The restoration site is approximately 1,300 feet northeast of Bergen Avenue. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Sanborn 1930: Vol. 15:64).*

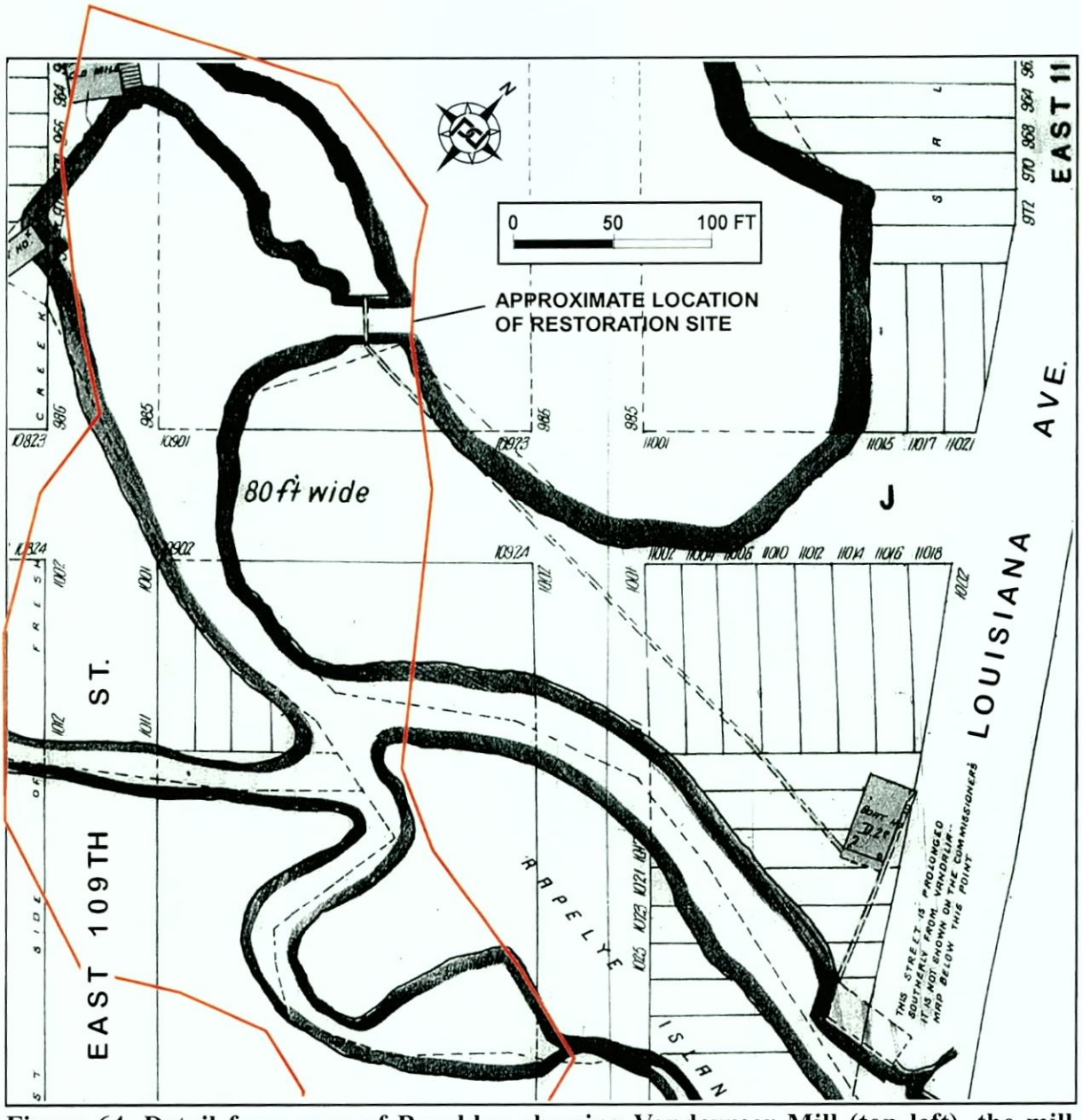


Figure 64. Detail from map of Brooklyn showing Vanderveer Mill (top left), the mill dam, boat houses and a wharf in 1907. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Sanborn 1907:Vol. 16:79).*

4. Fresh Creek.

Wharf and Mill Dam. A 1907 Sanborn map (Figure 64) shows the Vanderveer Mill at the position described in Section 4.2.3, on the line of East 109th Street and approximately 165 feet north of Avenue J (at top left). The mill dam is about 50 feet northwest of Avenue J with a boardwalk crossing it and connecting with a boat house some 350 feet on the northeast side of the creek. Another boardwalk is shown extending southward from the boat house to what appears to be a wharf on the eastern bank of the creek, approximately 225 feet south of the line of Avenue J. The existing alignment of Louisiana Avenue is not as depicted, however; rather it runs parallel to East 108th Street.

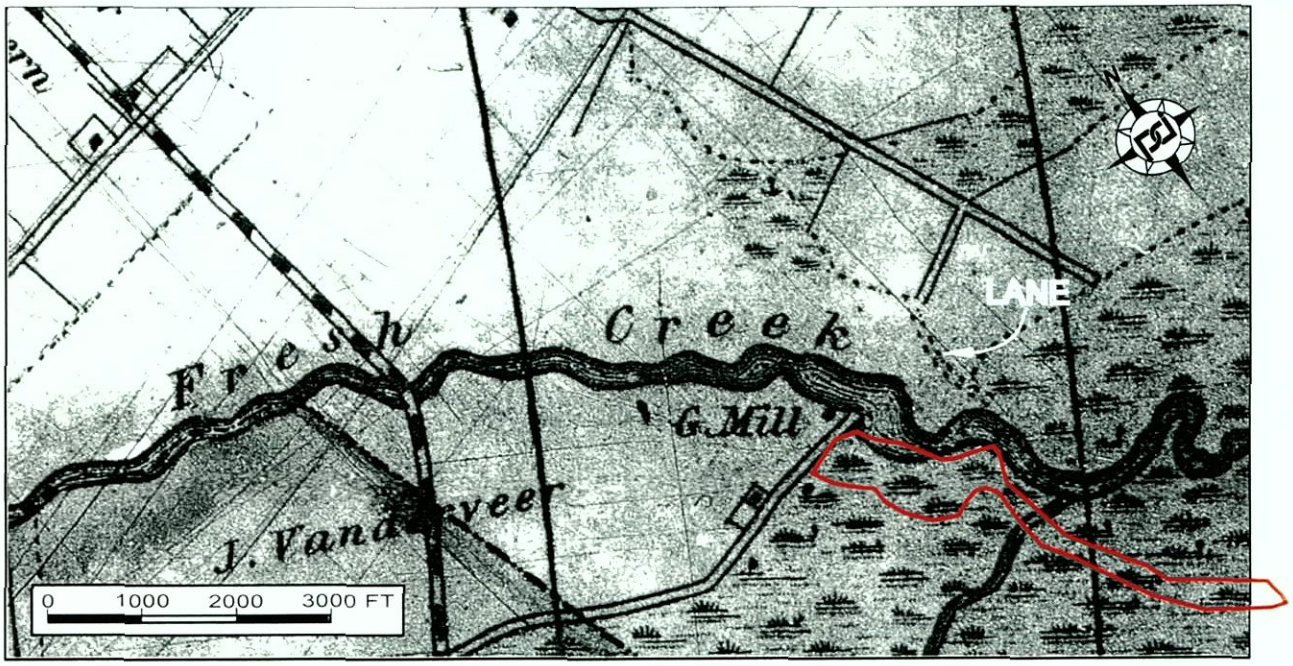


Figure 65. Detail of map showing Vanderveer's Mill (on west bank) and lane east of Fresh Creek in 1868. The approximate location of the restoration site is indicated in red. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Dripps 1868).*

The wharf and boathouse on the east bank of Fresh Creek are not illustrated on the less detailed nineteenth century maps, although maps from 1852 and 1868 (see Figures 30 and 65) depict a lane extending from an area of upland east of Fresh Creek to its eastern shore. The 1852 map shows it terminating a short distance north of the line of the Vanderveer mill, while the 1868 map shows it extending further southward, ending south of the location of the wharf as shown on the 1907 map (see Figure 64). Whether this lane has any connection to the boathouse and wharf shown on the later map is unknown.

On a 1928 map of the proposed Fresh Creek Basin (Figure 66) none of the structures shown in 1907 remain. However, the linear depiction of the Fresh Creek shoreline continues to suggest the presence of a wharf or bulkheading at the 1907 location. The configuration of the Vanderveer Mill dam is still visible.

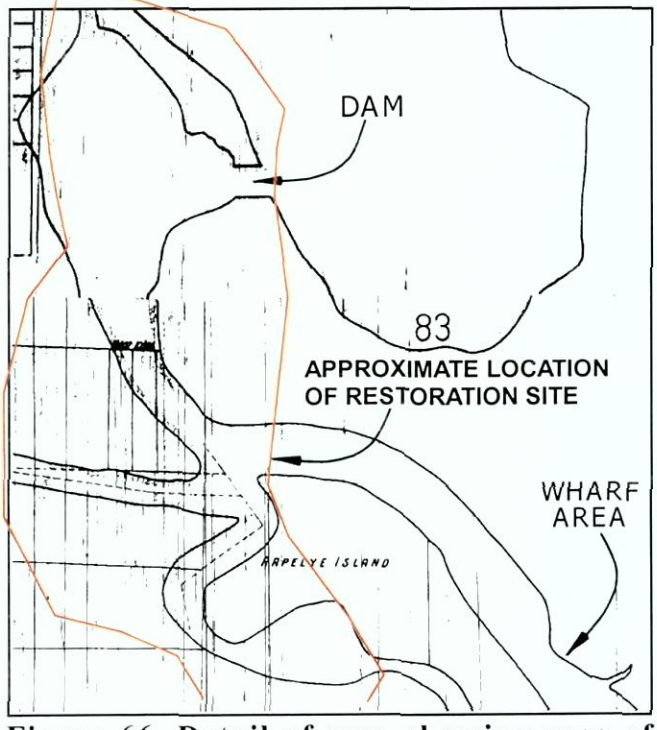


Figure 66. Detail of map showing area of wharf and mill dam at Fresh Creek in 1928. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Sanborn 1928:17:83, 84).*

During the site reconnaissance, wooden planking which probably represents the remnants of the wharf was observed at the approximate location shown on Figure 64. Several rows of posts and three rows of horizontal notched planks or beams were visible (Figure 67). The structure most likely extends eastward beneath landfill deposits. A raised area was also observed in Fresh Creek at low tide near the former mill dam site (Figure 68). Whether this raised area is connected with the dam or other facilities or whether it represents a mud flat formed after dredging of the upper portion of Fresh Creek (which removed the remains of the dam) is unknown.

Other Structures. With the exception of Vanderveer's Mill and its associated buildings, no structures are shown adjacent to Fresh Creek in the vicinity of the proposed restoration site on any of the maps consulted. This entire portion of the creek is bordered by marshland on an 1886 map (Figure 69). A hook-shaped stretch of upland penetrated the marshes to the east (across from the mill), but no structures are depicted. Another map (Figure 70) shows this upland in relationship to the street grid, but the closest it came to the creek was between Flatlands Avenue and Avenue J where at one point it was at the approximate present location of Louisiana Avenue.

The map produced by the Jamaica Bay Improvement Commission in 1909 (Figure 71) reflects the planned street grid and the proposed Fresh Creek Basin. That version of the basin was not constructed, although portions of the creek have been bulkheaded.

Structures appear adjacent to the creek on a 1921 map (Figure 72) and are evidently a cluster of small shacks on the east shore in the approximate location of what is now the line of Avenue K.

By 1924, a channel had been dredged in the lower part of the creek, beginning north of the present location of the Belt Parkway (Figure 73). A mound of what may be dredge spoil can be seen along the west bank of the creek near its mouth. Otherwise, most of the land adjacent to the lower portion of the creek appears to have remained unfilled.

Additional landfilling had taken place by 1941. A coast survey chart (Figure 74) shows fill adjacent to the southern portion of Fresh Creek, some of which was apparently associated with the construction of the Belt Parkway during the 1930s. Areas of marshland continue to be shown, however, bordering the creek south of Flatlands Avenue.

During the site visit, modern artifacts were evident within eroding landfill deposits between the east bank of Fresh Creek and the apartment buildings adjoining Louisiana Avenue, south of the line of Avenue J. These artifacts appeared to be distributed throughout the fill matrix and were not present in a concentrated layer like the deposit reported at the Dead Horse Bay site.

Figure 67. Remains of wharf on the east bank of Fresh Creek, facing northwest. Jamaica Bay Restoration Project *(Pickman 1999).*

Figure 68. View from the east bank of Fresh Creek toward site of mill (now apartment house at left), facing northwest. Note raised areas in creek. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Pickman 1999).*

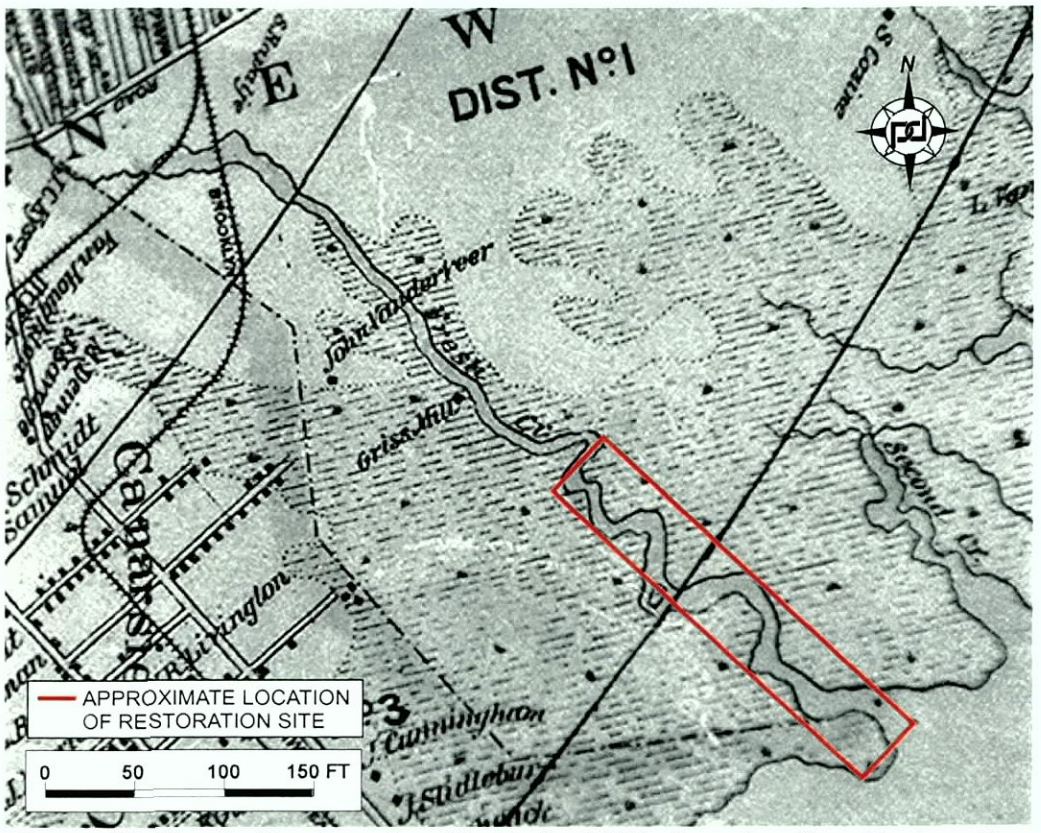


Figure 69. Fresh Creek and mill site in 1886. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Beers 1886).*

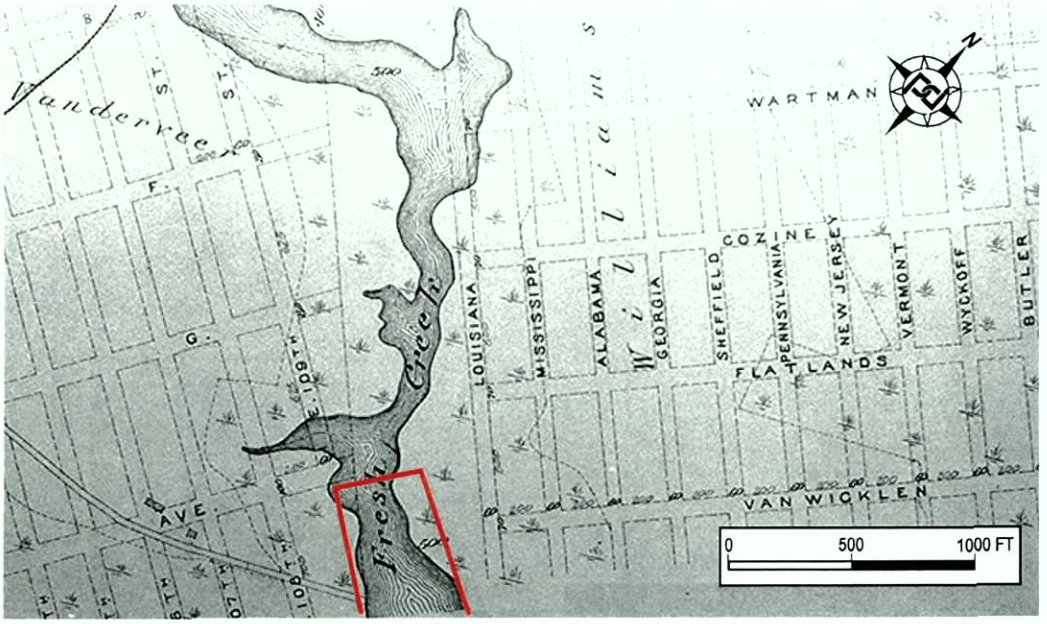


Figure 70. Fresh Creek with adjacent marsh and upland areas. Restoration site indicated in red. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Robinson 1886:Plate 40).*

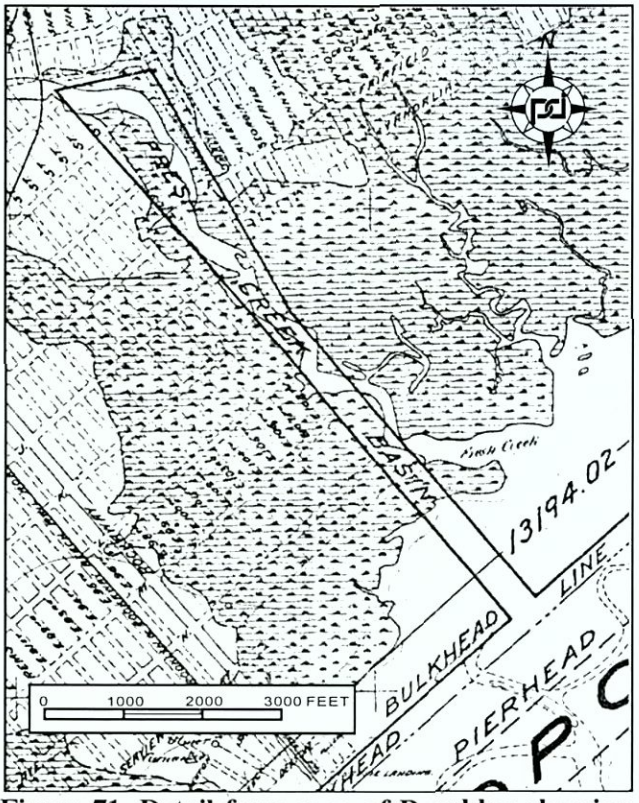


Figure 71. Detail from map of Brooklyn showing the proposed Fresh Creek Basin in 1909. Jamaica Bay Restoration Project *(Jamaica Bay Improvement Comm. 1909b:Plate III).*

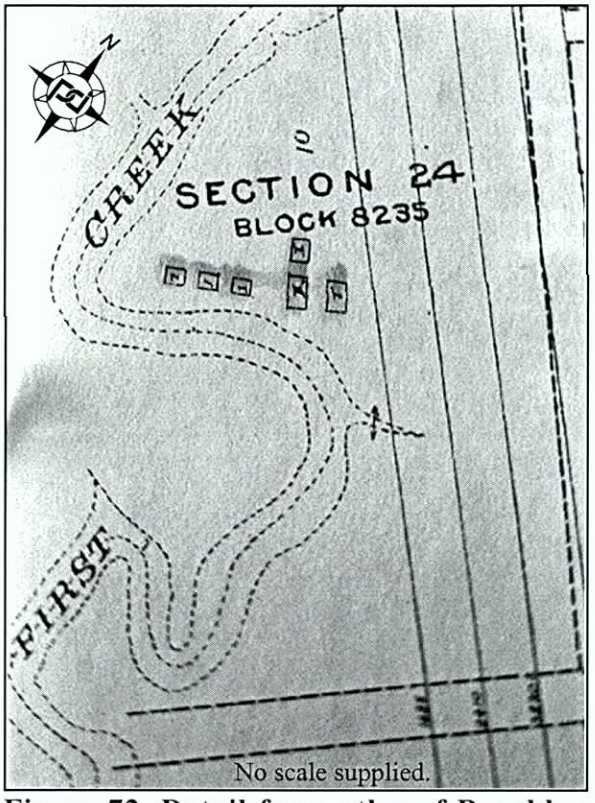


Figure 72. Detail from atlas of Brooklyn showing the east shore of Fresh Creek in 1921. Dashed lines at bottom denote approximate line of Avenue L *(Hyde 1921).*

Figure 73. Aerial photograph showing dredged channel in lower portion of Fresh Creek in 1924. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Fairchild 1924:Section 23B).*

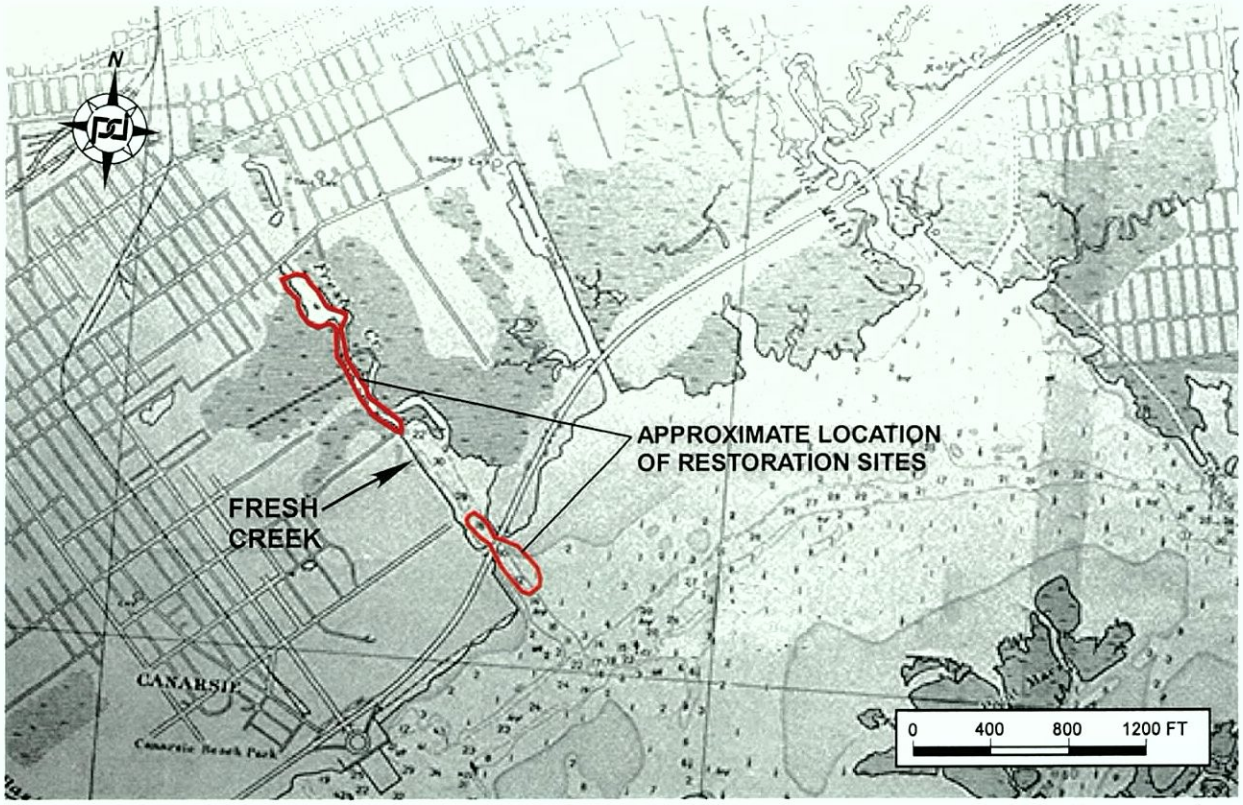


Figure 74. Fresh Creek and surrounding marshes in 1941. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(USCGS 1941).*

5. Spring Creek. The sole structure in the vicinity of the Spring Creek restoration site present on maps dating through the third quarter of the nineteenth century was the Van Wicklen Mill, located at the end of a spit of land extending into the marshes west of the creek and discussed in Section 4.2.3. The remainder of the study area continued to be marshland. The marshland west of the creek was known as Plunders Neck and the road leading to the mill is shown on an 1852 map as Plunders Road (Figure 75).

Spring Creek, which is adjacent to the northern part of the restoration site, flows in approximately the same southern course as shown on the nineteenth century maps, before looping to the west, with the Van Wicklen mill pond at the northeast curve of the loop. This loop and the mill pond were at the present site of the DEP facility. From the base of the mill pond the main branch of the creek flows south and is joined by Betts Creek from the west. A branch creek to the east is identified as Ralph Creek on recent USGS maps. The lower portion of Spring Creek is identified on some maps as Old Mill Creek. This corresponds approximately to the portion of the creek now south of the Belt Parkway. An eastern creek identified variously as Crum Creek, Crum Hill Creek, Crum Kill and Lotts Creek flowed into Old Mill Creek near the present line of 163rd Street (formerly Sheridan Avenue). A smaller, unnamed creek also flowed in from the east at the approximate line of 160th Street (formerly Flynn Avenue), just south of the Belt Parkway.

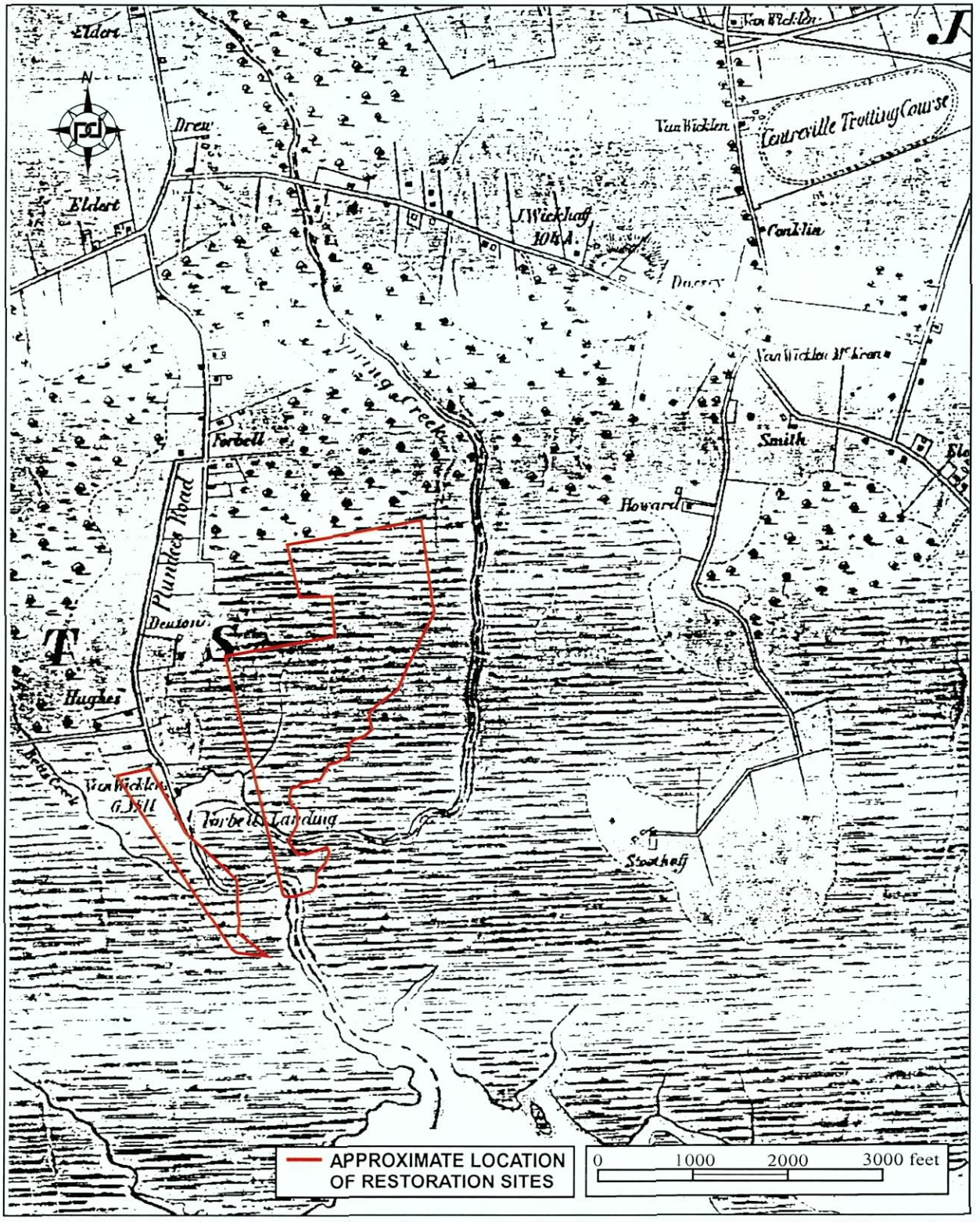


Figure 75. Detail from map of Kings County showing Plunders Road and Van Wicklen Mill (at left) near Spring Creek in 1852. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Dripps 1852).*

The Flynn Roadway. A major improvement in transportation between the north shore of Jamaica Bay and the Rockaway peninsula took place in 1880 when completion of a railroad trestle across the bay shortened the travel time required by previous railway routes around its eastern end or across it by ferry. The next improvement in transportation to the Rockaways would be construction of a roadway across the bay which began at the end of the nineteenth century.

The man behind this first attempt to construct a roadway across Jamaica Bay was

> an enterprising trolley car entrepreneur, Patrick H. Flynn .... [who] .... planned to build a roadway across the bay, eighty feet wide and containing a double track trolley line, a bicycle path, and a carriage way. After considering other routes, Flynn decided to run his line more or less parallel to the LIRR trestle and about 500 yards west of it. The northern end of the Flynn roadway would be a trestle from Black Marsh to a small promontory, known as Long Point, east of the mouth of Old Mill Creek. At Long Point, an embankment was to be built north to Liberty Avenue. Work began on the project in the summer of 1899, but it was not until the following April that the Long Point area saw activity. A large dredge lifted fill from the bottom of the bay and pumped it onto the marshes. By early 1901, a plateau had been created from Liberty Avenue south to Long Point and 1500 feet into the bay, thereafter legal complications were encountered which ultimately ended the entire project .... When the present Cross Bay Boulevard was built much of the Flynn roadway was used, but the new highway connected with the mainland at a point east of Flynn's route (Black 1981:53).

The road-building efforts of Patrick Flynn led to filling in areas of marsh along the route of the roadway north of the proposed causeway across the bay as well as on the Jamaica Bay islands along the route.

> In 1900 and 1901, construction of the causeway for the proposed road included the most extensive dredging and filling ever seen to that time in Jamaica Bay. Flynn acquired a huge dredging machine, 150 feet long and thirty-four wide, which required sixteen flat cars to transport it from Boston. Its 460 horsepower steam engine could dredge 20,000 cubic yards a day. In the spring of 1900 ten acres of meadows on the north shore in the vicinity of Old Mill Creek were elevated eight feet, and by the summer of 1901 a platform had been produced 350 feet in width from Liberty Avenue to Long Point. At the south end of the plateau was a marine section projecting 1500 feet into the bay. Subsequently the dredge filled meadows at Broad Channel and The Raunt, and between three and four miles of solid roadbed for the turnpike was formed (Black 1981:80).

With the exception of the portion of the marine section or pier extending southward from the Jamaica Bay shoreline, the causeway section across the open waters of the Bay was apparently never built.

Black (1981) attributes features shown on the coast survey sheets of 1911 and 1926 (see Figures 40 and 41) to the abortive Flynn roadway. An earlier (1909) map (Figure 76) shows the roadway and pier as well as the proposed continuation of the marine section across the open waters of the bay. This—as well as later maps—confirms that the route of the Flynn roadway on several of the Jamaica Bay Islands was subsequently used for Cross Bay Boulevard.

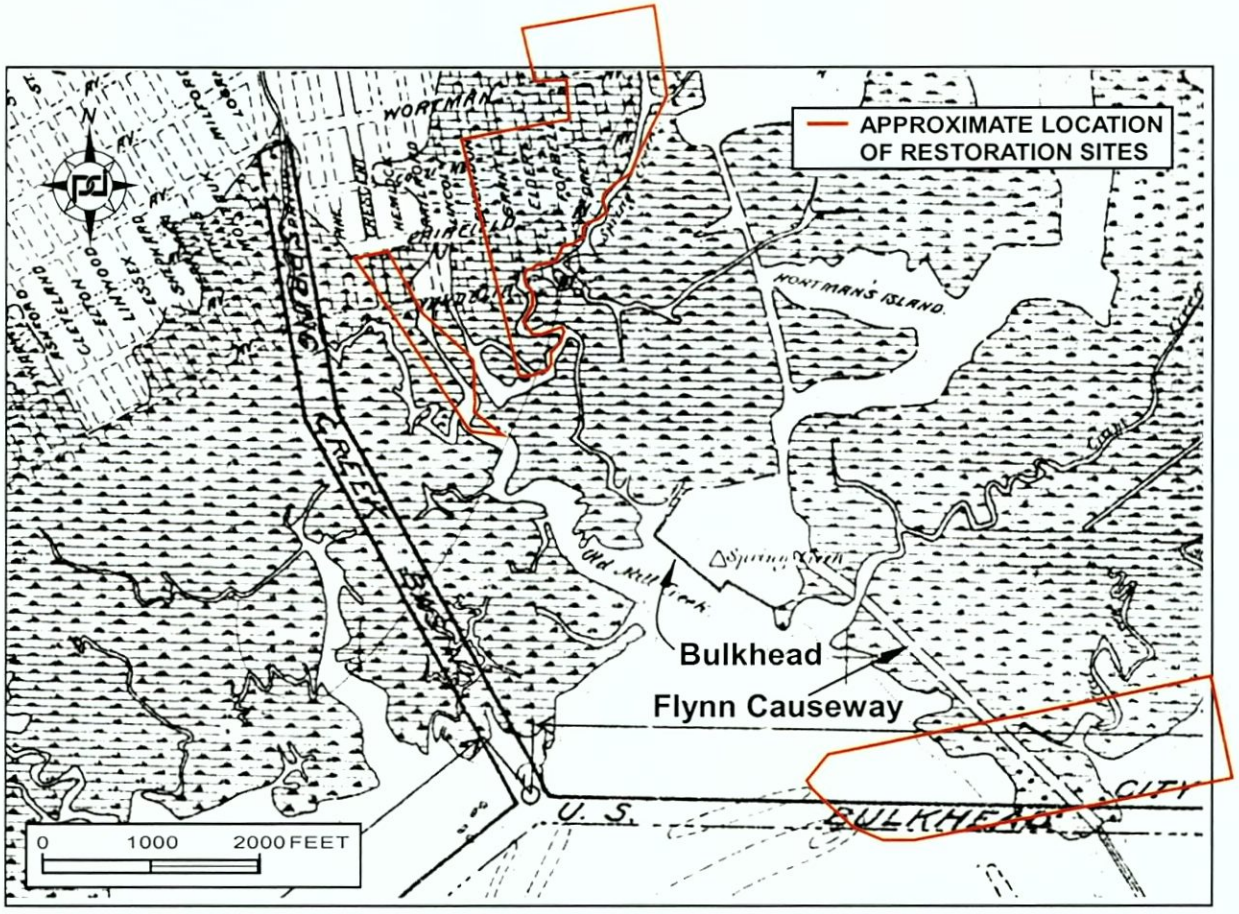


Figure 76. Detail of map showing bulkheaded area of Old Mill Creek and section of Flynn causeway in 1909. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Jamaica Bay Improvement Commission 1909b).*

On maps dating between 1909 and 1926 (Figures 76 through 79) the east bank of Old Mill Creek is shown as bulkheaded north of Crum Creek, with landfill deposited behind the bulkhead. This is apparently the ten-acre landfilled area mentioned by Black. It is likely that it represents an area where dredged sand was stored for use in construction of the road embankment. The upland contours shown on the 1915 topographic map (Figure 77b) are apparently the result of this landfilling. The causeway is shown on these maps extending to the southeast from the eastern edge of the landfill, crossing Crum Creek on a bridge (see Figure 78a) and continuing to the pier on the shore of the bay. The portion of the Flynn causeway south of the Belt Parkway and remains of the pier continue to be shown on a 1948 Coast and Geodetic Survey chart (Figure 80).

The bridge over Crum Creek was located just north of the line of Sheridan Avenue (163rd Street) and just east of the line of the present East 81st Street, approximately 1,800 feet north of the Gateway NRA, and within or adjacent to the current project area boundary. Crum Creek has since been bulkheaded and filled-in.

Two maps (see Figures 79 and 80) show the existing route of Cross Bay Boulevard as well as the remains of the Flynn causeway and pier. The route of the causeway also appears on the 1913 Hyde map (Figures 77a and 77b), although only the head of the pier is depicted. These features are also shown in relation to the proposed street grid on the 1915 Queens topographic sheets

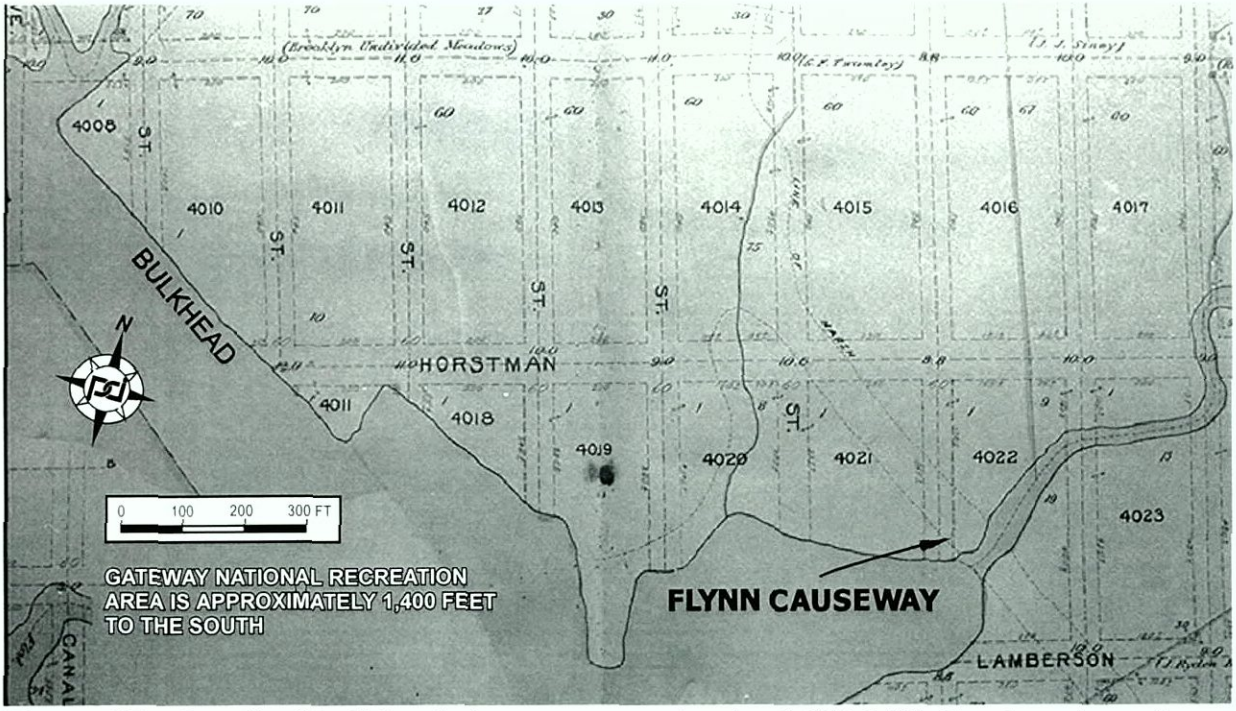


Figure 77a. Detail of bulkheaded area on east bank of Old Mill Creek and northern section of Flynn causeway in 1913. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Hyde 1913:Plate 31).*

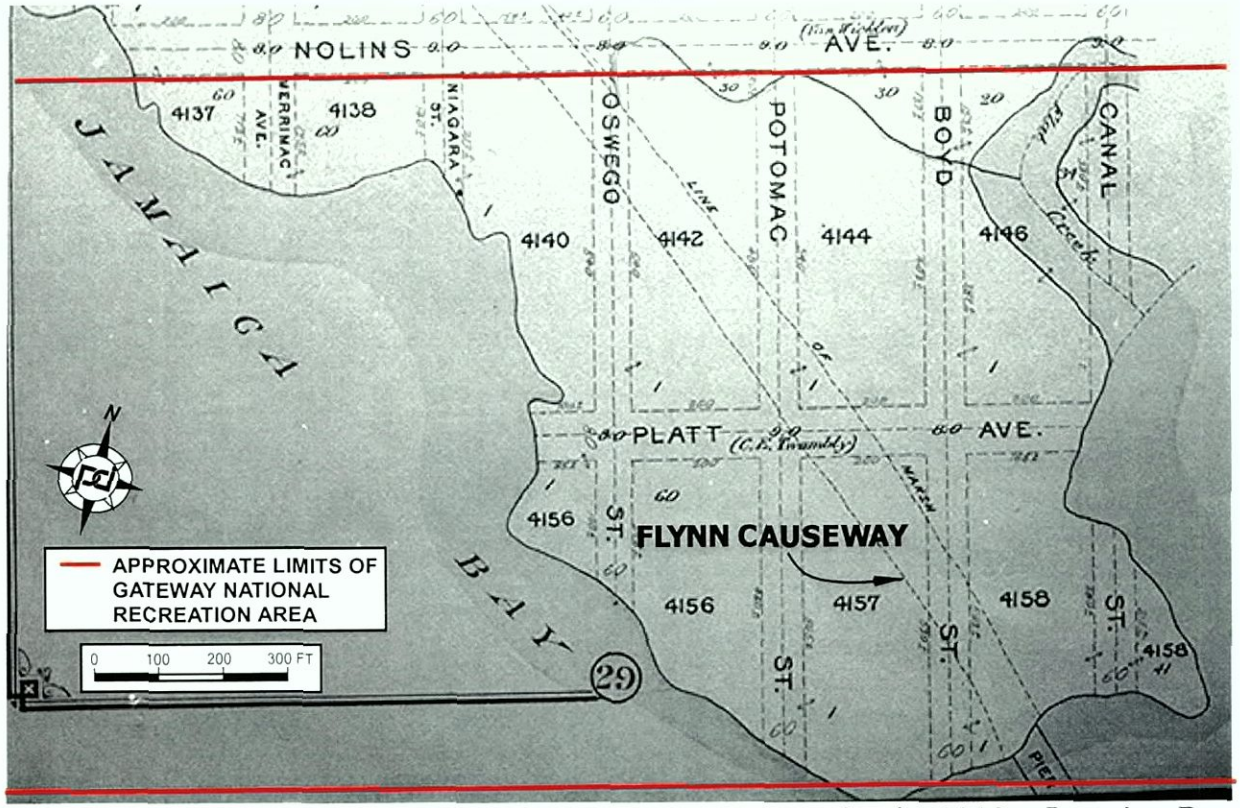


Figure 77b. Southern section of Flynn causeway and pier in 1913. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Hyde 1913:Plate 31).*

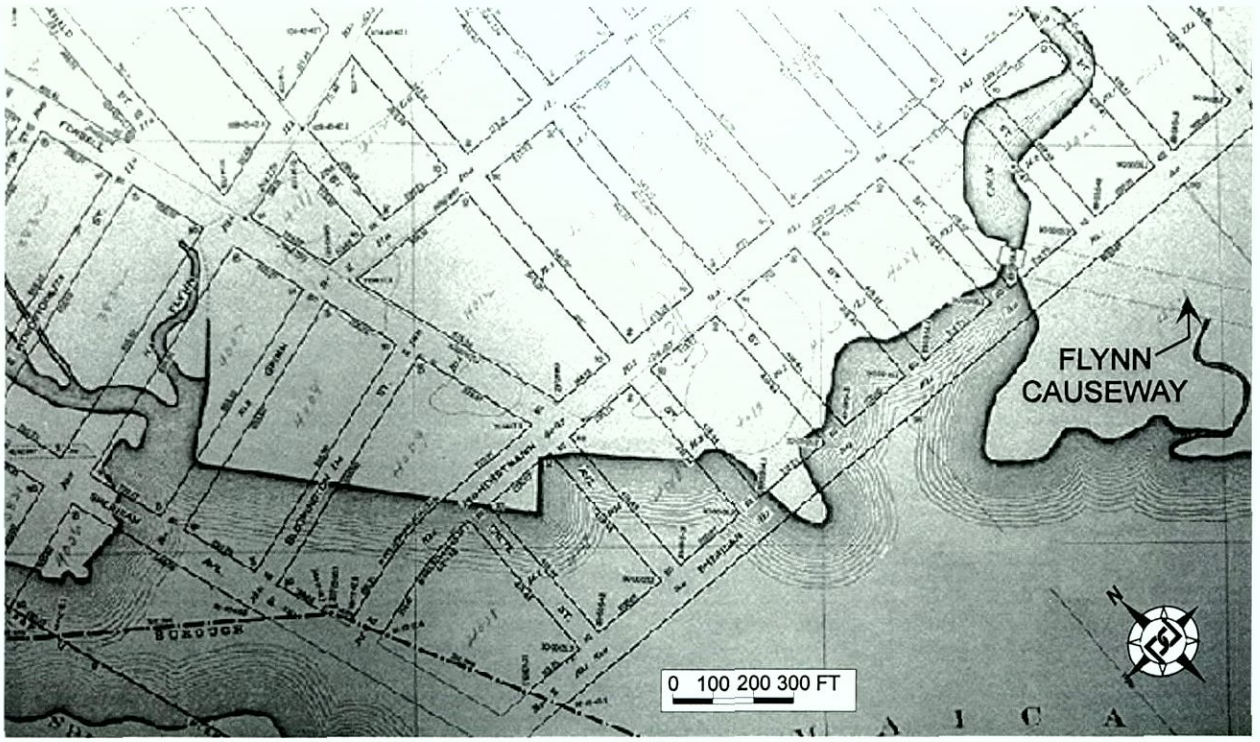


Figure 78a. Detail of map showing bulkheaded area on east bank of Old Mill Creek at left and a section of Flynn Causeway in 1915. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Borough of Queens 1915c).*

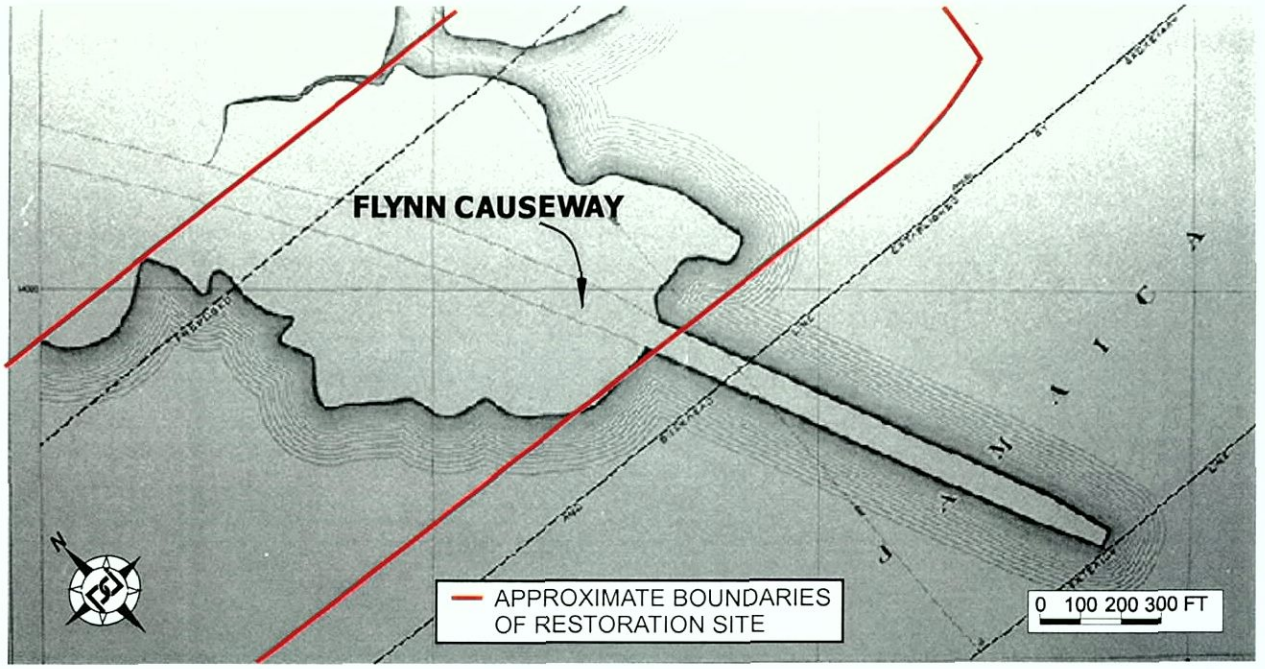


Figure 78b. Section of Flynn Pier and causeway in 1915. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Borough of Queens 1915c).*

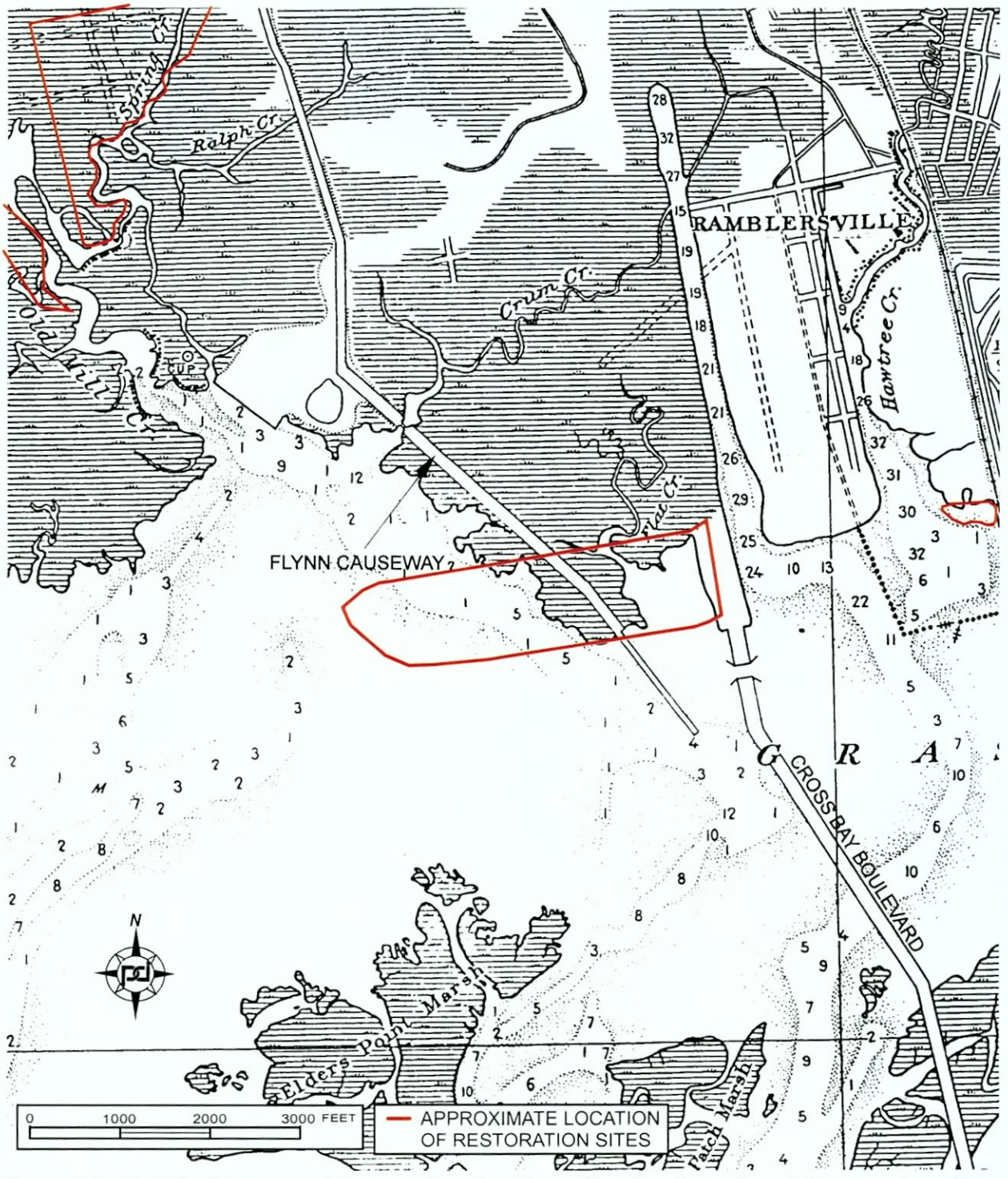


Figure 79. Detail of topographic map showing Cross Bay Boulevard and the remains of the Flynn causeway and pier. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(USCGS 1926).*

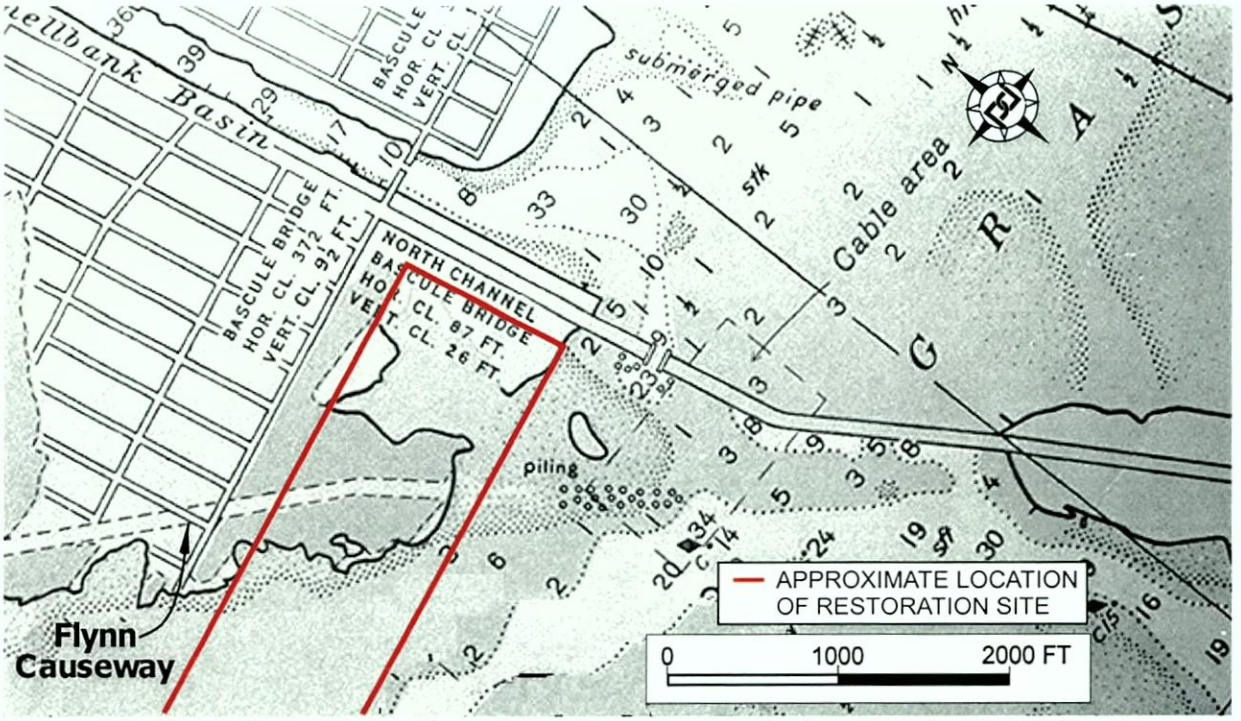


Figure 80. Coastal chart showing Flynn Causeway and pier remains in 1948. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(USCGS 1948).*

(Figures 78a, b) and aerial photographs from 1924 (Figures 81a, b). These maps clarify some of the inconsistencies in published descriptions of the Flynn roadway and its route. Flynn pier is shown (see Figure 80) extending outward from the shoreline of Jamaica Bay for a distance of some 1,300 feet, 200 feet shorter than that noted by Black (1981:80). From the shoreline, the roadway proceeds to the northwest, along what was then the shoreline of Old Mill Creek, but is now inland due to subsequent landfilling. The head of the Flynn pier is shown on the 1913 map (see Figure 77b) at approximately the line of Boyd Street (89th Street), and the Flynn roadway intersects the route of Nolins Avenue (165th Avenue) at approximately the line of Oswego Street (87th Street). This portion of the route is within the proposed restoration site. The Flynn roadway route continues northwest until it intersects the area adjacent to Old Mill Creek, which may lie within or adjacent to the eastern project boundary. This area had been filled in and bulkheaded at the time the roadway embankment was constructed. From there, the roadway turns to the north along the route of the present 80th Street and outside the current project area (see Appendix A).

The 1924 aerial photograph (Figure 81b) shows Cross Bay Boulevard under construction, with the Flynn roadway and pier to the left. A comparison of this photograph with the present route of Cross Bay Boulevard suggests that the head of Flynn pier would have been near the present shoreline. The marshland visible in the photograph between the pier and Cross Bay Boulevard would have been subsequently removed by dredging.

During the site reconnaissance, remains of four rows of wooden pilings extending into the bay were observed at the approximate location of the Flynn pier as shown on these maps (Figure 82).

Figure 81a. Aerial photograph showing Flynn Causeway in 1924. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Fairchild 1924:18C).*

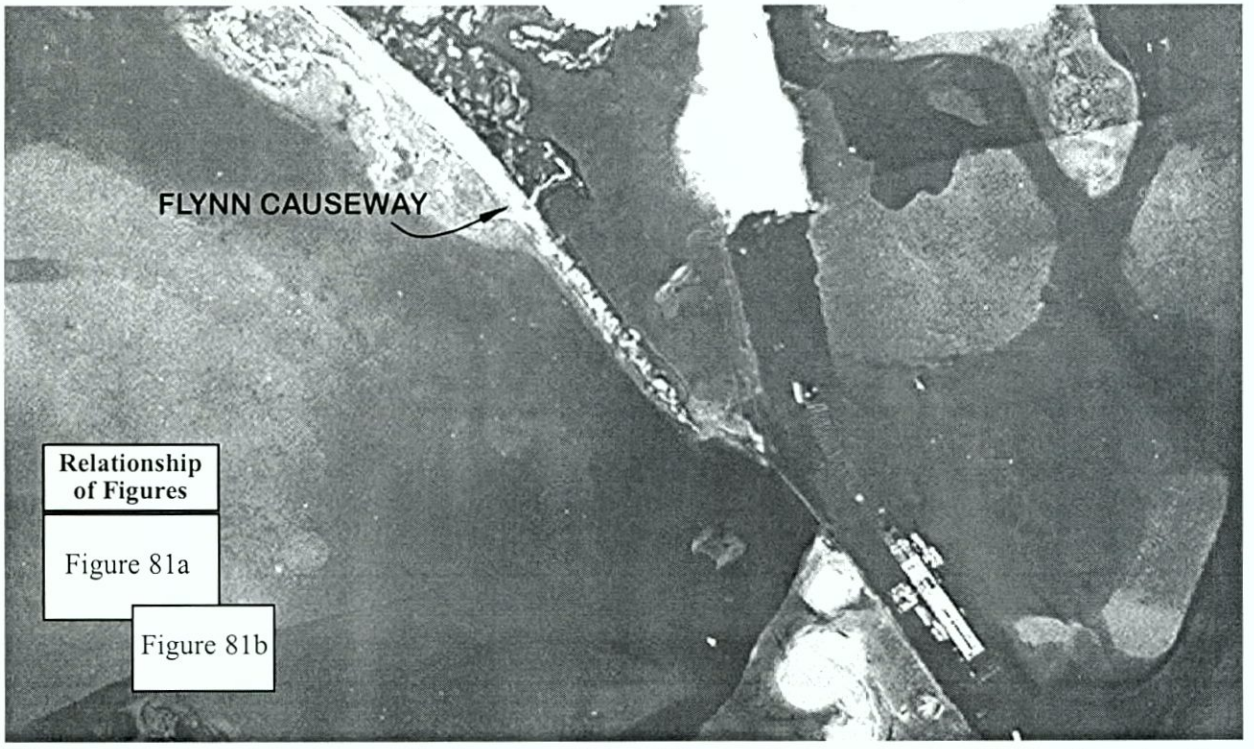


Figure 81b. Aerial photograph showing Flynn Pier and causeway in 1924. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Fairchild 1924:24B).*

Figure 82. Remains of Flynn Pier, facing southeast. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Pickman 1999).*

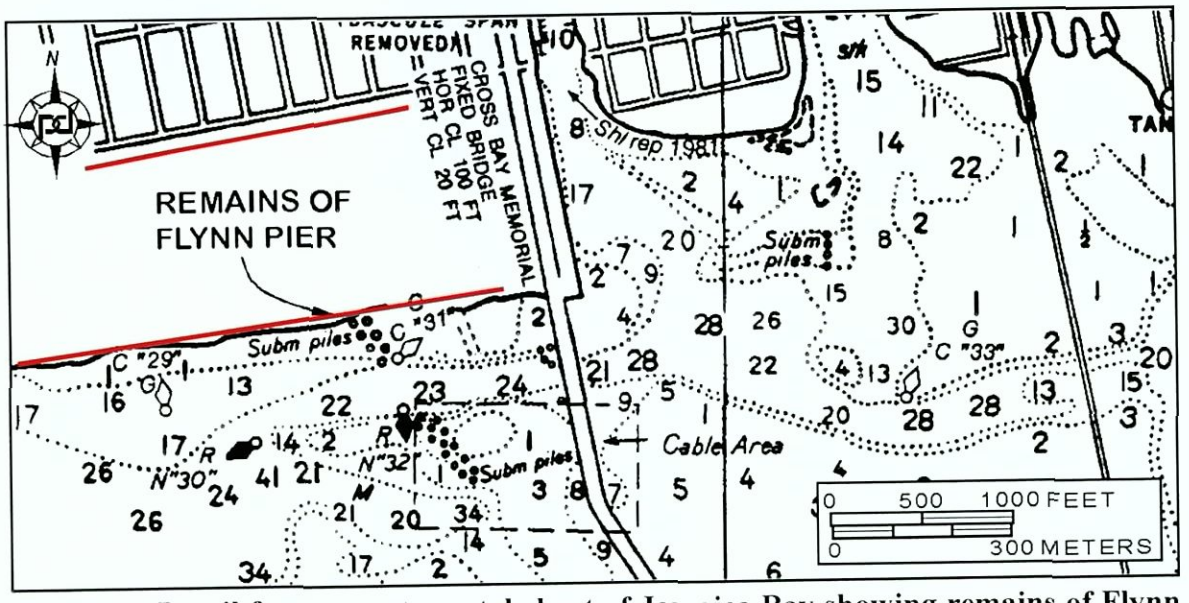


Figure 83. Detail from recent coastal chart of Jamaica Bay showing remains of Flynn Pier. The restoration site boundaries are indicated in red. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York (*NOAA 1986:Chart 12350*).

Some of the stringers and vertical planks had been left in the immediate shoreline area. The pier was 70 to 80 feet wide. Two buoys visible in the photograph may serve to mark the outer end of the submerged pilings which are so labeled on a 1986 coastal chart (Figure 83) extending some 1,200 feet from the shoreline. A recent article (*Forum of Queens* 1997:7) also identifies the pilings "visible from the north end of the Joseph P. Addabbo Bridge [i.e., the Cross Bay Boulevard bridge connecting Howard Beach and Black Bank marsh] looking west" as the remains of the Flynn pier.

Spring Creek Park follows the curve of Jamaica Bay from Cross Bay Boulevard to the northwest. Landfilling, which began in the 1950s (Raidy 1957), created the present configuration of the Jamaica Bay and Old Mill Creek eastern shorelines. Remains of the Flynn roadway embankment could be underneath the later landfill.

No indications of the Flynn bulkhead on the east side of Old Mill Creek were observed during the site reconnaissance. The 1915 topographic map (see Figure 78a), in addition to the other maps discussed, places the bulkheading east of the present shoreline and within the present project area, indicating that additional landfill has been deposited in this area subsequent to construction of the Flynn roadway. It is possible that the bulkheading is buried beneath the landfill.

Pleasant Point Bridge and Causeway. One source (*Forum of Queens* 1997:7) reports that the Flynn roadway had its northern terminus "at Crescent Street in Brooklyn and proceed[ed] south on the Queens side of Old Mill (Spring) Creek, crossing the bay at Long Point." This description suggests that the Flynn roadway route would have been west of that shown on the maps noted above. Examination of early twentieth century maps suggests that the inaccurate description of the route provided by this source may be due to the fact that another causeway road crossed the

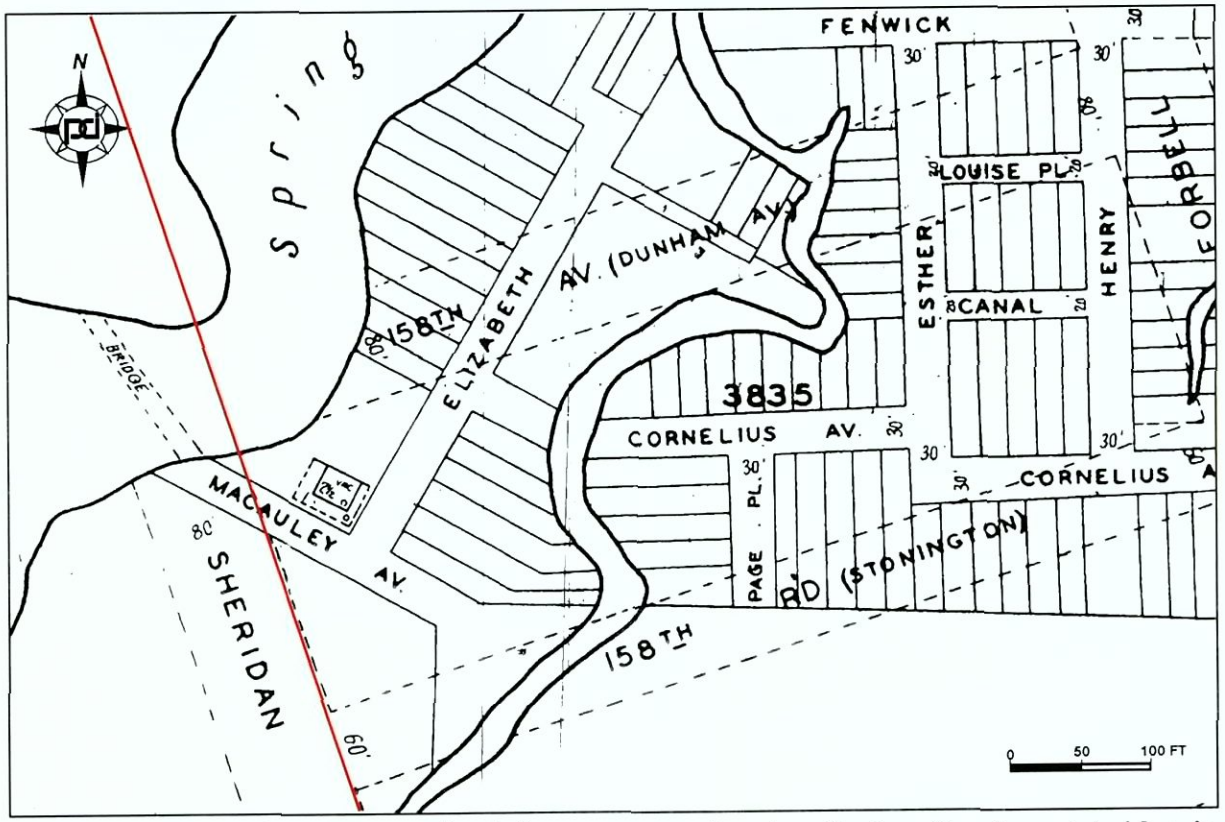


Figure 84. Detail from Borough of Queens map showing Spring Creek and bridge in northern section of Pleasant Point in 1927. Eastern boundary of the restoration site indicated in red. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Sanborn 1927:Vol. 18:73).*

marshes in the same area. This roadway crossed Spring Creek on the Pleasant Point bridge north of the site of the Belt Parkway along the line of Sheridan Avenue (Figure 84) and continued southward for a short distance before dividing, with one branch connecting to the community at Pleasant Point (below). This is clear on an aerial photograph from 1924 (Figure 85).

The 1913 Hyde map (Figure 86) shows the bridge crossing Spring Creek between Elderts Lane and Grant Avenue, rather than at Sheridan Avenue. Perusal of these maps, however, reveals that the bridge crosses the creek at the same location while the placement of the proposed streets differs. A number of structures are depicted on the south side of the creek in the vicinity of the bridge. Their location suggests that they were probably built on piles over the marshes. One appears to be a fire house (labeled "Hose Co.") which most likely served the Pleasant Point community.

Remains of this bridge and the associated causeway were observed during the site visit (Figure 87) at the approximate location indicated on the maps. The roadway apparently crossed the marshes on a plank causeway supported on pilings, which are visible extending south of the wooden bridge site to the Belt Parkway and also for a short distance north of the bridge, where they are covered by landfill. These remains are not within the current restoration site (see Appendix A).

Figure 85. Aerial photograph showing Spring Creek, Pleasant Point Road and bridge in 1924. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Fairchild 1924:Section 18C).*

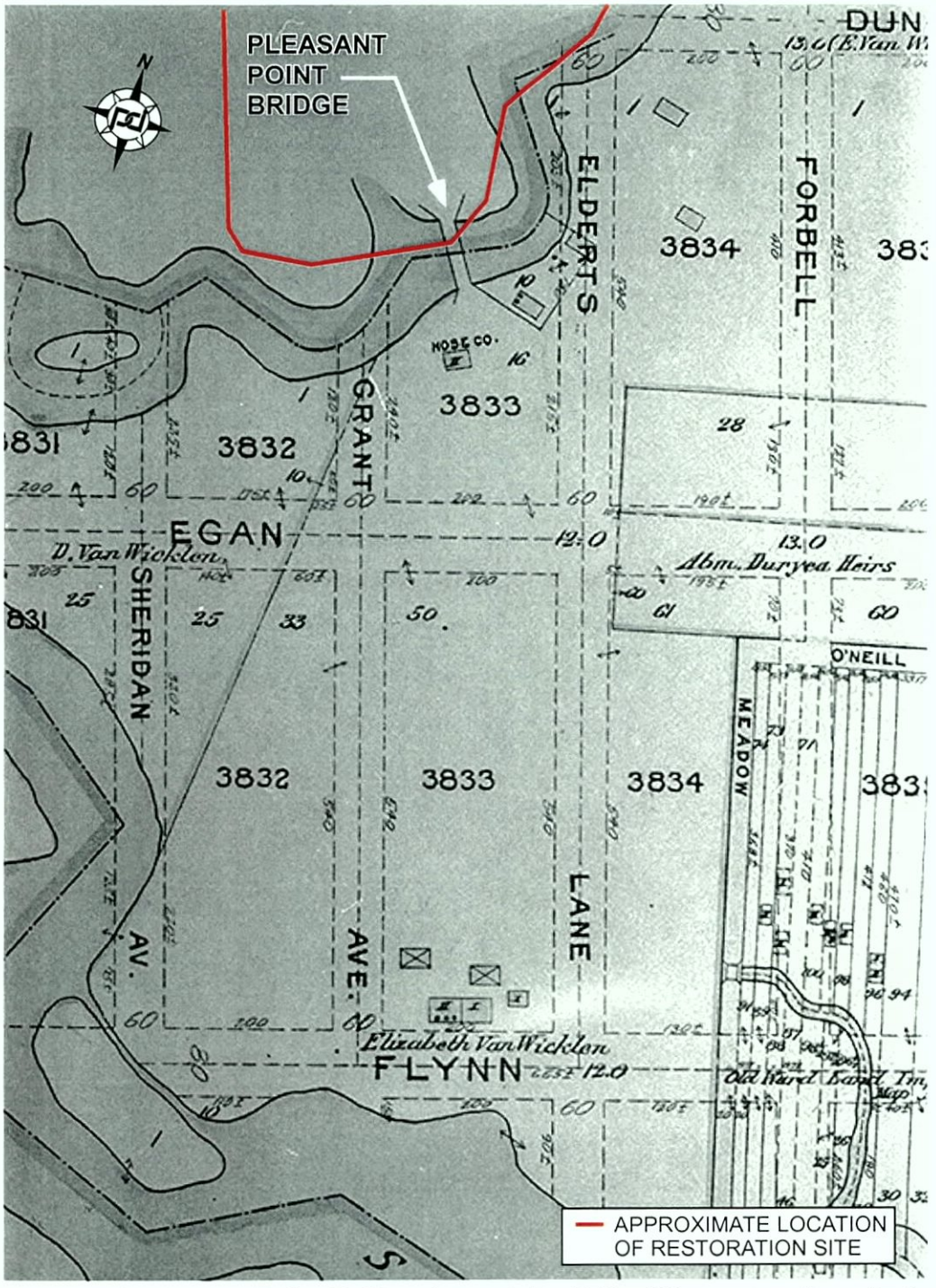


Figure 86. Pleasant Point Bridge (at top) in 1913. The restoration site is indicated in red. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Hyde 1913:Plate 31).*

Figure 87. Remains of Pleasant Point Bridge and causeway, facing west. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Pickman 1999).*

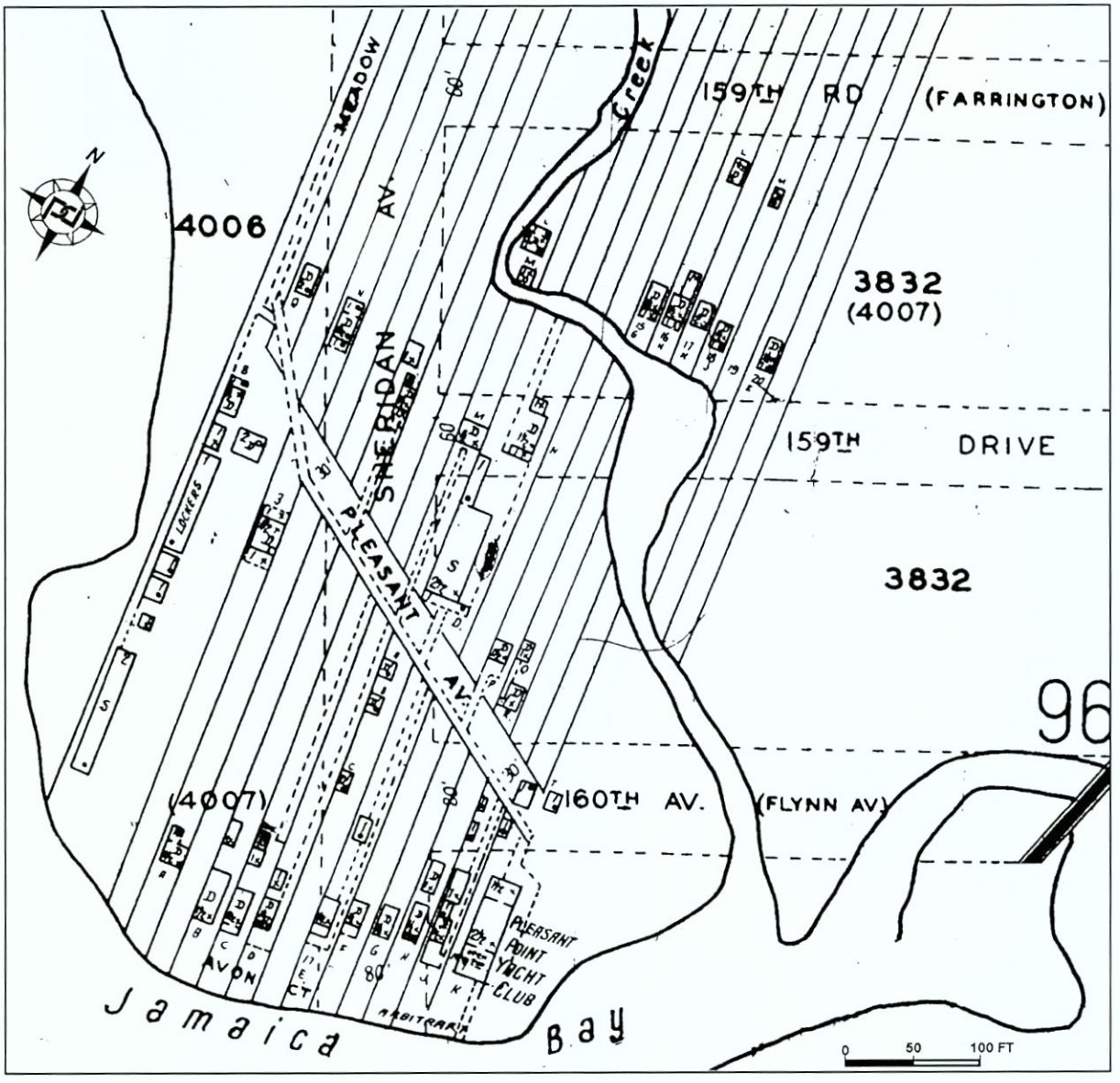


Figure 88. Detail from Borough of Queens map showing southern section of Pleasant Point in 1927. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Sanborn 1927:Vol. 18:73).*

The 1927 Sanborn map (Figure 88) shows the Pleasant Point Yacht Club and a group of small buildings located on the east bank near the mouth of Spring (Old Mill) Creek. This community apparently developed around the turn of the twentieth century. A few small buildings are shown there on the 1901 Hyde map (Figure 89). Pleasant Point was north of the section of the creek which had been bulkheaded, apparently in connection with construction of the Flynn Roadway, placing the Pleasant Point structures well outside the present restoration sites. A few pilings were noted along the shoreline in this general vicinity during the reconnaissance.

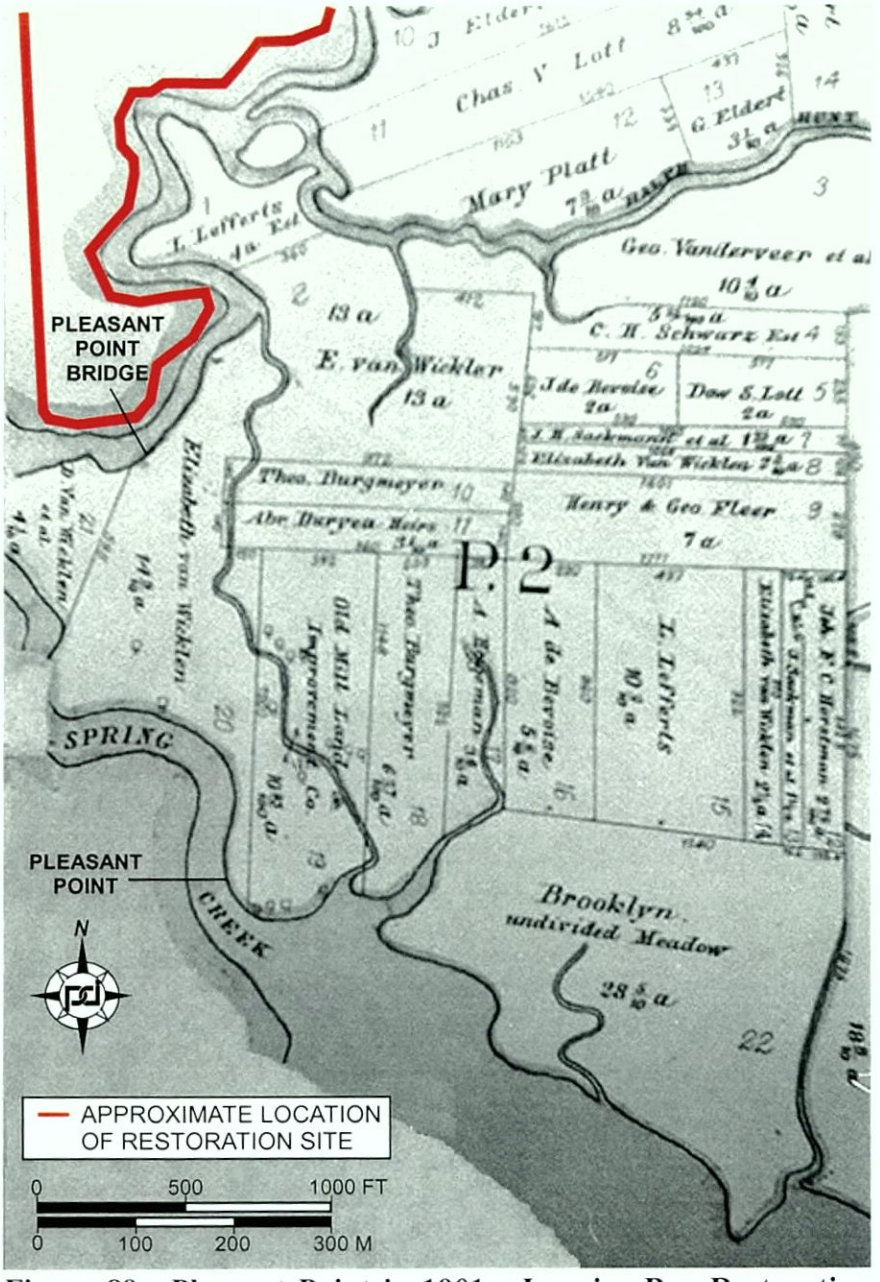


Figure 89. Pleasant Point in 1901. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Hyde 1901).*

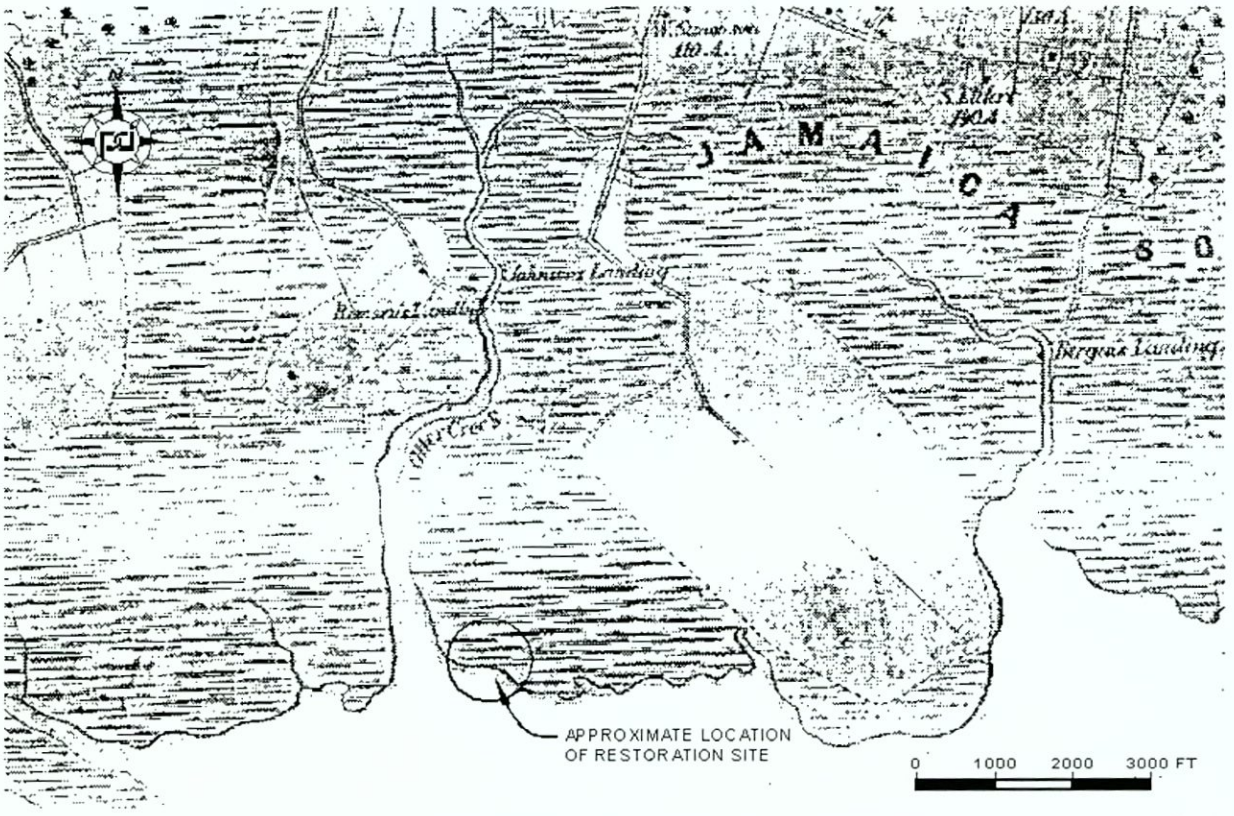


Figure 90. Detail from map of Kings County showing Otter and Bergen creeks in 1852. Jamaica Bay Restoration Project, Kings, Queens and Nassau counties, New York *(Dripps 1852).*

6. Hawtree/Bergen Basins. The Dripps map of 1852 (Figure 90) denotes two landings on opposite sides of Otter Creek (present-day Hawtree Creek). Remsens Landing was situated on an area of upland west of the creek and Johnson's Landing was on its east bank. The locations of both of these landings were well to the north of the restoration site. At this time the creek remained unaltered.

About one mile east of Otter/Hawtree Creek was Bergen Creek with an associated landing, Bergens Landing. This tidal creek, however, was not at the site of the present Bergen Basin but farther east at a location which is now within the boundaries of JFK airport.

The island of raised land east of Hawtree Creek was the site of several homes owned by H. L. Wykoff and M. Hayes which can be seen on the 1873 Beers map (Figure 91). Another structure owned by Capt. J. Briggs is shown south of the two noted above. By 1886 (Figure 92), the latter structure is owned by H. Lau, with a third structure, labeled "S. Fleet," to the south. The former Briggs structure is now labeled "Club House." The 1915 Queens Borough topographic sheet (see Figure 21) shows that the southwestern tip of this upland area extended southward to a point a short distance south of the line of 163rd Avenue, placing it some 1,500 feet north of the restoration site. The houses identified on the nineteenth century maps would have been located east of the

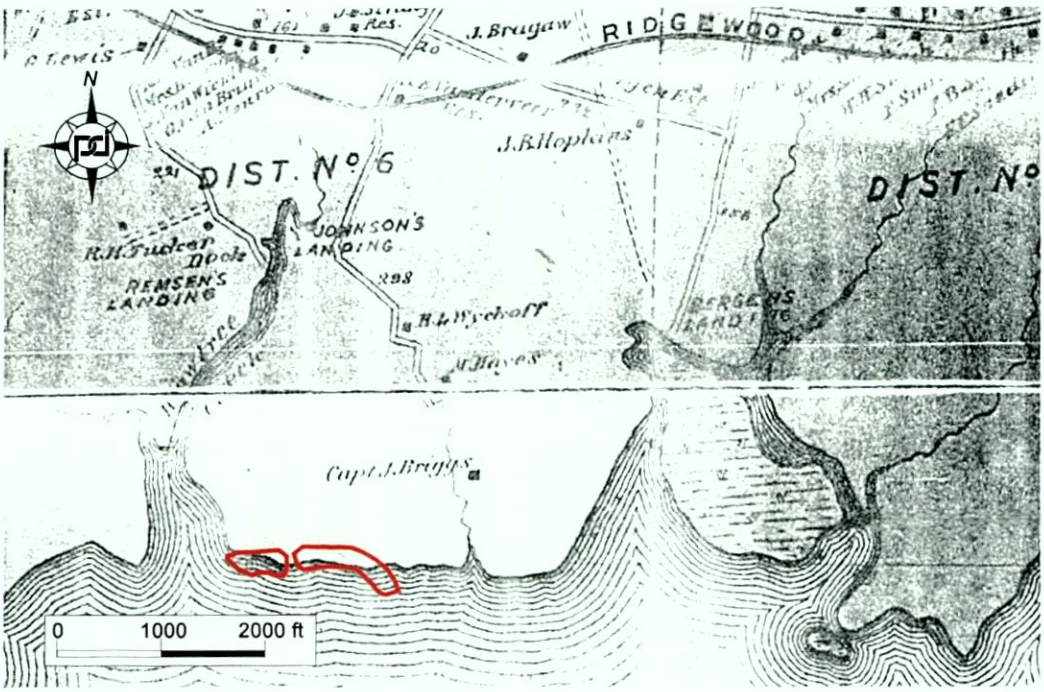


Figure 91. Area surrounding Hawtree Creek in 1873. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Beers 1873).*

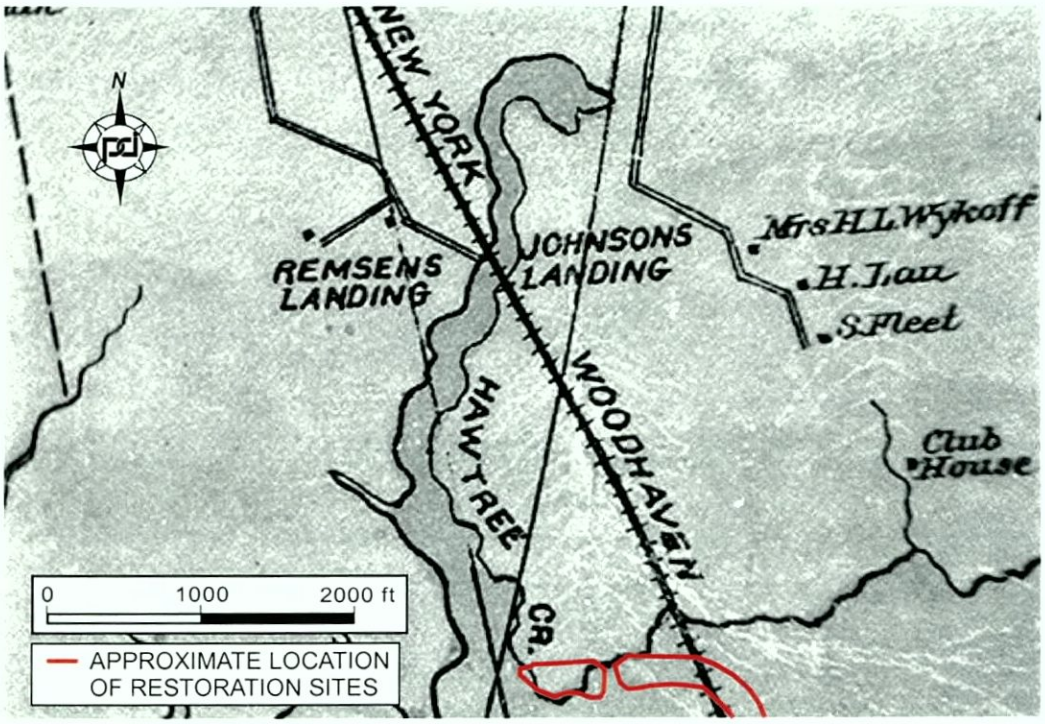


Figure 92. Area surrounding Hawtree Creek in 1886. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Beers 1886).*

present location of Bergen Basin and within the boundaries of JFK airport. Prior to the 1880s, train travel to the Rockaway Peninsula was by means of a route around the eastern end of Jamaica Bay to Far Rockaway. The trip took approximately 90 minutes from Long Island City to the Rockaway beaches. The only other option was to take a steamboat across the bay (Black 1981:74).

In the 1870s James M. Oakley and his company, the New York, Woodhaven and Rockaway Railroad, conceived the idea of building a railroad line on a wooden trestle over Jamaica Bay. This route would reduce the travel time to the Rockaways to thirty minutes. Construction of the nearly five-mile long trestle began in August of 1878 and was completed in March of 1880. Railroad service began in August of that year (Black 1981:74).

> The trestle carried a double track, resting on ties twenty-two feet long. Beneath the ties were caps, each one foot square and thirty feet in length. The understructure of the trestle consisted of 1719 pile bents, located every twelve to seventeen feet along the route .... the top of the road [was] about nine feet above mean high water (Black 1981: 74-75).

The route of the railroad line is shown on maps of 1886 and 1891 (see Figures 92 and 93), leaving the Jamaica Bay shoreline some 800 feet east of the mouth of Hawtree Creek. The station at Howard Beach opened in 1899 and was located on the east bank of Hawtree Creek at what is now 160th Avenue. "There was no depot building; a boardwalk alongside the tracks served to mark the stop" (Seyfried 1966).

In 1886 Oakley sold his rail line and trestle to the Long Island Railroad. Maintenance of the wooden trestle was a problem and fires, including blazes in 1887 and 1892, caused repeated damage. However, the Long Island Railroad continued operating its route across Jamaica Bay until 1950, when a large fire caused extensive damage to the trestle. The railroad, which had declared bankruptcy, decided not to rebuild the trestle. After remaining idle for three years, the route was purchased by the City of New York for incorporation into the municipal rapid transit system, and the existing trestle was constructed (Black 1981:4.)

According to Seyfried (1966) "Long before the coming of the railroad in 1880, fishermen began building homes on stilts on either bank of the winding Hawtree Creek," a settlement which came to be known as Ramblersville. He quotes a 1903 newspaper article describing Ramblersville as

> a picturesque village on stilts. When the tide is low there is almost no water, but at high tide sailboats come to the back doors of the villagers, all of whom are fishermen, clam diggers, oystermen or caterers to the city people who want to go fishing. The principal business is fishing, crabbing and clamming for the New York market.

Although there had been previous squatters in the area, the Ramblersville community developed during the 1890s, and had grown to approximately 500 persons by 1905 (Queens Borough Public Library 1905). The Ramblersville houses were all set on piles as were the boardwalks which connected them. The settlement got its name because the houses were not established on a fixed grid, but followed the banks of the creeks which "rambled" through the marshland (Queens Borough Public Library 1905; Davis 1911). These structures are shown along the banks of Hawtree

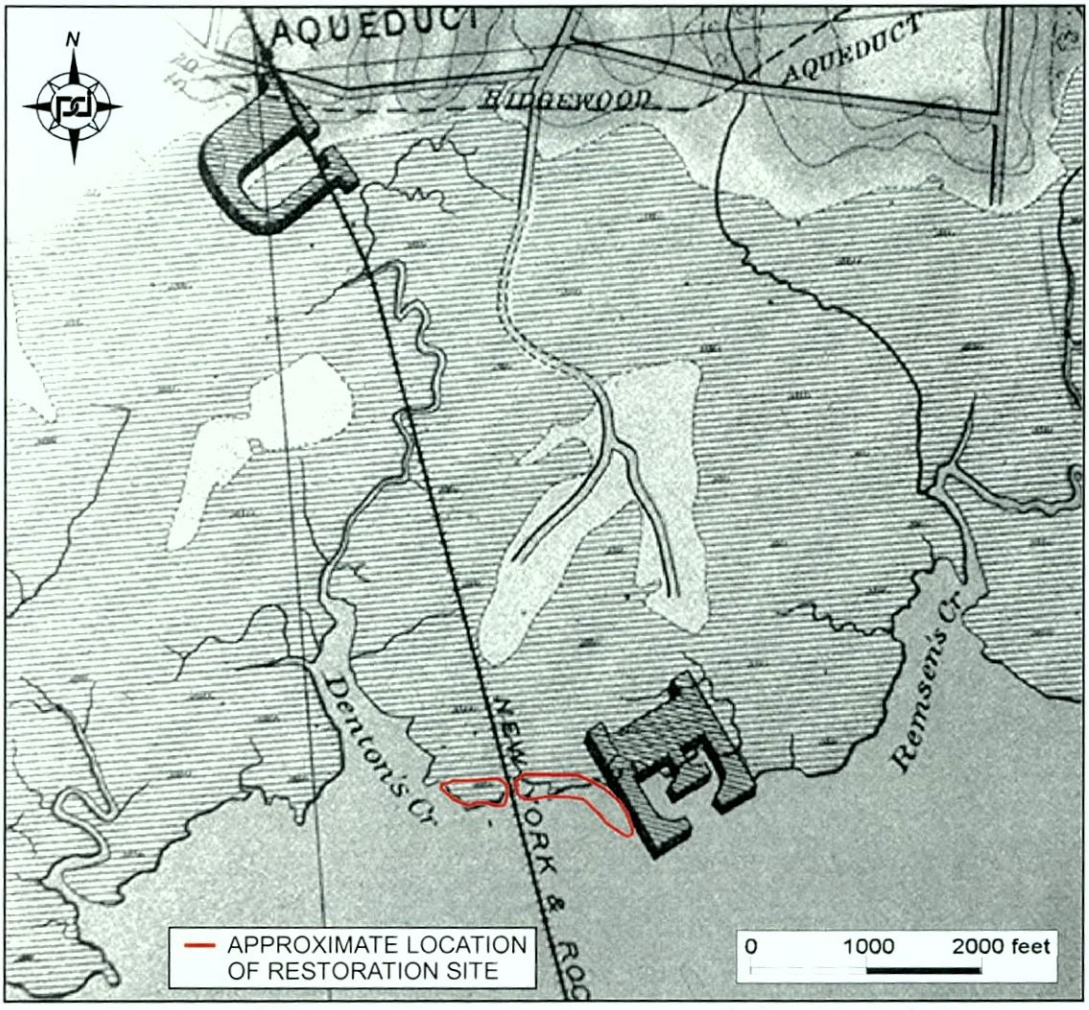


Figure 93. Area of Hawtree Creek showing route of New York & Rockaway Railroad in 1891. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Bien 1891).*

Creek on the 1901 Hyde map (Figure 94). These structures were located west of the railroad and approximately one-half mile north of the restoration site.

As late as 1956 there were buildings on stilts remaining in the Ramblersville area. No sewers meant that "the occupants of the houses throw all of their garbage and other refuse into the creek where it remains for the most part" (Young 1956a).

In the late 1890s, an entrepreneur named William J. Howard built a hotel on pilings over Jamaica Bay some 1,700 to 2,000 feet from the shoreline, to which it was connected by a wooden boardwalk. The hotel was a substantial structure, as can be seen in the print included here as Figure 95. A station on the railroad trestle opened circa 1898. Initially, guests were ferried from the station to the hotel, but in 1900 a second boardwalk, some 1,400 feet in length, was constructed connecting the station with the hotel.

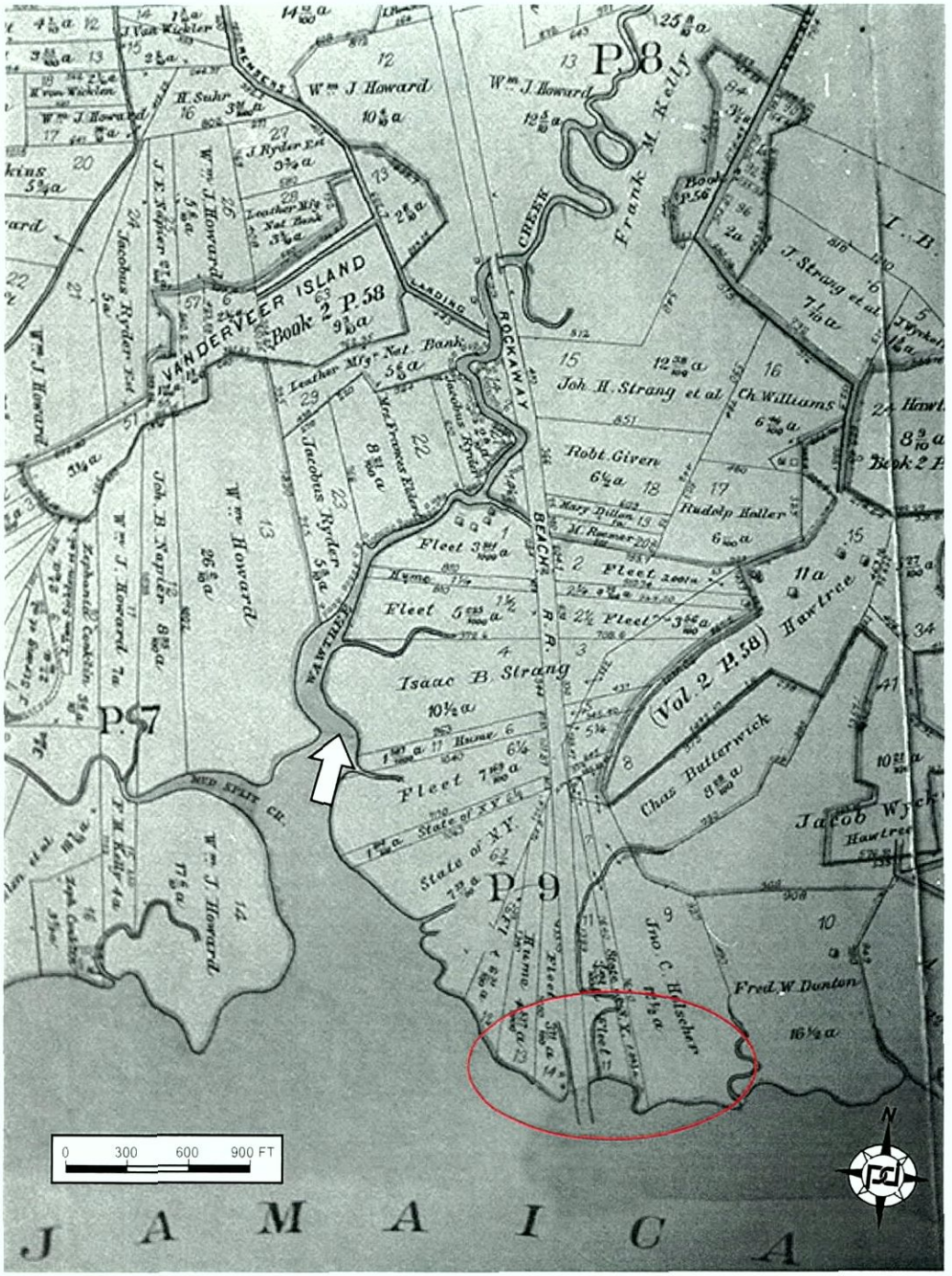


Figure 94. Area surrounding Hawtree Creek (indicated by arrow) in 1901. The approximate location of the restoration site is identified in red. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Hyde 1901:Plate 17).*

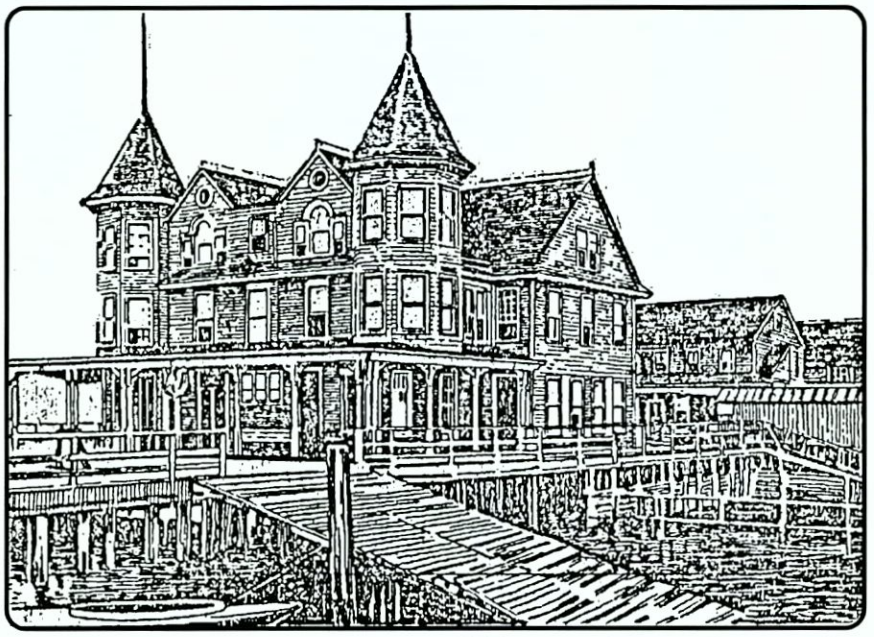


Figure 95. The Howard Hotel ca. 1898. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Queens Borough Public Library n.d.).*

Additional structures were reportedly built along the boardwalk connecting the hotel with the shoreline, including a hotel annex, cottages, a dance hall, stables, bath houses and a private powerhouse generating electricity for the hotel. Most of this complex was destroyed by fire in 1907 and was never rebuilt (Queens Borough Public Library 1905, Seyfried 1966, O'Neill 1948, New York Times 1907).

Although the pier is not shown on the 1901 Hyde map (see Figure 94), the land that Howard had purchased along the shoreline is identified, and the location of the pier is marked by the small peninsula which is shown extending into the bay west of Hawtree Creek. Subsequent landfilling evidently placed the hotel site along the present shoreline. Reportedly it was at the present location of Charles Memorial Park and 98th Street, west of Hawtree Basin (*Forum of Queens* 1997), placing the pier and the Ramblersville community west of the restoration site, which is located east of the basin.

As of 1911, the land east of Hawtree Creek remained unfilled. A map from that year (Figure 96) identifies seven small structures built on piles in the marshes between the creek and the railroad tracks and south of the proposed Van Sicklen/Nolens Avenue, which corresponds to the present 165th Avenue. These likely represented fishermen's shacks or vacation bungalows. One of these stood on a small point next to the mouth of the creek about 175 feet south of 165th Avenue. The others were a group of structures approximately 500 feet south of 165th Avenue, connected to the railroad tracks by a boardwalk. The location of these structures would be within or immediately adjacent to the restoration site (see Appendix A).

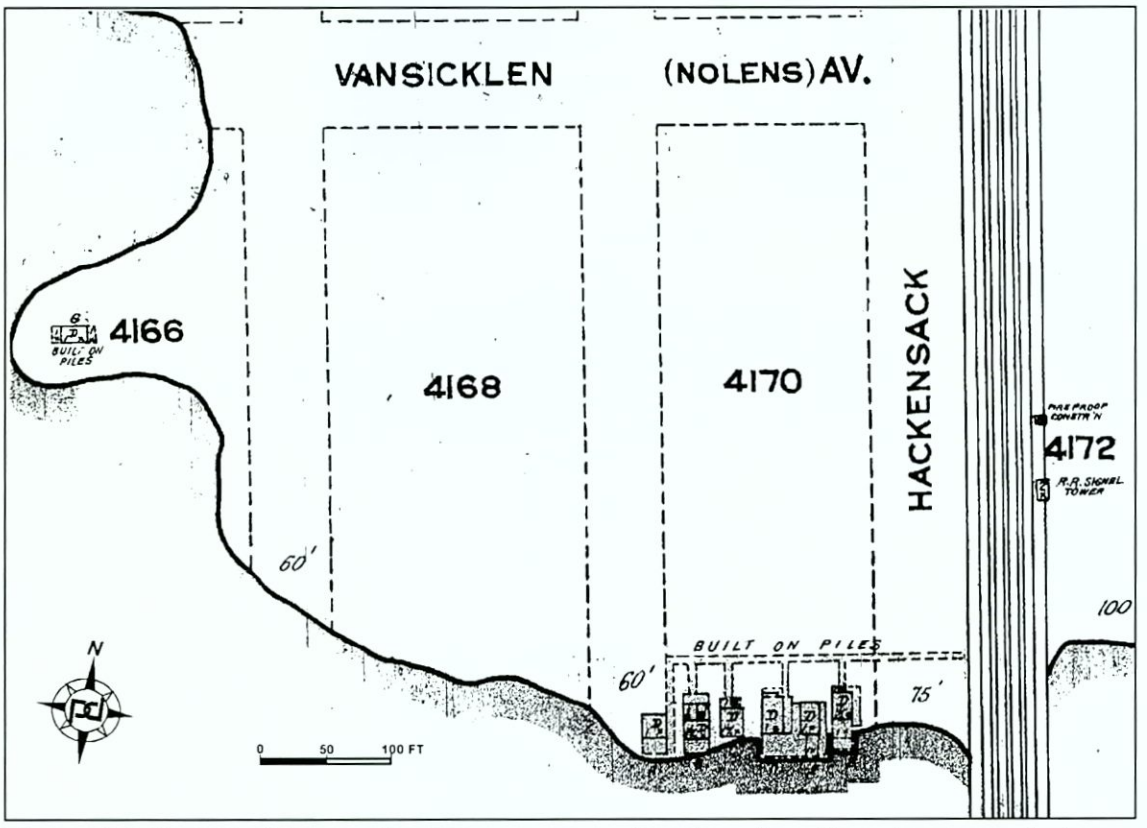


Figure 96. Detail of Borough of Queens map showing shoreline structures between Hawtree Creek and the railroad in 1911. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Sanborn 1911:Vol. 4:96).*

After the destruction of his hotel, William Howard turned his energies to a real estate development known initially as Howard Estates, later known as Howard Beach Estates, and finally as Howard Beach. This development was built on former marshland west of Hawtree Creek filled with sand dredged from the bay. Howard also built a recreational center known as the casino along the west bank of the creek at the present location of the portion of Charles Park located west of Hawtree Basin (*Forum of Queens* 1997:9).

During the 1920s, another real estate entrepreneur, William A. Hamilton, undertook a project similar to Howard's east of Hawtree Creek on landfill newly deposited by the U.S. Navy as a result of creating Shellbank and Hawtree Basins. Dredging had been conducted for a planned submarine base which was not constructed (*Forum of Queens* 1997:10).

By 1927 (Sanborn 1927), a wooden bridge had been built across Hawtree Creek and is shown about 50 feet south of 165th Avenue on Figure 97. The map also shows a group of mostly one-story frame structures which had been constructed on the filled land for a distance extending some 400 feet south of the line of 165th Avenue. These would have been located within the boundaries of the present Frank M. Charles Memorial Park and several of the house sites would be within the boundaries of the restoration site. The 1913 Hyde map (Figure 98) shows three small structures

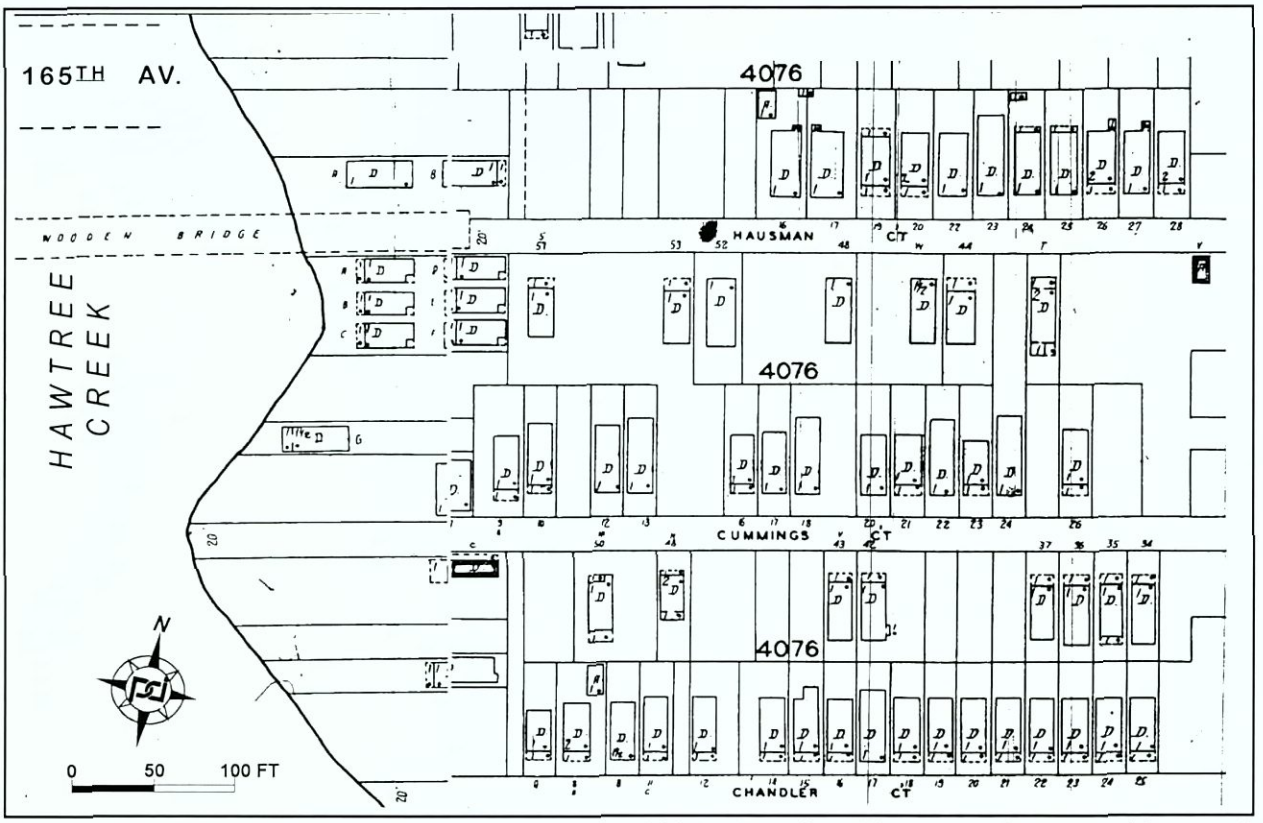


Figure 97. Hamilton Beach community in 1927, showing Hawtree Creek bridge and structures west of Long Island Railroad. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Sanborn 1927:Vol. 18:62).*

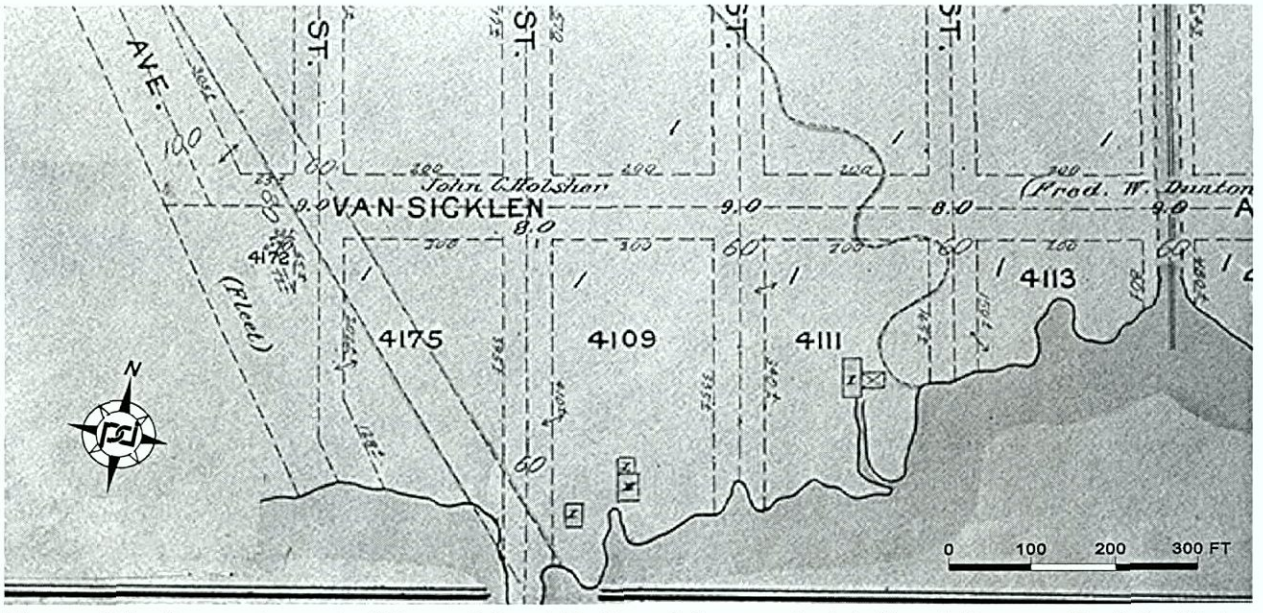


Figure 98. Property east of Long Island Railroad (present vicinity of Bergen Basin). Note: Lefferts Avenue is at left; Van Sicklen Avenue is present 165th Avenue. The restoration site lies south of Van Sicklen Avenue. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Hyde 1913:Plate 21).*

Figure 99. Water tank at mouth of Bergen Basin. Jamaica Bay Restoration Project, Kings, Queens and Nassau counties, New York *(Pickman 1999).*

near the shoreline between the railroad tracks and what is now the location of Bergen Basin. Within ten years the East Hamilton Beach community, situated east of the railroad tracks and currently outside the restoration site, had been developed. This community consisted of houses built on four canals dredged out of the marshland. The dredge spoil was apparently utilized to fill in the marshes between the canals. A canal had also been dredged east of the homes. The mouth of this canal would be at the present location of Bergen Basin.

According to Willensky and White 1988:789 (cited in Kearns et al. 1991:11), the homes in the East Hamilton Beach Community were razed and the area, including the canals, filled in ca. 1942 when Idlewild airport, the predecessor to JFK, was constructed. The existing Bergen Basin was subsequently constructed. A large circular water tank on the western tip of Bergen Basin, noted during the site visit (Figure 99), was installed prior to 1966 (Kearns et al. 1991:11). Although it is not shown on the 1948 coast survey chart it is identified as a water tank on a recent topographic map (USGS 1979; see Figure 8). The upper portion served as the storage reservoir with pumping machinery located in the lower portion. The tank is not within the current restoration site boundaries.

7. Motts Point/Bayswater State Park.

As noted in Section 4.2.1, all of the Rockaway peninsula was owned by the Cornell family until ca. 1809. After the property was divided among the Cornell heirs, the portion now known as Bayswater was sold to Calvin S. Mott in 1843 (Gloeggler 1973). The 1852 Dripps map (Figure 100) identifies three structures belonging to "Mott" on the peninsula. The southernmost appears to have been located at the western end of what is now Bayswater Avenue. The other two structures were located on the northeastern part of the peninsula later known as Mott's Point or Breezy Point. These structures were most likely in the vicinity of what was later the eastern end of Point Breeze Place.

The 1859 Walling map (Figure 101) does not show structures on the Bayswater Peninsula, apparently an omission on the part of the mapmaker. However, a roadway which corresponds with the present Mott Avenue is evident, which was not delineated on the earlier map. This road branches near Motts Point, with the right branch leading to the vicinity of the Mott structures shown on the 1852 map.

The Hurdis Dock. The 1873 Beers map (Figure 102) shows that a dock ("Hurdis Dock") had been built on the northeast corner of the point. The southernmost of three structures in the vicinity of the dock is described as the residence of J. Hurdis, proprietor of a lumber yard located between the dock and the Hurdis residence. West of the Hurdis buildings is a structure belonging to R.T. Terry. Two of these structures may be the same ones labeled "Mott" on the 1852 map.

The 1879 coast survey chart (Figure 103) shows the Hurdis structures in detail and also shows the outline of the Hurdis property boundaries. The map shows two large rectangular buildings and two smaller ones within a rectangular area extending northward to the shoreline through an area of marshland. It is likely that this represents the Hurdis Dock and lumber yard as indicated on the 1873 map. The Hurdis property and dock as shown on the 1891 Wolverton map (Figure 104) north and east of the end of Point Breeze Place, corresponds with the location of these features on the 1879 map. The two large rectangular buildings, presumably associated with the lumber yard, are no longer shown. A building that probably represents the Hurdis house is shown south of Point Breeze Place and the small structure shown on the Hurdis Dock appears to correspond with one shown on the earlier map. This latter structure, as well as the dock itself, would be within the restoration site boundaries.

No indication of the Hurdis dock or associated structures were noted during the site reconnaissance, but except for the immediate shoreline, this area could not be closely examined. It appears to have been covered with later landfill, with a band of phragmites and dense brush extending along the shoreline between the beach and an upland area (see Figure 25).

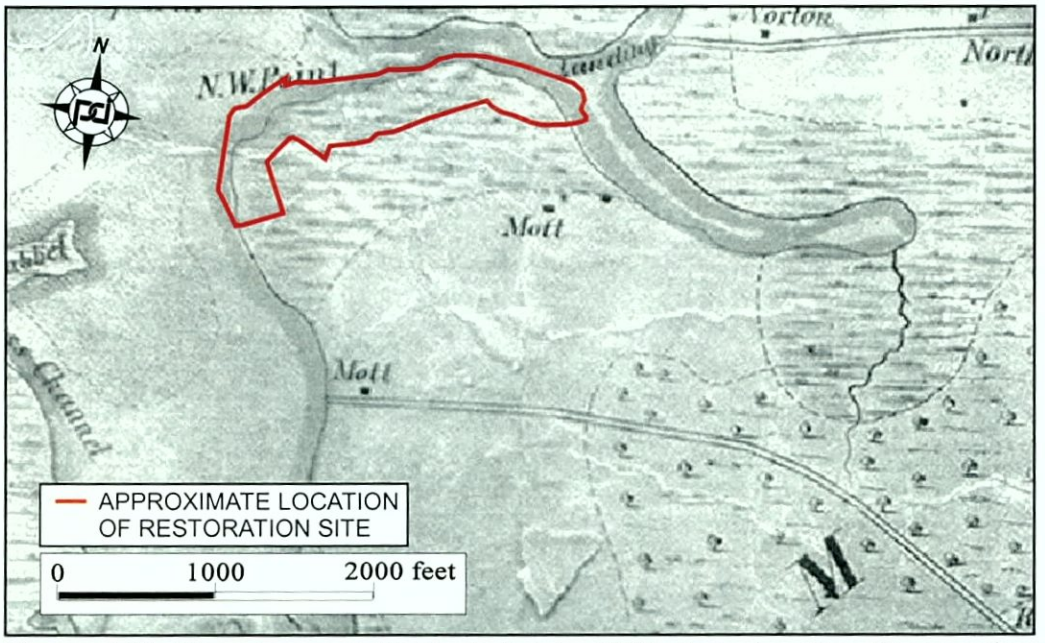


Figure 100. Structures at Motts Point in 1852. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Dripps 1852).*

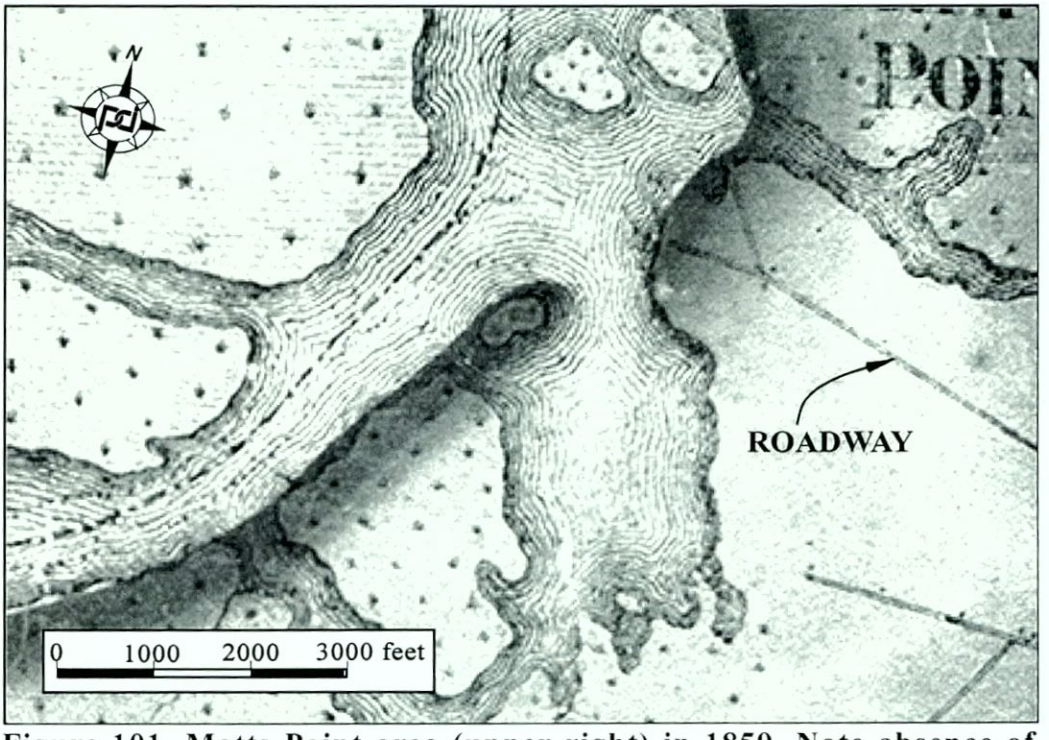


Figure 101. Motts Point area (upper right) in 1859. Note absence of structures. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Walling 1859).*

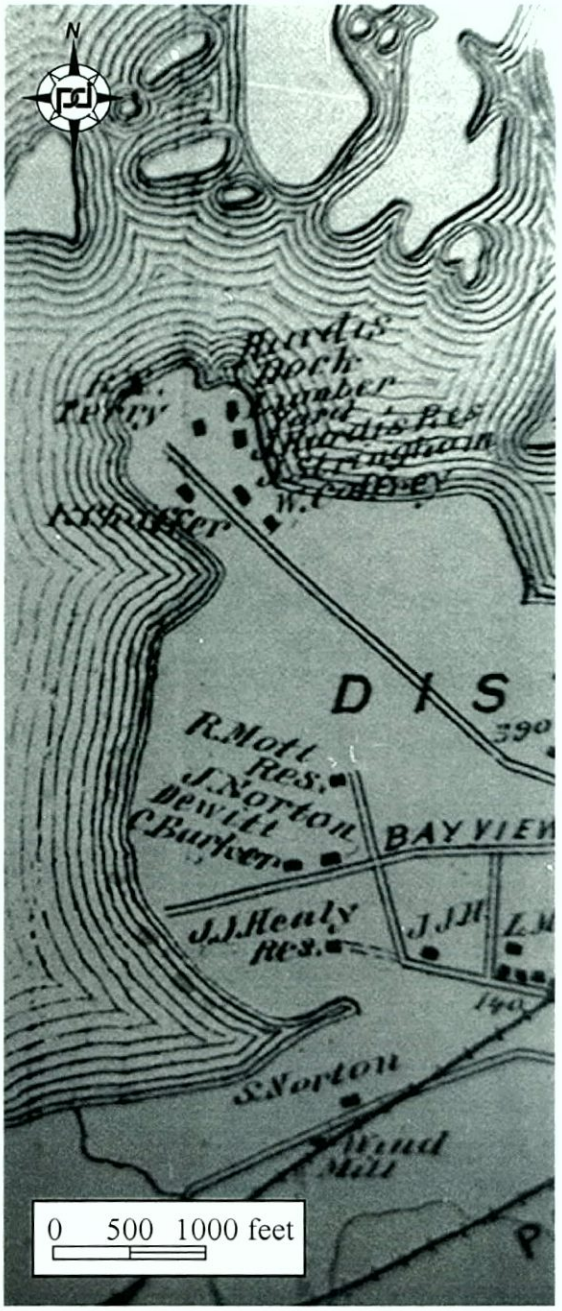


Figure 102. Detail from atlas showing Motts Point in 1873. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Beers 1873: 118).*

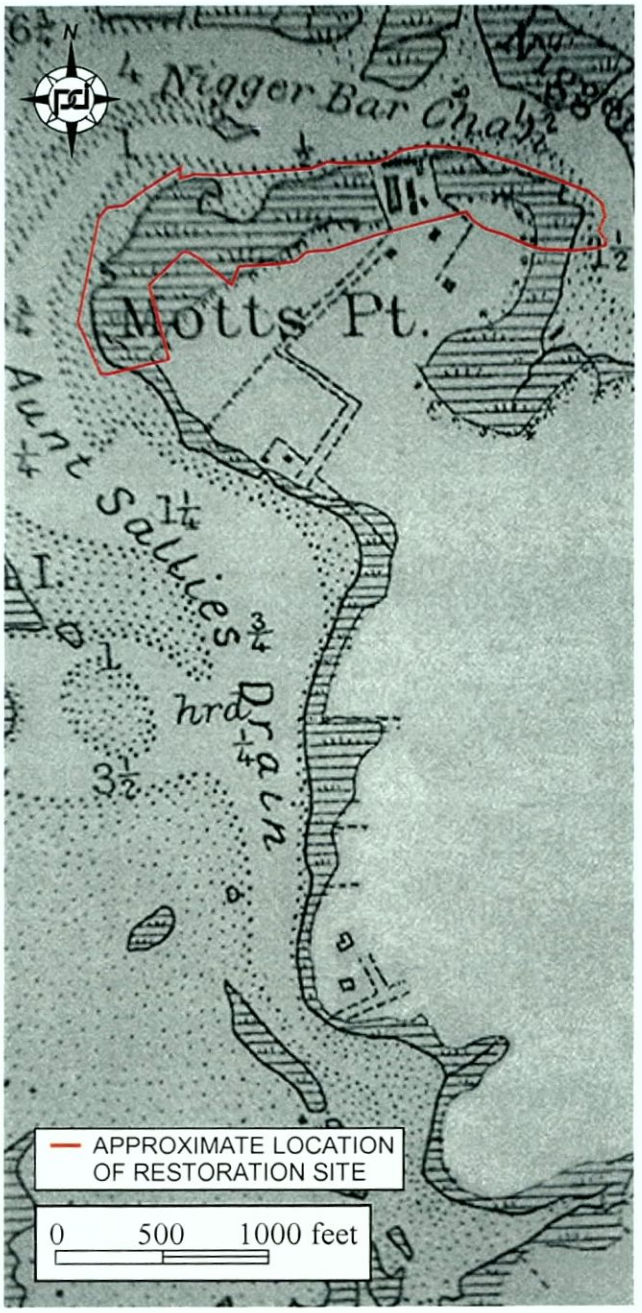


Figure 103. Detail from coastal survey chart showing Motts Point in 1879. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(USCGS 1879: 18).*

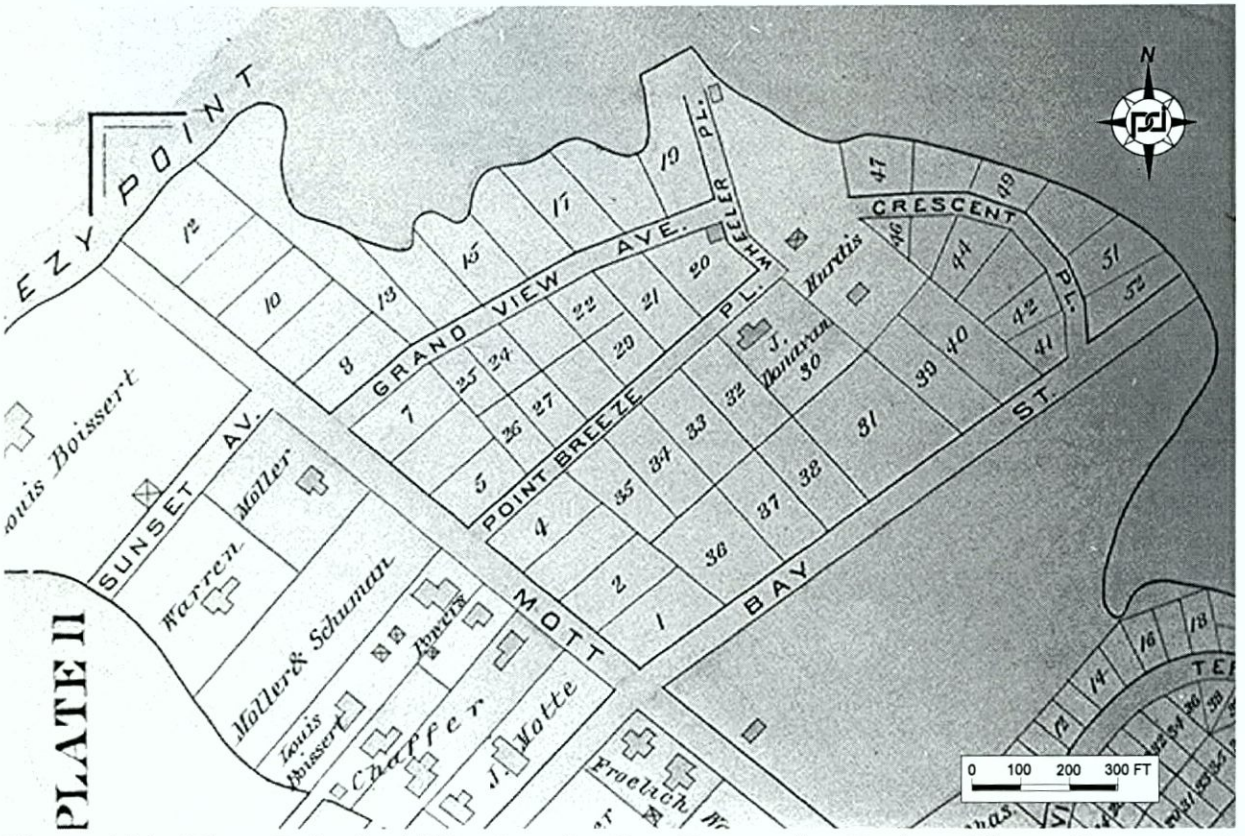


Figure 104. Motts Point in 1891. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Wolverton 1891:Plate 11).*

The Boissert Property. Development of the Motts Point/Bayswater area in the latter portion of the nineteenth century was largely due to the efforts of William Trist Bailey, who purchased the land with the intention of building homes for sale. The centerpiece of the Bayswater Development was to be the Bayswater Hotel, which was located approximately 2,000 feet south of the restoration site, southeast of the intersection of Waterloo Place and Westborne Avenue (Gloeggler 1973).

William Bailey was reportedly born at Bayswater, England, which provided the name for the development (Queens Borough Public Library 1910). Gloeggler (1973) stated that Bailey "laid out the major section in 1878," but the map produced the following year (see Figure 103) reflects no construction of homes.

A promotional brochure for the Bayswater Development stressed the upland of the area: "At Bayswater the land is all high, beautiful and undulating, presenting a variety of villa sites, the natural topography has been preserved as far as practical for perfect drainage" (Bailey c. 1880). A print showing the type of house which Bailey was building at Bayswater (Figure 105) implies that he was trying to attract the affluent to his development.

By 1886 (Figure 106) a number of houses had been erected, apparently by Bailey, along what is now Mott Avenue. One of these, at the northern end of Mott Avenue, is attributed to S. Boissert. Figure 107 provides a close-up of the Boissert property at Breezy Point (Motts Point) west of Mott Avenue.

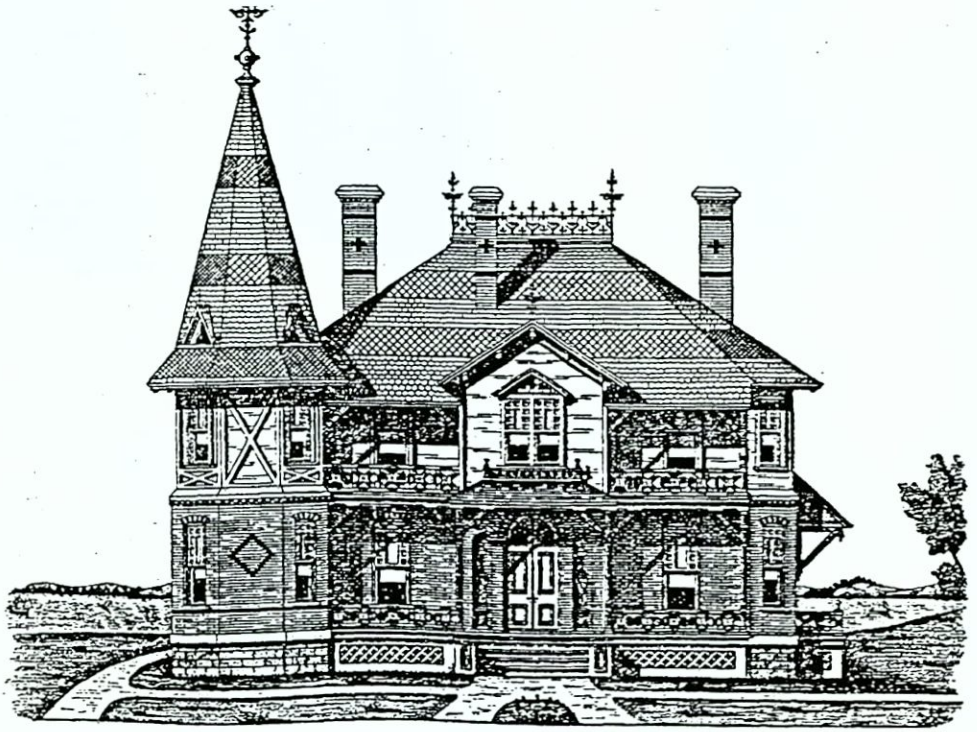


Figure 105. The Bailey House, ca. 1880. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Bailey ca. 1880).*

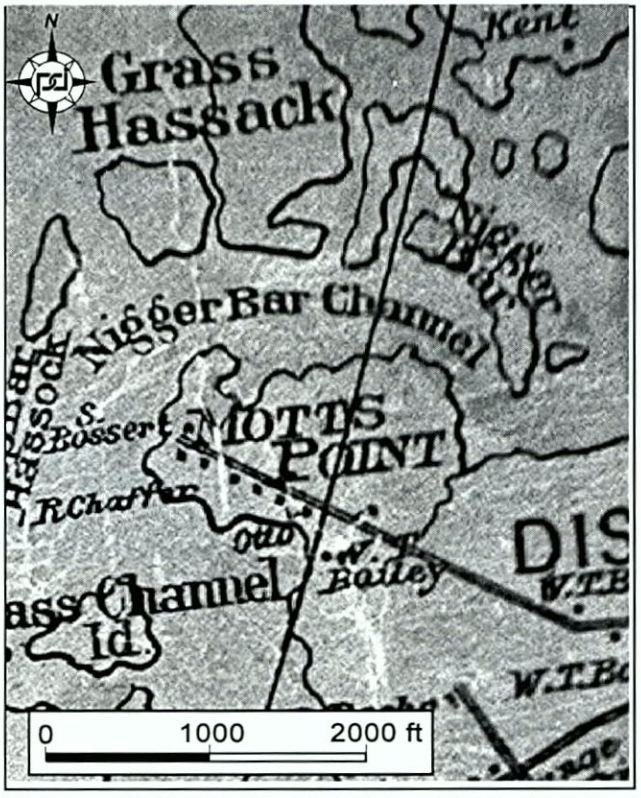


Figure 106. Motts Point in 1886 showing structures built along present-day Mott Avenue. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Beers 1886).*

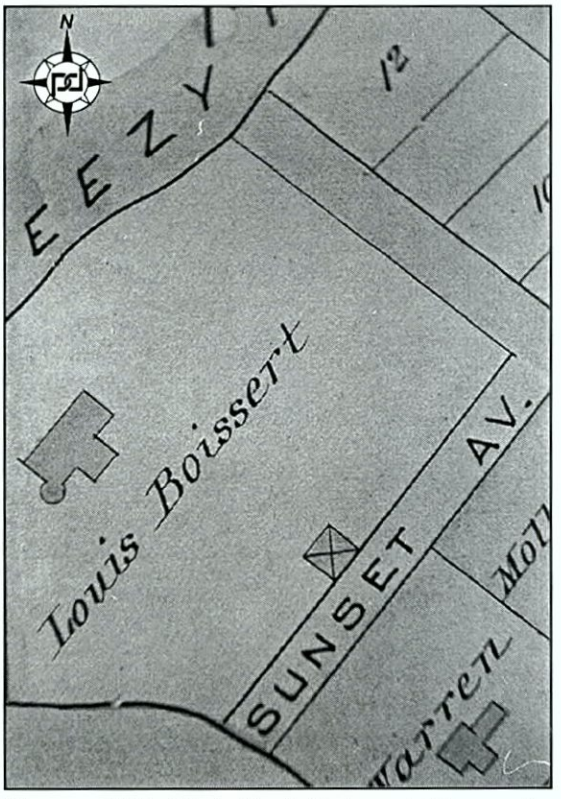


Figure 107. Detail of Boissert House in 1891. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Wolverton 1891:Plate 11).*

Both the 1852 and 1873 maps (see Figures 100 and 102) show the northernmost portion of Motts Point as consisting of marshland. This would later include the location of the Boissert house. If these maps are correct, the house site would necessarily have been filled in prior to construction. The 1859 Walling map (see Figure 101), however, as well as later nineteenth and early twentieth century maps (Figures 108, 109 and 110, next subsection), indicate the shoreline approximately at its present location. These maps, as well as observation of the area and the description of the development noted above suggest that the 1852 and 1873 maps are inaccurate and that the northwestern portion of Motts Point, where the Boissert house was located, was most likely natural upland.

The Boissert/Heinsheimer Property. The Boissert house and outbuilding are evident southwest of Mott Avenue on a 1901 map (Figure 108). Although no owner is identified on the map, Louis J. Boissert is listed as a member of the Bayswater Yacht Club that same year (Pettit 1901:13-14), implying his continued residence there.

A different map from 1901 (Figure 109) shows the Breezy Point (Boissert) house as a 2½-story L-shaped dwelling. A wind mill and a water tank are among the outbuildings to the southeast. Whether the wind mill pump system dates to the construction of the house in the 1880s or is a later addition is unknown. A dock extends into the bay north of the house.

The plan of the house underwent alterations in the next decade. The property is depicted in greater detail on a map from 1912 (Figure 110). Its approximate location is the same as on earlier maps but an addition has been built at an angle to the main portion of the house. The outbuildings have also changed. In place of the wind mill and water tank are a greenhouse, garage and laundry room. The original main house shown on the earlier maps may have been razed and replaced, although it is more likely that the original building had been modified and extended.

The 1912 map does not identify the owner of the property, although a 1913 advertisement announced that "at Breezy Point, now Motts Point, at the tip of Mott Avenue . . . A.M. Hemsheimer has a villa costing $150,000. The premises have a beautiful frontage on Jamaica Bay" (Gloeggler 1973). The renovated structure depicted on the 1912 map (see Figure 110) is the Hemsheimer house. A 1908 article (Queens Borough Public Library 1908) identifies "Louis A. Heinsheimer" (note the variant spelling) as a New York banker.

The first public water system in the Rockaways was completed in 1885 by the Queens County Water Company (Bellot 1918:37). When the system was extended to the Motts Point area is unknown, but by 1901 six-inch water pipes had been installed along Mott Avenue and the western portion of Point Breeze Place (Sanborn 1901). When the house at Motts Point was renovated between 1901 and 1912, the former wind mill/water tank system was likely discarded for a connection with the public water supply. This probably occurred when Hemsheimer acquired the property.

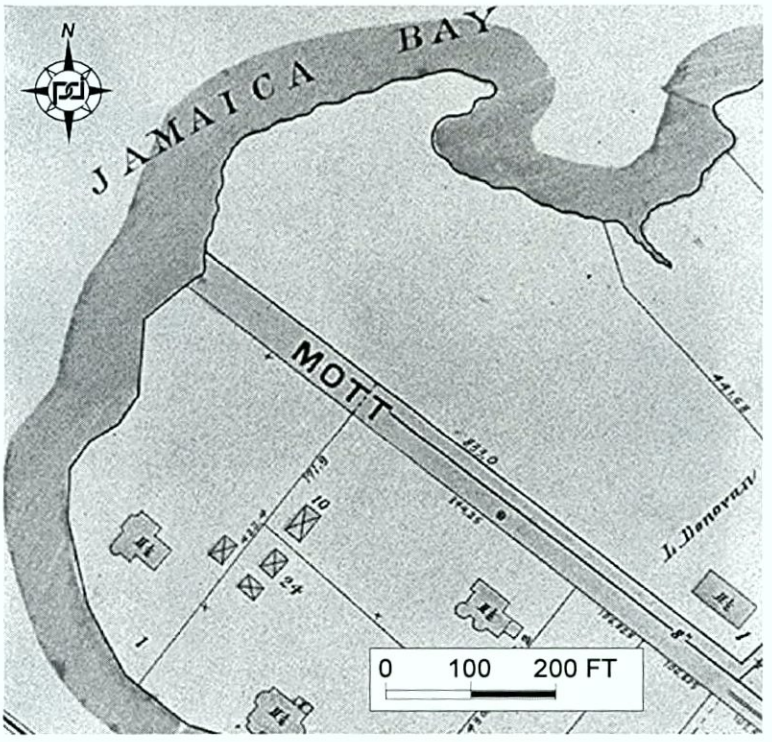


Figure 108. The Boissert House site at Mott's Point in 1901. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Hyde 1901:Plate 22).*

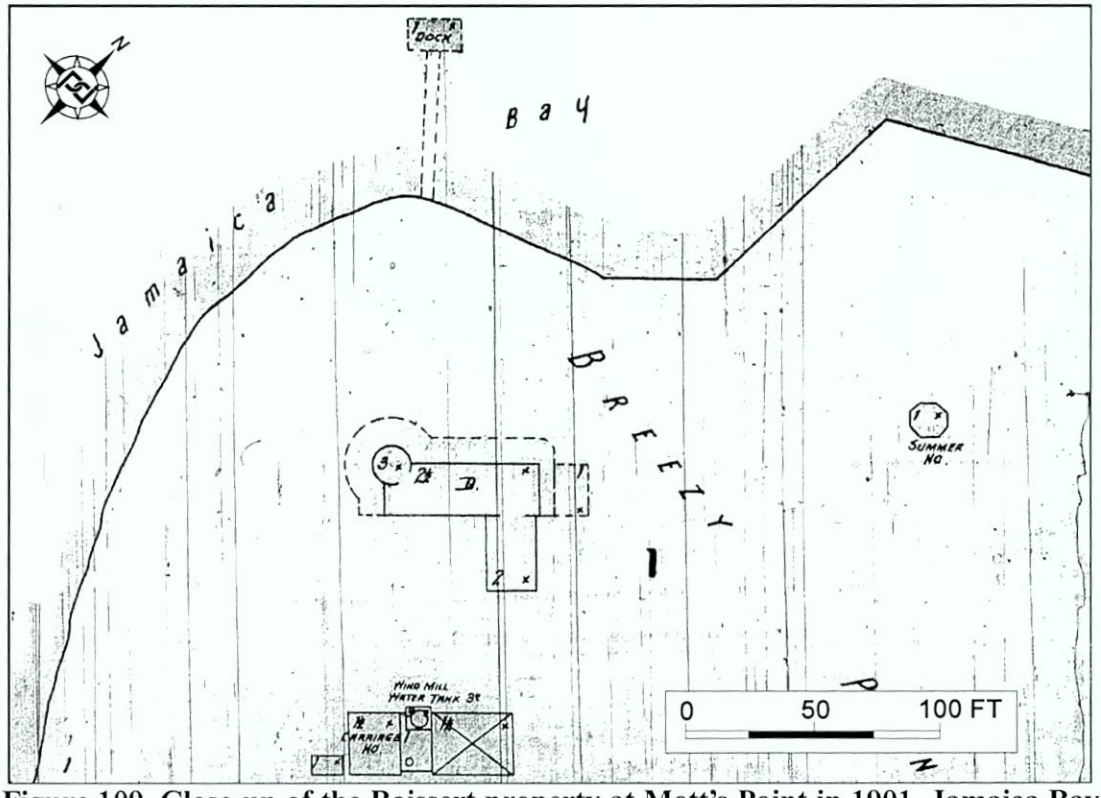


Figure 109. Close-up of the Boissert property at Mott's Point in 1901. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Sanborn 1901).*

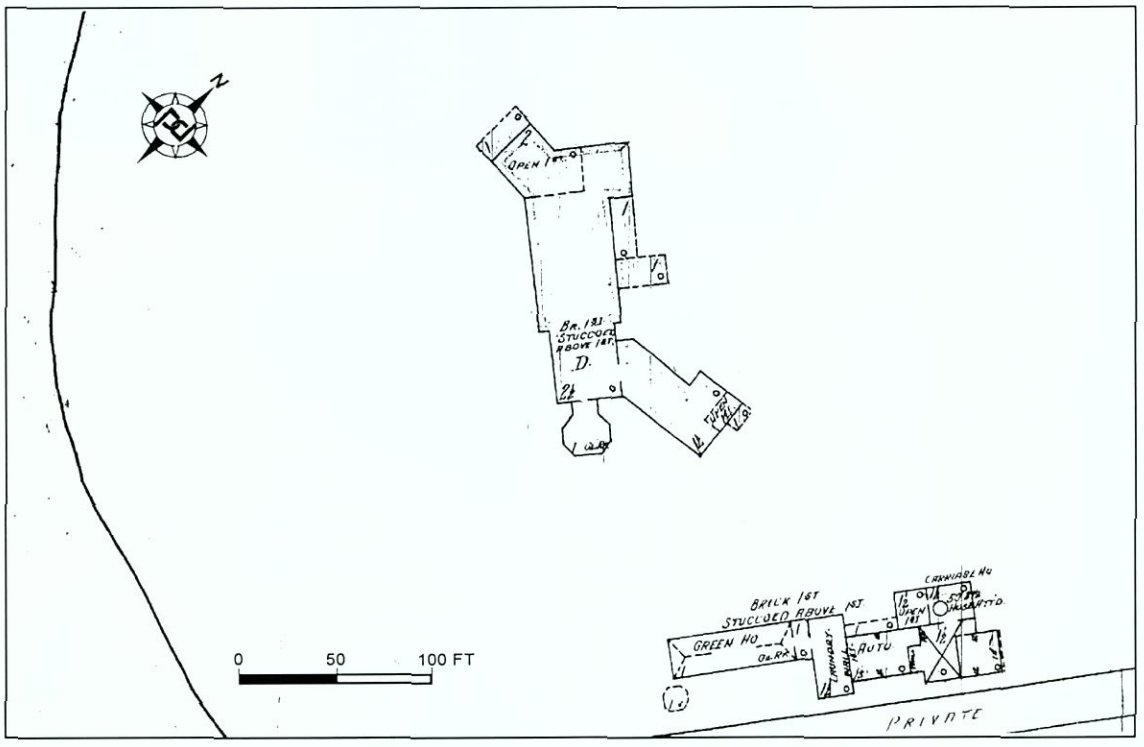


Figure 110. The Boissert/Hemsheimer property in 1912. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Sanborn 1912:Vol. 8).*

On a 1933 map (Figure 111), the buildings at Mott Point display a similar configuration as they did in 1912, although the property has been converted to institutional use as the Natalie & Louis A. Heinsheiner (sic) Memorial Hospital. That designation is still evident on a 1951 map. By 1990 (Figure 112), the property is identified as a "Jewish Day Camp." The main building hah not changed, but a two-story structure had been added to the northeast. The former outbuildings to the south were no longer extant.

All of the structures on this property were razed after 1990. The property was acquired by the State of New York for incorporation into Bayswater Point State Park in 1991 (Rockaway *Journal* 1991). No record of a cultural resources report for the park was available at the time of the documentary review. When the park was dedicated a member of the Audubon Society noted that "Bayswater Point has a number of special natural features including the last patch of mature native oak forests on Jamaica Bay" (Rockaway *Journal* 1991). This is another indication that upland areas within the project site are natural rather than fill areas.

The site of the Boissert/Heinsheimer house is within the upland portion of the restoration site. During the site reconnaissance aboveground remains of structures were noted, including foundations of the main portion of the house and the angled extension added during the early twentieth century (Figure 113). Remains of the outbuildings along the southeastern boundary of the property and another unidentified brick feature were noted. These remains are outside the restoration site.

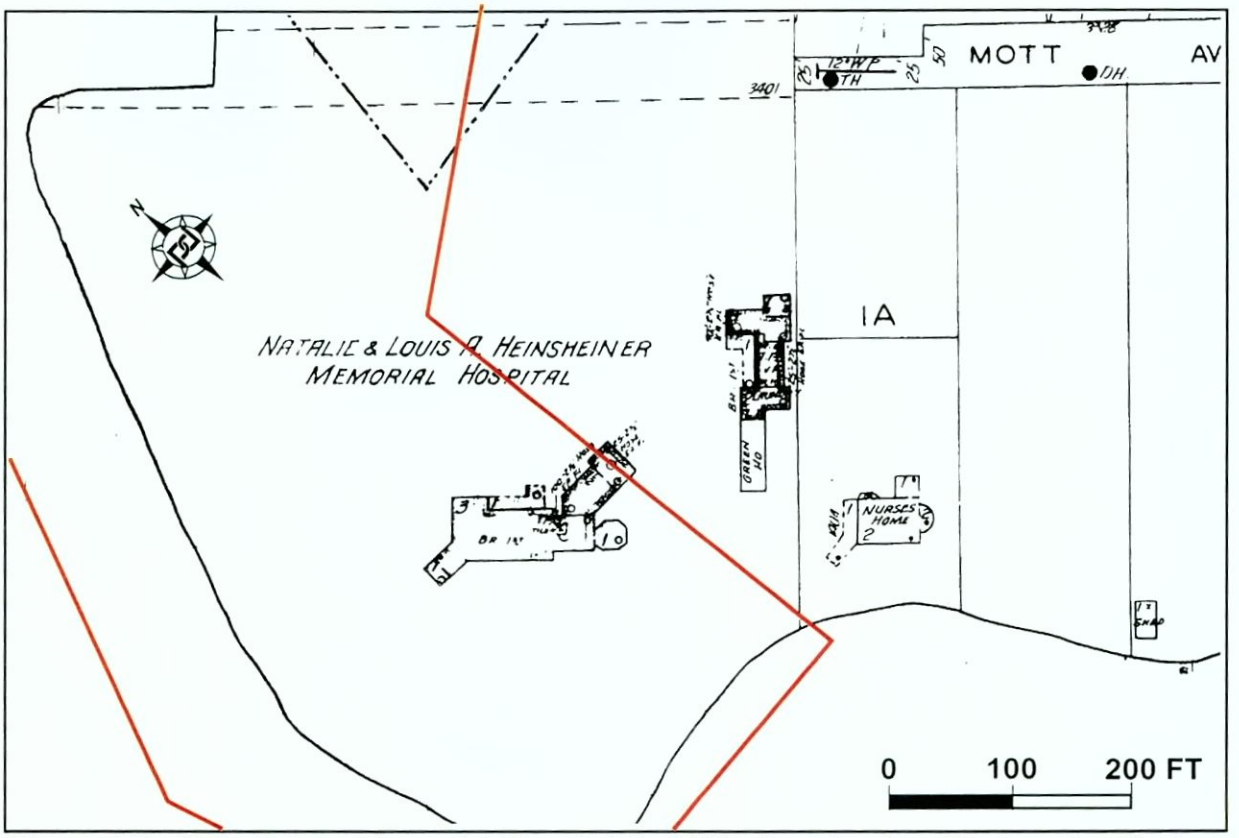


Figure 111. Heinsheiner Memorial Hospital in 1933. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Sanborn 1933).*

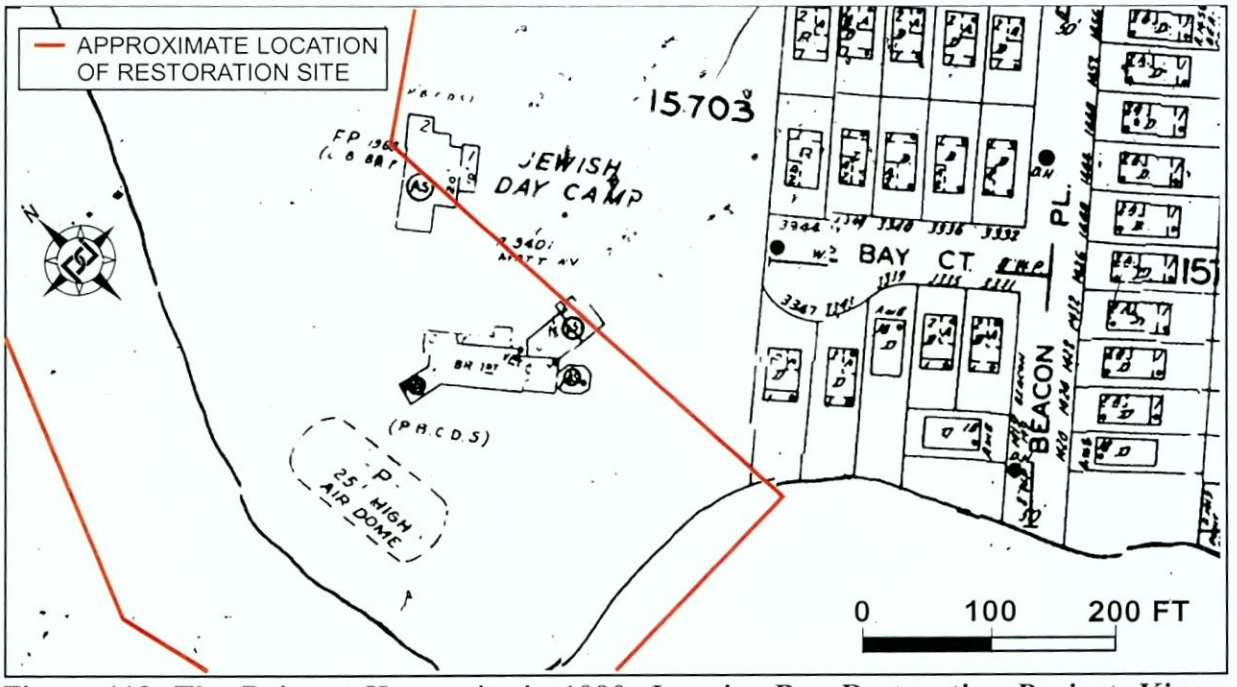


Figure 112. The Boissert House site in 1990. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Sanborn 1990).*

Figure 113. Foundation of Boissert/Heinsheimer House, facing northwest. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Pickman 1999).*

Sea Wall. The 1901 Sanborn map (see Figure 109) appears to show bulkheading along the northwest shoreline of Motts Point between the Boissert house and the line of Mott Avenue. The configuration of the shoreline protection structure as shown on later maps (see Figures 110, 111 and 112) differs from that shown in 1901. This later structure may represent the present concrete seawall (Figure 114), although in dilapidated condition. It may have been constructed when Heinsheimer assumed ownership of the property.

The Hurdis Site. The 1901 Hyde map (Figure 115) continues to show a tract of land at the end of Point Breeze Place which appears to correspond to the configuration of the Hurdis property as noted on the 1879 and 1891 maps (see Figures 103 and 104). A 2½-story house, not illustrated on the earlier maps, is situated north of the line of Point Breeze Place with an outbuilding some 80 feet to the east. The main house appears to be within the boundaries of the restoration site. A stand of trees and bramble suggestive of a house site was noted in the approximate site of this structure during the site visit. The dense bramble prevented a closer examination of the site. The dock shown on the nineteenth century maps does not appear on the 1901 map, but a small, one-story structure is shown along the shoreline just west of the property line. The 2½-story structure is not evident on maps from 1907 (Figure 116) or 1912 (Figure 117). A two-story house is depicted south of Point Breeze Place in 1901 and 1907, but it, too, is gone by 1912. The one-story building near the shoreline is shown on all three; the 1912 map shows a walkway leading to this building.

Figure 114. Remnants of concrete seawall at Motts Point, facing northeast. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Pickman 1999).*

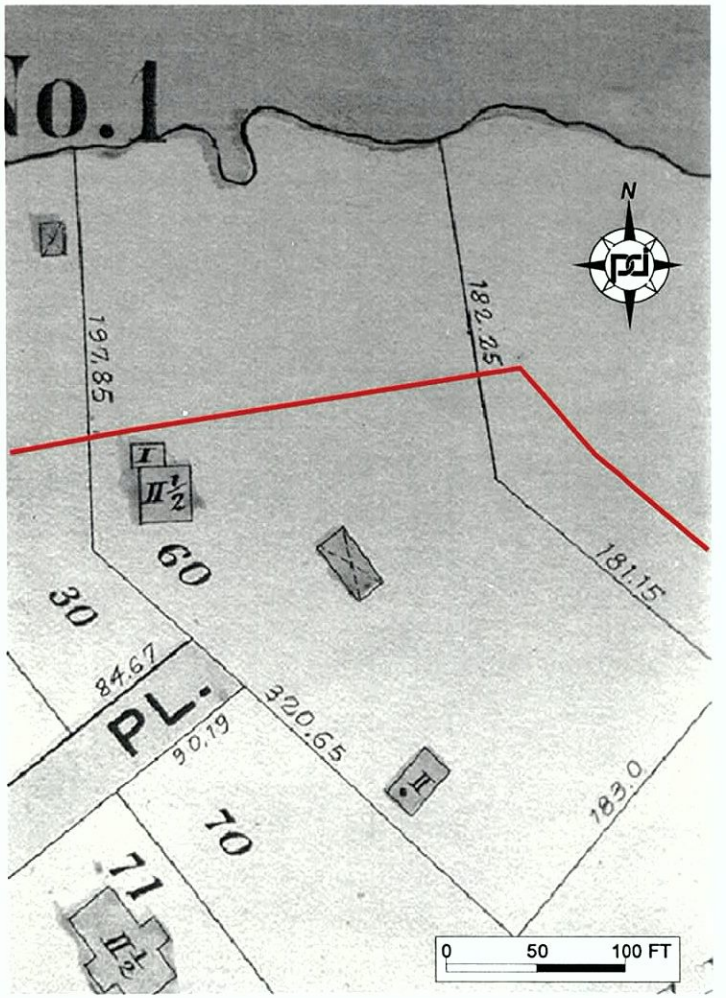


Figure 115. The Hurdis property at Motts Point in 1901. The southern boundary of the restoration site is indicated in red. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Hyde 1901:Plate 22).*

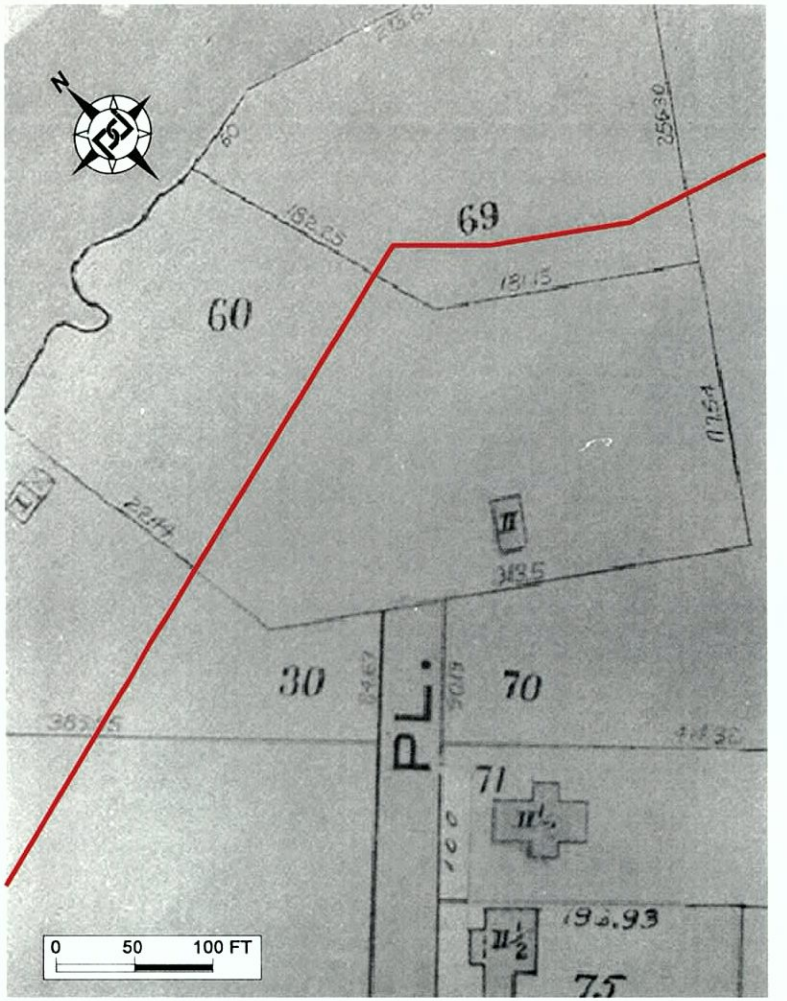


Figure 116. The Hurdis property in 1907. The southern boundary of the restoration site is indicated in red. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Hyde 1907:Plate 33).*

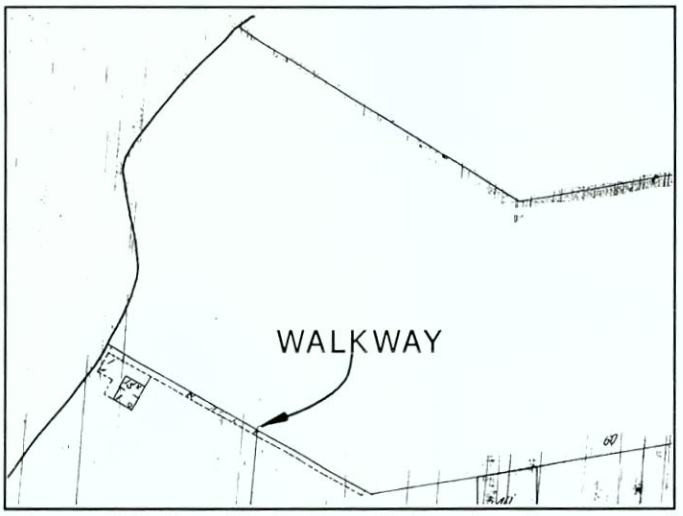


Figure 117. Detail of Motts Point showing area of the Hurdis property in 1912. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Sanborn 1912).*

Later maps (e.g., Figure 118) continue to show no structures on the former Hurdis tract. An aerial photograph taken in 1924 (Figure 119) indicates an area extending northeast from the end of Point Breeze Place which may represent traces of the former Hurdis dock. It should be noted that the end of Point Breeze Place as shown on maps prior to 1933 was at the approximate location of its present intersection with Plunkett Avenue. The Hurdis dock would be located within tract 187A on the 1933 Sanborn map (see Figure 118). During the reconnaissance, decayed pilings were observed at several points along the north shore of Motts Point (Figure 120), but appear to be west of the Hurdis dock site.

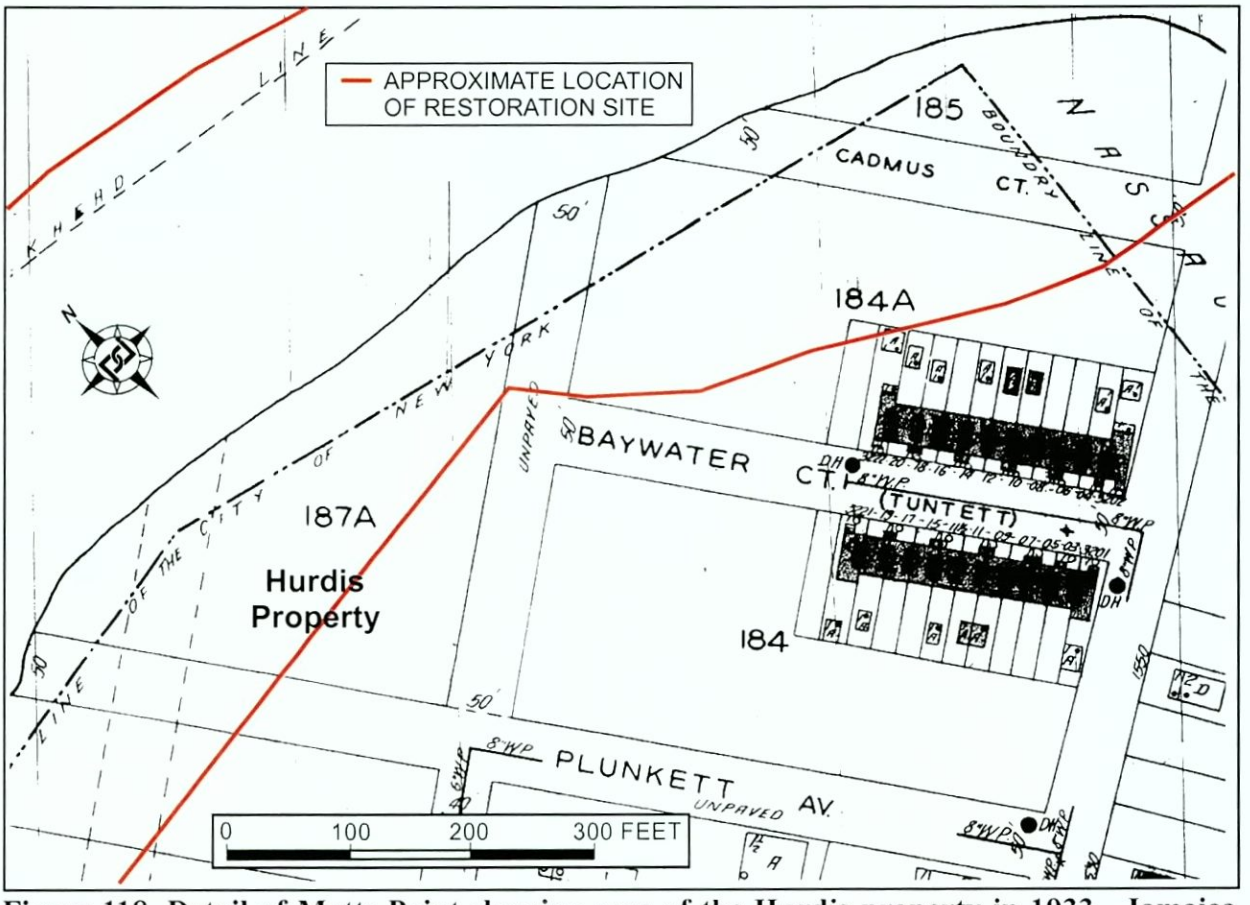


Figure 118. Detail of Motts Point showing area of the Hurdis property in 1933. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Sanborn 1933:55).*

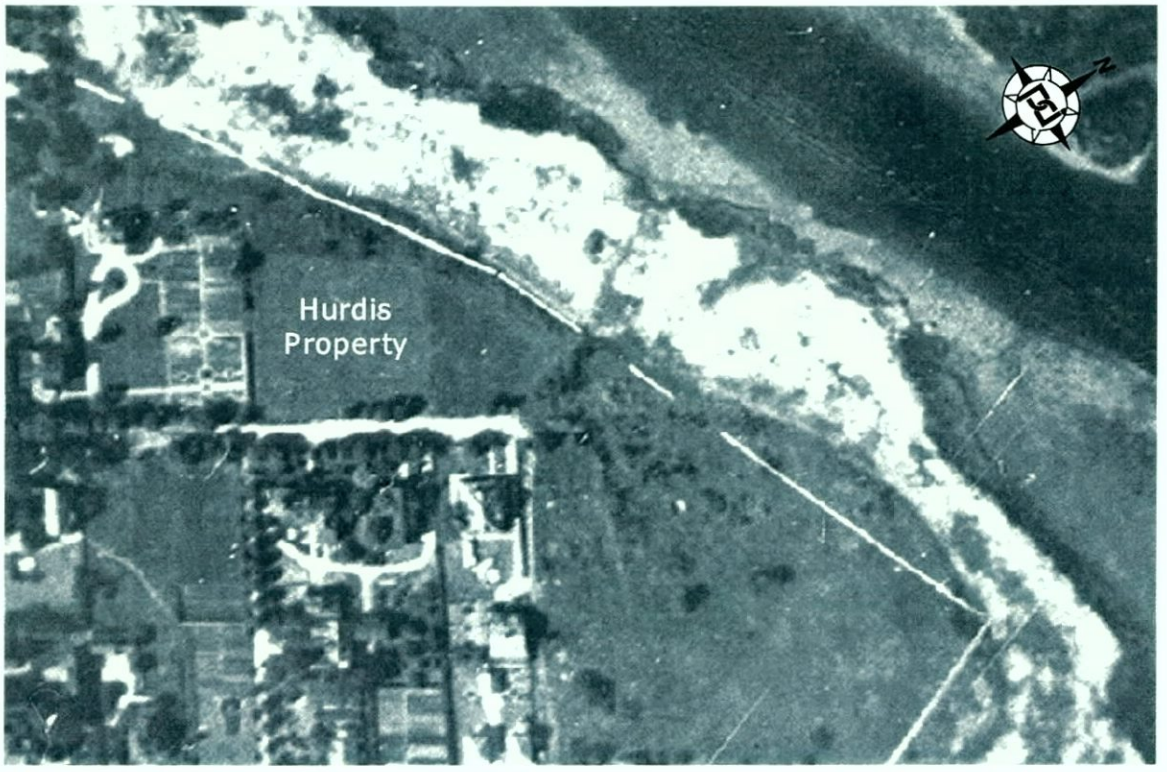


Figure 119. Aerial photograph of the Hurdis property in 1924. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Fairchild 1924:Section 25C).*

Figure 120. Decayed pilings on north shore of Motts Point, facing north. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Pickman 1999).*

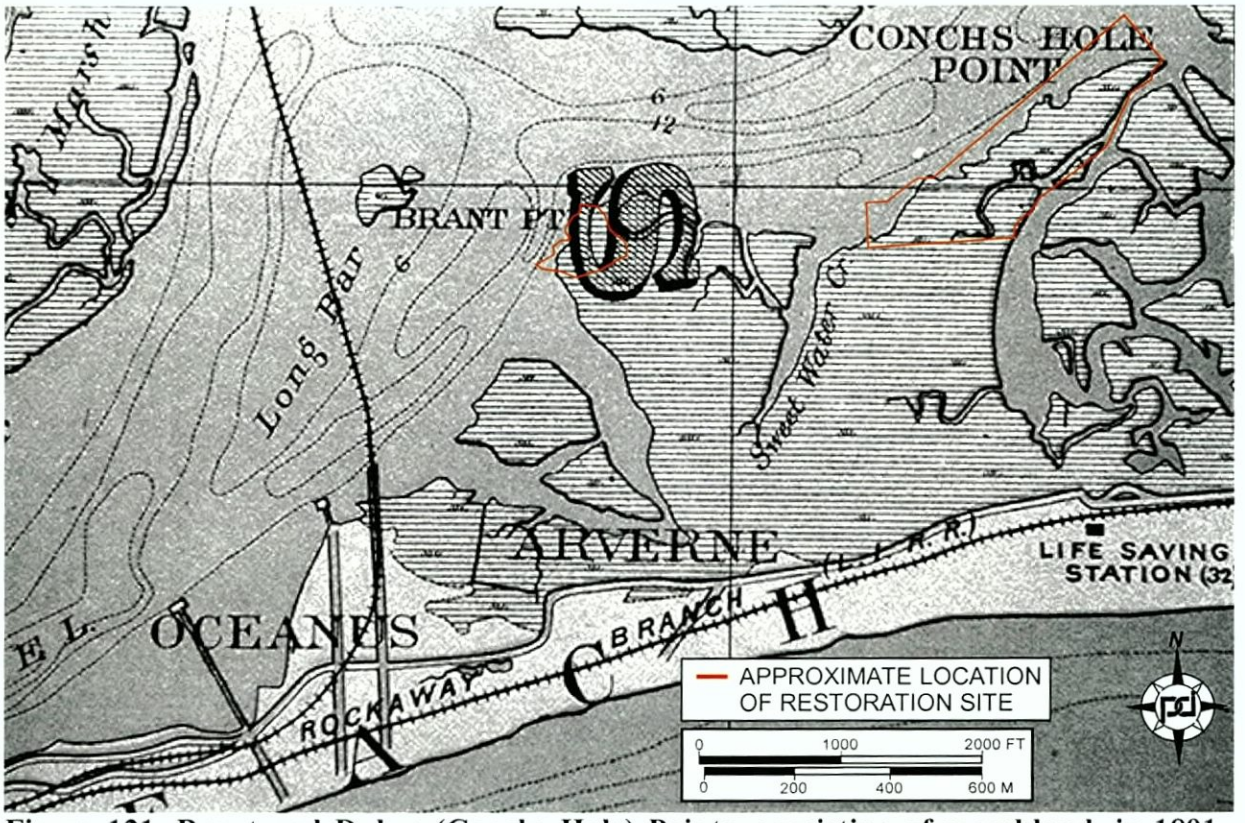


Figure 121. Brant and Dubos (Conchs Hole) Points, consisting of marshland, in 1891. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Bien 1891:Plate 4).*

8. Dubos Point. Dubos Point, also known as Conchs Hole Point, is an approximately 3500-foot long peninsula extending northeastward into Jamaica Bay. The restoration site also includes an area of upland at the base of the peninsula extending westward to Beach 65th Street (formerly Meredith Avenue) and southward to De Costa Avenue (formerly Adah Avenue) (see Figure 9).

Until the second decade of the twentieth century the proposed project site (along with Brant Point to the west) consisted of marshland (Figure 121). Both sites are within the Arverne section which was developed, beginning in 1882, by Remington Vernam. (Arverne is discussed further in the next section, Brant Point.) For several years, development was restricted to the area of the Rockaway peninsula south of the railroad tracks. Land at the base of the Conch's Hole peninsula, which includes the upland section of the Dubos Point restoration site, is shown as vacant on the 1912 Sanborn map (Figure 122).

In 1907, Remington Vernam sold the remainder of his holdings north of the railroad and between Beach 63rd Street and Beach 74th Street to the Somerville Realty Company, headed by Louis J. Somerville, which proceeded to bulkhead the shoreline and fill in the marshes in this area (Bellot 1918:100-101; Gloeggler 1983).

The 1912 map shows that the filling and bulkheading of the shoreline undertaken prior to that year had not included Dubos Point. By 1919 (Figures 123a and 123b), however, bulkheading and filling had taken place. This was likely done as part of the Somerville development.

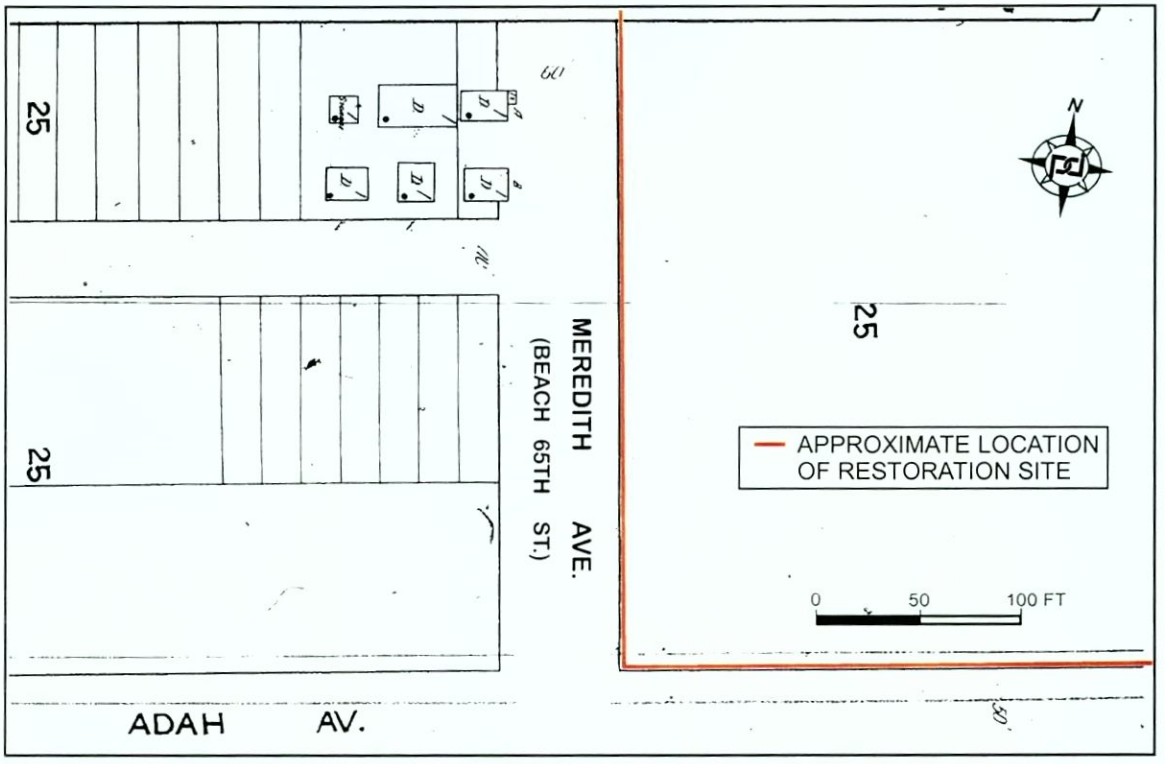


Figure 122. Dubos Point in 1912. Restoration site is at right. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Sanborn 1912:Vol. 8:57).*

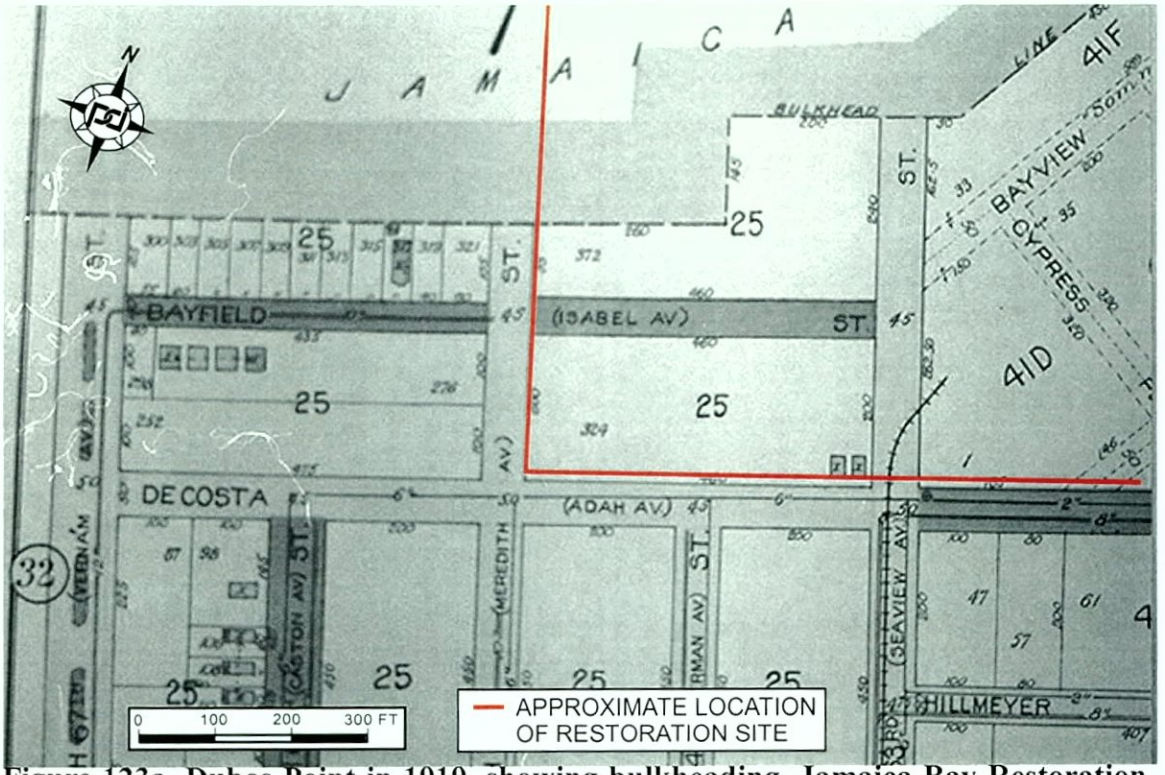


Figure 123a. Dubos Point in 1919, showing bulkheading. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Ullitz 1919:Plate 31).*

Although the 1919 map shows a street grid laid out on the point, no structures are shown. Two small frame structures are shown on the northwestern corner of De Costa Avenue and 63rd Street. Comparison of the size of these structures with the domestic structures further to the west suggests that they probably represent storage sheds.

The 1924 aerial photograph (Figure 124) shows three structures at the location of the sheds illustrated on the 1919 map (see Figure 123a). A number of other structures can be seen immediately east and north of these sheds, as well as on Dubos Point. On maps from 1933 and 1951 (Figures 125 and 126), the structures continue to appear at the base of the Dubos Point peninsula and are identified as storage and office facilities for W. H. Gahagan, Contracting Engineers. The buildings depicted further out are gone by 1933 (see Figure 125). These may have been erected by the engineers engaged in the filling and bulkheading of the area, who subsequently maintained facilities at the base of Dubos Point. The later map indicates that the streets which had been laid out were never developed.

Remains of wooden bulkheading are still present along the shoreline of the Dubos Point site. The landfill along the shoreline behind the bulkhead has been eroded and the pilings and other remnants are now offshore (Figure 127).

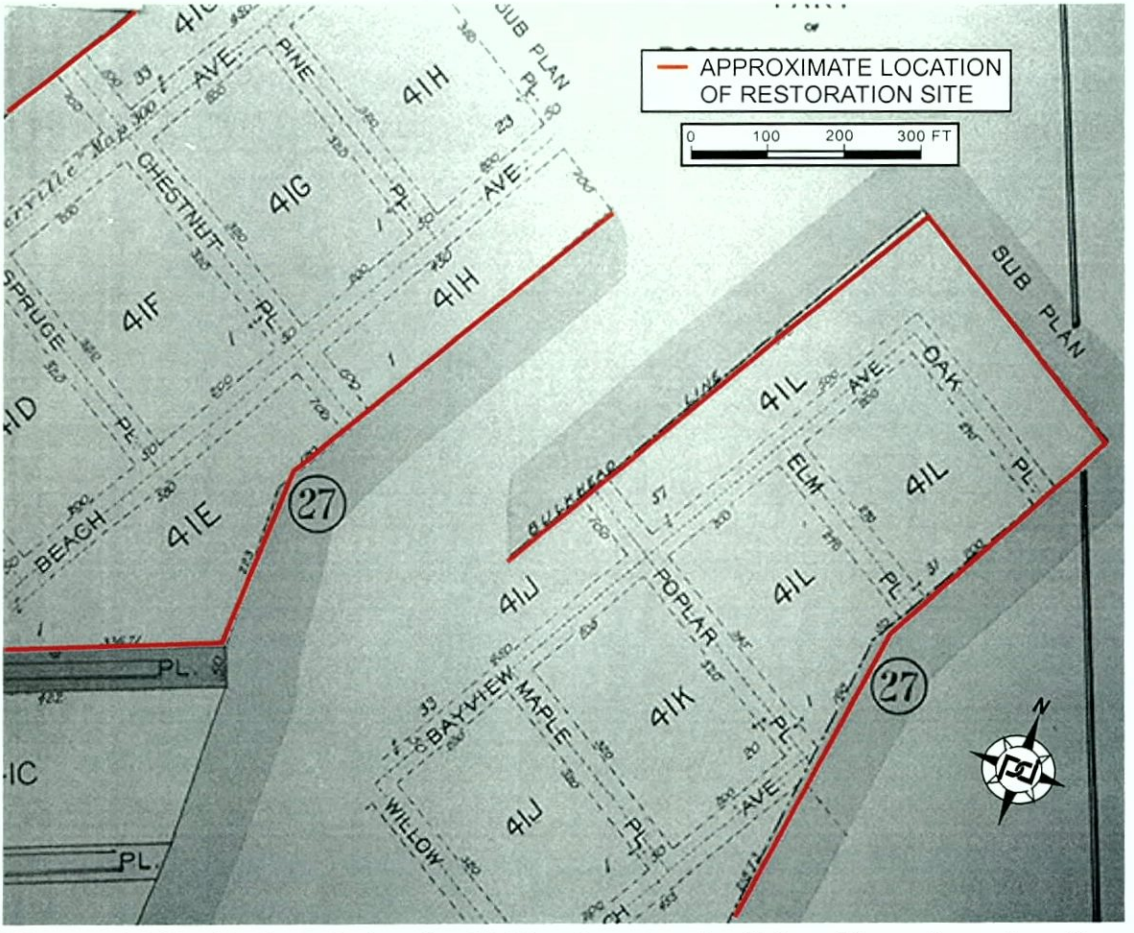


Figure 123b. Dubos Point in 1919, showing bulkheading. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Ullitz 1919).*

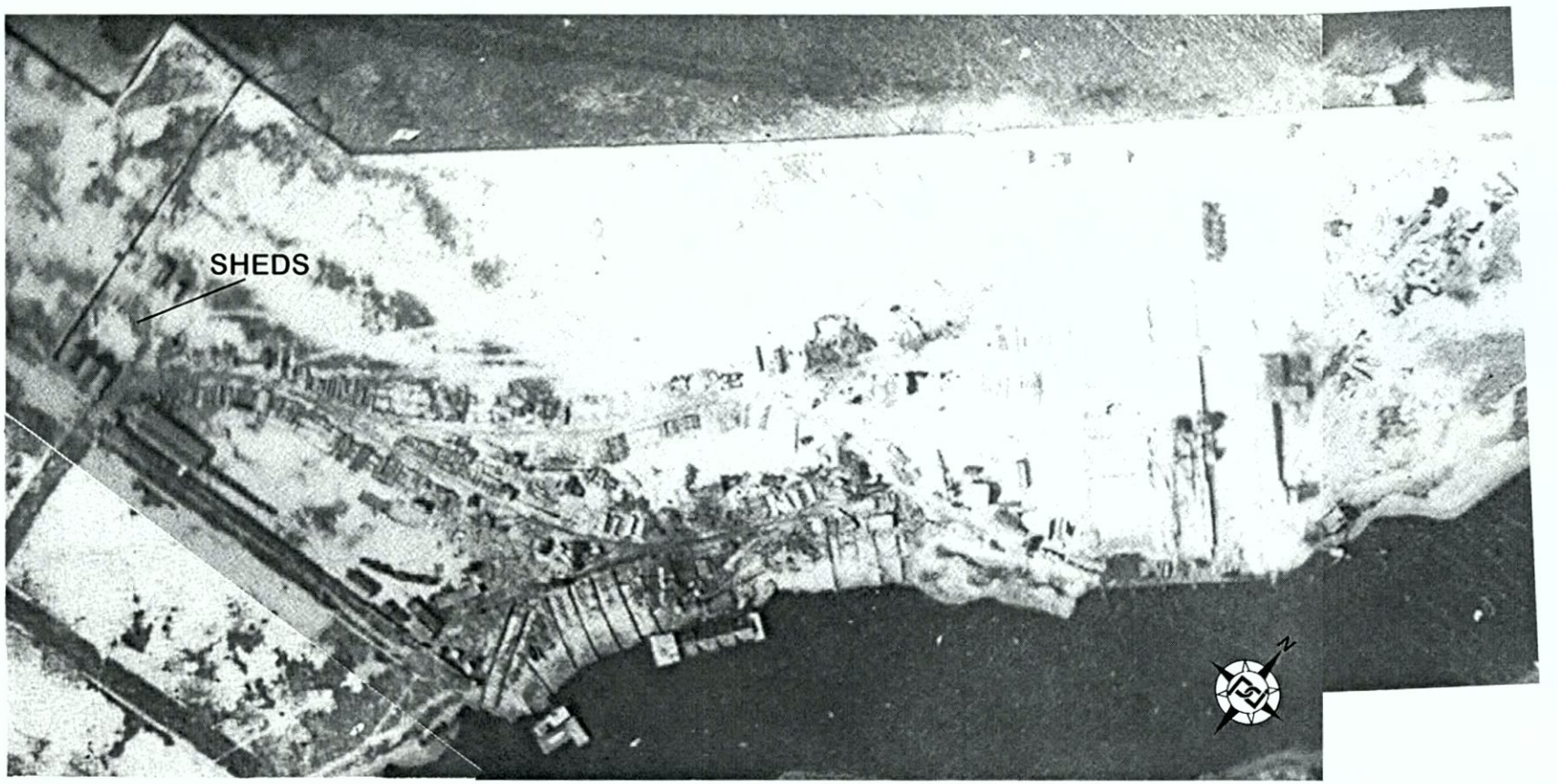


Figure 124. Aerial photograph showing northern section of Dubos Point in 1924. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Fairchild 1924:Section 31B).*

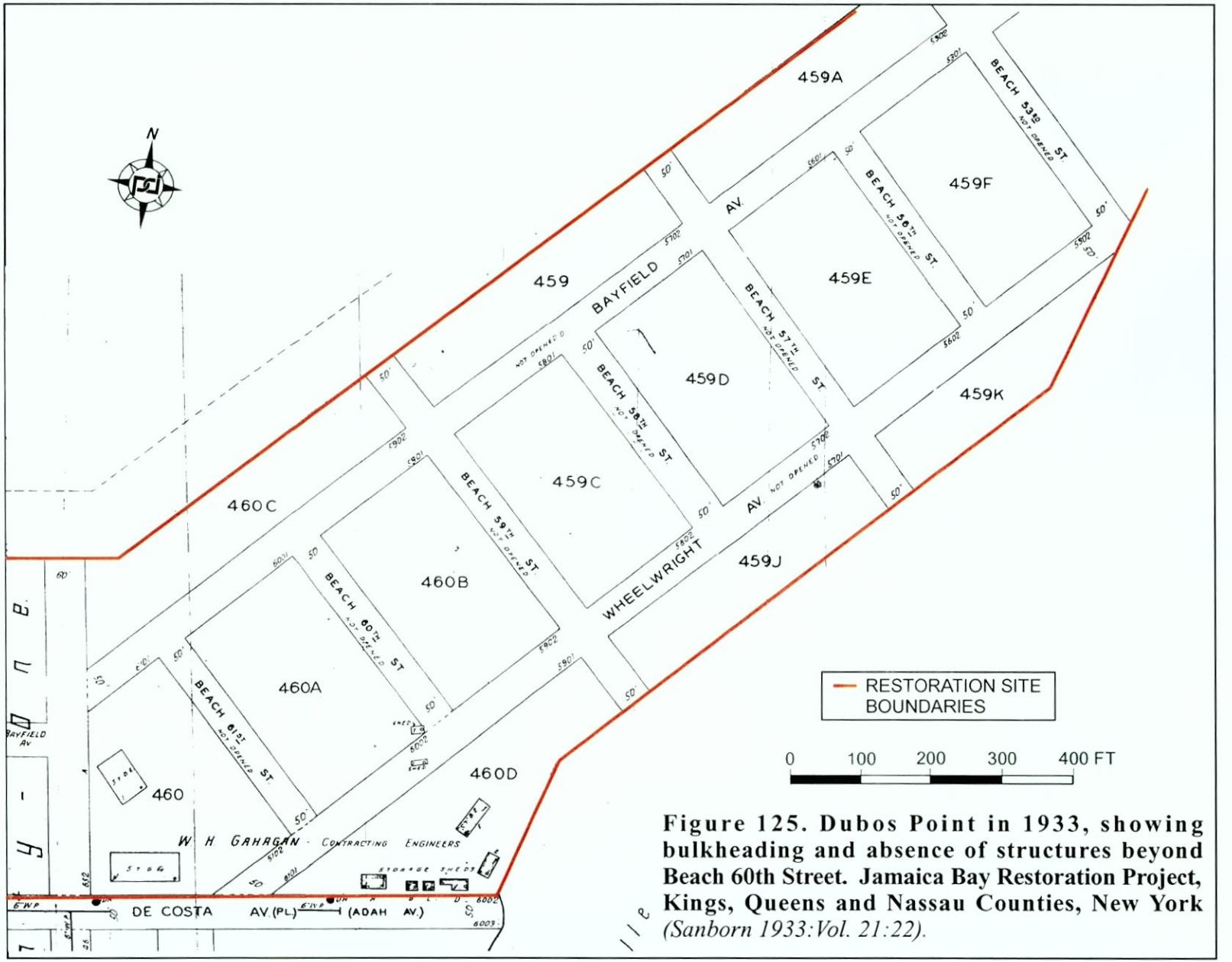


Figure 125. Dubos Point in 1933, showing bulkheading and absence of structures beyond Beach 60th Street. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Sanborn 1933:Vol. 21:22).*

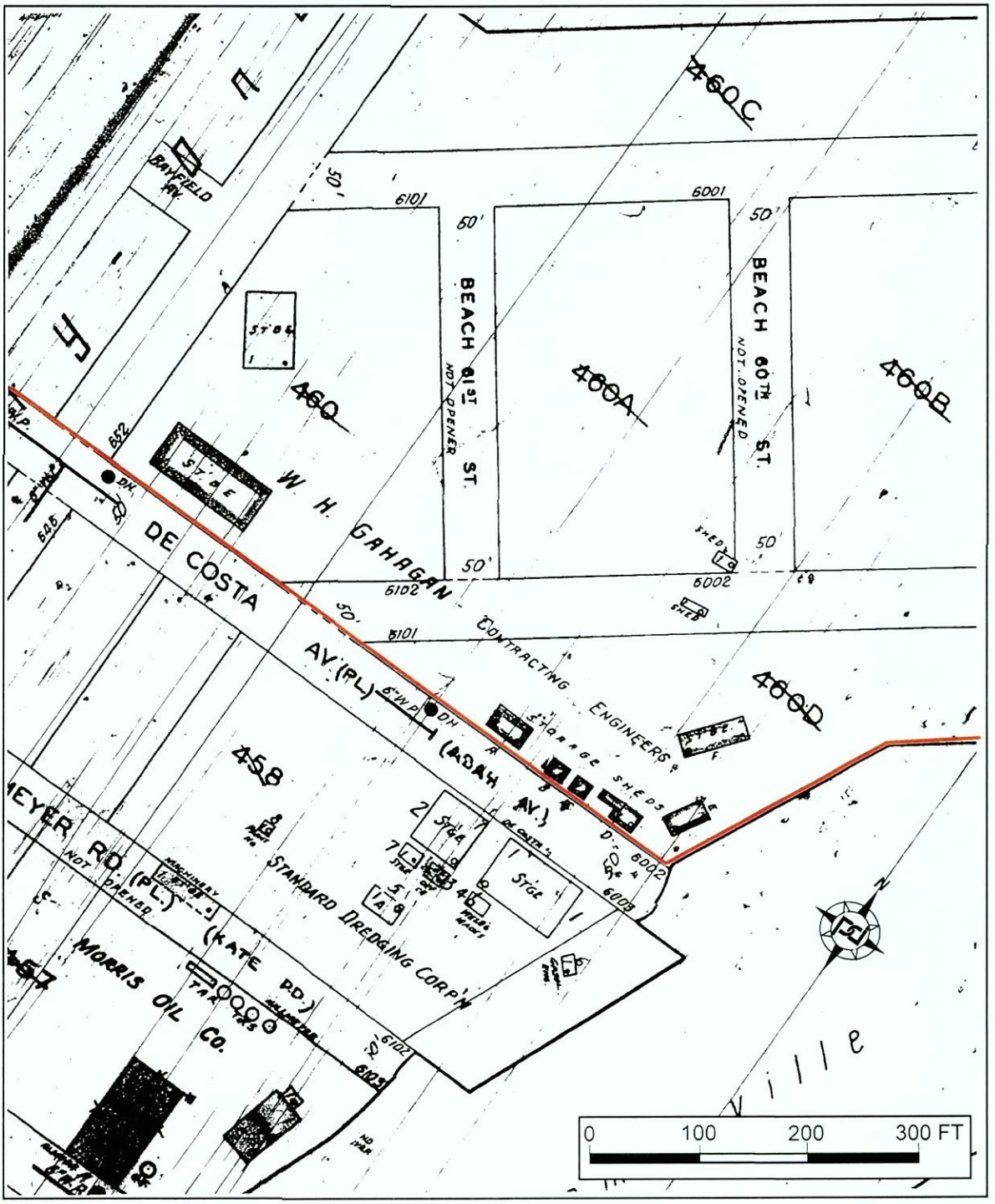


Figure 126. Structures at the base of Dubos Point in 1951. The restoration site is north of De Costa Avenue. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Sanborn 1951:Vol. 8:59).*

Figure 127. Remains of wooden bulkheading at Dubos Point, facing southwest. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Pickman 1999).*

9. Brant Point. As mentioned briefly in the discussion of Dubos Point, Brant Point is part of Arverne, named after Remington Vernam, who developed the area beginning in the 1880s. Until the turn of the century, development of this area was restricted to the section of the peninsula lying south of the railroad tracks; the northern section remained marshland (Bellot 1918; Seyfried 1986). In 1904, "the demand for small houses at moderate rates became so pressing that Vernam reclaimed a large tract of land lying north of the tracks with an extensive frontage on Jamaica Bay, and named it Vernam Park" (Seyfried 1986:4). The 1909 Jamaica Bay Improvement Commission map (Figure 128) shows Vernam Park and the bulkheaded and filled-in land south of Brant Point. Brant Point itself is still-unfilled marshland. The 1911 Coast Survey map (Figure 129), however, shows a number of structures on a small area of upland at the tip of the point, with an area of marshland to the south, separating the point from the Vernam Park development. This area is shown in detail on the 1912 Hyde and Sanborn maps (Figures 130 and 131). The Hyde map shows an area along the northern shore of the point separated from the mainland by a tidal creek. Seven small structures, apparently representing five houses and outbuildings, are illustrated whereas the Sanborn map shows only three houses and an outbuilding in the same area. The streets labeled Isabel, Adah and Kate Avenues correspond to those now named Bayfield, DeCosta and Hillmeyer Avenues. Wave Crest Avenue matches the present Beach 72nd Street while Germain Avenue corresponds with the currently mapped Barbadoes Drive, which has not been actually constructed.

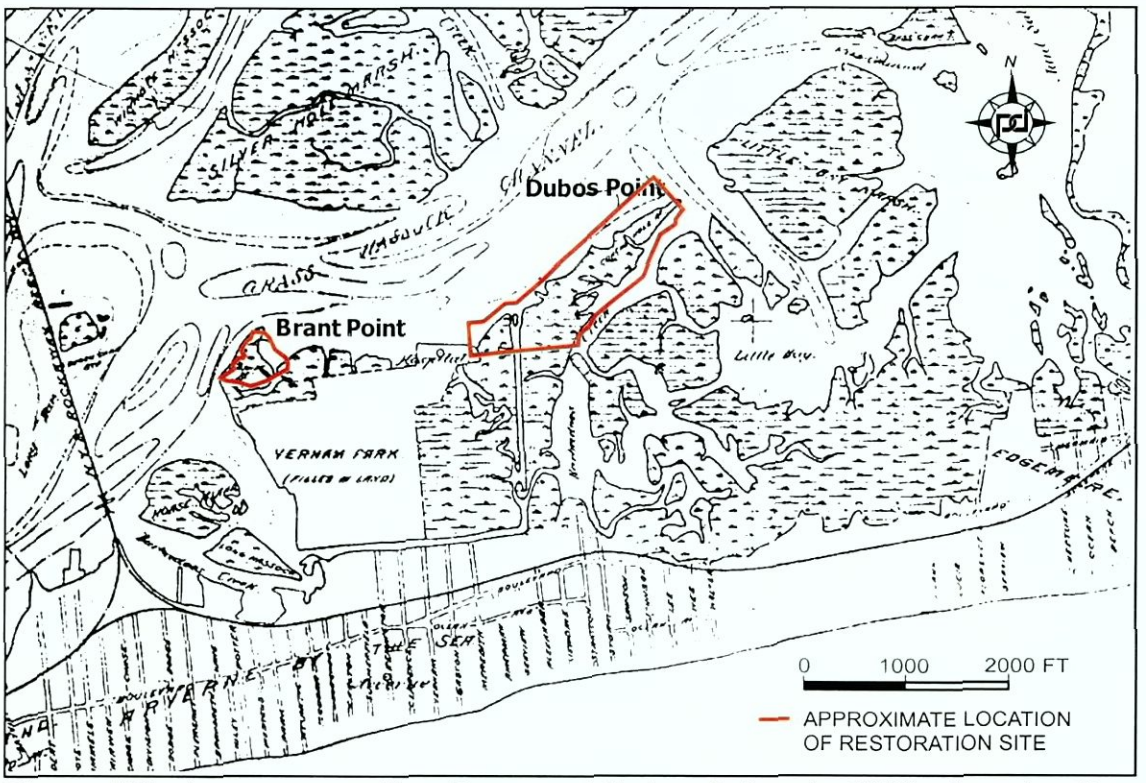


Figure 128. Area surrounding Brant and Dubos Points in 1909. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Jamaica Bay Improvement Comm. 1909b).*

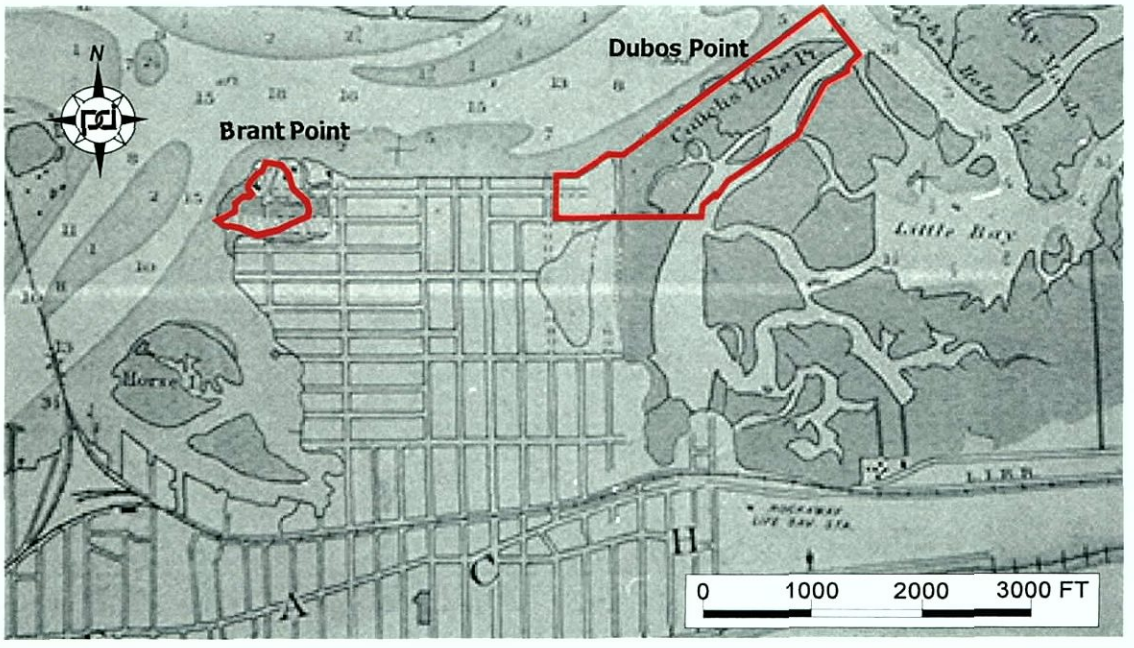


Figure 129. Area surrounding Brant and Dubos (Conchs Hole) Points in 1911. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(USCGS 1911).*

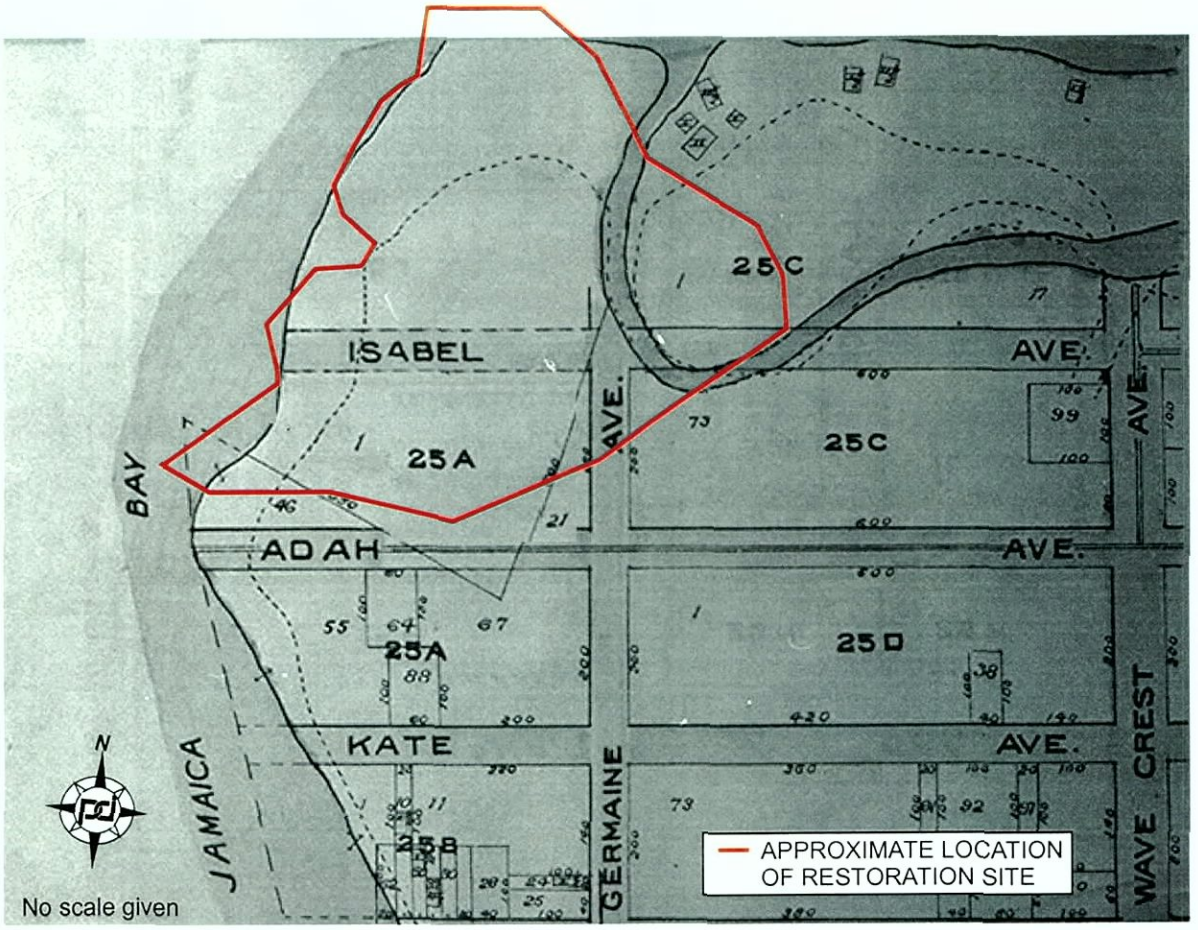


Figure 130. Detail of structures (top) at Brant Point in 1912. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Hyde 1912:Plate 61).*

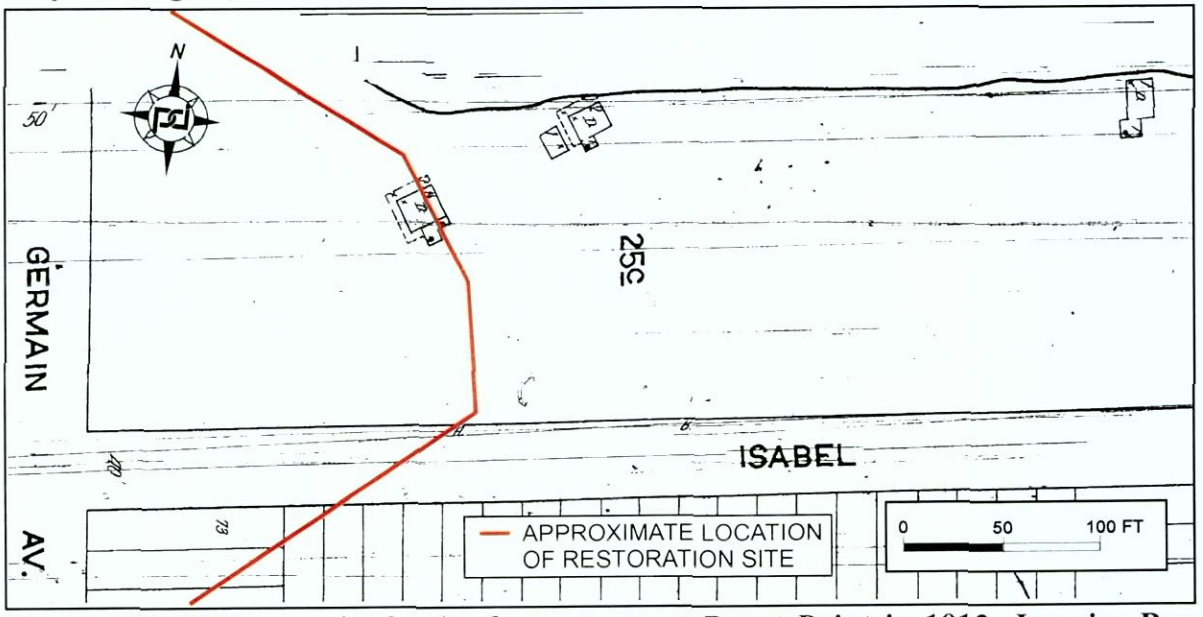


Figure 131. Difference in detail of structures at Brant Point in 1912. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Sanborn 1912:Vol. 8:65).*

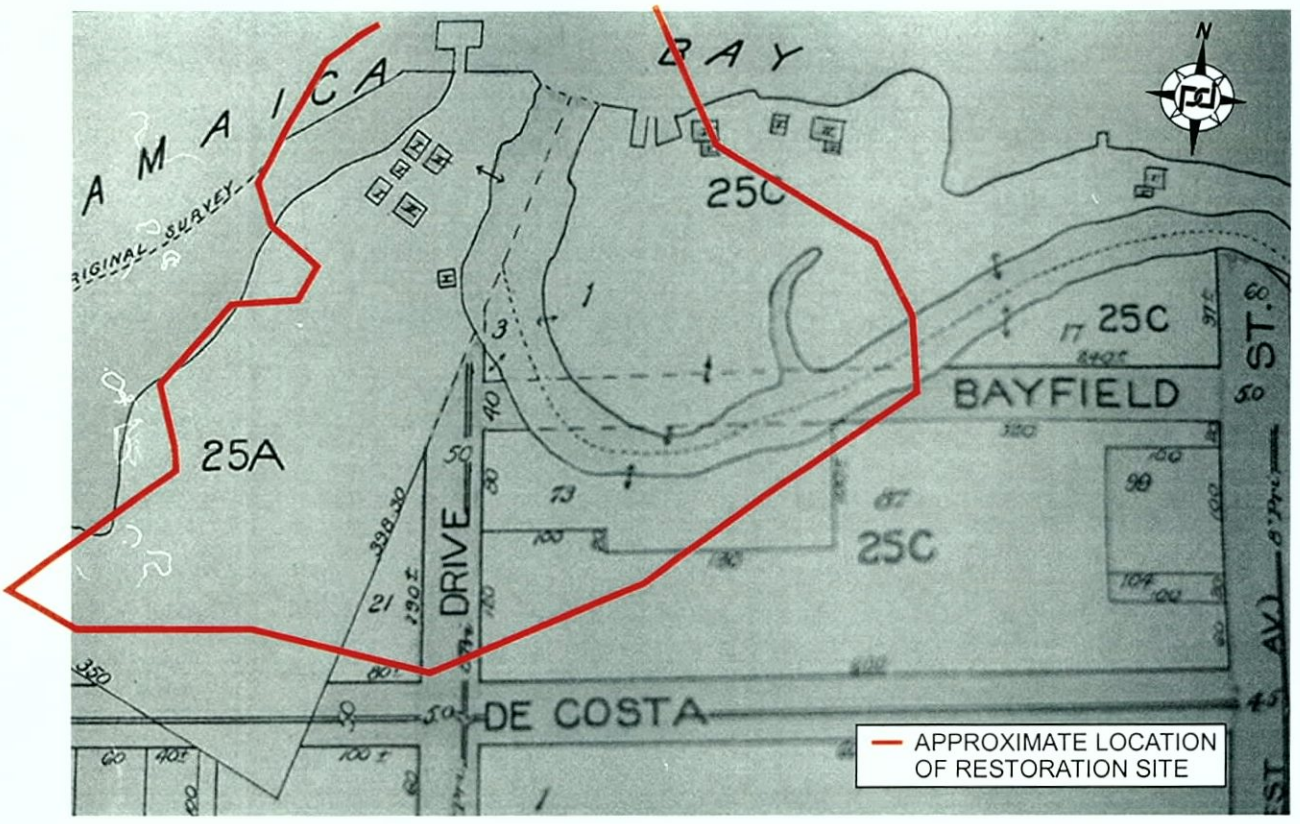


Figure 132. Location of structures at Brant Point in 1919. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Ullitz 1919:Plate 32).*

The 1919 Ullitz map (Figure 132) continues to show the creek and what appear to be the same structures illustrated on the earlier Sanborn map in addition to six small structures and a pier located west of the creek and the line of Barbadoes Drive.

The 1933 Sanborn map (Figure 133) shows two of the three structures along the shoreline east of Germain Avenue as still standing but in a dilapidated condition. Five structures continue to be shown west of Germain Avenue, three of which are identified as dwellings and one as a boat house. The 1933 map does not show the pier indicated on the 1919 map. This map also shows two houses which had been constructed at the southwest corner of Bayfield Avenue and Beach 72nd Street. One of these would appear to be the house still standing at this location (Figure 134), which is not within the boundaries of the restoration site.

Comparison of early twentieth century maps with the restoration site map (see Figure 10) suggests that erosion of the point has most likely placed the remains of these structures beyond the present shoreline. No indications of these structures were noted during the site visit.

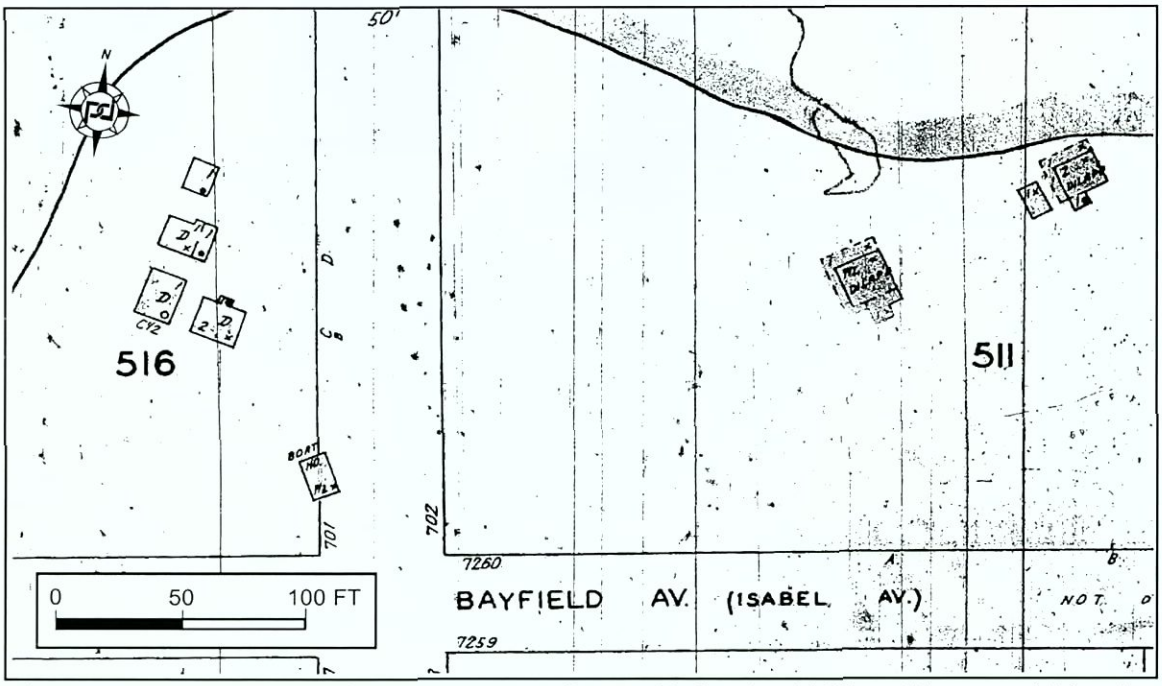


Figure 133. Location of structures at Brant Point in 1933. All are within the restoration site boundaries. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Sanborn 1933:Vol. 21:19).*

Figure 134. House at northwest corner of Bayfield Avenue and Beach 72nd Street. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Pickman 1999).*

Figure 135. The marsh islands of the Broad Channel area in 1891. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Wolverton 1891:Plate 31).*

10. Broad Channel. All of the mid- to late-nineteenth century maps show the Jamaica Bay islands, including those immediately west of Broad Channel, as being uninhabited (e.g., Figure 135). After the opening of the railroad trestle in 1880 a fishing village was supposedly established on Big Egg Marsh, the marshy island on which the community later known as Broad Channel is located (WPA 1939:590). According to Young (1963), when the railroad trestle opened Broad Channel was the only station. "It was then quite a colony of houses built on stilts along the bay and some creeks, and there also was a hotel and a fishing station."

> The village on stilts was on the west side of the trestle. . . . Instead of streets there were boardwalks. . .and there was no light at night except what filtered from the oil lamps in the houses. There were no hotels or stores and residents had to depend on rain for their water supply. On the east side of the trestle there was later built a two-story hotel and fishing station (Young 1955b).

Seyfried's account, however, suggests that the hotel was built first, after the opening of the trestle, with the development of a larger community occurring subsequently. He notes that when the railroad first opened there were "a few fishermen's shacks" on an area of high ground in Big Egg Marsh (Seyfried 1966, Part 5:37). In 1881, the year after the opening of the trestle, a station was established at Broad Channel. A newspaper article (cited by Seyfried) announced that "a hotel has been erected here on one of the marshes by Charles A. Denton and the railroad has made it a stopping place. It is called Broad Channel." A later article (1903) noted that "Broad Channel boasts a fairly good hotel and caters chiefly to fishermen who can afford luxuries

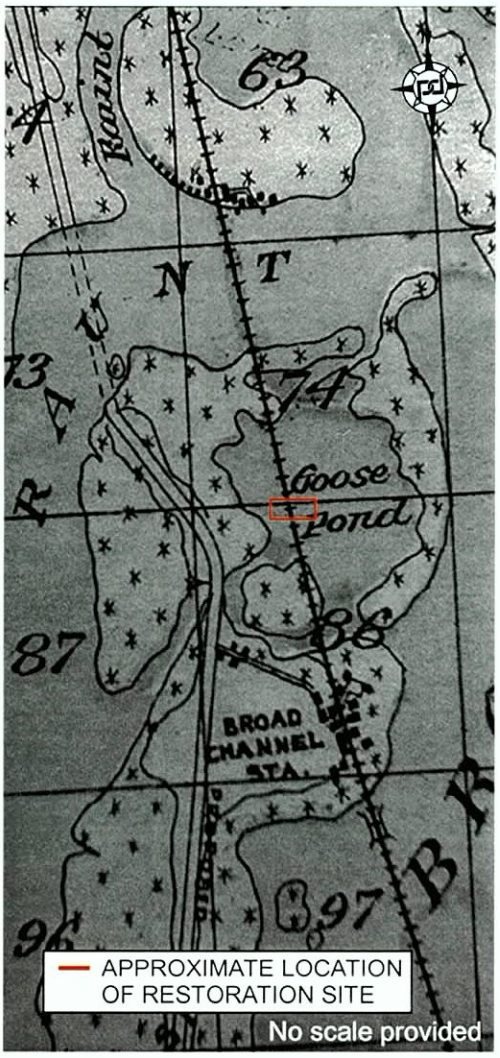


Figure 136. Broad Channel area in 1907. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Hyde 1907).*

in both boats and bait. The Broad Channelers are all shrimp fishermen" (cited by Seyfried 1966, Part 5:170).

The first map to show the presence of the Broad Channel community dates from 1907 (Figure 136); it displays some 20 structures, most in the immediate vicinity of the railroad station. In 1911, only 36 persons, in addition to the Rockaway Inlet Boat Club, are listed as occupying lots at Broad Channel under permits from the New York City Department of Docks and Ferries (DDF 1911: 449).

The 1909 Jamaica Bay Improvement Commission map (Figure 137) shows the Broad Channel railroad station, with the portion of the marsh to the west having been filled-in, presumably at the time of the construction of the failed Flynn causeway (discussed in connection with the Spring Creek restoration site). The map shows the route of the proposed Flynn causeway across Big Egg Marsh and Goose Pond Marsh to the north. This part of the route was eventually followed by Cross Bay Boulevard. North of the Broad Channel Railroad station, the railroad trestle crossed a body of water known as Goose Pond, which separated Goose Pond marsh on the west from two smaller marshy islands to the east. A culvert is present beneath the Flynn roadway connecting the portions of Goose Pond on the east and west sides of the roadway. This culvert would appear to be at approximately the same location of the existing culvert beneath Cross Bay Boulevard.

By the time of the 1913 Hyde atlas (Figure 138) a large number of frame structures had been constructed at Broad Channel. At the location of the existing culvert, the 1913 map notes the presence of a "sluice way" connecting the portion of Goose Pond west of the roadway with the open water between the island and the railroad trestle.

A more organized development of Broad Channel began in 1915, when Pier Noel, a real estate speculator, formed the Broad Channel Corporation, which obtained a 30-year lease from the City. A 1915 photograph of a portion of the Broad Channel settlement is included here as Figure 139. Subsequently, "lots were sublet, streets laid out, and electric and water plants built" at Broad Channel (WPA 1939:590). The Broad Channel Corporation failed within a few years and could not meet its payments to the City. As a result the City once more collected the rents from the occupants of the community and further developed the area, including the construction of additional bulkheading and provision of gas, electricity and water (Young 1959).

"When Prohibition came, the island was nicknamed 'Little Cuba.' Yacht clubs and night clubs opened, and rum running was widespread. . . . In 1925, Cross Bay Boulevard was built, beaches were developed, and a business district sprang up" (WPA 1939: 590).

An aerial photograph (Figure 140) taken when Cross Bay Boulevard was under construction, shows that the area between the eventual location of the boulevard and the railroad tracks, which was formerly open water, had been partially filled in. A channel of open water extends eastward from what appears to be the location of the existing culvert beneath Cross Bay Boulevard. The area immediately north of this channel appears to have been at least partially filled in, while marshland is still present south of it. There appears to be a culvert beneath the railroad embankment north of this channel and north of the proposed restoration site. Structures line the route of Cross Bay Boulevard, but none are visible in the filled area north of the channel.

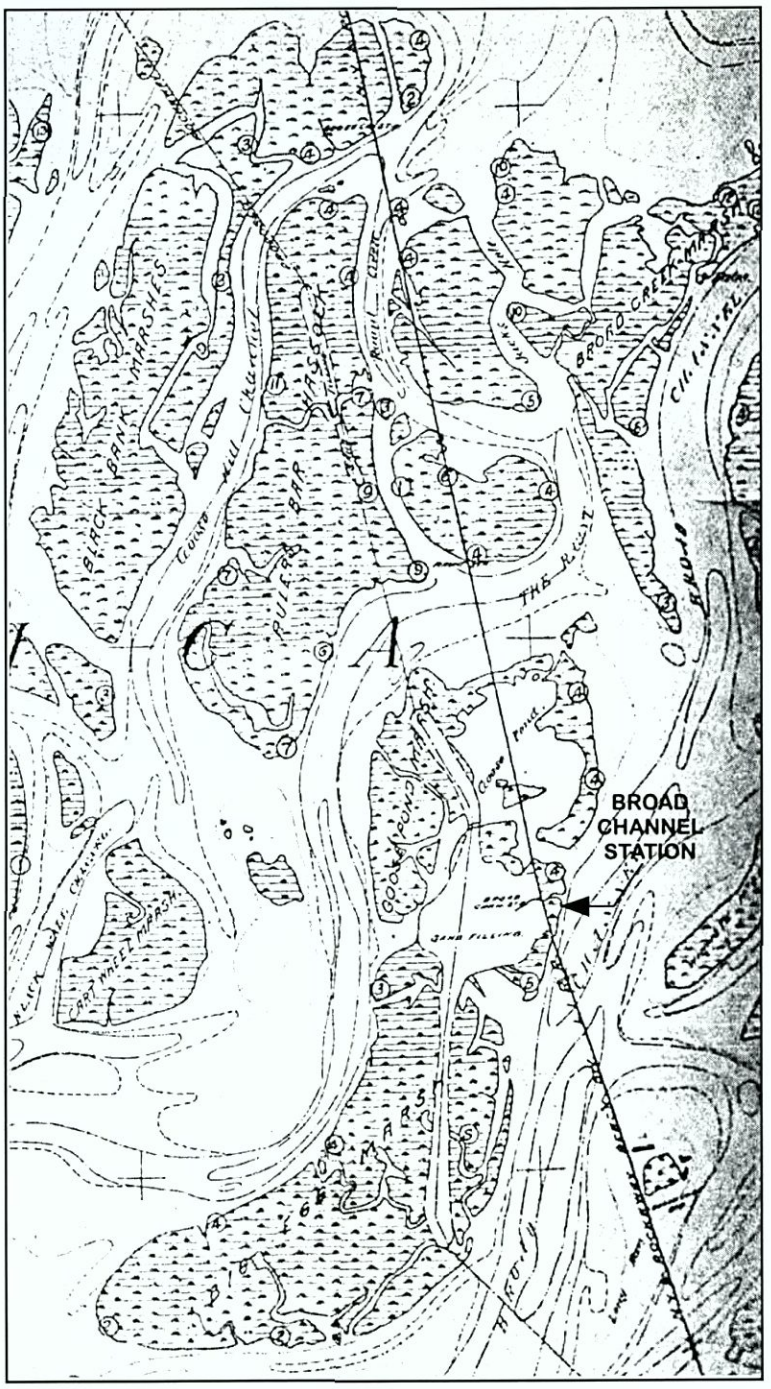


Figure 137. Broad Channel area in 1909. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Jamaica Bay Improvement Comm. 1909b).*

According to a 1939 description of Broad Channel:

> On the eastern side the shore dips and curves; here the cottages are whitewashed and trim. In other sections long rows of ramshackle buildings lean over the water on their uncertain their uncertain stilts. Poverty and decay mark the dirt streets and battered houses whose gardens are decorated with mounds of bleached shells (WPA 1939:590).

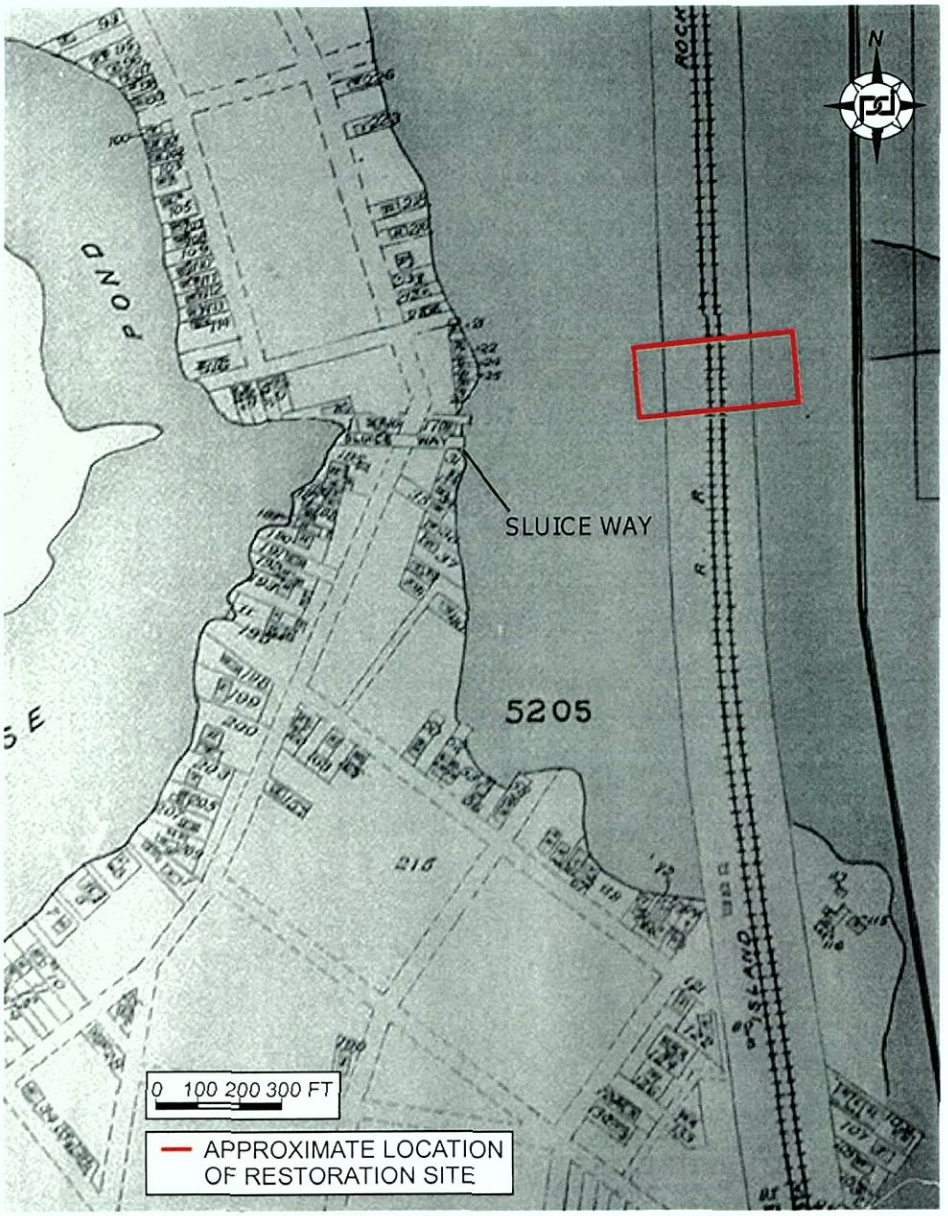


Figure 138. Structures and the sluice way at Broad Channel in 1913. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Hyde 1913:Plate 31).*

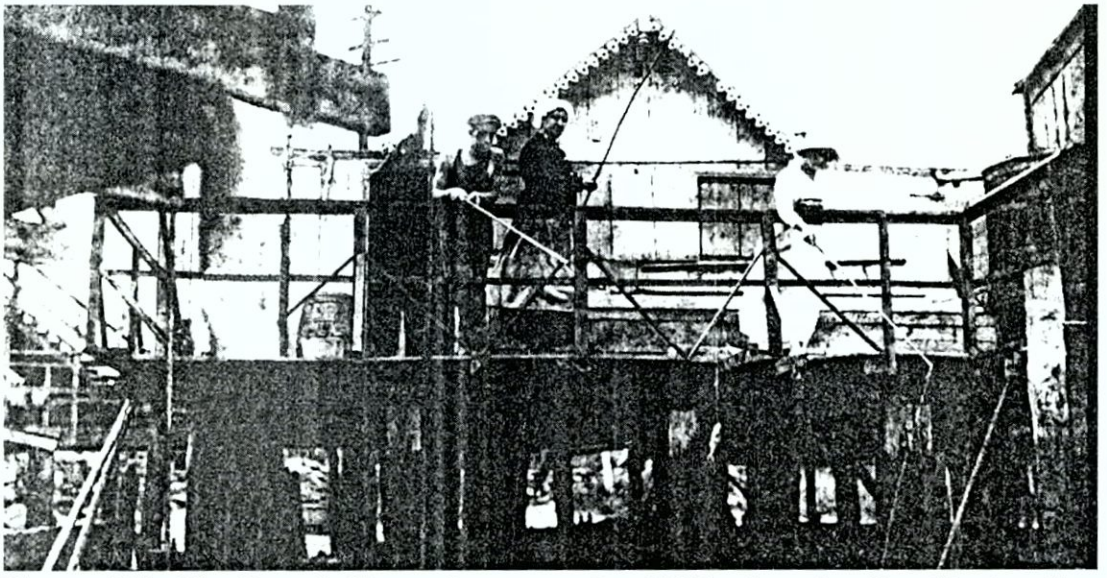


Figure 139. The Broad Channel community, 1915. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Library of Congress, Bain Collection).*

Figure 140. Aerial photograph showing culvert and filled land of Broad Channel area in 1924. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Fairchild 1924:Section 24D).*

Figure 141. Cross Bay Boulevard culvert area at Broad Channel in 1936. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Hyde 1936:Plate 25).*

The 1936 Hyde map (Figure 141) shows the existing culvert at the bend in Cross Bay Boulevard south of East 5th Road. The map does not show any structures east of those which adjoin Cross Bay Boulevard.

Today, an area of marsh exists between the houses along the east side of Cross Bay Boulevard and the landfill apparently deposited after the New York City Transit Authority rebuilt the trestle in 1950. This marsh area is the only remnant of Goose Pond. A few outbuildings are built on piles over the marsh at the rear of the houses fronting on Cross Bay Boulevard (Figure 142).

11. JFK Runway By-pass.

Occupation of Jamaica Bay Islands. Black (1981:21) observes that none of the islands in Jamaica bay "within the limits of the town of Jamaica appear to have been inhabited during the period before the Civil War." He also notes that during the late nineteenth century shacks had been built by fishing clubs and squatters at various locations on the Jamaica Bay Islands. After the Department of Docks and Ferries (DDF) assumed administration of the bay in 1897, the city took over leases to previous occupants and granted new ones (Black 1981:60).

Figure 142. Structures on pilings east of Cross Bay Boulevard and south of the culvert, facing north. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(Pickman 1999).*

In 1911 the DDF reported that it had issued occupation permits to four persons, in addition to the Kensington Rod and Gun Club, at the Raunt; one person at Hemlock Meadows; and one person at Goose Creek (DDF 1911:450). The Raunt was located along the railroad trestle north of Broad Channel and Goose Creek was located north of the Raunt, also along the line of the railroad trestle.

Black (1981:62) noted that small communities of fishing huts and vacation cottages were located at other points along the trestle including Beach Channel, north of the Rockaways and Swift Creek, and west of the Raunt. Individual shacks were also located elsewhere in the Bay. Black examined records at the DDF and found structures at Duck Creek, Broad Creek Marsh, Joco's Marsh, East High Meadow, Old Swale Marsh, Yellow Bar Hassock and Great Bar Marsh (Black 1981:62).

By 1939 the islands in Jamaica Bay were home to some four thousand persons, nearly all of whom lived on Broad Channel. Approximately 80 people lived on other islands and most of these probably were located on the Raunt. According to a 1939 description

> the Raunt ... contains only a few dozen jerrybuilt shacks .... a new wooden footbridge spans the channel between the boulevard and the Raunt. The houses with their crazy catwalks stand above the mud. There is no gas or fresh water. Large tanks used to catch rain water are to be seen everywhere .... Beyond the Raunt are many lonely and forbidding islands, some spotted with frail shacks (WPA 1939: 591).

Ruffle Bar, an island east of Barren Island, had an area of upland on which buildings were constructed during the second half of the nineteenth century and as many as forty buildings were present in 1926 (Black 1981:63). A hotel, possibly built in the nineteenth century, was reportedly located on this island, and the remains of a wooden pier were reported here in the 1970s (Milner 1978:133).

JFK Runway Restoration Site. Construction for what was then known as Idlewild airport began ca. 1942, and the airport opened in 1948. It was subsequently expanded to 4,930 acres (Kearns et al. 1991) and the name changed after the assassination of President Kennedy. The runway at the restoration site was later extended some 3,300 feet southward from the northern shoreline of the bay on landfill. Comparison of maps from before and after the runway's construction (Figures 143 and 144), confirms that its construction resulted in the removal of much of Duck Creek Marsh and the northwestern corner of Jo Co's Marsh. The northeastern portion of the runway site consisted of open bay waters or sand flats prior to the landfilling.

None of the maps examined for this study reveal the presence of structures on Duck Creek or Jo Co's marsh. It is possible that the small shacks, apparently built on pilings, reported to be on these islands in the DDF records (as reported by Black [1981]), were not substantial enough to warrant inclusion on these maps. Their location is unknown.

4.2.6 Shipwrecks.

Black (1981:26-27) notes that early boat traffic in Jamaica Bay was limited to shallow draft vessels "employed in oystering or fishing. Town records refer to canoes, pettiaguers and sloops." Traffic between New York and the bay was "ordinarily not by vessel" (Black 1981: 26).

Even later in the historic period

> because of Jamaica Bay's generally shallow waters, vessels of slight draft have been the most common cargo carriers .... only sloops, lighters, scows, and barges were able to move in any general sense around the various sections of the bay...[however, such vessels were numerous and a 1906 list] ... includes twenty-nine such vessels then operating in the bay (Black 1981:72).

Reported Jamaica Bay Shipwrecks. Some of the compendia which list wrecks along the East Coast of the United States (e.g., Lonsdale and Kaplan 1964) do not include shipwrecks in Jamaica Bay. Similarly, the New York Harbor shipwreck inventory conducted for the New York District by Engebretsen (1982) does not list Jamaica Bay shipwrecks. The NOAA (1999) automated wreck and obstruction system (AWOIS) also does not list any wrecks in the waters of the bay. This may be due to the fact that the system is focusing on identified hidden obstructions. Because of the shallow waters, many Jamaica Bay wrecks are visible.

Recent editions of the Jamaica Bay marine chart show a number of visible wrecks along the shorelines and some of the tidal creeks. None of these are within the area of impact of the proposed

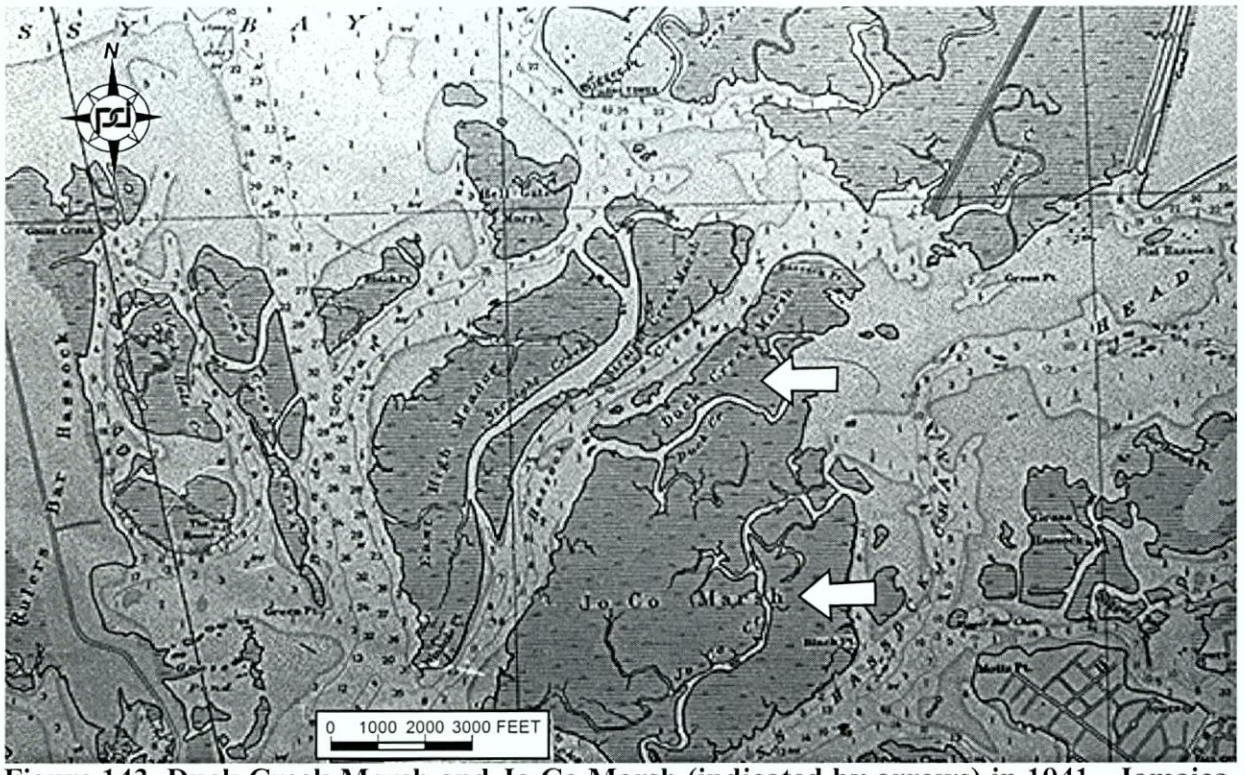


Figure 143. Duck Creek Marsh and Jo Co Marsh (indicated by arrows) in 1941. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(USCGS 1941).*

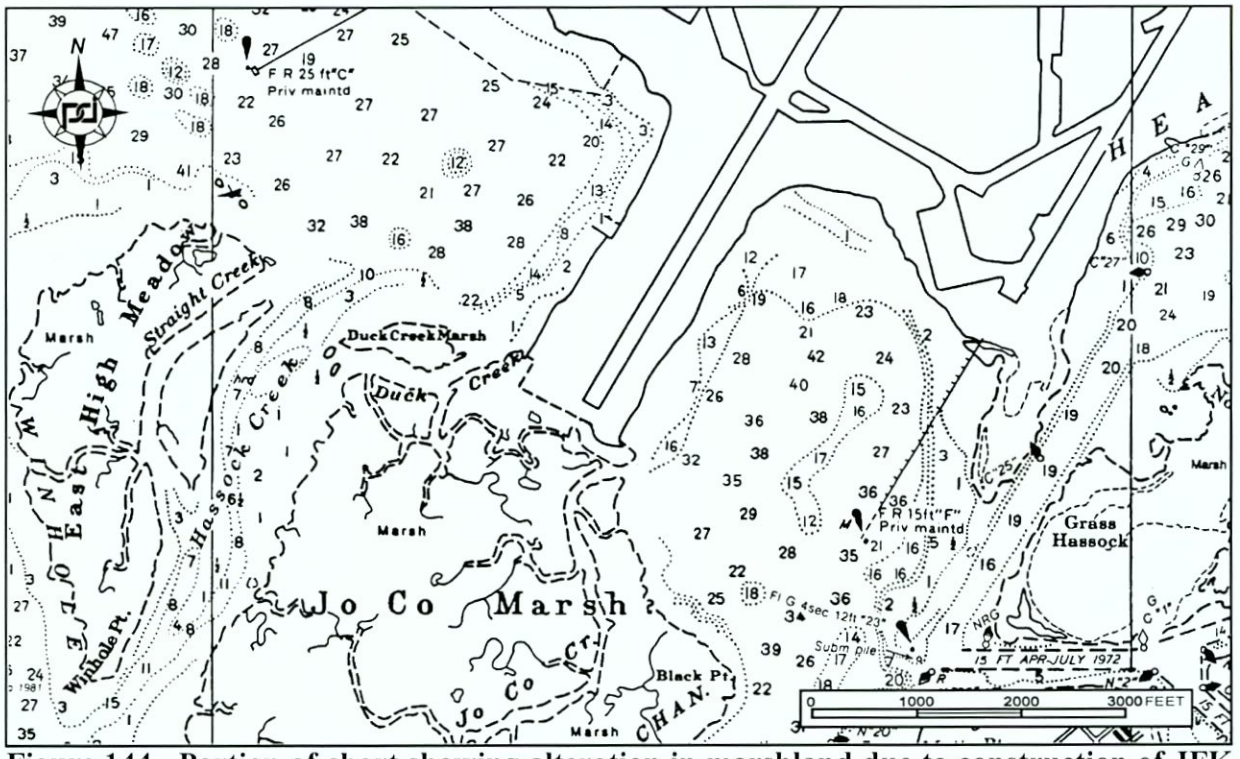


Figure 144. Portion of chart showing alteration in marshland due to construction of JFK runway. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(NOAA 1986).*

restoration sites. Two wrecks depicted along the west side of Gerritsen Creek, some 1,000-1,500 feet west of the restoration site (Figure 145), were not visible at the time of the reconnaissance, which was conducted at high tide.

Berman (1972:300-301) lists several wrecks in Jamaica Bay as follows:

> No. 226 Bergen Basin, Jamaica Bay, N.Y. 110 yds. 88° from tank, Hamilton Beach. Scow. Depth 17'. Wreck lies northeast to southwest. Length 110'.
>
> No. 229 Jamaica Bay, N.Y. 150 yds., 99° from tank at Hamilton Beach. Depth 23'.
>
> No. 234 Gerritsen Inlet, Jamaica Bay, N.Y. Above Plum Beach Bridge. Several barges in area.
>
> No 236 Jamaica Bay, N.Y. Off Nova Scotia Bar, about 2,200 yds., 46° from Cupola, Rockaway Point. Unknown object.

With the possible exception of the Gerritsen Inlet wrecks, those listed by Berman do not appear to be shown on recent nautical charts. The two Hamilton Beach wrecks would be near the mouth of Bergen Basin, but are more than 200 feet offshore of the Hawtree/Bergen restoration site so that any impacts are unlikely.

Rattray (1973) lists the following four wrecks recorded as having occurred in Jamaica Bay waters:

> March 4, 1881, Sloop *J. R. Brown* sank at Barren Island, Rockaway Bay
>
> July 10, 1887 Sloop *Mystery* capsized in Jamaica Bay, 24 drowned
>
> March 7, 1894 Sloop *Mary F. Durrua* drifted into Jamaica Bay, spars cleared away, sails dragging, master in cabin, dead
>
> Oct 21 1913, Gas Screw *Martha J.* struck by lightning in Jamaica Bay, burned, 3 saved.

Two additional wrecks occurred in Rockaway inlet, the scow *Franklin* in 1887 and the schooner *Robert A. Snow* in 1899.

In addition to the above, Young (1955a) notes that a ship went aground on a sandbar in Jamaica Bay, several hundred feet off the old railroad station at Beach Channel. The accident occurred as the ship was being towed to Broad Channel, where it was to be beached and converted into a recreation center and bowling ally. After the accident the hulk sank into the sand, began to fall apart and after several years was no longer visible. The exact location of these wrecks is not given, nor is their ultimate disposition. It is uncertain if any of these would be represented by the wrecks shown on the NOAA chart or listed by Berman.

Wrecks Noted During Site Reconnaissance. The remains of a number of derelict boats were observed during the field reconnaissance; two, offshore Dead Horse Bay and Brant Point, could be impacted by the proposed restoration activities.

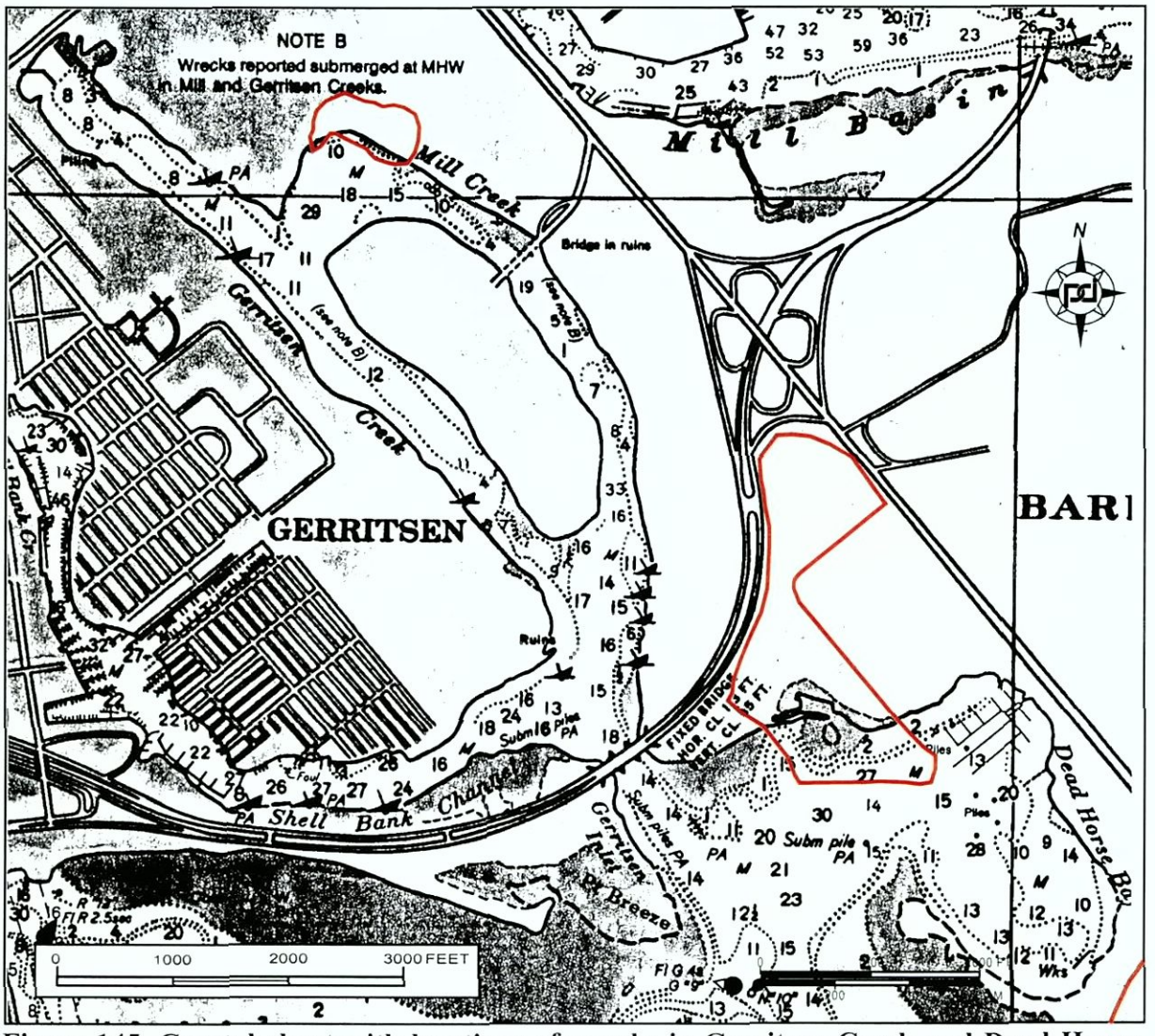


Figure 145. Coastal chart with locations of wrecks in Gerritsen Creek and Dead Horse Bay. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(NOAA 1986).*

Timbers extending for an estimated 250 feet were noted on tidal flats approximately 50 feet north of the beach on the north shore of Dead Horse Bay (Figure 146). At approximately mid-tide longitudinal timbers apparently belonging to the side of the hull were noted above water and other transverse timbers could be seen below water. Additional remains may be visible at extreme low tide. A recent NOAA chart (see bottom right of Figure 145) indicates "wrecks" at this approximate location. The wreck would appear to be offshore of the western end of the upland Dead Horse Bay restoration site.

The other visible wreck is that of a barge, also located on a tidal flat some 30 feet offshore of the southwestern corner of the Brant Point restoration site (Figure 147). This may be the southernmost of two wrecks shown on a 1939 nautical chart (Figure 148).

Figure 146. Bow of a wrecked ship on the north shore of Dead Horse Bay, facing west. Jamaica Bay Restoration Project, Kings, Queens and Nassau counties, New York *(Pickman 1999).*

Figure 147. Wrecked ship at Brant Point, facing northwest. Jamaica Bay Restoration Project, Kings, Queens and Nassau counties, New York *(Pickman 1999).*

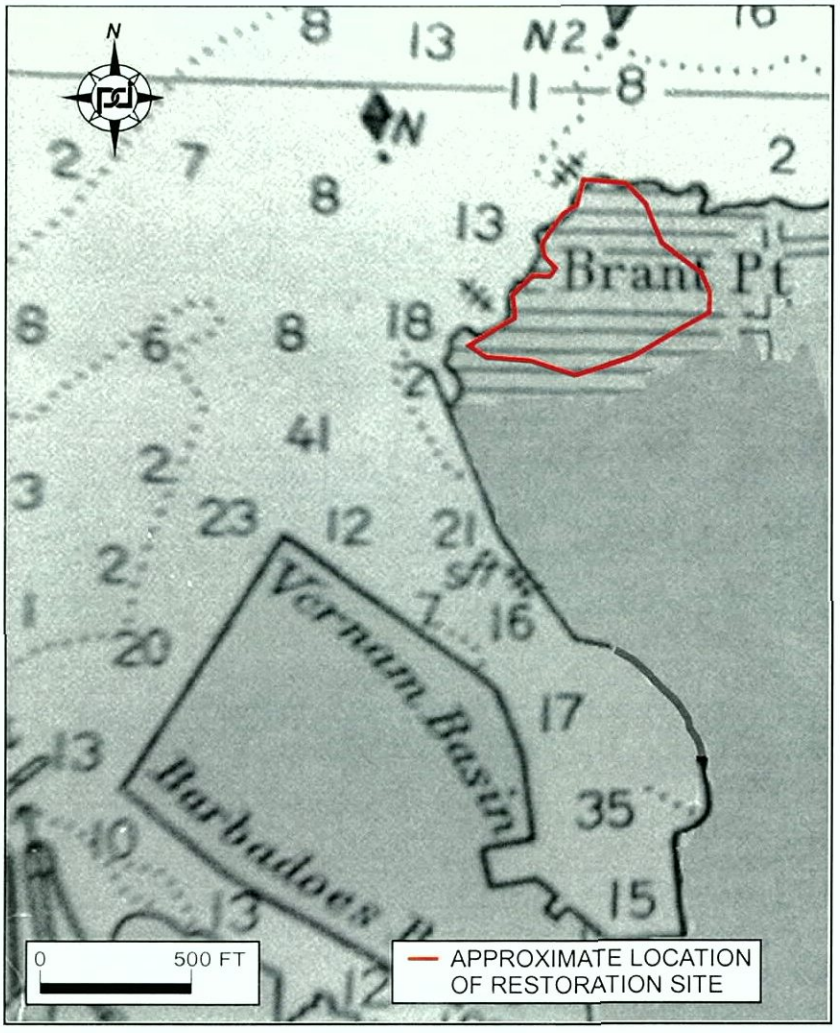


Figure 148. Coastal chart locating shipwrecks off Brant Point. Jamaica Bay Restoration Project, Kings, Queens and Nassau Counties, New York *(USCGS 1939).*

5.0. CONCLUSIONS AND RECOMMENDATIONS - SUMMARY

The results of this baseline study indicate the presence of potentially significant cultural resources within or in the immediate vicinity of ten proposed Jamaica Bay Ecosystem Restoration Project sites. At four locations—Dead Horse Bay, Fresh Creek, Spring Creek, and Motts Point—remains of historic period cultural landscapes are embedded in the existing environment. Dead Horse Bay, Paerdegat Basin and Motts Point exhibit potential for the discovery of additional historic deposits and prehistoric remains. The Hawtree/Bergen Basin and Gerritsen Creek restoration sites may contain evidence of early twentieth century structures and associated artifact deposits, while possible early twentieth century bulkhead remnants are extant along the Dubos Point project area shoreline. At Dead Horse Bay and Brant Point potentially significant marine resources are present. Actual or inferred cultural resources at these locations should be the subject of further study as outlined below.

No cultural resources have been recorded for two of the three remaining restoration sites: Broad Channel and the JFK Runway By-pass. Past land use history and archaeological sensitivity of Broad Channel indicates low potential for locating unrecorded terrestrial and submerged resources. No further work or monitoring during earth-moving activities is recommended. The JFK Runway By–pass might impact historic resources within the current marshland or even submerged prehistoric remains, with further work considered. No specific locations for the Oyster/Eelgrass Reintroduction test areas have been identified. The Jamaica Bay floor possesses a range of archaeological sensitivities from high to low, carrying a recommendation of deferment until areas have been determined.

The rationale and specific recommendations for each of the twelve restoration areas are presented as Table 3 and Table 4. Table 3 provides the developmental context for the general survey strategy which is then applied to the particular project areas as outlined in Table 4. All of the restoration areas share common land use history patterns, which influence the subsequent Phase IB survey strategy. The oyster and eelgrass beds will be positioned on the bay floor; eight areas were or will be formed from filled-in marshlands; the remaining areas possess uplands (possibly unaltered) in addition to filled-in marshlands. Phase IB survey issues for this tri-part division of project areas largely overlap and involve four aspects. The presence of known prehistoric or historic sites can be and has been determined through archival investigations and field reconnaissance. The background studies also indicated that a variety of terrestrial prehistoric and historic sites from extraction camps to house complexes to recreation facilities could additionally be present, especially where dry areas would have been located within or adjacent to the marshlands. Submerged historic boats, piers and similar shoreline detritus were found during the reconnaissance with other such remains possible. Sub-marsh prehistoric sites may also be extant, although for any one area the likelihood is considered low. The highest probability that restoration activities will affect sub-marsh levels will occur during the channel construction at the end of the JFK runway and the creation of new tidal creeks at Motts Point, Dubos Point and Broad Channel. The general survey design reflects the formation histories of each restoration area.

Table 3. General Phase IB Developmental Context for the Twelve Restoration Areas

Restoration Area Formation History	Phase IB Survey Issue	Modification Factors	General Survey Strategy
Uplands within Filled Former Marshlands Dead Horse Bay Paerdegat Basin Bayswater/Motts Point	1) Presence of Known Prehistoric or Historic Sites 2) Probability of Unknown Prehistoric or Historic Sites 3) Probability of Sub-marsh Prehistoric sites 4) Probability of Submerged Historic sites	Nature and Extent of Restoration Activities Nature of Possible Resources	1) Documentation of resource involving its nature and condition 2) Phase IB for Uplands subsurface testing with manual or mechanical methods Phase IB for Filled Marshland subsurface testing with mechanical methods 3) No Further Work or Monitoring During Restoration Activities 4) Phase IB Visual or Remote Sensing Examination; documentary investigation
Filled Former Marshland Gerritsen Creek Fresh Creek Spring Creek Hawtree Point Dubois Point Brant Point Broad Channel JFK Runway Bypass	1) Presence of Known Prehistoric or Historic Sites 2) Probability of Unknown Prehistoric or Historic Sites 3) Probability of Sub-marsh Prehistoric sites 4) Probability of Submerged Historic sites	Nature and Extent of Restoration Activities Nature of Possible Resources	1) Documentation of resource involving its nature and condition 2) Phase IB for Filled Marshland subsurface testing with mechanical methods 3) No Further Work or Monitoring During Restoration Activities 4) Phase IB Visual or Remote Sensing Examination; documentary investigation
Current Bay Floor Oyster Beds Eelgrass Beds	1) Probability of Sub-marsh Prehistoric sites 2) Probability of Submerged Historic sites	Nature and Extent of Restoration Activities Nature of Possible Resources	1) No Further Work or Monitoring During Restoration Activities 2) Phase IB Visual or Remote Sensing Examination; documentary investigation

Restoration areas with former uplands: for known historic remains (no prehistoric sites were indicated) documentation involving such characteristics as their nature, condition, dimensions, identification, and relationships to on-shore resources.

Current uplands with the potential for unrecorded prehistoric or historic sites: subsurface testing with manual (shovel testing) or mechanical (auger, backhoe) methods when extent of possible fill or disturbance is unknown.

Terrestrial areas composed of former marshlands with the same resource potential: subsurface testing with largely mechanical means to ensure examination of original marsh strata. The probability of locating sub-marsh early prehistoric resources is considered low for any one restoration area, but highest for four sites—JFK Runway, Motts Point, Dubos Point and Broad Channel. Most of the updated earth-moving activities will be limited to affecting historic fill layers placed atop former marshland and unlikely to affect any more deeply buried remains. No further work is recommended; alternatively, monitoring during rehabilitation could be employed.

Non-terrestrial marsh, tidal flats and open water portions of the project areas with the possibility of encountering near-surface and submerged historic resources: visual examination with a boat at low tide or more formal remote sensing techniques. Further review of existing documentary sources may be necessary to help identify the encountered remains.

The Phase IB strategies for the eight restoration areas composed of filled-in marshlands are the same, except for the elimination of the testing procedure for former uplands. The survey issues involved in establishing oyster and eelgrass beds include the probabilities of sub-marsh early prehistoric and submerged historic sites. Testing options include monitoring, visual/remote sensing techniques, or no further work.

The final character of the Phase IB survey for a particular restoration area will be further modified by the nature and extent of the planned activities and the nature of the possible resources. Direct or indirect impacts to what percentage of the total acreage are among the modification factors. If impacts to any given resource can be avoided, however, no further investigations at this location are recommended.

The application of the general survey strategy to the individual Jamaica Bay restoration areas is presented in Table 4. The data includes summaries of the investigation of each of the areas, the proposed project activity, prehistoric and historic site assessments, and recommendations. This outline is embellished in succeeding sections. Eight of the project areas possess updated information on rehabilitation activities and boundaries, presented in Appendix A, which have been incorporated into the tables and accompanying discussion.

Table 4. Summary of Activity and Recommendation at the Twelve Restoration Sites.

Location	Proposed Restoration Activity	Prehistoric Site Assessment	Historic Site Assessment	Recommendation
1. Dead Horse Bay (see Appendix A)	create salt marsh and tidal creek system; stabilize landfill; create dune habitat; preserve existing and create new beaches; reconfigure upland habitat through excavation or replacement of existing fill or soils (see Appendix A)	none recorded; most of Barren Island marshland with small upland area	before 1850s cattle and horse pasturage with very few non-substantial structures; area of commercial industry (fertilizer; fish-oil; garbage; ferry service) from 1850s to 1930s; airport (Floyd Bennett Field), Marine Parkway Bridge adjacent; part of restoration area filled in with garbage/refuse and sand top layer from 1948 to 1955, remainder is marshland and open water; visible remains of a breakwater/pier in southwest section possibly associated with ferry service, and bulkheading in southeast section possibly associated with fertilizer plant or ferry service, and a shipwreck immediately offshore of restoration area (see Appendix A) 1899 data shows most of area former marsh with some upland in southeast with peninsula, flats, shallow water, and some deep water elsewhere	Phase IB : a) documentation of *breakwater/pier* pilings in southwest corner; bulkhead remains along south shoreline; wooden vessel remains b) surface inspection of and subsurface testing of upland , dune and beach areas with manual or mechanical methods; c) inspection of marsh, mudflats, adjacent waters with remote sensing methods; especially the wooden vessel remains
2. Gerritsen Creek	grading of existing terrain; establishment of new plant species	filled-in former marsh land, no high ground; Gerritsen Creek or Ryder's Pond or Site #50, #3608, #4 burials/shell heaps/ pottery, large village site dating to Archaic, Woodland and Contact periods; 1 burial/shell deposit site; 1 burial site reported, all 3 in vicinity of restoration area	Gerritsen Mill built ca. 1645, in operation till 1889, standing till early 1900s; some 2000 ft northwest of restoration area; National Register Lott House some 4500 ft north of restoration area; prior to landfilling for Marine Park begun in 1930s the restoration area was marshland; Watkins Hotel built by 1907 and *several small* wooden structures built probably on pilings within restoration area, not currently visible	Phase IB a) surface inspection of and subsurface testing with largely mechanical means; Watkins Hotel complex and wooden structures remains may be extant Phase IB field survey of extant Gerritsen Mill Dam complex should plans call for dredging in the waterway
3. Paerdegat Basin (see Appendix A)	construction of ecology park; salt marsh, tidal channel, and upland habitat restoration by excavating on-site soils (see Appendix A)	Site #51 in the vicinity, see description below; land around creek former marsh with no areas of dry ground; north restoration area represents10 to 15 feet of fill over tidal marsh deposits	a tidal creek; the basin channelized construction completed after 1926; early 1900s wooden structures on pilings adjacent to basin and at or near southeast corner boundary (see Appendix A) 1899 data shows uplands along northeast border, rest of land formed from marsh; tidal channel, tidal flats, shallow with some deep water elsewhere	Phase IB a) surface and subsurface probe with manual or mechanical means of former upland and current land portions b) inspection of Bay end with remote sensing methods

Table 4 continued.

Location	Proposed Restoration Activity	Prehistoric Site Assessment	Historic Site Assessment	Recommendation
4. Fresh Creek (see Appendix A)	recontouring of the former tidal creek by removing fills and establishing marshes; improve current uplands; excavation of on-site soils (see Appendix A)	sites near the restoration area: a major village site # 51 (or # 7390) with shell heaps and cultivated lands; site reported 500 ft west; and 3 Parker sites (a camp, village, other) closest of all sites is 450 ft east	creek with adjacent marshland, with structures shown adjacent in 1921; channel dredging, bulkheading and partial filling in (1900-1920); modern artifacts present within eroding landfill deposits within restoration site; Vanderveer Mill complex (mill, dam, boat houses and wharf) built mid-1700s, standing till early 1900s, adjacent to Fresh Creek in vicinity of restoration area with remains of at least the wharf extant (see Appendix A) 1899 data shows all terrestrial lands formed of marsh with flats and Fresh Creek composed of shallow water elsewhere	Phase IB: a) documentation of remains associated with Vanderveer Mill b) surface and subsurface inspection with largely mechanical means of terrestrial sections c) inspection of Bay end with remote sensing methods
5. Spring Creek (see Appendix A)	tidal marsh improvements; passive recreation activities; establish dune complex along south border through large scale excavation and use of fill materials; export of soils possible (see Appendix A)	none listed, but report of a concentration of shells and various artifacts some 1500 ft northwest of restoration site; 2 areas of higher ground with potential prehistoric use or settlement near or very near restoration site, but could have resulted from landfilling	creek with adjacent marshland with subsequent bulkheading, fill deposits, road building and other earth-moving activities (ca. 1900) within or near restoration site; remains of Flynn causeway (1900) likely buried under subsequent fill and partially within restoration site; remains of wooden pilings for pier associated with the causeway are extant; Van Wicklen Mill built late 1700s/early 1800s, used for storage by 1908, some 2000 ft northwest of current 2003 northern limit of restoration site; Pleasant Point Bridge and causeway early 1900s remains outside of 2003 restoration site limits; Pleasant Point Yacht Club and other small structures from early 1900s located north of 2003 restoration site (see Appendix A) 1899 data shows lands formed from marshes, with roadway exception (former Flynn Causeway); tidal channels, flats and shallow water elsewhere	Phase IB: a) documentation of remains associated with Flynn Causeway b) surface and subsurface inspection with largely mechanical means of terrestrial sections; especially Flynn Causeway alignment c) inspection of marsh, mudflat, and adjacent waters with remote sensing methods

Table 4 continued.

Location	Proposed Restoration Activity	Prehistoric Site Assessment	Historic Site Assessment	Recommendation
6. Hawtree Point (see Appendix A)	remove invasive vegetation then establish Bergen Basin side marsh and coastal plant species; construct fence between Charles Memorial Park and coastal vegetation; minor earth moving within project area (see Appendix A)	the Aqueduct site, major village site with at least a Late Woodland component 1 mile north of restoration area; possible others in vicinity; Site 137 with pottery and ground stone some 3500 ft north of restoration area; strip of higher ground possible prehistoric use or settlement located 1500 ft north of restoration area	creeks with adjacent marshes; mid to late 1800s homes and landings near restoration area; New York, Woodhaven and Rockaway Railroad later part of Long Island Railway built ca. 1880 in operation till 1950 at eastern edge of restoration area; Ramblersville community with houses on stilts (1880-1956) along banks of Hawtree Creek near restoration area; Howard Hotel built on pilings with boardwalk (late 1890s) along with other structures to 1907 near restoration area; 7 small structures (homes) built on piles within restoration area; early 1900s development projects on filled land from dredging the bay near restoration area; early 1900s wood homes partially within restoration area; early 1900s East Hamilton Beach community not within restoration area, homes and canals filled in ca. 1942 for Idlewild airport and present Bergen basin subsequently built; brick water tank built prior to 1966 at Bergen Basin mouth not in restoration area (see Appendix A) 1899 data shows all lands formed from marsh with flats and shallow water elsewhere	Phase IB: surface and subsurface examination with largely mechanical means to locate possible structural remains or artifact deposits associated with the early 1900s development of the area
7. Motts Point or Bayswater State Park (see Appendix A)	keep current bulkhead; tidal creek widening; extensive manipulation of plant species to control invasive plants and to create marsh and dune habitats through excavation and use of on-site soils (see Appendix A)	none recorded but reports of shell deposits/burials/ other artifacts in the Bayswater area south of restoration area; most of present upland represents unfilled land with possible use or settlement by prehistoric peoples	by 1852 construction at Motts Point noted homes near restoration area, the Hurdis Dock, lumber yard; the Hurdis Property (Hurdis Dock and one associated structure) within the restoration area; the Boissert/ Heinsheimer Property with house and outbuildings begun by 1886 with all buildings razed after 1990 but with some foundations still evident, within restoration area; decayed pilings on north shore (see Appendix A) 1899 data shows upland along south central border while remaining lands formed from marsh with flats and shallow water elsewhere	Phase IB: a) Boissert House site: Avoid, if not documentation of structural remains b) surface and subsurface inspection with largely mechanical means of terrestrial sections (with exceptions); especially Hurdis Lumber Yard c) inspection of shoreline, mudflat, and adjacent waters with remote sensing methods; especially the observed decayed pilings d) possible monitoring of sub-marsh construction for prehistoric strata

Table 4 continued.

Location	Proposed Restoration Activity	Prehistoric Site Assessment	Historic Site Assessment	Recommendation
8. Dubos Point (see Appendix A)	leave existing bulkhead; create tidal marsh; construct tidal channels; establish shoreline erosion control measures along west shoreline; create upland habitat at peninsula landward boundaries; grading and excavation on of on-site soils (see Appendix A)	none recorded within or in vicinity of restoration area	before 1909 unfilled marshland; by 1919 bulkheading and infilling as part of Sommerville development; minimal structures erected however and remains of wooded bullkhead extant along the eroding infilled shoreline (see Appendix A) 1899 data shows all of lands formed from marsh with tidal channels and shallow and deep water elsewhere	Phase IB a) documentary research to establish date or history of bulkhead combined with field survey of existing remains b) surface and subsurface inspection with largely mechanical means of southern terrestrial sections c) inspection of shoreline and adjacent waters with remote sensing methods; especially the observed wooden bulkheading d) possible monitoring of sub-marsh construction for prehistoric strata
9. Brant Point (see Appendix A)	create shore erosion structures; remove fills in west portion to create tidal marsh habitat; place fills in east portion to create coastal grasslands and upland forest while also reducing dumping activities through grading of on-site soils (see Appendix A)	none recorded within or in vicinity of restoration area	before 1909 unfilled marshland; by 1911 several structures present with erosion of the point likely placing structures within the restoration area beyond the present shoreline; visible shipwreck remains immediately offshore of restoration area (see Appendix A) 1899 data shows most of lands formed from marsh and two channels with flats and shallow water elsewhere	Phase IB a) surface and subsurface inspection with largely mechanical means of terrestrial sections c) inspection of shoreline and adjacent waters with remote sensing methods to include the visible remains of wooden barge
10. Broad Channel	construction of a new culvert under MTA causeway and establishment of short tidal creeks	none recorded within or in vicinity of restoration area	marsh and channel area till railroad opened in 1880 then establishment of small fishing community with station, with continued development and attendant filling in of marsh and open water area	No further work. or monitoring low probability of encountering unreported terrestrial or submerged resources; primarily replacement of existing culvert
11. JFK Runway By-pass	establishment of a channel across Jo Co Marsh at end of JFK south runway extension	Site #138, fishing station, Site #154x with lithics, Site #139 a fishing place, Site #140 with pottery and lithics noted near restoration area before airport construction	possible scattered, impermanent structures whose specific locations are unknown before ca. 1942 airport construction began; subsequent runway extension on filled in previous marsh and channels within restoration area	Phase IB remote sensing survey of marshland combined with monitoring during construction for possible submerged prehistoric sites

Table 4 continued.

Location	Proposed Restoration Activity	Prehistoric Site Assessment	Historic Site Assessment	Recommendation
12. Test Oyster Beds, Eelgrass Areas	various test reintroduction areas for eastern oysters and eelgrass	no specific locations	no specific locations	Defer Probability of locating known or potential submerged resources co uld vary from low to high

5.1. CONCLUSIONS AND RECOMMENDATIONS

5.1.1 Dead Horse Bay Restoration Site

No prehistoric sites have been recorded within the Dead Horse Bay restoration site which will be the object of rather extensive restoration activities throughout the 147.47-acre project area. Salt marshes, beaches, a tidal creek system, and dune habitats will be created; the existing landfill stabilized, and the upland habitat reconfigured. Various historic mid-1800s to mid-1900s commercial industries, the Floyd Bennett Air Field, and the Marine Parkway Bridge were all located within the vicinity of the restoration site. Recent refuse deposits and remains of three historic features were noted during field reconnaissance. Recommendations for these resources, and the landfill which will not be impacted, need to be specifically addressed.

Ferry Service. Prior to the opening of the railroad trestle across Jamaica Bay in 1880, much of the travel to the Rockaways was by means of ferries which ran from various points on the north shore of the bay. Ferry service continued through the 1930s with five of the ferries making stops at Barren Island (south portion of restoration site), the earliest by 1905. Piers are shown on the 1909 and 1911 maps (see Figures 40 and 43) west of the White factory where bulkheading and a breakwater or pier had been constructed at the southwest corner of the island. Pilings were observed at these locations during the site reconnaissance (see Figure 44) which are probabily part of the facilities built for the ferries.

The White Factory. A factory for processing dead animals into fertilizer was built on the south shore of Barren Island in the late nineteenth century, most likely immediately west of the present route of Flatbush Avenue (see Figures 40, 41, 43, 46 and 47). Pilings apparently representing remains of a bulkhead associated with this factory were noted during the reconnaissance (see Figure 45), which are now within the restoration site. Upland plant replacement adjoining the west side of Flatbush Avenue may directly, if not indirectly, impact any remains of the factory complex which might be buried at this location beneath landfill. The extent of the overburden is unknown.

Landfill Deposits. A stratum of garbage landfill containing a dense deposit of artifacts is located along the west shore of Barren Island. This landfill was placed there between 1948 and 1955. Landfill deposits dating earlier in the historic period can be considered as possibly significant

archaeological resources. The recent date of the landfill deposition suggests that it would not be considered eligible to the National Register of Historic Places. Although stabilization of the eroding bank is anticipated, the impact or mixing/removal of refuse material is likely to be minimal. Stabilization will slow the natural erosion of the landfill.

Marine Resources. The remains of a wooden vessel, some 250 feet in length, are present along the south shore of Dead Horse Bay (see Figure 146). Located some 50 feet north of the beach and visible at low tide, its proximity to the restoration site may result in impaction from project activity.

Recommendations. No further work is recommended at the Landfill Deposits on Barren Island, since they are unlikely to be significantly impacted by the stabilization process. A Phase IB investigation is considered necessary for the remaining project area which would include:

- documentation of the breakwater/pier pilings in the southwest corner, the bulkhead remains along the southern shoreline, and the wooden vessel. The first two resources will be directly impacted by dune and beach creation, while the third may be indirectly impacted. Documentation should include such characteristics as the nature, dimensions and condition of the remains, and in the case of the vessel, its identification or type of water craft. The wooden vessel could date from the late nineteenth or early twentieth century and therefore be considered a significant cultural resource (see Harris and Pickman 1999). The survey should be conducted at low tide, when the maximum amount of above-seabed exposure is available.

- for the remainder of the terrestrial portion of the restoration area, a surface inspection and subsurface testing of former upland, dune and beach areas with manual or mechanical (auger, backhoe) methods.

- inspection of current marsh, mudflats, and adjacent waters with remote sensing methods. The inspection should be comprised of a magnetometer, side scan sonar and Global Positioning System (GPS). The remote sensing will, through the use of the magnetometer, side scan, and GPS navigation system, accurately map above and below bay or harbor floor features (such as construction debris, shipwrecks) if present.

5.1.2. Gerritsen Creek Restoration Site

Three prehistoric and a very early historic period mill are among the resources noted in the vicinity of the Gerritsen Creek restoration site. The Watkins Hotel (built by 1907) along with other wooden structures constitute resources which fall within the 11.12 acre restoration area.

Watkins Hotel. A "hotel," which most likely represented an inn frequented by fisherman, was located in the marshland on the edge of Mill Creek. This structure was constructed prior to 1907 and was supported on pilings. Refuse from this structure would likely have been discarded into the creek and possibly the surrounding marshland. Some of this refuse may have been washed

away while other material may have become embedded in the silts on the creek bottom. Such deposits could be archaeologically significant; the likelihood of discovering undisturbed remains within the restoration site is difficult to determine from the documentary assessment.

Gerritsen Mill. Remains of the Gerritsen Mill Dam and other possibly associated features, are reportedly visible in Gerritsen Creek at low tide. The Gerritsen Mill was perhaps the earliest of the tide mills constructed on several of the tidal creeks along the north shore of Jamaica Bay in the seventeenth and eighteenth centuries. Associated remains would certainly be considered potentially significant. The remains associated with the Gerritsen Mill are not within or near the restoration site. Plans for future dredging projects in Gerritsen Creek should consider possible impacts on these cultural resources.

Recommendations. Phase IB involving surface inspection and subsurface testing with mainly mechanical testing (i.e., auger or backhoe) to examine prior marshland surface. Possible features or artifact deposits from the Watkins Hotel may be extant.

Gerritsen Mill Remains - No further work at present; additional archival and field survey if future earth-moving activities such as dredging or creek widening are planned.

5.1.3. Paerdegat Basin Restoration Site

Construction of an Ecology Park, in addition to salt marsh, tidal channel and upland habitat restoration will take place throughout this 80.2-acre project area. A major prehistoric village site was in the vicinity, and early twentieth-century wooden structures on pilings lined the historic channelized basin at or near the southeast corner boundary (see Figure 63). At least part of the basin site represents upper soil layers of 10 to 15 feet of fill over tidal marsh deposits, which also possessed a former upland along the northeast border.

Recommendations. Phase IB consisting of land and water inspections. Surface and subsurface examination with manual, if minimal fill over current upland, or more likely mechanical (auger, backhoe) means of present terrestrial portions. Inspection of the bay or more open waters with remote sensing methods (magnetometer, side scan, GPS system).

5.1.4. Fresh Creek Restoration Site

Four prehistoric sites, early twentieth century structures, and modern landfill deposits have been reported near or within the Fresh Creek restoration area. The waterway first underwent reconfiguration in the early 1900s; a similar reconfiguration is proposed, in addition to the establishment of new plant species, within the 27.82-acre site. These activities will affect a large portion of the project area. The wharf portion of the Vanderveer Mill built in the mid-1700s lies within the project area.

Wharf and Raised Area. A 1907 map shows a wharf on the east bank of Fresh Creek, south of Avenue J (see Figure 64). The wharf and a boat house were connected to the Vanderveer Mill by

a boardwalk or pathway which extended across the mill dam. During the field reconnaissance, remains of the wharf were noted at the location shown on the 1907 map (see Figure 67). The wharf was not illustrated on earlier, less detailed maps, but a roadway extending to the shore of the creek was depicted in this area on maps from 1852 and 1868 (see Figures 30 and 65). Also during the reconnaissance an elevated area in the creek was observed at low tide in the vicinity of the Vanderveer Mill dam site (see Figure 68). It was not possible to further examine this area to determine whether it includes cultural remains associated with the mill dam.

Recommendations. Phase IB investigation. Additional intensive documentary research, including examination of primary documents, is recommended to further evaluate the wharf on the east side of Fresh Creek. Particular objectives would be to determine the wharf's date of construction and its association with the Vanderveer Mill. This phase should be combined with a field survey to expose and record this feature (or avoid the wharf), as well as a surface and subsurface (visual by boat at low tide or remote sensing procedures) examination of the elevated area in Fresh Creek.

Surface and subsurface examination with largely mechanical (auger, backhoe) means should also be undertaken in the remaining terrestrial portions, in addition to a remote sensing survey (magnetometer, side scan, GPS system) of the Bay or more open waters.

5.1.5. Spring Creek Restoration Site

A number of water quality and habitat improvements are planned for the Spring Creek area, involving extensive excavations throughout the site's 188.67 acres. While no prehistoric sites are listed in the vicinity, historic period alteration of the landscape has been considerable. Reconfiguring of the creek and adjacent marshland, the construction of the Flynn Roadway and Pleasant Point Causeway, the establishment of communities, and the building of the Van Wicklen Mill have been documented for the general area beginning in the late 1700s or early 1800s.

Flynn Pier and Roadway Embankment. In 1900 the first attempt was made to build a roadway across Jamaica Bay. The plans involved construction of a wooden causeway on pilings across the open waters of the bay and deposition of landfill to construct an embankment across the Jamaica Bay marshlands.

Maps and other documentary sources show that the only portion of the marine causeway completed was an approximately 1,300-foot pier section extending outward from the Jamaica Bay shoreline. Remains of this structure are present on the shoreline of the restoration site's southernmost section. The roadway embankment extending northward from the shoreline was apparently also constructed for it is shown on early twentieth century maps. The section south of 165th Avenue would be within the boundaries of the restoration site.

A larger area of landfill, located along the eastern shoreline of Old Mill Creek, and associated with the construction of the roadway embankment, is also shown on maps of this period. The shoreline adjacent to the landfill would appear to have been bulkheaded. This area is also within the boundaries of the restoration site.

Pleasant Point Causeway. A bridge and wooden causeway were constructed across the Spring Creek marshes prior to 1913 connecting the dry ground north of Spring Creek with the small community which developed in the Pleasant Point area, south of the present location of the Belt Parkway. Remains of the wooden bridge, and pilings which supported the causeway are visible in the area north of the Belt Parkway and southeast of the DEP facility. The bridge and at least part of the causeway route are now outside the restoration site, and no further work is recommended.

Recommendations. Flynn Roadway - Phase IB investigation. As the first attempt to construct a roadway across Jamaica Bay, construction of the Flynn Roadway can be considered as a significant event in local and regional history. When Cross Bay Boulevard was constructed in 1925, it utilized the portion of the Flynn route which crossed the Jamaica Bay Islands. Additional investigation of the Flynn roadway/pier remains is recommended. This should include further documentary research utilizing primary sources, which could include deeds, court documents and records of the New York City Department of Docks and Ferries. Field investigations should include on-site recording of the remains of the Flynn pier. Mechanical equipment (backhoe) should be utilized to trench across the embankment route to determine whether it can be stratigraphically identified beneath the later landfill. Similar trenching could determine whether the Flynn bulkheading along Old Mill Creek is present beneath the later landfill.

Surface and subsurface examination, again with mainly mechanical (auger, backhoe) means should also be conducted in the remaining terrestrial portions, in addition to a remote sensing survey (magnetometer, side scan, GPS system) of the mashes, mudflats and open waters.

5.1.6. Hawtree/Bergen Basin Restoration Site

Removal of invasive vegetation and establishment of marsh and coastal plant species, in addition to erecting a fence around the Charles Memorial Park is scheduled to take place within this 1.79-acre project area. Prehistoric sites and a number of historic period homes, a railroad, and a hotel are recorded within or near the basin. Those known resources within the restoration area consist of structures built on pilings above the marshland along the Jamaica Bay shoreline indicated on maps from 1901 to 1913 (see Figures 94, 96 and 98). As noted for the Watkins Hotel at the Gerritsen Creek site, refuse from these structures would likely have been discarded into surrounding marshland. Some of this material may have been washed away by tidal action while some may have become imbedded in marsh deposits underlying later landfill. The structures and deposits would be evidence of early historical development of the site, but their likelihood of survival in a good context is difficult to determine from only background data.

Recommendations. Phase IB surface and subsurface examination with mainly mechanical (i.e., auger, backhoe) means of the terrestrial portions (minus tennis courts and fringe marsh/beach/dune) to uncover possible structural remains or artifact deposits associated with the early 1900s development of the area. It appears from the current project maps that the fringe marsh/beach/dune area and adjacent open waters will not be directly or indirectly affected by the proposed restoration activities.

5.1.7. Motts Point Restoration Site

The Motts Point restoration site will have its tidal creeks widened, its terrain reconfigured and its plant species altered mainly along the shoreline accounting for 5.78-acres of direct impacts. No prehistoric sites have been recorded within the study area, but reports of shell deposits are known further south and the area's high ground adjacent to marsh land would have attracted prehistoric peoples. Two historic period properties, the Boissert/Heinsheimer House complex and the Hurdis Lumber Yard site, lie within the restoration site.

Boissert/Heinsheimer House Site. A house was constructed between 1879 and 1886 in the western portion of the restoration site's upland area. It was apparently owned and occupied at this time by Louis Boissert. This may have been one of the houses constructed by William Tritt Bailey as part of his plan to develop Bayswater. During the first decade of the twentieth century, the property was owned and occupied by a New York banker, Louis A. Heinsheimer. At this time modifications were apparently made to the structure and the present concrete seawall built.

Portions of the foundation of the main building, an extension added as part of the early twentieth century modifications, and a complex of outbuildings along the southern boundary of the site are visible. An additional brick feature, which could represent the edge of a pathway or possibly a portion of a subsurface feature was also noted during the site reconnaissance.

Water for the house was obtained by using a windmill and storage tank and a public water supply was available by 1901. When the house was built, however, a water supply system utilizing cisterns or a hand-pumped well system may have been utilized. It is also uncertain whether early waste disposal systems would have utilized privy pits, or a septic tank/cesspool. It is possible, therefore, that subterranean open pit features representing cisterns, privies or wells and dating to the early period of the house occupation could be present on the site. Such features could contain deposits that include domestic artifacts and faunal material.

Prehistoric Site Potential. Prehistoric sites have been reported on the Bayswater peninsula. Although prehistoric deposits have not been specifically noted on Motts Point, this may have represented an advantageous location for resource procurement sites. Maps from 1852 and 1873 appear to show the later site of the Boissert/Heinsheimer house as marshland, indicating that landfill would have been deposited at the house site prior to construction. These maps more likely inaccurately depict the extent of the marshland in this vicinity.

The Hurdis Lumber Yard Site. A lumber yard and dock were located in the northeastern portion of the restoration site prior to 1873. At least one of the associated structures may be depicted on an 1852 map (see Figure 100). By 1901, most of the lumber yard structures were no longer standing, but between 1891 and 1901 a domestic structure was built in this area. The Hurdis lumber yard and dock site would appear to be covered with later landfill.

Recommendations. Phase IB investigation. The Boissert/Heinsheimer house and the Hurdis Lumber Yard both played a role in the development of the Bayswater community. Intensive documentary research combined with archaeological field investigations may yield significant

information. Current plans (see Appendix A) call for no activities on the uplands and a majority of beach/coastal marsh/maintained areas/native grassland designated areas. Since the Boissert/ Heinsheimer house is located on the upland, it should be possible to avoid the site. If avoidance is not possible, then an investigation is recommended comprising further documentary research (examination of deeds, census records and other primary sources) and subsurface investigations utilizing a combination of manual and machine-assisted techniques.

Surface and subsurface examination with auger or backhoe should also be undertaken in the remaining terrestrial impact areas, with particular emphasis along the northeast fringe area where the Hurdis site is located. Additional documentary research is also suggested to provide a context for any possible remains. Scheduled rehabilitation efforts along the shoreline indicate direct and indirect impacts to the these areas and adjacent open waters sufficient to recommend a remote sensing survey (magnetometer, side scan, GPS system). Decayed pilings along the north shore were noted during the field reconnaissance. Tidal creek widening may reach sub-marsh strata, with monitoring for possible early prehistoric sites or materials a possibility.

5.1.8. Dubos Point Restoration Site

Restoration activities comprise creating a tidal marsh and channels, establishing shoreline erosion control measures along the western section and creating upland habitat at the southern portion of the peninsula. The activities will directly affect 4.86 acres of land, in addition to the shoreline and peninsula base. No prehistoric sites have been recorded for the project area and limited historic period development has occurred. The remains of a wooden bulkhead along the eroding shoreline of the restoration area (see Figure 127) were observed during the field reconnaissance.

Recommendations. Phase IB additional documentary research is recommended to establish the date or history of the bulkhead and its association with the Sommerville development project. In addition, a field survey should be conducted with boat at low tide or other remote sensing procedure to map the location and assess the condition of the existing remains.

Surface and subsurface examination with auger or backhoe should also be undertaken in the remaining terrestrial portions. Activities are currently planned for only the southern and most archaeologically sensitive half of the project area. A remote sensing survey (magnetometer, side scan, GPS system) of the shoreline and adjacent open waters is also recommended, to include the remains of the wooden bulkheading. As at Motts Point, tidal creek widening in this area may reach sub-marsh strata, with monitoring for possible early prehistoric sites or materials a possibility.

5.1.9. Brant Point Restoration Site

The shore protection measures and habitat changes proposed for this 8.41-acre area will not impact any known prehistoric sites. Historic period structural remains and associated artifact deposits may be present, with a wooden barge located immediately offshore the southwestern corner of the study area. This appears to be one of the two wrecks shown on a 1939 USCGS chart (see Figure 148). The wreck is substantially intact, although rot has caused collapse of roof and walls (see Figure 147).

Recommendations. Phase IB surface and subsurface inspection of the entire project area with largely mechanical means to locate any historic structures or associated features beneath the fill layers. Late nineteenth century and early twentieth century barges or vessels can be considered significant cultural resources (see Harris and Pickman 1999). A remote sensing survey (magnetometer, side scan, GPS system) of the shoreline and immediately adjacent open waters should be conducted to document the extant barge or other submerged resources. Attributes to record include the vessel's dimensions, vessel type, and condition. Additional archival investigation can be conducted to identify the vessel or vessel type in order to provide an evaluative context for the remains.

5.1.10. Broad Channel Restoration Site

The construction of the new culvert under the MTA causeway and the establishment of short tidal creeks will not affect any known prehistoric or historic resources. No developed areas are to be impacted and no structures were indicated on any of the maps obtained for this investigation. The probability that any undiscovered terrestrial or underwater sites will be affected is considered low. The planned project area is small and formerly was marshland.

Recommendations. No further work; monitoring during construction may also be considered.

5.1.11. JFK Runway By-pass Restoration Site

The establishment of a channel across the existing Jo Co Marsh at the end of the JFK south runway extension is proposed for this restoration site. No prehistoric sites are known within the project area, although four have been recorded near former marshland before construction of the airport. It is unclear if any historic period structures were within the restoration area. Prehistoric submerged sites might be at risk. The depth of the new channel may reach beneath the historic period fill to the former marshland surface although such a risk is considered low.

Recommendations. Phase IB remote sensing survey (magnetometer, side scan, GPS system) of the marshland to locate any historic or later prehistoric remains. Monitoring during construction for any impacts to early prehistoric resources below the marshland surface.

5.1.12 Reintroduction of Oyster Beds and Eelgrass Restoration Areas

The reintroduction of test oyster beds and eelgrass would affect any submerged historic or prehistoric resources. Unrecorded wrecks or other historic features could be present. Shell deposits or other evidence of human exploitation laid down when sea levels were lower than at present could be preserved beneath the Jamaica Bay marshland. Reintroduction of oyster beds and eelgrass may or may not involve minimal disturbance to the bay floor.

Recommendations. Since no specific locations have been identified, the probability of locating known or potential submerged historic or prehistoric resources could vary from high to low. Deferment is recommended until specific locations are determined.

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APPENDIX A
CONCEPTUAL PLAN REPORT

US Army Corps
of Engineers
New York District

CONCEPTUAL PLAN REPORT

Final / March, 2003

Prepared for the New York District, U.S. Army Corps of Engineers

By
Barry A. Vittor & Associates, Inc.
Kingston, NY
And
Environmental Concern
Denton, MD

Dead Horse Bay Conceptual Plan Report

Task 2b1; Develop Water to Vegetation Zone Elevations Design Criteria

Existing tide guage information provides the following elevations for Dead Horse Bay exterior for October and November of 2001. All readings are in NAVD 88 and in feet.

MLLW*	MLW*	MHW	MHHW	MHWS	Midtide
N/A	-3.00	2.00	2.09	2.97	-0.50

Source: U.S. Army Corps of Engineers, New York District. February 2003. *Summary of Water Level Data Report.* Jamaica Bay Ecosystem Restoration Project Feasibility Study. 7 pp plus figures.
*Readings not defined since in shallow water.

The biological benchmark data collected during October of 2001 provides the following information on the relationship of vegetation to elevation. All readings are in NAVD 88 and in feet.

Average Lowest Common Reed (*Phragmites australis*) Elevation	Average Elevation Between Smooth Cordgrass (*Spartina alterniflora*) and Salt Marsh Hay (*Spartina patens*)	Average Highest Elevation of Smooth Cordgrass (*Spartina alterniflora*) with Bare Beach Upgradient	Average Upper Wrack Line Elevation
1.99	2.33	1.31	4.29

Combining these two data sets with the October and November, 2001 tidal amplitude of 5.49 feet from Canarsie Pier tide gauge provides the following vegetation design zone elevations.

Tidal Amplitude	Mudflat Elevations (MLW to Midtide)	Low Marsh Elevations (Midtide to MHW)	High Marsh Elevations (MHW to Spring High Tide)	Upland Elevations (Above Spring High Tide)
5.49	-3.0 to 0.0	0.0 to 2.2	2.2 to 3.0	Above 3.0

Task 2b2; Rationale for Design

Figure 1; Historical Baseline Map provides the extent and acreage of deep water (greater than 2 meters), shallow water (less than 2 meters), flats, marsh and upland. As seen on this figure the following historical features are noted:

* The site was formed mostly of marsh with some upland mapped in the southeast site section
* The western peninsula of Dead Horse Bay was intact with a small cove mapped on the east side of the peninsula
* The nonvegetated areas are formed predominately of flats and shallow water with the exception of the deep water zone along Deep and Garritsons Creeks.

Figure 1. Historical Baseline Map Dead Horse Bay, 1899.

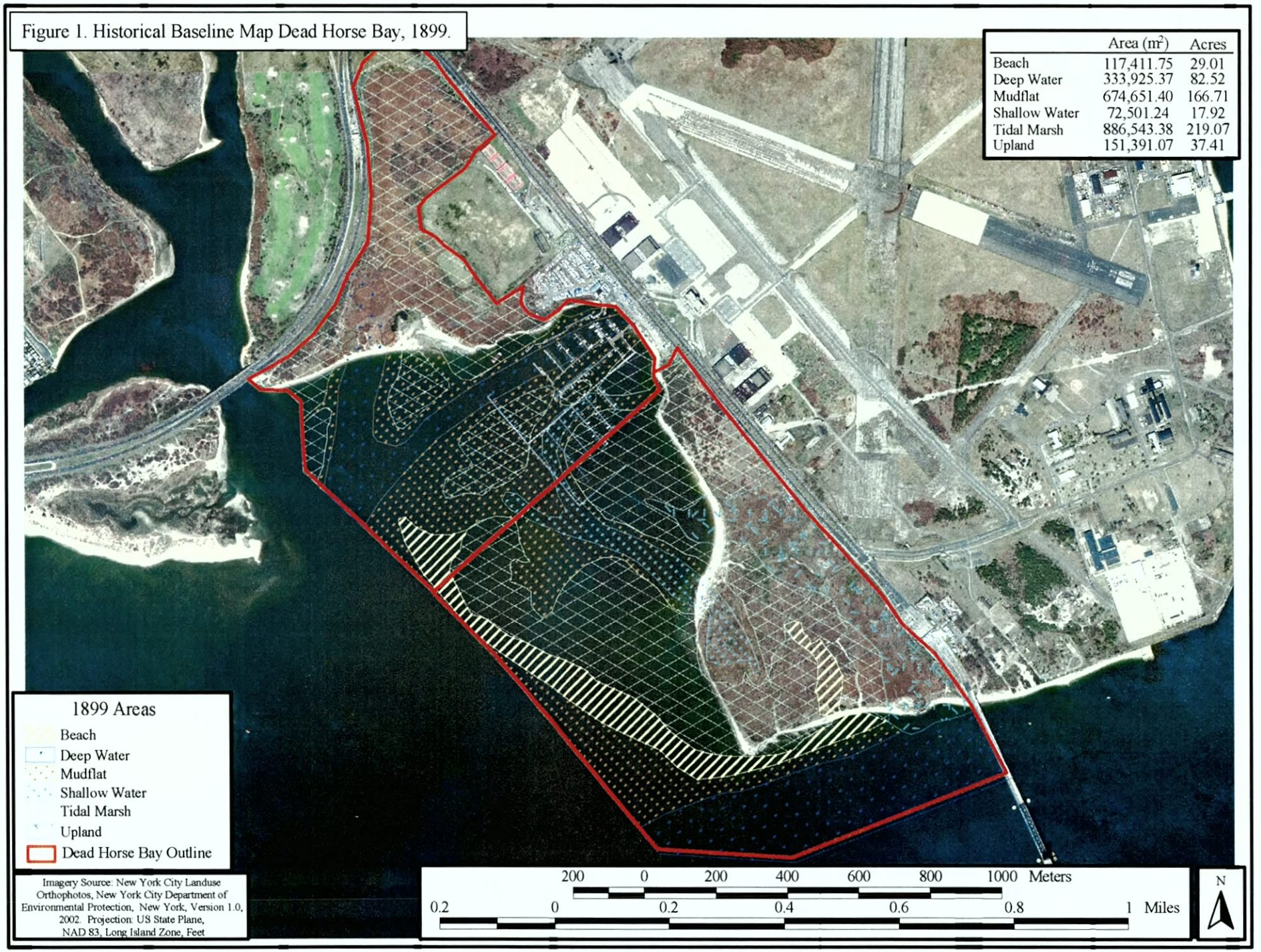


Figure 2; Existing Conditions Baseline Map illustrates the portions and areas of the project currently mapped as deep water, shallow water, low marsh, high marsh, invasive species and upland plant communities. This figure illustrates the following:

* Landward the site is formed mostly of upland with minor amounts of remnant marsh around the shoreline
* The former peninsula of Dead Horse Bay is now either mudflat or shallow water
* The remaining water is deep water most likely due to past dredging activities

Figure 3; Proposed Restoration Features Map depicts the proposed work for the site. The features were determined using both Figure 1 & 2 combined with the *December, 2002 Jamaica Bay Ecosystem Restoration Project: Existing Conditions, Future Without Project Conditions, Goals and Objectives Report* information to generate the restoration strategy. This strategy was formulated to reestablish, if possible, any historical habitats while achieving the goals and objectives. The goals and objectives for this restoration site include:

Restoration goals for Dead Horse Bay include:

* Reestablishment of salt marsh area in the north and south sections.
* Incorporate a tidal creek system in the north restoration area
* Stabilize the solid waste landfill from erosive forces in the southwest and south shorelines
* Create dune habitat in the south restoration area

Restoration objectives include:

* For economical objectives:
    - Use fills that are suitable in the north sections for coastal dune and maritime forest restoration and peninsula restoration in the southern section
    - Integrate and expand the current NPS restoration effort into the south project restoration approach
* For ecological objectives:
    - Incorporate wildlife attractors into the project design
    - Avoid areas with RTE plants

To realize these goals and objectives economically, balancing the earthwork on site as much as practicable was pursued. To facilitate the incremental cost analysis the proposed plan has been designed as separable features so that economical evaluation of the environmental benefits can be analyzed. With this approach, the following restoration plan features are proposed:

For Dead Horse North:

1. Through excavation remove fills to create tidal marsh and channel system
2. Preserve the existing beach

Figure 2. Existing Conditions Baseline Map, Dead Horse Bay.

	Area (m^2)	Acres
Upland	628,400.45	29.01
Beach and Marsh	78,934.17	82.52
Deep Water	759,947.18	166.71
Mudflat	273,997.62	17.92
Shallow Water	192,354.56	219.07

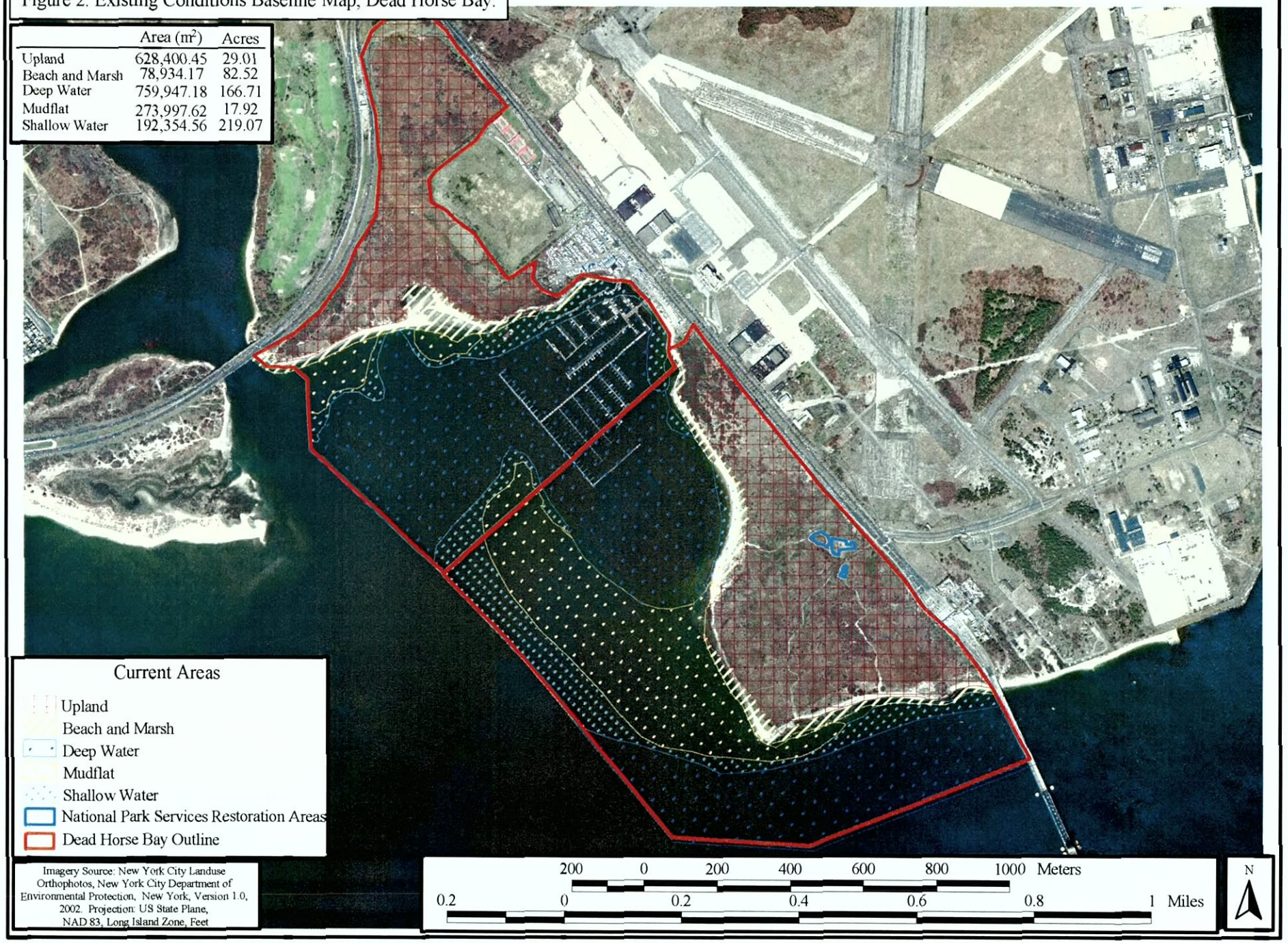


Figure 3. Proposed Restoration Features Map, Dead Horse Bay.

3. Blend grades from the created tidal marsh to the surrounding upland to create upland habitat

For Dead Horse South:

1. Use fills from Dead Horse North to stabilize the eroding landfill to the 1974 NYSDEC jurisdictional limits
2. Establish coastal dune habitat along the higher energy west and south shorelines
3. Replace the upland invasive species with native plant communities that complement NPS restoration areas
4. Create additional beach habitat along the west and southern shorelines and preserve

Task 2b3; Identify Construction Methods & Equipment and Develop Preliminary Unit Costs

Provided in separate document.

Task 2b4; Identify Material Disposal / Acquisition Options

This project will require both mass and fine grading to achieve the intended design grades. Fill areas on the project are located in Dead Horse South for the peninsula, coastal dune creation and upland restoration. These fills arise from cuts in Dead Horse North.

Paerdegat Basin Conceptual Plan Report

Task 2b1; Develop Water to Vegetation Zone Elevations Design Criteria

Existing tide gauge information provides the following elevations for Paerdegat Basin for October and November of 2001. All readings are in NAVD 88 and in feet.

For Paerdegat Basin South

MLLW	MLW	MHW	MHHW	MHWS	Midtide
-3.15	-3.07	2.10	2.17	3.29	-0.49

For Paerdegat Basin North

MLLW	MLW	MHW	MHHW	MHWS	Midtide
-3.29	-3.20	2.17	2.24	3.42	-0.46

Source: U.S. Army Corps of Engineers, New York District. February 2003. *Summary of Water Level Data Report.* Jamaica Bay Ecosystem Restoration Project Feasibility Study. 7 pp plus figures.

The biological benchmark data collected during October of 2001 provides the following information on the relationship of vegetation to elevation. All readings are in NAVD 88 and in feet.

Average Lowest Common Reed (*Phragmites australis*) Elevation	Average Elevation Between Smooth Cordgrass (*Spartina alterniflora*) and Salt Marsh Hay (*Spartina patens*)
1.78	2.43

Combining these two data sets with the October and November, 2001 mean tidal amplitude of 5.16 feet from the south tide gauge and 5.37 from the north gauge provides the following vegetation design zone elevations.

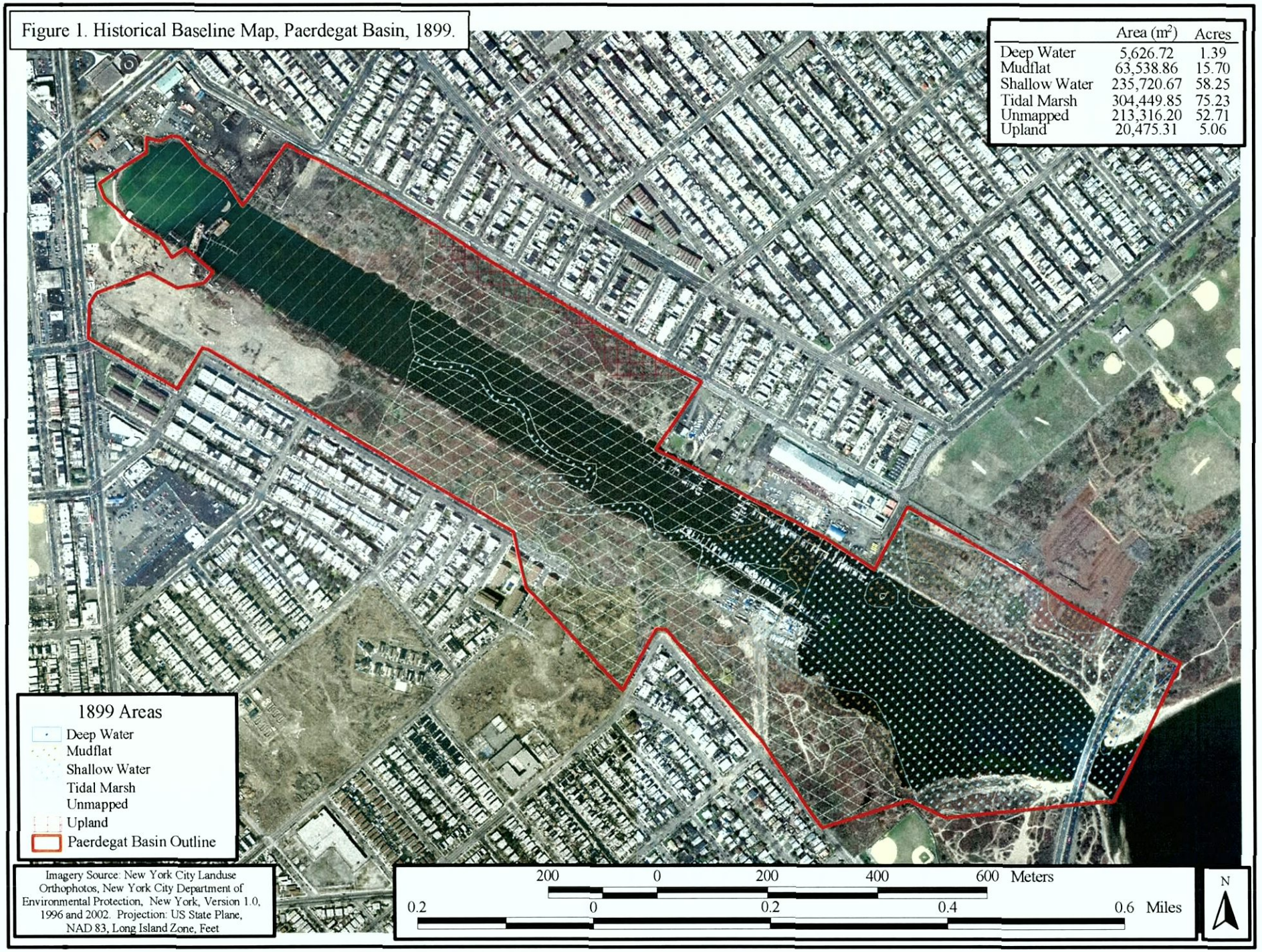
Average Mean Tidal Amplitude	Mudflat Elevations (MLW to Midtide)	Low Marsh Elevations (Midtide to MHW)	High Marsh Elevations (MHW to Spring High Tide)	Upland Elevations (Above Spring High Tide)
5.27	-3.0 to 0.0	0.0 to 2.4	2.4 to 3.1	Above 3.1

Task 2b2; Rationale for Design

Figure 1; Historical Baseline Map provides the extent and acreage of deep water (greater than 2 meters), shallow water (less than 2 meters), flats, marsh and upland. As seen on this figure, the following features are evident:

* Within the mapped areas, an upland area was situated along the northeast project limit
* The remaining terrestrial lands were formed of marsh
* A tidal channel previously existed in the south central portion of the project
* Tidal flats occur along the southern shoreline

Figure 1. Historical Baseline Map, Paerdegat Basin, 1899.



	Area (m^2)	Acres
Deep Water	5,626.72	1.39
Mudflat	63,538.86	15.70
Shallow Water	235,720.67	58.25
Tidal Marsh	304,449.85	75.23
Unmapped	213,316.20	52.71
Upland	20,475.31	5.06

* The remaining waterward areas were comprised of shallow water with the exception of a deep water section in the eastern portion of the project

Figure 2; Existing Conditions Baseline Map illustrates the portions and areas of the project currently mapped as deep water, shallow water, low marsh, high marsh, invasive species and upland plant communities. This figure illustrates:

* Land now extends into Jamaica Bay farther then shown on Figure 1
* The south central tidal channel has been filled in
* Remnant marshes exist in the southeast site sections and decrease in frequency towards the head of basin
* The south basin side is mostly comprised of invasive plant species with the north side containing some coastal shrubland and secondary woodlands
* Deepwater forms the predominant water areas with some shallow water mapped downgradient of the existing marinas

Figure 3; Proposed Restoration Features Map depicts the proposed work for the site. The features were determined using both Figure 1 & 2 combined with the *December, 2002 Jamaica Bay Ecosystem Restoration Project: Existing Conditions, Future Without Project Conditions, Goals and Objectives Report* information to generate the restoration strategy. *Figure 4; Local Sponsor Plan* provides the currently proposed work envisioned by the New York City Department of Environmental Protection and New York City Department of Parks. This plan involves the construction of an ecology park with tidal marsh combined with coastal grass and shrubland creation. The restoration strategy for this site therefore involved integrating the local sponsor's plans with restoring historical salt marsh and tidal channels. The goals and objectives for this restoration site include:

Restoration goals include:

* Integrating salt marsh restoration into the local sponsor's master plan
* Creating fringe marsh habitat along the lower, less degraded portions of Paerdegat Basin
* Incorporate upland restoration in the upper more degraded sections of Paerdegat Basin

Restoration objectives include:

* For economical objectives:
    - Using dredged coastal sands for landscape capping
    - Close coordination of restoration plan strategy with local project sponsor plans
    - Execute pilot scale tests of salt marsh plantings to ascertain the vegetation viability
* For ecological objectives:
    - Reduce ecological contaminant risk
    - Enhancement of upland habitat areas

Figure 2. Existing Conditions Baseline Map, Paerdegat Basin.

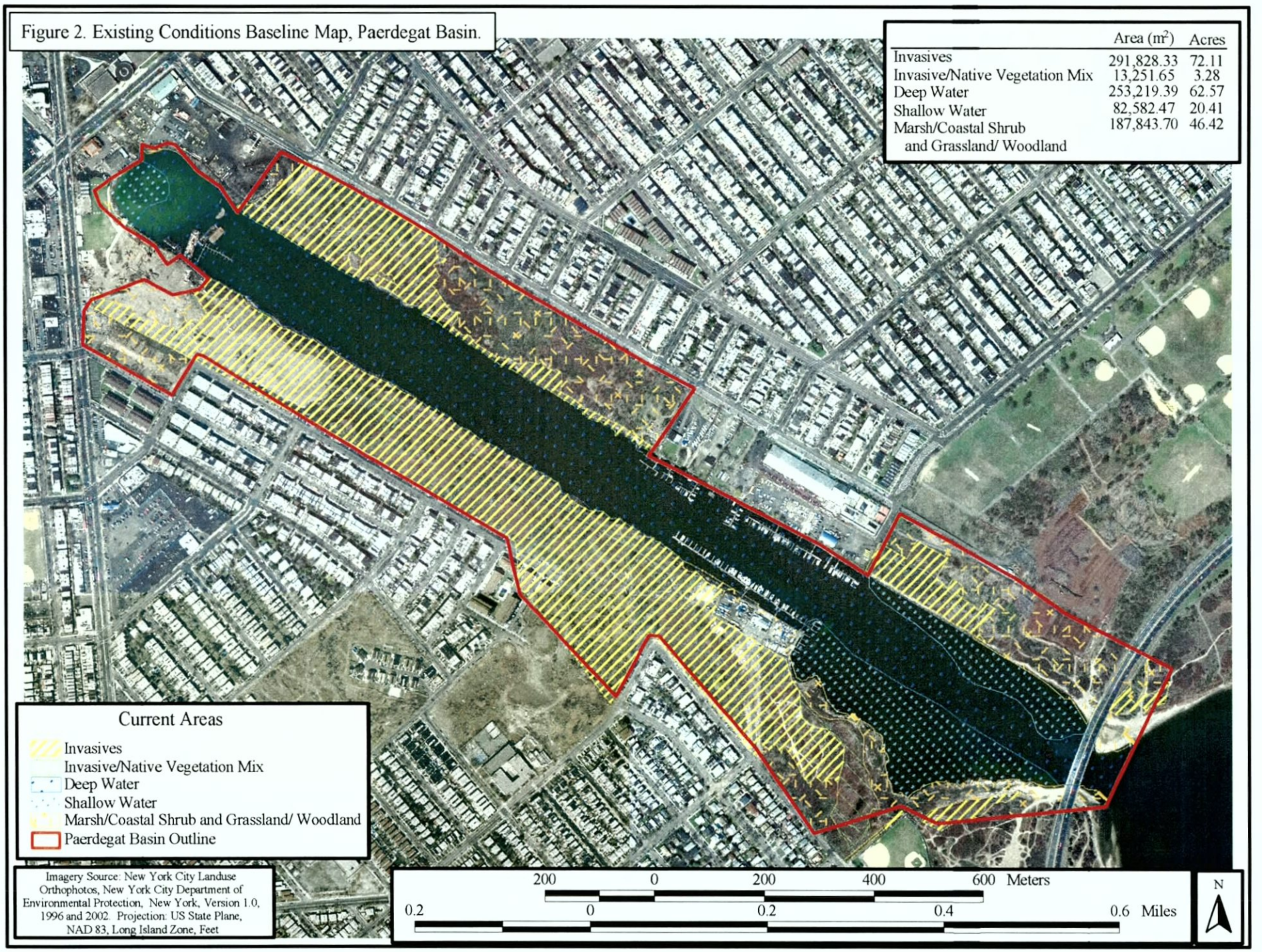


Figure 3. Proposed Restoration Features Map, Paerdegat Basin.

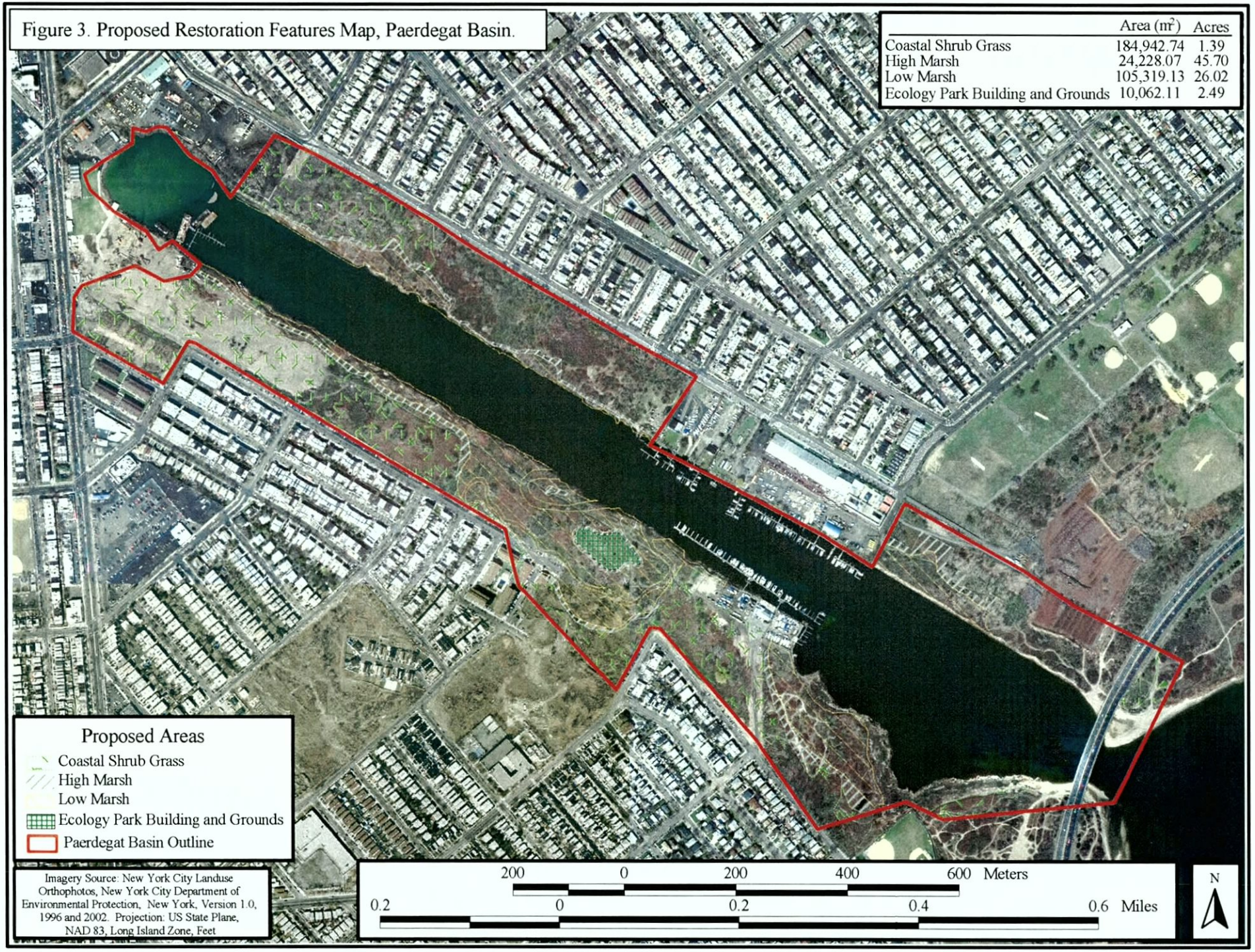
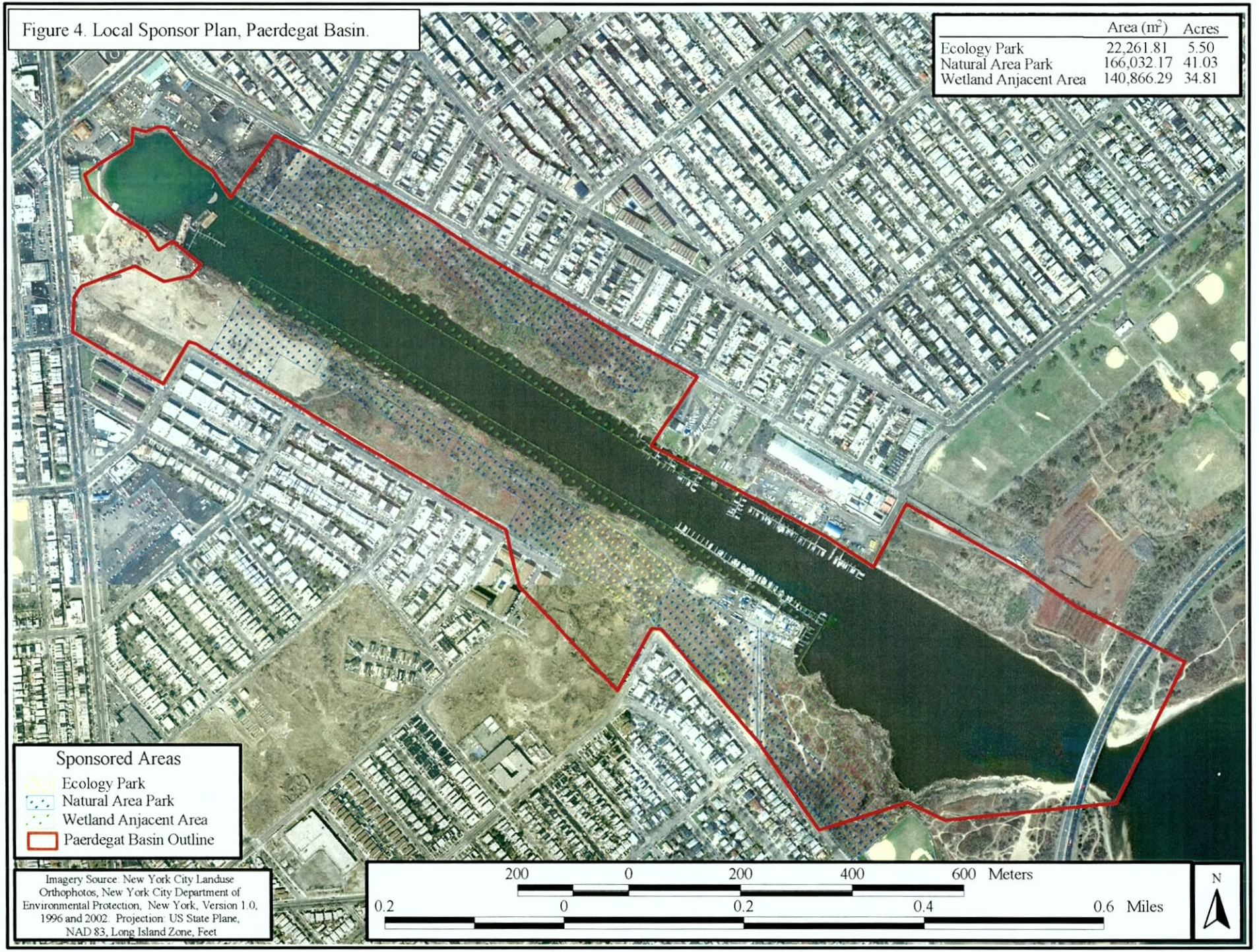


Figure 4. Local Sponsor Plan, Paerdegat Basin.



To realize these goals and objectives economically, balancing the earthwork on site as much as practicable was pursued. To facilitate the incremental cost analysis the proposed plan has been designed as separable features so that economical evaluation of the environmental benefits can be analyzed. With this approach, the following restoration plan features are proposed:

1. Lowering of grades and exposing the historical tidal channel in the vicinity of the planned Ecology Park to intertidal elevations with the subsequent creation of marsh habitat
2. Extending fringe tidal marsh around the perimeter of the basin through the lowering of landward grades to intertidal elevations
3. Creation of coastal grass and shrub habitat in the uplands that are dominated by invasive plant species

Task 2b3; Identify Construction Methods & Equipment and Develop Preliminary Unit Costs

Provided in separate document.

Task 2b4; Identify Material Disposal / Acquisition Options

Extensive cuts and fills will be necessary to lower the grades surrounding the proposed Ecology Park. Preliminary geotechnical information indicates the cut materials are mostly comprised of solid waste with coastal sands near the shoreline. Moderate cuts and fills will be necessary for the creation of the fringe tidal marsh around the basin perimeter. The cuts from these areas will be used during the coastal grass and shrub habitat creation phase. It is therefore anticipated that the earthwork of the site can be balanced without requiring import or export of fill material.

Fresh Creek Conceptual Plan Report

Task 2b1; Develop Water to Vegetation Zone Elevations Design Criteria

Existing tide gauge information provides the following elevations for Fresh Creek South and Fresh Creek North for October and November of 2001. All readings are in NAVD 88 and in feet.

For Fresh Creek South:

MLLW	MLW	MHW	MHHW	MHWS	Midtide
-2.84	-2.75	2.57	2.64	3.72	-0.07

For Fresh Creek North:

MLLW*	MLW*	MHW	MHHW	MHWS	Midtide
N/A	-2.19	2.49	2.56	3.82	-0.04

Source: U.S. Army Corps of Engineers, New York District. February 2003. *Summary of Water Level Data Report.* Jamaica Bay Ecosystem Restoration Project Feasibility Study. 7 pp plus figures.
*Readings not defined since in shallow water

The biological benchmark data collected during October of 2001 provides the following information on the relationship of vegetation to elevation. All readings are in NAVD 88 and in feet.

Average Lowest Common Reed (*Phragmites australis*) Elevation	Average Elevation Between Smooth Cordgrass (*Spartina alterniflora*) and Salt Marsh Hay (*Spartina patens*)	Average Elevation Between Salt Marsh Hay (*Spartina patens*) and Hightide Bush (*Iva frutescens*)
2.49	2.25	2.35

Combining these two data sets with the October and November, 2001 tidal amplitude of 5.32 from the Fresh Creek South tide gauge provides the following vegetation design zone elevations.

Tidal Amplitude	Mudflat Elevations (MLW to Midtide)	Low Marsh Elevations (Midtide to MHW)	High Marsh Elevations (MHW to Spring High Tide)	Upland Elevations (Above Spring High Tide)
5.32	-2.5 to 0.1	0.1 to 2.3	2.3 to 3.1	Above 3.1

Task 2b2; Rationale for Design

Figure 1; Historical Baseline Map provides the extent and acreage of deep water (greater than 2 meters), shallow water (less than 2 meters), flats, marsh and upland. As seen on this figure, the following features are evident:

* Within the mapped areas all terrestrial lands were formed of marsh

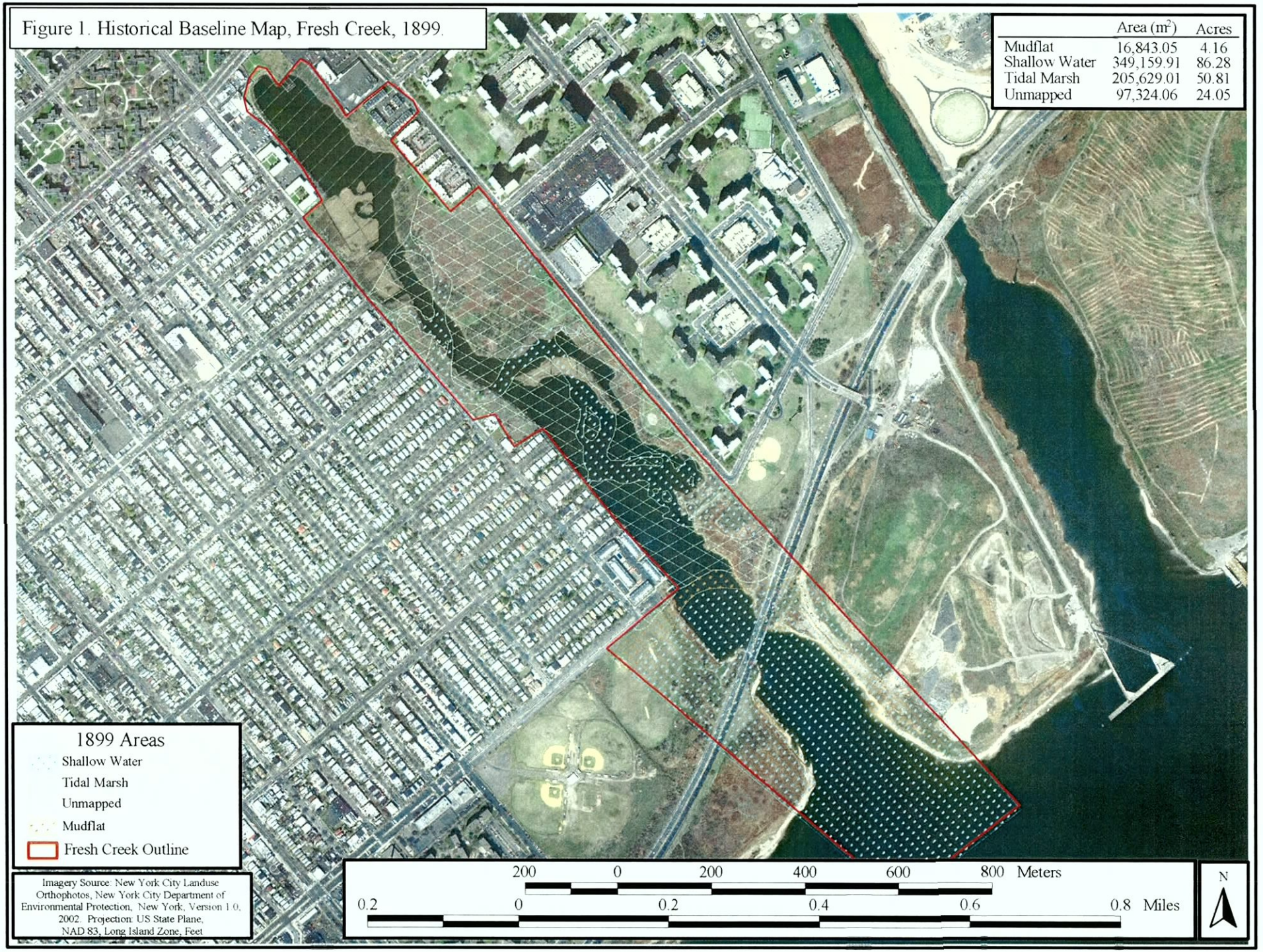


Figure 1. Historical Baseline Map, Fresh Creek, 1899.
Area (m²) Acres
Mudflat 16,843.05 4.16
Shallow Water 349,159.91 86.28
Tidal Marsh 205,629.01 50.81
Unmapped 97,324.06 24.05
1899 Areas
Shallow Water
Tidal Marsh
Unmapped
Mudflat
Fresh Creek Outline
Imagery Source: New York City Landuse Orthophotos, New York City Department of Environmental Protection, New York, Version 1.0, 2002. Projection: US State Plane, NAD 83, Long Island Zone, Feet
200 0 200 400 600 800 Meters
0.2 0 0.2 0.4 0.6 0.8 Miles
N

* Flats occurred along the southern shoreline with the remaining project area, including Fresh Creek, comprised of shallow water

Figure 2; Existing Conditions Baseline Map illustrates the portions and areas of the project currently mapped as deep water, shallow water, low marsh, high marsh, invasive species and upland plant communities. This figure illustrates:

* Land now extends into Jamaica Bay farther then shown on Figure 1
* Areas dominated by invasive plant species exist both sides of Fresh Creek
* Remnant marshes exist in the northeast and central site sections
* The lower half of Fresh Creek is comprised of deep water with the northern half formed of shallow water
* Tidal flats are not appreciable in extent

Figure 3; Proposed Restoration Features Map depicts the proposed work for the site. The features were determined using both Figure 1 & 2 combined with the *December, 2002 Jamaica Bay Ecosystem Restoration Project: Existing Conditions, Future Without Project Conditions, Goals and Objectives Report* information to generate the restoration strategy. This strategy was formulated to reestablish, if possible, any historical habitats while achieving the goals and objectives. The goals and objectives for this restoration site include:

Restoration goals include:

* Removing fills and restoring tidal fringe marsh to the maximum extent possible
* Enhancing existing marshes by filling in and revegetating ditches
* Improving upland habitat transition to the surrounding project limits

Restoration objectives include:

* For economical objectives:
    - Remanipulate on-site fills to create upland habitat
* For ecological objectives:
    - Maximize salt marsh creation
    - Create diverse upland habitat fringe along project limits

To realize these goals and objectives economically, balancing the earthwork on site as much as practicable was pursued. To facilitate the incremental cost analysis the proposed plan has been designed as separable features so that economical evaluation of the environmental benefits can be analyzed. With this approach, the following restoration plan features are proposed:

1. Remanipulate the grades dominated by invasives in the east central project area then establish coastal grassland and shrub community with forested transitional zones
2. Restore the remnant salt marshes in the north and central site portions

Figure 2. Existing Conditions Baseline Map, Fresh Creek.

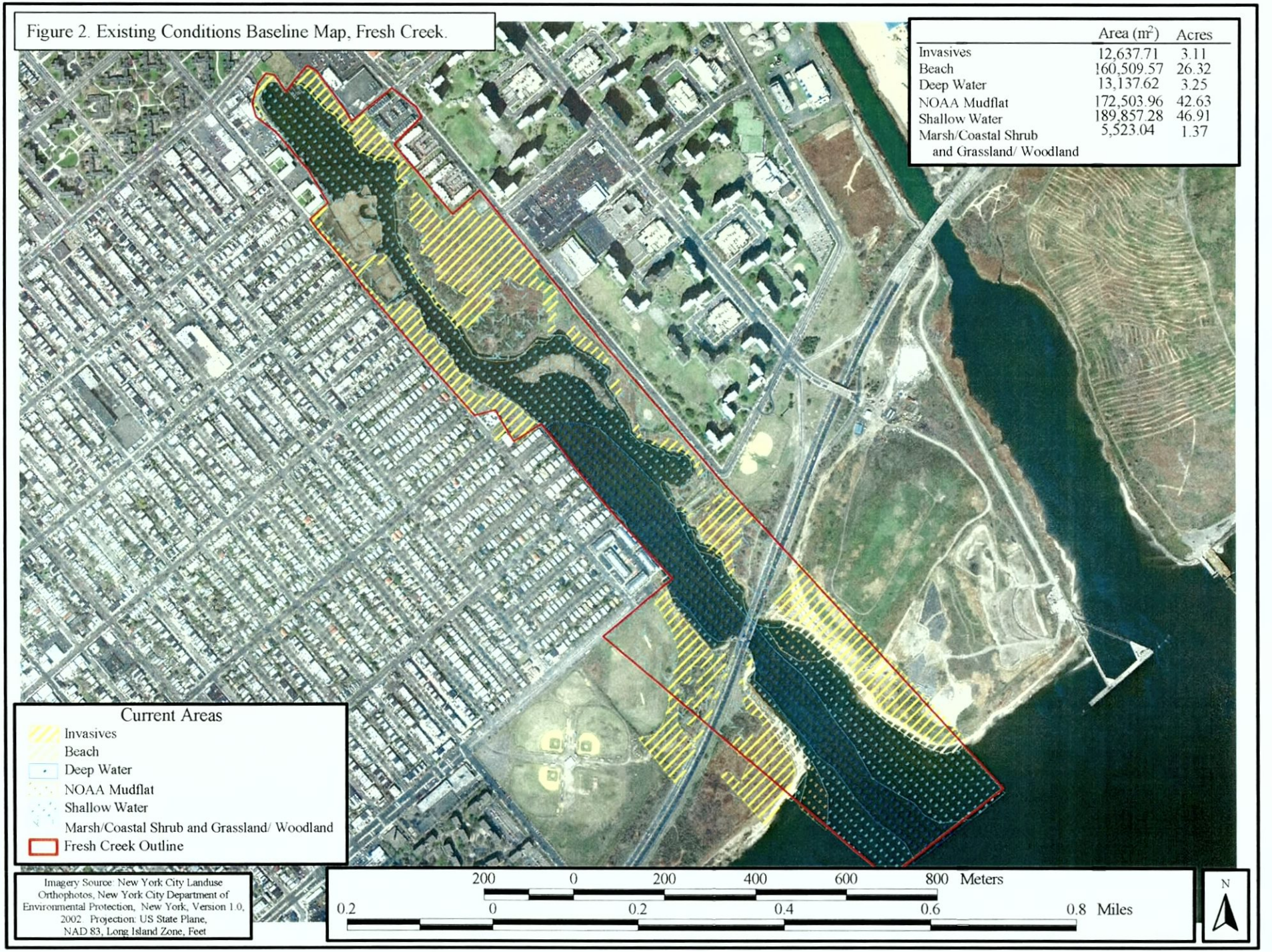
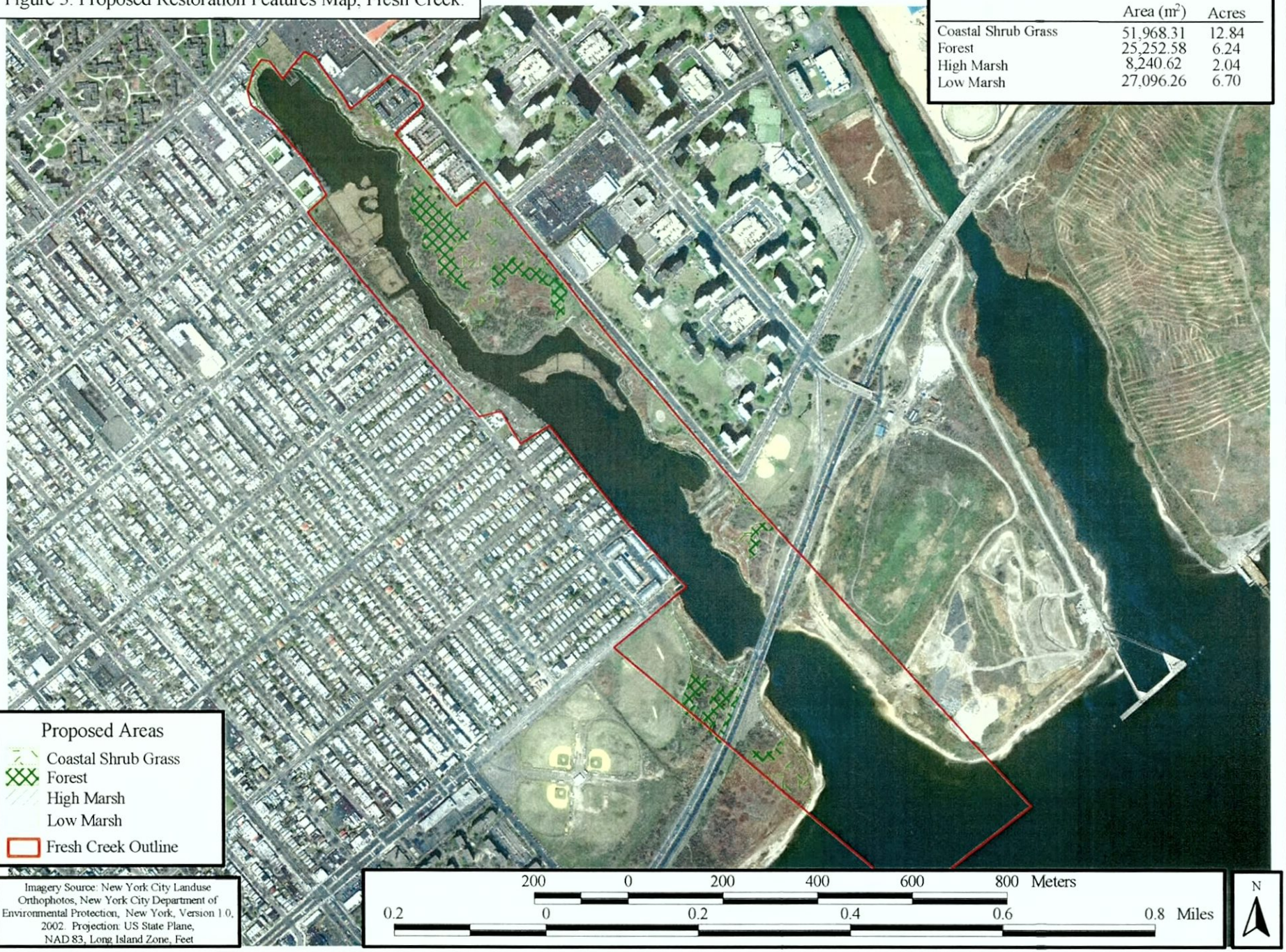


Figure 3. Proposed Restoration Features Map, Fresh Creek.



3. Remove fills from the adjacent invasive dominated areas of Fresh Creek to intertidal elevations and create tidal marsh and coastal complex plant communities.

Task 2b3; Identify Construction Methods & Equipment and Develop Preliminary Unit Costs

Provided in separate document.

Task 2b4; Identify Material Disposal / Acquisition Options

Moderate cuts and fills will be necessary to realize the restoration concept. The area planned for coastal shrub and grassland in the east central site section will be used as fill areas during grade manipulation for the other areas requiring cuts.

Spring Creek South Conceptual Plan Report

Task 2b1; Develop Water to Vegetation Zone Elevations Design Criteria

Existing tide gauge information provides the following elevations for Spring Creek North for October and November of 2001. All readings are in NAVD 88 and in feet.

MLLW*	MLW*	MHW	MHHW	MHWS	Midtide
N/A	-2.29	2.18	2.18	3.25	-0.26

Source: U.S. Army Corps of Engineers, New York District. February 2003. *Summary of Water Level Data Report.* Jamaica Bay Ecosystem Restoration Project Feasibility Study. 7 pp plus figures.

*Readings not defined since in shallow water.

The biological benchmark data collected during October of 2001 provides the following information on the relationship of vegetation to elevation. All readings are in NAVD 88 and in feet.

Average Lowest Common Reed (*Phragmites australis*) Elevation	Average Elevation Between Smooth Cordgrass (*Spartina alterniflora*) and Salt Marsh Hay (*Spartina patens*)	Average Highest Smooth Cordgrass (Spartina alterniflora) Elevation With Beach Upgradient
1.92	2.57	2.49

Combining these two data sets with the October and November, 2001 average tidal amplitude of 5.00 feet provides the following vegetation design zone elevations.

Tidal Amplitude	Mudflat Elevations (MLW to Midtide)	Low Marsh Elevations (Midtide to MHW)	High Marsh Elevations (MHW to Spring High Tide)	Upland Elevations (Above Spring High Tide)
5.49	-2.4 to 0.3	0.3 to 2.5	2.5 to 3.3	Above 3.3

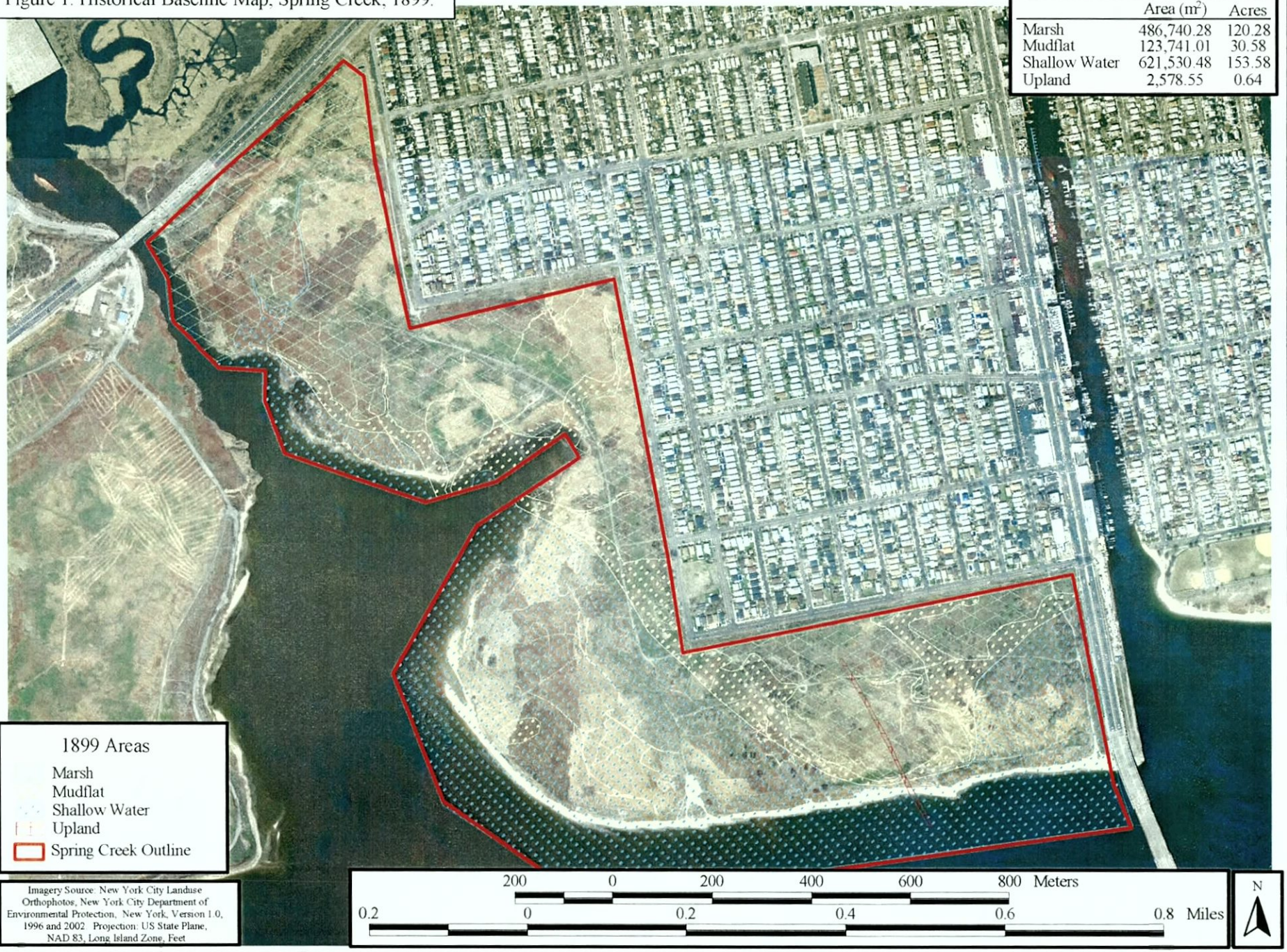
Task 2b2; Rationale for Design

Figure 1; Historical Baseline Map provides the extent and acreage of deep water (greater than 2 meters), shallow water (less than 2 meters), flats, marsh and upland. As seen on this figure, the following features are evident:

* With the exception of a small roadway in the south, the terrestrial portions of the site consisted entirely of marsh
* Tidal channels existed within the marsh at several locations
* Flats formed a narrow strip along the shoreline with shallow water comprising the remaining project water areas

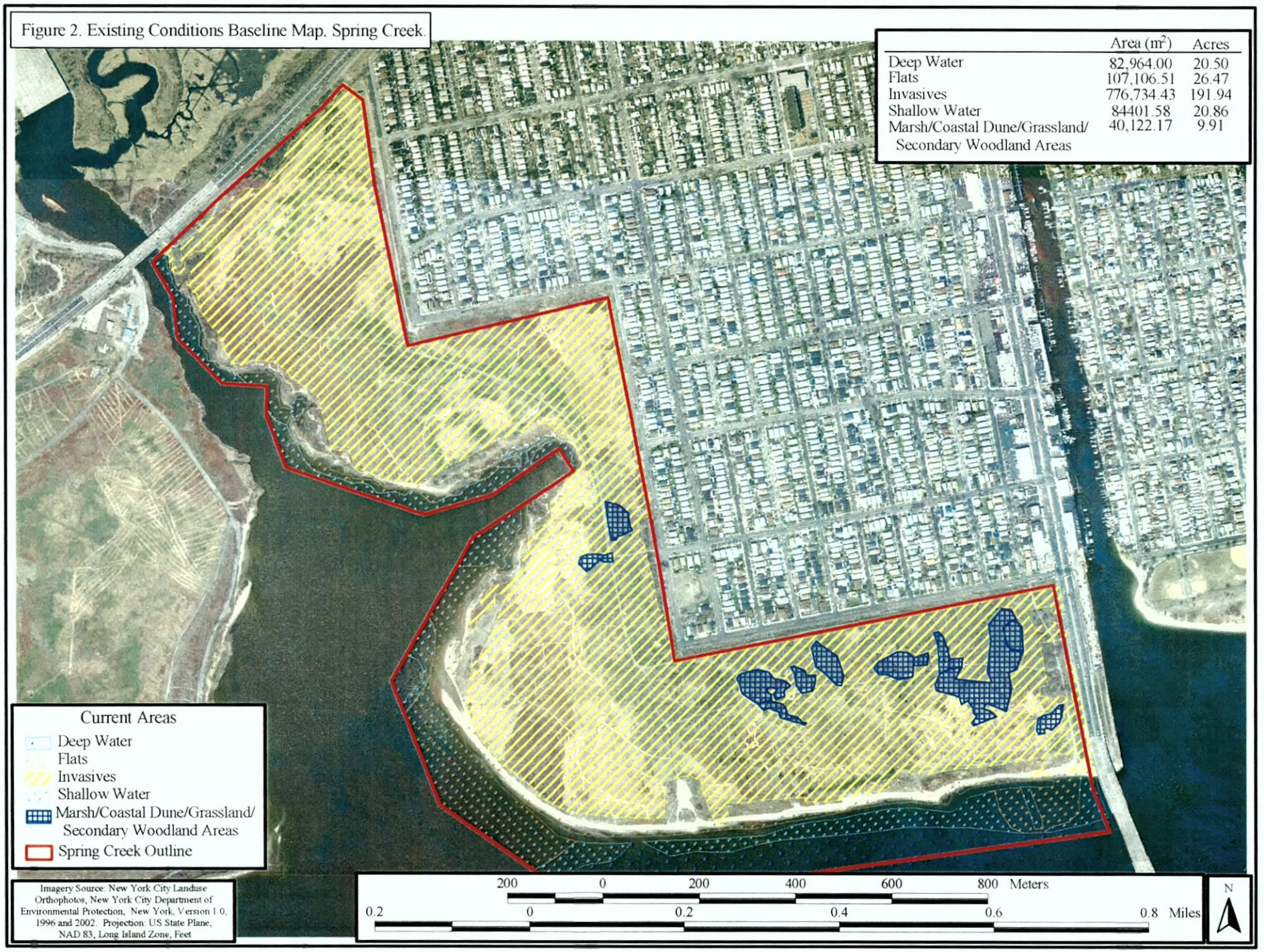
Figure 2; Existing Conditions Baseline Map illustrates the portions and areas of the project currently mapped as deep water, shallow water, low marsh, high marsh, invasive species and upland plant communities. This figure illustrates:

Figure 1. Historical Baseline Map, Spring Creek, 1899.



	Area (m^2)	Acres
Marsh	486,740.28	120.28
Mudflat	123,741.01	30.58
Shallow Water	621,530.48	153.58
Upland	2,578.55	0.64

Figure 2. Existing Conditions Baseline Map. Spring Creek.



* The terrestrial portion of the project occupies a significantly larger area when compared to Figure 1 and is predominantly upland
* Invasive plant communities dominate nearly the entire northern project area and most of the southern site sections
* Beach and marsh habitat fringe the shoreline

Figure 3; Proposed Restoration Features Map depicts the proposed work for the site. The features were determined using both Figure 1 & 2 combined with the *December, 2002 Jamaica Bay Ecosystem Restoration Project: Existing Conditions, Future Without Project Conditions, Goals and Objectives Report* information to generate the restoration strategy. This strategy was formulated to reestablish, if possible, any historical habitats while achieving the goals and objectives. The goals and objectives for this restoration site include:

Restoration goals include:

* Restoring and creating tidal salt marsh
* Minimizing future impacts from ATV use and unauthorized filling
* Incorporate passive recreation activities components for community
* Establish dune complex habitat in south project areas

Restoration objectives include:

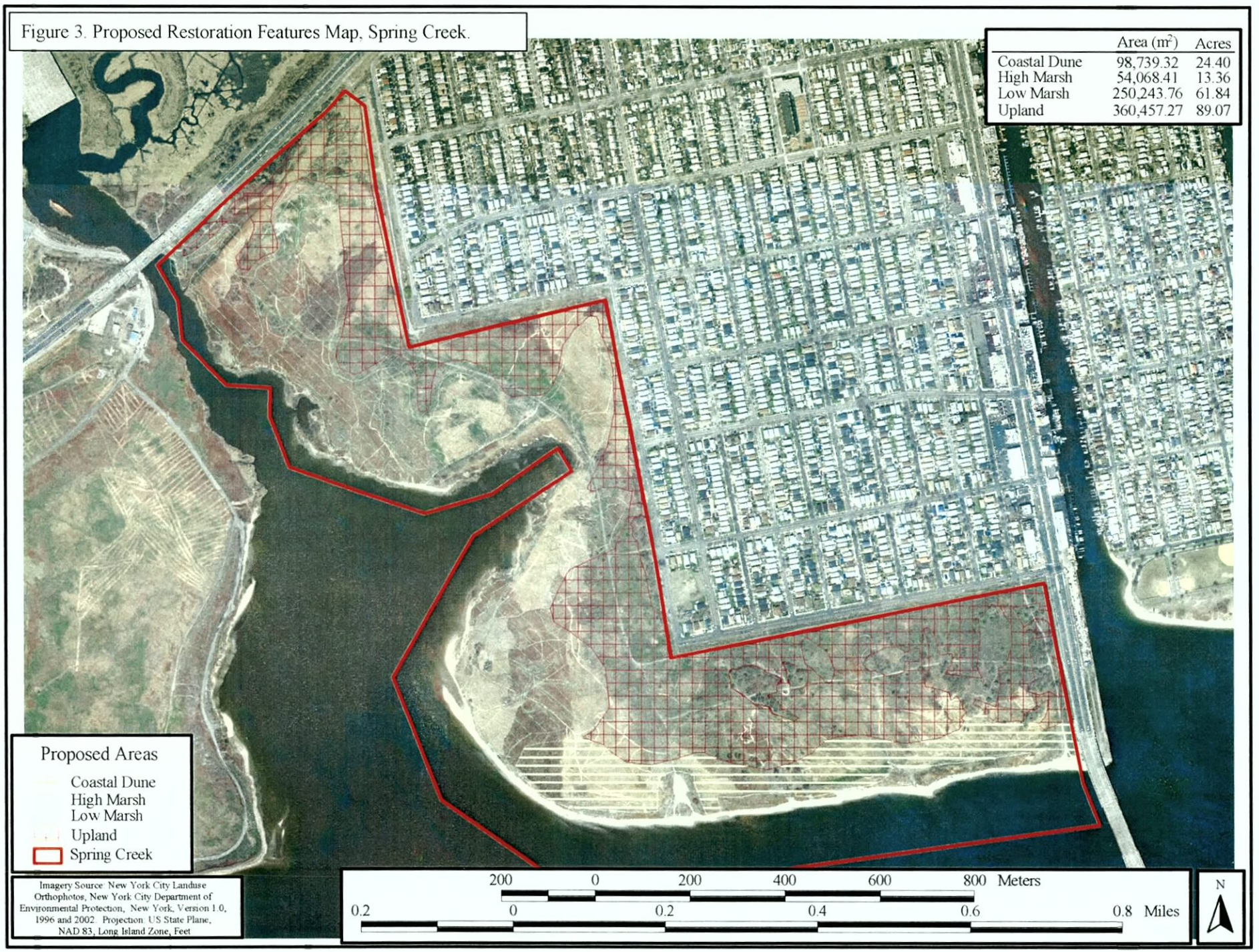
* For economical objectives:
    - Use Flynn Causeway fills for dune restoration and/or Pennsylvania Avenue landfill cap
    - Investigate feasibility of using other fill materials for Pennsylvania Avenue landfill cap
* For ecological objectives:
    - Establish wildlife attractors for targeted wildlife species
    - Provide educational opportunities for community
    - Create diverse upland habitat tie-in to surrounding community

To realize these goals and objectives economically, balancing the earthwork on site as much as practicable was pursued. To facilitate the incremental cost analysis the proposed plan has been designed as separable features so that economical evaluation of the environmental benefits can be analyzed. With this approach, the following restoration plan features are proposed:

1. Excavate the northern project area down to intertidal elevations, incorporate tidal channels along historical alignments where feasible then establish marsh and coastal plant communities
2. Remove the invasive plant communities in the south site sections then fill using the northern site cuts to create undulating grades with coastal dune, grassland and shrub systems

Task 2b3; Identify Construction Methods & Equipment and Develop Preliminary Unit Costs

Figure 3. Proposed Restoration Features Map, Spring Creek.



Provided in separate document.

Task 2b4; Identify Material Disposal / Acquisition Options

This project will require large amounts of cuts and fills to realize the restoration concept. Though the southern area will be used for filling, excess cuts may need to be exported from the site. Some of the cuts will consist of coastal sands from the Flynn Causeway construction. With the nearby Pennsylvania Avenue Landfill requiring large amounts of soil to close the facility, the excess cuts may possibly be used as cap material pending specification compliance.

Hawtree Point Conceptual Plan Report

Task 2b1; Develop Water to Vegetation Zone Elevations Design Criteria

Existing tide gauge information provides the following elevations for Hawtree Point for October and November of 2001. All readings are in NAVD 88 and in feet.

MLLW*	MLW*	MHW	MHHW	MHWS	Midtide
N/A	-3.12	1.88	1.93	3.17	-0.62

Source: U.S. Army Corps of Engineers, New York District. February 2003. *Summary of Water Level Data Report.* Jamaica Bay Ecosystem Restoration Project Feasibility Study. 7 pp plus figures.

*Readings not defined since in shallow water.

The biological benchmark data collected during October of 2001 provides the following information on the relationship of vegetation to elevation. All readings are in NAVD 88 and in feet.

Average Lowest Common Reed (*Phragmites australis*) Elevation	Average Elevation Between Smooth Cordgrass (*Spartina alterniflora*) and Salt Marsh Hay (*Spartina patens*)
3.14	2.25

Combining these two data sets with the October and November, 2001 average tidal amplitude of 5.00 feet provides the following vegetation design zone elevations.

Tidal Amplitude	Mudflat Elevations (MLW to Midtide)	Low Marsh Elevations (Midtide to MHW)	High Marsh Elevations (MHW to Spring High Tide)	Upland Elevations (Above Spring High Tide)
5.00	-2.5 to 0.0	0.0 to 2.3	2.3 to 3.1	Above 3.1

Task 2b2; Rationale for Design

Figure 1; Historical Baseline Map provides the extent and acreage of deep water (greater than 2 meters), shallow water (less than 2 meters), flats, marsh and upland. As seen on this figure, the following features are evident:

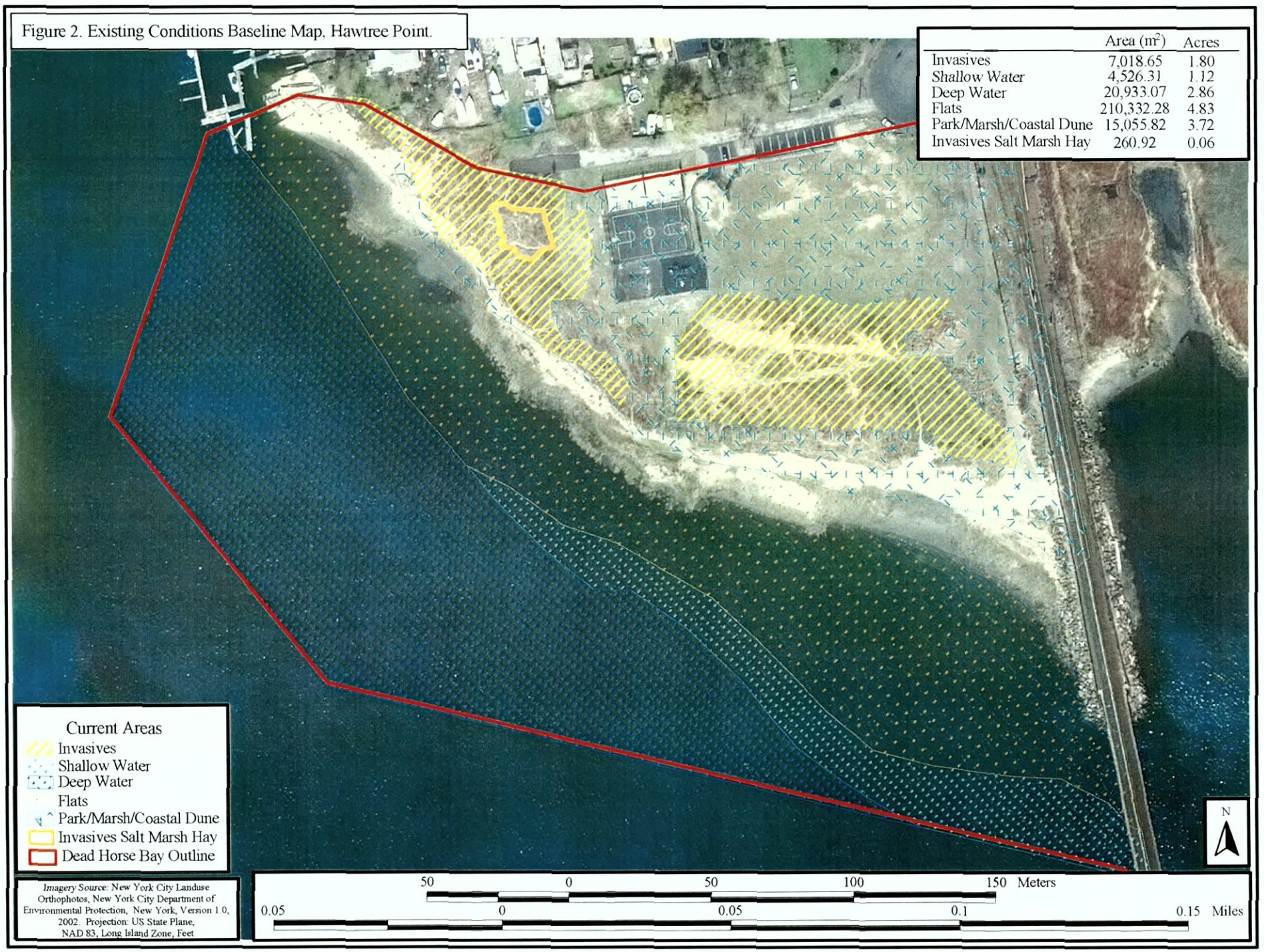
* Marsh formed the entire terrestrial portions of the site
* Flats comprised the west area and along the southern shoreline with shallow water extending south to the project boundaries

Figure 2; Existing Conditions Baseline Map illustrates the portions and areas of the project currently mapped as deep water, shallow water, low marsh, high marsh, invasive species and upland plant communities. This figure illustrates:

* Invasive plant communities dominate several areas between the park and beach area

Figure 1. Historical Baseline Map, Hawtree Point, 1899.

Figure 2. Existing Conditions Baseline Map, Hawtree Point.



* Native coastal plant communities form the other surrounding areas

Figure 3; Proposed Restoration Features Map depicts the proposed work for the site. The features were determined using both Figure 1 & 2 combined with the *December, 2002 Jamaica Bay Ecosystem Restoration Project: Existing Conditions, Future Without Project Conditions, Goals and Objectives Report* information to generate the restoration strategy. This strategy was formulated to reestablish, if possible, any historical habitats while achieving the goals and objectives. The goals and objectives for this restoration site include:

Restoration goals include:

* To enhance then protect Charles Memorial Park restored fringe marshes
* To provide interpretive features for the community
* To restore the Bergen Basin side tidal wetlands through fill removal to intertidal elevations

Restoration objectives include:

* Economical related objectives:
    - Identify viable sources for fill removal for the Bergen Basin portion of the project
    - Engage community participation in the restoration activities in Charles Memorial Park
* Ecological related objectives:
    - Integrate ecological restoration with educational opportunities for the community for the Charles Memorial Park portion of the restoration plan
    - Provide diverse upland habitat integration for the Bergen Basin side of the project
    - Incorporate wildlife attractors in the Bergen Basin side of the project but without enhancing waterfowl use due to close proximity of JFK Airport

To realize these goals and objectives economically, balancing the earthwork on site as much as practicable was pursued. To facilitate the incremental cost analysis the proposed plan has been designed as separable features so that economical evaluation of the environmental benefits can be analyzed. With this approach, the following restoration plan features are proposed:

1. Remove the invasive vegetation then establish marsh and coastal plant communities
2. Construct a fence between the coastal vegetation communities and Charles Memorial Park to keep motorized recreational equipment out

Task 2b3; Identify Construction Methods & Equipment and Develop Preliminary Unit Costs

Provided in separate document.

Figure 3. Proposed Restoration Features Map, Hawtree Point.

Task 2b4; Identify Material Disposal / Acquisition Options

This project will require minor amounts of cuts and fills for the restoration effort. It is therefore judged that no importing or exporting of fills will be necessary.

Bayswater State Park Conceptual Plan Report

Task 2b1; Develop Water to Vegetation Zone Elevations Design Criteria

Existing tide gauge information provides the following elevations for Bayswater State Park for October and November of 2001. All readings are in NAVD 88 and in feet.

MLW	MHW	MHHW	MHWS	Midtide
-1.98	2.89	2.90	3.83	0.46

Source: U.S. Army Corps of Engineers, New York District. February 2003. *Summary of Water Level Data Report.* Jamaica Bay Ecosystem Restoration Project Feasibility Study. 7 pp plus figures.

The biological benchmark data collected during October of 2001 provides the following information on the relationship of vegetation to elevation. All readings are in NAVD 88 and in feet.

Average Lowest Common Reed (*Phragmites australis*) Elevation	Average Elevation Between Smooth Cordgrass (*Spartina alterniflora*) and Salt Marsh Hay (*Spartina patens*)	Average Highest Elevation of Smooth Cordgrass (*Spartina alterniflora*)
2.40	1.77	1.80

Combining these two data sets with the October and November, 2001 tidal amplitude of 4.86 feet from Bayswater State Park tide gauge provides the following vegetation design zone elevations.

Tidal Amplitude	Mudflat Elevations (MLW to Midtide)	Low Marsh Elevations (Midtide to MHW)	High Marsh Elevations (MHW to Spring High Tide)	Upland Elevations (Above Spring High Tide)
4.86	-2.6 to 0.2	0.2 to 2.3	2.3 to 2.6	Above 2.6

Task 2b2; Rationale for Design

Figure 1; Historical Baseline Map provides the extent and acreage of deep water (greater than 2 meters), shallow water (less than 2 meters), flats, marsh and upland. As seen on this figure, the following features are evident:

* Upland existed along the southeast portion of the project
* Marsh formed the rest of the terrestrial portions of the site
* Flats and shallow water in roughly equal proportions comprised the remaining site areas

Figure 2; Existing Conditions Baseline Map illustrates the portions and areas of the project currently mapped as deep water, shallow water, low marsh, high marsh, invasive species and upland plant communities. This figure illustrates:

Figure 1. Historical Baseline Map, Bayswater State Park, 1899.

	Area (m^2)	Acres
Marsh	67,900.70	16.78
Mudflat	70,556.04	17.43
Shallow Water	132,157.35	32.66
Upland	29,298.55	7.24

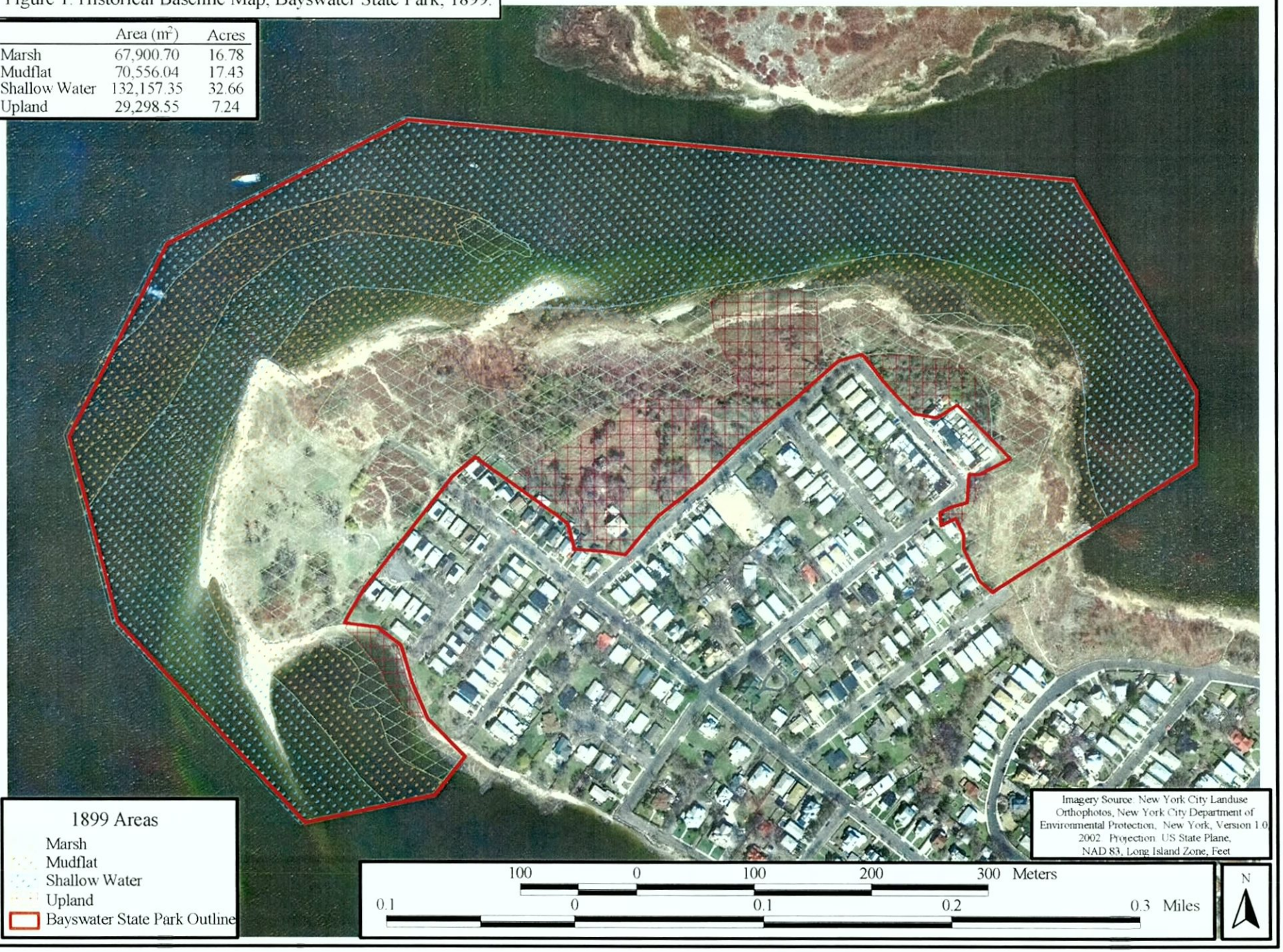
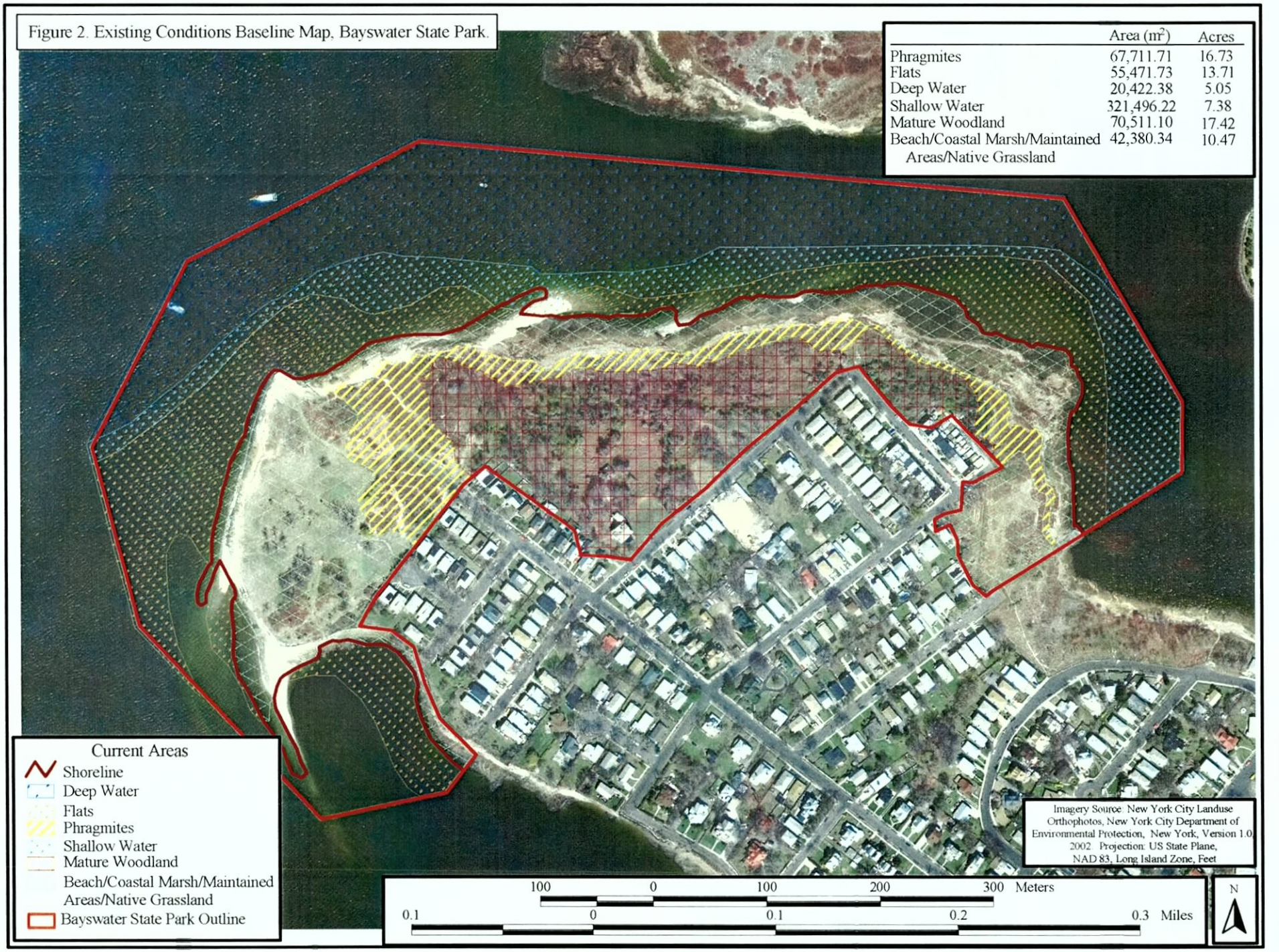


Figure 2. Existing Conditions Baseline Map, Bayswater State Park.

	Area (m^2)	Acres
Phragmites	67,711.71	16.73
Flats	55,471.73	13.71
Deep Water	20,422.38	5.05
Shallow Water	321,496.22	7.38
Mature Woodland	70,511.10	17.42
Beach/Coastal Marsh/Maintained Areas/Native Grassland	42,380.34	10.47



* Invasive plant communities form the area from the park entrance to Jamaica Bay with a second area forming a linear strip along the northern edge of the mature forest
* The shoreline is active as seen in the sand bars on the northern and western site sections

Figure 3; Proposed Restoration Features Map depicts the proposed work for the site. The features were determined using both Figure 1 & 2 combined with the *December, 2002 Jamaica Bay Ecosystem Restoration Project: Existing Conditions, Future Without Project Conditions, Goals and Objectives Report* information to generate the restoration strategy. This strategy was formulated to reestablish, if possible, any historical habitats while achieving the goals and objectives. The goals and objectives for this restoration site include:

Restoration goals include:

* Integrating proposed restoration areas with the existing native vegetation communities in particular the mature woodland in the east site sections
* Address the failing bulkhead through the use of strategically placed shoreline erosion control structures and creation of coastal dune habitat
* Account for public use of the park in the restoration strategy

Restoration objectives include:

* Economically related:
    - Use on-site soil whenever possible
    - Set intertidal marsh grades to reduce invasion of *Phragmites australis*
* Ecologically related:
    - Create vertical structure to enhance avian habitat
    - Identify restoration limits by delineating invasive species boundaries
    - Pursue high interspersion of water, salt marsh and upland edges

To realize these goals and objectives economically, balancing the earthwork on site as much as practicable was pursued. To facilitate the incremental cost analysis the proposed plan has been designed as separable features so that economical evaluation of the environmental benefits can be analyzed. With this approach, the following restoration plan features are proposed:

1. Excavate the invasive plant community between the park entrance and Jamaica Bay to intertidal elevations with a channel system to create marsh
2. Fill along the landward area of the coastal structures to create coastal dune habitat

Task 2b3; Identify Construction Methods & Equipment and Develop Preliminary Unit Costs

Provided in separate document.

Task 2b4; Identify Material Disposal / Acquisition Options

Figure 3. Proposed Restoration Features Map. Bayswater State Park.

	Area (m^2)	Acres
Coastal Dune	2,166.67	0.54
Channel	769.23	0.19
Invasives Restoration Feature 1	11,198.15	2.77
Invasives Restoration Feature 2	9,224.22	2.28

This project will require both mass and fine grading to achieve the intended design grades. Fill areas on the project are located landward of the coastal structures. These fills arise from cuts in the creation of the tidal marsh and channel system in the central site portions. It is anticipated that the earthwork will balance on this site.

Dubos Point Conceptual Plan Report

Task 2b1; Develop Water to Vegetation Zone Elevations Design Criteria

Existing tide gauge information provides the following elevations for Dubos Point for October and November of 2001. All readings are in NAVD 88 and in feet.

MLW	MHW	MHHW	MHWS	Midtide
-2.21	2.39	2.43	3.46	0.09

Source: U.S. Army Corps of Engineers, New York District. February 2003. *Summary of Water Level Data Report.* Jamaica Bay Ecosystem Restoration Project Feasibility Study. 7 pp plus figures.

The biological benchmark data collected during October of 2001 provides the following information on the relationship of vegetation to elevation. All readings are in NAVD 88 and in feet.

Average Lowest Common Reed (*Phragmites australis*) Elevation	Average Elevation Between Smooth Cordgrass (*Spartina alterniflora*) and Salt Marsh Hay (*Spartina patens*)	AverageElevation Between Hightide Bush (*Iva frutescens*) and Salt Marsh Hay (*Spartina patens*)	Average Upper Wrack Line Elevation	Average Elevation Between Salt Marsh Hay (*Spartina patens*) and Beachgrass (*Ammophila breviligulata*)
2.63	1.99	3.17	2.82	2.41

Combining these two data sets with the October and November, 2001 tidal amplitude of 4.60 feet from Dubos Point tide gauge provides the following vegetation design zone elevations.

Tidal Amplitude	Mudflat Elevations (MLW to Midtide)	Low Marsh Elevations (Midtide to MHW)	High Marsh Elevations (MHW to Spring High Tide)	Upland Elevations (Above Spring High Tide)
4.60	-2.5 to 0.1	0.1 to 2.5	2.5 to 3.4	Above 3.4

Task 2b2; Rationale for Design

Figure 1; Historical Baseline Map provides the extent and acreage of deep water (greater than 2 meters), shallow water (less than 2 meters), flats, marsh and upland. As seen on this figure, the following features are shown:

* The terrestrial portions were formed of tidal marsh
* More channels were from the eastern side of Dubos Point with one channel noted on the western side
* Shallow and deep water formed the water areas of the site

Figure 1. Historical Baseline Map, Dubos Point, 1899.

	Area (m^2)	Acres
Deep Water	6,960.21	1.72
Marsh	130,719.44	32.20
Shallow Water	117,189.72	28.96

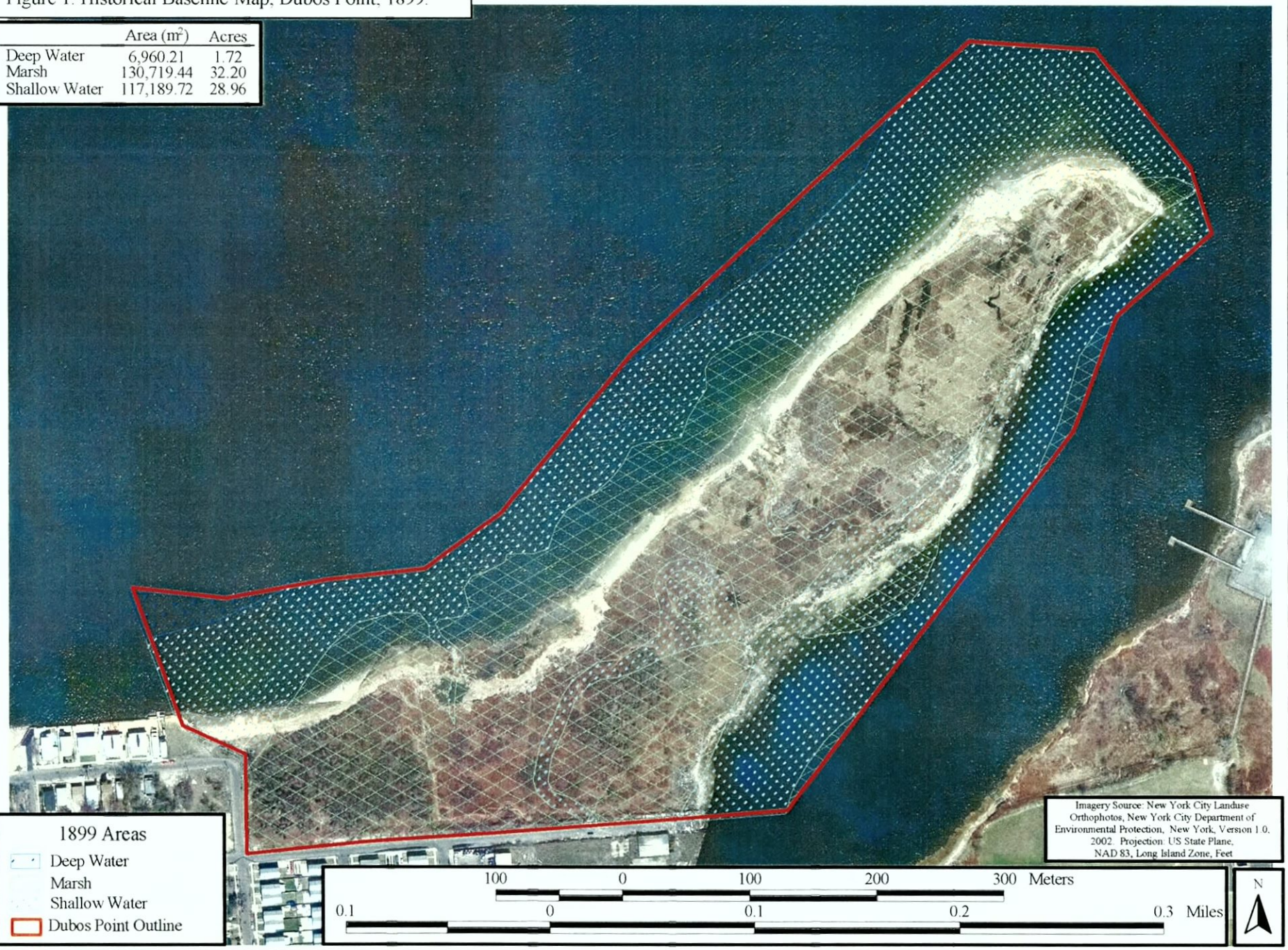


Figure 2; Existing Conditions Baseline Map illustrates the portions and areas of the project currently mapped as deep water, shallow water, low marsh, high marsh, invasive species and upland plant communities. This figure shows:

* The invasive plant communities are located in the south central site portion with the remaining terrestrial parts of Dubos Point comprised of native plant communities of mostly marsh habitat
* The current land area is larger then the historical area
* Deep water occupies more of the water zones with shallow water smaller in extent

Figure 3; Proposed Restoration Features Map depicts the proposed work for the site. The features were determined using both Figure 1 & 2 combined with the *December, 2002 Jamaica Bay Ecosystem Restoration Project: Existing Conditions, Future Without Project Conditions, Goals and Objectives Report* information to generate the restoration strategy. This strategy was formulated to reestablish, if possible, any historical habitats while achieving the goals and objectives. The goals and objectives for this restoration site include:

Restoration goals include:

* Address shore erosion through selection and placement of environmentally sensitive structures
* Selectively remove invasive species monocultures and replace with diverse native vegetation
* Create barriers to reduce dumping while still allowing access for passive recreation

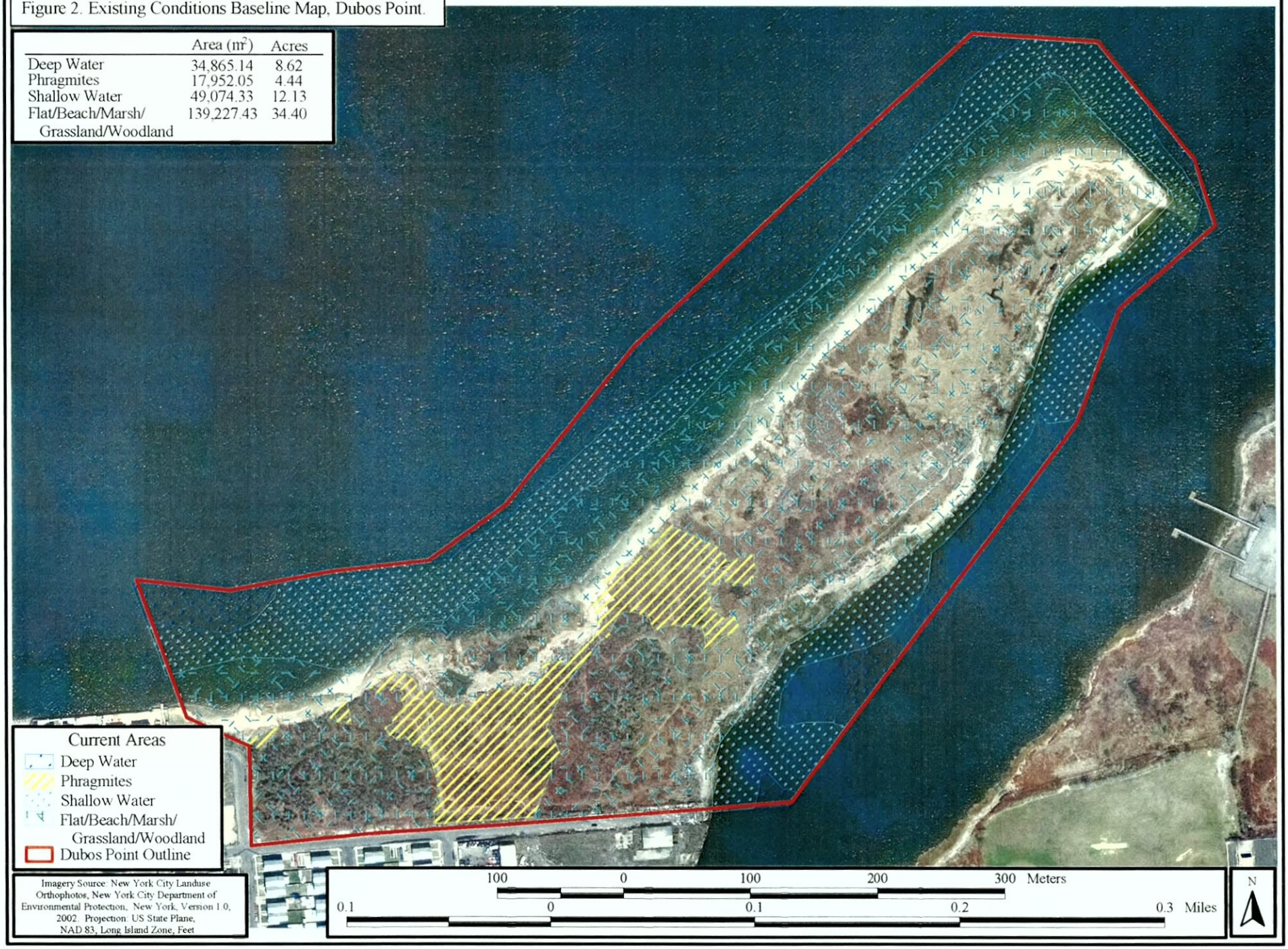
Restoration objectives include:

* Economically related:
    - Reuse on site soils wherever practicable
    - Leave existing bulkhead structure in-place
* Ecologically related:
    - Minimize disturbance during construction by identifying less sensitive construction access and staging areas
    - Place shore erosion control structures to promote macroinvertebrate habitat
    - Create sinuous upland channels to promote connectivity between different habitat types
    - Remove nuisance mosquito habitat

To realize these goals and objectives economically, balancing the earthwork on site as much as practicable was pursued. To facilitate the incremental cost analysis the proposed plan has been designed as separable features so that economical evaluation of the environmental benefits can be analyzed. With this approach, the following restoration plan features are proposed:

Figure 2. Existing Conditions Baseline Map, Dubos Point.

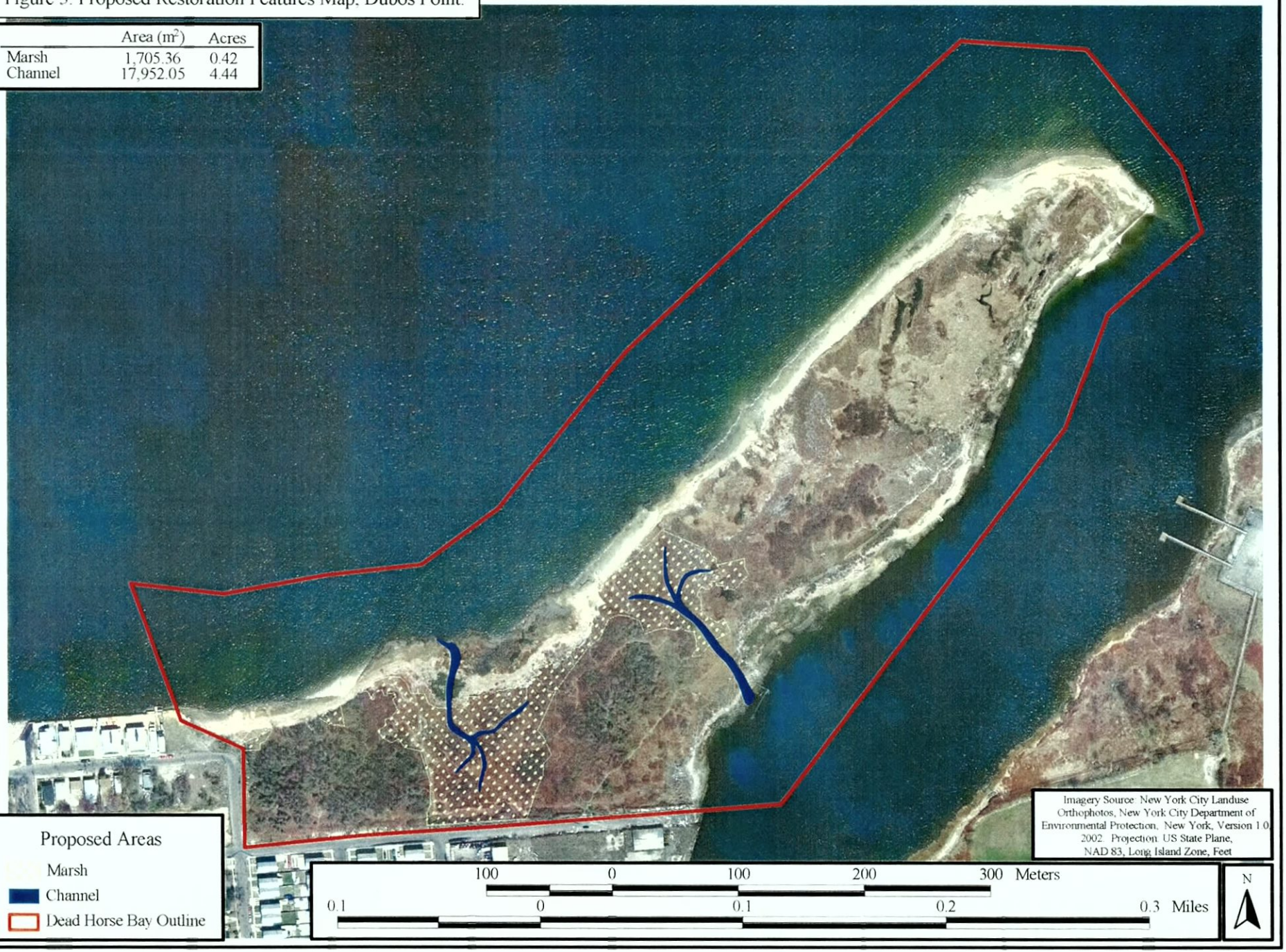
	Area (m^2)	Acres
Deep Water	34,865.14	8.62
Phragmites	17,952.05	4.44
Shallow Water	49,074.33	12.13
Flat/Beach/Marsh/ Grassland/Woodland	139,227.43	34.40



Imagery Source: New York City Landuse Orthophotos, New York City Department of Environmental Protection, New York, Version 1.0, 2002. Projection: US State Plane, NAD 83, Long Island Zone, Feet

Figure 3. Proposed Restoration Features Map, Dubos Point.

	Area (m^2)	Acres
Marsh	1,705.36	0.42
Channel	17,952.05	4.44



1. Create tidal marsh by excavating out the invasive plant community footprint to achieve intertidal grades
2. Construct tidal channels to promote proper tidal exchange to the created marsh areas
3. Establish shoreline erosion control measures along the western shoreline to stabilize land and create beach habitat
4. Use the fills to create undulating upland habitat at the peninsula landward boundaries while also discouraging dumping activities

Task 2b3; Identify Construction Methods & Equipment and Develop Preliminary Unit Costs

Provided in separate document.

Task 2b4; Identify Material Disposal / Acquisition Options

This project will require both mass and fine grading to achieve the intended design grades. Fill areas on the project are located along the landward boundaries. These fills arise from cuts within the invasive plant community and tidal channel footprints. It is anticipated that the earthwork will balance on this site.

Brant Point Conceptual Plan Report

Task 2b1; Develop Water to Vegetation Zone Elevations Design Criteria

Existing tide gauge information provides the following elevations for Brant Point for October and November of 2001. All readings are in NAVD 88 and in feet.

MLW	MHW	MHHW	MHWS	Midtide
-2.77	2.20	2.24	3.25	-0.36

Source: U.S. Army Corps of Engineers, New York District. February 2003. *Summary of Water Level Data Report.* Jamaica Bay Ecosystem Restoration Project Feasibility Study. 7 pp plus figures.

The biological benchmark data collected during October of 2001 provides the following information on the relationship of vegetation to elevation. All readings are in NAVD 88 and in feet.

Average Elevation Between Smooth Cordgrass (*Spartina alterniflora*) and Salt Marsh Hay (*Spartina patens*)	Highest Average Elevation of Smooth Cordgrass (*Spartina alterniflora*) with Bare Upgradient
2.31	1.84

Combining these two data sets with the October and November, 2001 tidal amplitude of 4.97 feet from Brant Point tide gauge provides the following vegetation design zone elevations.

Tidal Amplitude	Mudflat Elevations (MLW to Midtide)	Low Marsh Elevations (Midtide to MHW)	High Marsh Elevations (MHW to Spring High Tide)	Upland Elevations (Above Spring High Tide)
4.97	-3.0 to 0.0	0.0 to 2.3	2.3 to 3.2	Above 3.2

Task 2b2; Rationale for Design

Figure 1; Historical Baseline Map provides the extent and acreage of deep water (greater than 2 meters), shallow water (less than 2 meters), flats, marsh and upland. As seen on this figure the following information is noted:

* Almost the entire project area was formed of marsh
* Two channels were present; one larger in the north and one smaller to the east
* The remaining portion was formed of flats and shallow water

Figure 2; Existing Conditions Baseline Map illustrates the portions and areas of the project currently mapped as deep water, shallow water, low marsh, high marsh, invasive species and upland plant communities. This figure illustrates:

Figure 1. Historical Baseline Map, Brant Point, 1899.

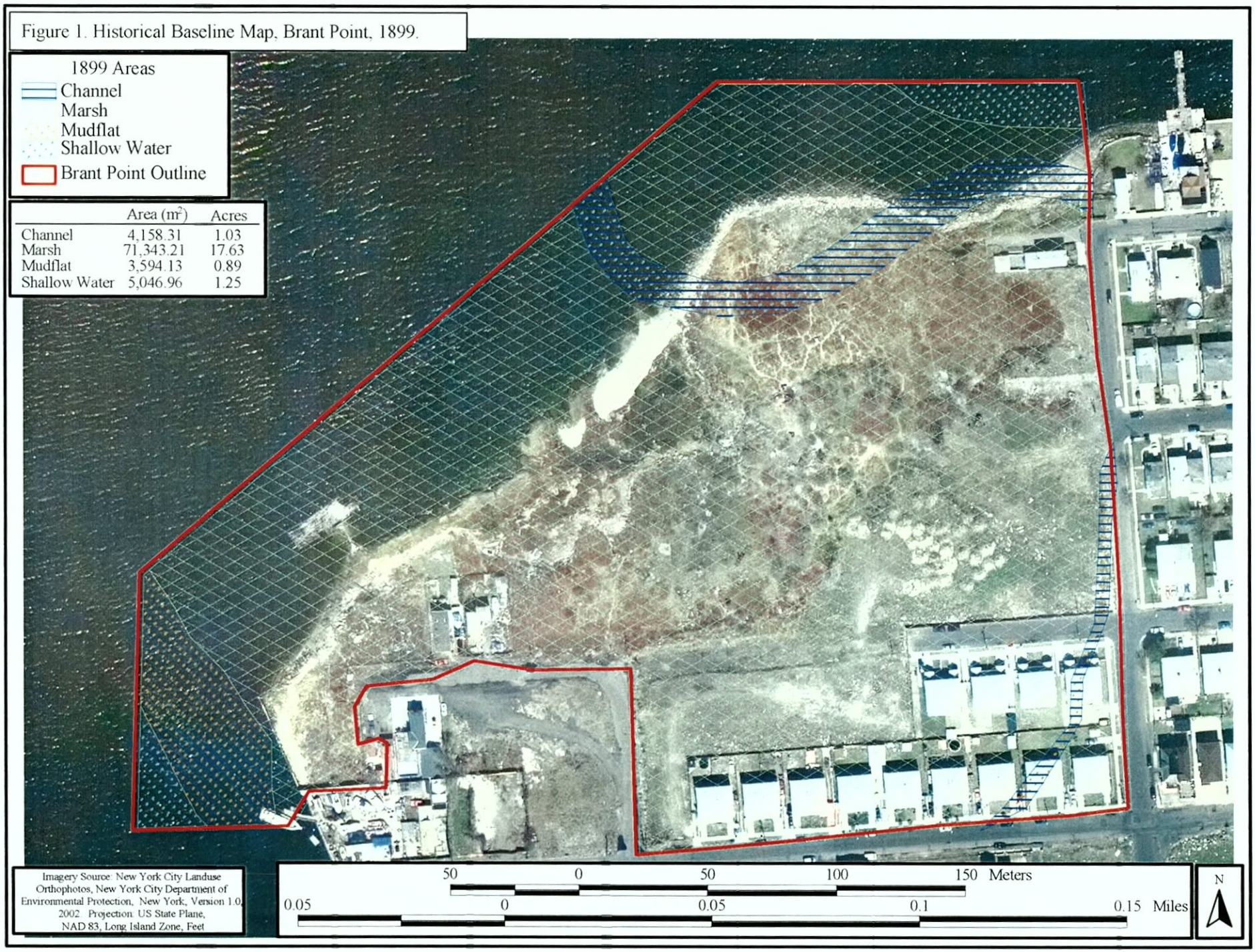


Figure 2. Existing Conditions Baseline Map, Brant Point.

Imagery Source: New York City Landuse Orthophotos, New York City Department of Environmental Protection, New York, Version 1.0, 2002. Projection: US State Plane, NAD 83, Long Island Zone, Feet

	Area (m^2)	Acres
Barge	309.06	0.08
Beach	3,103.02	0.77
Upland	48,504.42	11.99
Wetland	4,760.58	1.18

* The marshes have been mostly filled except for a small area in the west central project area
* Considerable erosion has occurred with an active beach area
* Very little shallow water exists with the majority of the water consisting of deep water

Figure 3; Proposed Restoration Features Map depicts the proposed work for the site. The features were determined using both Figure 1 & 2 combined with the *December, 2002 Jamaica Bay Ecosystem Restoration Project: Existing Conditions, Future Without Project Conditions, Goals and Objectives Report* information to generate the restoration strategy. This strategy was formulated to reestablish, if possible, any historical habitats while achieving the goals and objectives. The goals and objectives for this restoration site include:

Restoration goals include:

* Address the chronic shoreline erosion to arrest the continual loss of land
* Stop the indiscriminate dumping on the parcel
* Create salt marsh habitat after addressing shore erosion threat
* Establish upland restoration that complements restored salt marsh areas

Restoration objectives include:

* Economically related;
    - Use on site materials to create upland habitat zones adjacent to project area boundaries
    - Incorporate shore erosion structures that promote a similar effect as the sunken barge to promote macroinvertebrate habitat
    - Create barriers to curtail additional dumping and waste disposal
* Ecologically related:
    - Create protected salt marsh fringe habitat that integrates with upland habitat
    - Incorporate wildlife attractors to promote use by birds and small mammals
    - Provide educational opportunities for community

To realize these goals and objectives economically, balancing the earthwork on site as much as practicable was pursued. To facilitate the incremental cost analysis the proposed plan has been designed as separable features so that economical evaluation of the environmental benefits can be analyzed. With this approach, the following restoration plan features are proposed:

1. The creation of shoreline erosion protection that protects against further land loss while also providing habitat
2. Remove fills in the western site portions to create tidal marsh habitat
3. Place fills in the eastern site sections to create coastal grasslands and upland forests while also reducing dumping activities

Figure 3. Proposed Restoration Features Map, Brant Point.

	Area (m^2)	Acres
Low Marsh	7,515.07	1.86
Upland Forest	11,991.62	2.96
Upland Meadow	11,590.05	2.86
High Marsh	2,944.43	0.73

Task 2b3; Identify Construction Methods & Equipment and Develop Preliminary Unit Costs

Provided in separate document.

Task 2b4; Identify Material Disposal / Acquisition Options

This project will require both mass and fine grading to achieve the intended design grades. Fill areas on the project are located in the east and south site sections to form an undulating upland coastal habitat These fills arise from cuts in the west site portions. It is anticipated that the earthwork will balance for this site without import or export of fills necessary.

APPENDIX B

VITAE OF KEY PERSONNEL

PCI BUFFALO • TUSCALOOSA • MEMPHIS • TAMPA

Buffalo Branch Office • 2390 Clinton Street • Buffalo, NY 14227 • (716) 821-1650 • Fax (716) 821-1607

MICHELE HELENE HAYWARD, Ph.D., RPA
Senior Archaeologist

EDUCATION

Ph.D. Anthropology, The Pennsylvania State University, 1986
M.A. Anthropology, The Pennsylvania State University, 1975
B.A. Anthropology, Beloit College, 1972

EXPERIENCE

Dr. Hayward has more than twenty (20) years of experience conducting archaeological investigations and cultural resource management (CRM) projects throughout New York state, New Jersey, and the eastern United States as well as the Caribbean, Mexico, and Central America. She is currently a Senior Archaeologist with Panamerican Consultants, Inc. (PCI), and serves as Laboratory Director at PCI's Buffalo Branch Office. As principal investigator and field director for all levels of archaeological investigations, her duties include reconnaissance surveys and preliminary and intensive data recovery excavations of prehistoric and historic sites; archival research; and historic and prehistoric data analysis. She has comprehensive experience in report preparation and proposal writing as well as designing archaeological field strategies at all levels

Dr. Hayward has served as Principal Investigator and Co-principal Investigator for thirteen (13) cultural resource investigations at the United States Military Academy at West Point, Orange County, New York. Conducted for the New York District of the U.S. Army Corps of Engineers under subcontract, these investigations included Phase I cultural resource surveys for the Cadet Library Annex, New Brick Housing, Stewart Army Subpost, Gross Olympic Center, Bull Hill Road Extension, former Married Junior Officers' Quarters (Building 124), timber harvests at Mine Lake, Turkey Mountain, Long Pond, Firebreak 2, Range 4, and Range Road 22, Hurricane Floyd timber sale areas, and Stony Lonesome Road By-Pass.

She has also served as Principal Investigator for six (6) cultural resource investigations for proposed cellular communications tower projects for URS Corporation. Project locations for these investigations include the following New York State counties: Erie, Cattaraugus, Chautauqua, and Steuben. The investigations included the supervising archival and documentary research; directing the systematic survey of the project areas; and report preparation.

In addition, she served as Laboratory Director for the cultural resources investigation of sixteen (16) wetland restoration areas in Central and Northern New York. Conducted for the Natural Resources Conservation Service, these investigations were conducted for sites in Broome, Jefferson, Madison, Montgomery, Oneida, Oswego, Otsego, Lewis, and St. Lawrence Counties.

Her experience in CRM consists of both reviewing projects and reports as a representative of the Institute of Puerto Rican Culture and conducting investigations for this agency and private firms. Dr. Hayward is fluent in Spanish and has extensive experience preparing documents and conducting interviews in Spanish. In addition to her responsibilities as Senior Archaeologist with PCI, Dr. Hayward has co-written proposals to obtain funds from the National Park Service, administered by the Puerto Rican State Historic Preservation

Office (PRSHPO), to continue research on island rock art sites. This interest was initiated while she was employed at the Institute of Puerto Rican Culture.

Dr. Hayward has also served as Research Archaeologist and Project Review Archaeologist for the Center of Archaeological Investigations, Institute of Puerto Rican Culture, San Juan, Puerto Rico. Her duties included the initial assessment of some 600 to 800 annual permit applications for state and privately funded construction projects to determine the level of archaeological investigation; review of CRM reports for Phase I, II, and III projects; review of proposals for Phase II and III investigations; preparation of detailed scopes of work for Phase II and III studies; meetings with applicants, both private and public, to discuss the level of project effort; and principal investigator on Institute-sponsored archaeological research projects.

REPRESENTATIVE PANAMERICAN CONSULTANTS, INC. EXPERIENCE (1992 to Present)

Dr. Hayward served as co-principal investigator and primary author for the archaeological monitoring of overburden removal from the Commercial Slip, Buffalo, New York. This project involved several archaeologists from PCI working under contact fo Parsons, Brinckerhoff, Quade & Douglas, Inc. for the Empire State Development Corporation of New York. During the monitoring no significant cultural resources were impacted and the remaining slip walls and adjacent historic building foundations were found to be in good condition and recommended as eligible to the National Register.

She was principal investigator for a Phase I investigation of the grounds surrounding the former Married Junior Officers' Quarters (Building 124) at the U.S. Military Academy, West Point, Orange County, New York. The project was conducted for the USACE, New York District, under contract to Northern Ecological Associates, Inc. of Canton, New York. Building 124 was considered National Register eligible, but a suitable reuse for the structure could not be found. Its deteriorated condition made demolition the most viable alternative, with a HABS/HAER Level II documentation carried out before the building's removal.

Also for USACE, she was principal investigator for a Phase I investigation of the Hurricane Floyd Timber Sale Areas at the U.S. Military Academy, West Point, Orange County, New York. Under contract to Northern Ecological Associates, Inc. for the USACE, New York District, the project covered some 670 acres distributed among 18 non-contiguous heavily wooded regions. The aim was to employ background data from all the regions combined with a vehicular survey of each area along with more intensive inspection of five areas to develop levels of survey effort.

Also for the USACE, New York District, Dr. Hayward served as principal investigator for two cultural resource assessments of the area around Jamaica Bay off the Atlantic coast of New York.

She served as principal investigator on a Phase I study of the Morris Branch Canal Outlet area along the Passaic River waterfront, Newark, New Jersey. Conducted for the USACE, New York District, the investigation included documentary and background research, a review of earlier reports, archaeological excavation and report preparation. The goal was to locate any structural remains or features associated with the National Register-listed Morris Canal, which was operational by 1831.

Dr. Hayward served as Senior Archaeologist for a Phase I survey of the Green Brook sub-basin in Somerset and Union Counties, New Jersey. The investigation was undertaken for the USACE, New York District under contract to Barry A. Vittor and Associates, Inc., Mobile, Alabama. In addition to the archaeological work, PCI performed a National Register eligibility evaluation of Green Brook Park, an Olmsted Brothers

designed facility. The project area included the park, as well as 18,560 linear feet along portions of the Stony Brook and Green Brook.

She was Principal Investigator for the archaeological monitoring of an area of historic households, Site 16A, at the former Griffiss Air Force Base, Rome, Oneida County, New York. The project was undertaken for Peer Consultants, Inc. and involved the inspection of historic material already taken from an adjacent non-National Register eligible site, as well as insuring that no cultural deposits from Site 16A were impacted during removal of lead contaminated soil.

Principal Investigator for a Phase I survey at the Herkimer Home, Herkimer County, New York. The project was conducted for the New York State Canal Corporation and the New York State Office of Parks, Recreation and Historic Preservation. Although the project area was only approximately one-half acre, the surface and subsurface investigation confirmed the results of a previous investigation (1993) that a prehistoric site was present in or near the proposed dock area along the Mohawk River/Erie Canal. The dock facilities will impact only a portion of the site which most likely extends beyond the current project limits. Dr. Hayward recommended that the site as significant and potentially eligible to the National Register.

OTHER PANAMERICAN CONSULTANTS, INC. EXPERIENCE (1993 TO PRESENT)

Dr. Hayward has served as principal investigator/field director on more than twenty (20) cultural resource investigations in Puerto Rico and the U.S. Virgin Islands. The research comprised reviews of pertinent environmental and archaeological background information; field excavations; the development of research designs; and analyses of stratigraphic profiles, radiocarbon dates, artifacts, and faunal remains. For the Institute of Puerto Rican Culture Experience, Dr. Hayward and archaeologists Marisol J. Meléndez Maíz and Marlene Ramos Velez, conducted an investigation, documentation and comparative study of four rock art (petroglyph) sites in Puerto Rico.

ARCHAEOLOGICAL LABORATORY EXPERIENCE

Dr. Hayward has served as Laboratory Director, taught laboratory methods at the graduate level, and has served as Laboratory Director and supervisor on PCI projects, including a mitigation project at El Morro (San Juan, Puerto Rico) and the Aklis prehistoric site at Sandy Point Wildlife Refuge (St. Croix, USVI). Her archaeological laboratory experience includes the identification and inventorying of prehistoric and historic material from a variety of culture areas and periods including the eastern United States, and the teaching of a graduate course in laboratory methods in Puerto Rico.

ARNOLD PICKMAN
Industrial Archaeologist

EDUCATION

M.A. Archaeology, New York University, 1985
B.A. Anthropology, New York University, 1976

EXPERIENCE

Mr. Pickman is currently an independent consulting archaeologist. He has fourteen years experience in prehistoric and historic period archaeology and has conducted various field investigations throughout eastern New York and New Jersey. He is experienced at conducting cultural resource investigations on large-scale projects including landfill, utility, and highway projects, which often require design of field methodology including predictive site modeling strategies, all phases of archaeological field investigations, and report preparation.

Mr. Pickman has directed and implemented a comprehensive array of field methodologies pertinent to cultural resource investigations, including developing and implementing research designs, and directing field components for Phase I and Phase II field investigations. As principal investigator and field director he has coordinated and supervised Phase I and II field investigations.

CONSULTING PROJECTS CONDUCTED FOR U.S. ARMY CORPS OF ENGINEERS

Mr. Pickman served as co-principal investigator and industrial archaeologist for a cultural resources investigation for the Joseph G. Minish Passaic River Waterfront Park and Historic area located in the City of Newark, New Jersey. The investigation included documentary research, field measurements, and photographic recordation of cultural resources at sites of the former Newark Lime and Cement Company, the New Jersey Railroad & Transportation Company, and the Stephens and Condit Shipping Company.

He served as industrial archaeologist for the Morris Canal Right-of-Way cultural resource investigation in preparation for the construction of the Joseph G. Minish Passaic River Waterfront Park and Historic Area in Newark, New Jersey.

Mr. Pickman recently conducted a cultural resources assessment at the locations proposed T-groin installations at Rockaway Beach, Edgemere, Queens County, New York. The investigation included field inspection of 3000 feet of shoreline, documentary research, and photographic documentation of site and field conditions.

He also conducted Stage IB and Stage II archaeological investigations of prehistoric and nineteenth century industrial sites on the Ramapo River in Passaic County, New Jersey. He has prepared an annotated bibliography for Hudson River Environmental Reconstruction. Mr. Pickman conducted an archaeological survey and developed a predictive model for Greenwood Lake, Passaic County, New Jersey. He has conducted a cultural resource reconnaissance for the Beach Erosion Control Project, Rockaway Inlet to Norton's Point, Brooklyn, New York.

OTHER ARCHAEOLOGICAL CONSULTING PROJECTS

Mr. Pickman has conducted many New York-area cultural resources investigations. His responsibilities included documentary research, field reconnaissance, photographic documentation, and report writing. His projects include:

Cultural Resources Reconnaissance of the Atlantic Coast of Long Island, Jones Inlet to Rockaway Inlet, Long Beach Island, Nassau County, New York.

Archaeological Testing and Construction Monitoring, Shoreline Protection and other improvements, Alice Austen Park, Borough of Staten Island, City of New York, conducted for Lomma Construction and New York City Department of Parks and Recreation.

Archaeological Documentary Study and Field Testing, Sobel Court Park, Staten Island, New York. Conducted for New York City Department of Parks and Recreation.

Archaeological Documentary Study, South Jamaica Urban Renewal Area, Borough of Queens, New York. Conducted for New York City Department of Housing Preservation and Development.

Numerous Stage I and II archaeological investigations of prehistoric and historic sites in the counties of Suffolk, Westchester, Staten Island, Manhattan, Brooklyn, Queens, Nassau, Dutchess, and the Bronx.

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MARK A. STEINBACK
Senior Historian

EDUCATION

M.A. Local and Regional History, State University of New York at Albany, 1987
B.A. History (with Honors), State University of New York at Albany, 1985

EXPERIENCE

Mr. Steinback is currently Senior Historian and Assistant Preservation Planner for Panamerican Consultants, Inc. (PCI). He also serves as the director of report and proposal production at the Buffalo (New York) Branch office. He has over ten (10) years experience conducting historic period and archival research and analysis. His experience includes preparing historic contexts and summaries of local ethnohistoric and historic period background and assessing historic period site sensitivities and significance for various cultural resource and archaeological projects. These investigations include preparation of historic period background of project sites; archival, documentary, ethnohistoric, and cartographic research; prehistoric and historic site file analysis; relevant federal and state census and deed research; and preparation of written evaluations for inclusion in archaeological and cultural resources reports and cultural resources management plans.

He is experienced at conducting historical and archival research for large-scale projects including U.S. military installations (e.g., the Air Force, Army, Marine and Navy) pipeline/corridor projects, and flood control projects, which often require detailed archival and historical map research, design of research questions as part of field methodologies, and report preparation (including Historic American Building Survey/Historic American Engineering Record [HABS/HAER]-level documentation). In addition, he has more than seven (7) years editorial experience and has edited more than thirty (30) cultural resource, archaeological, structural, and environmental assessment reports for both public and private sector clients.

Mr. Steinback taught courses in American History and Western Civilization at Schenectady County Community College, Schenectady, New York, as an adjunct history instructor. His early research interests focused on the development and practice of mercantilist theory as it concerned English colonization of North America and the Caribbean. Later research interests involved the industrialization of America from the 1840s through the 1920s with a special focus on socio-cultural history of workers and their responses to industrialization, immigration and urbanization. He is a member of the New York State Historical Association and Organization of American Historians.

REPRESENTATIVE PANAMERICAN CONSULTANTS, INC. EXPERIENCE

For the U.S. Army Medical Research and Materiel Command, Mr. Steinback is currently preparing the Cold War historic contexts for the architectural inventory and National Register Evaluation of historic structures for Fort Monmouth military reservation (New Jersey), Pine Bluff Arsenal (Arkansas), Umatilla Chemical Depot (Oregon), and the Soldier System Center (Natick, Massachusetts). He conducted installation-specific archival and documentary research and prepared the Cold War (1946-1990) historic context for each installation.

For the U.S. Army Medical Research and Materiel Command, he was the project historian and assistant preservation planner for the revision of Fort Hamiliton's integrated cultural resources management plan. He conducted archival and documentary research and prepared the historic context for the installation. In addition, he summarized and prepared the discussion of the pertinent federal and military cultural resources laws and regulations and supervised the preparation of the document.

For the New York District, U.S. Army Corps of Engineers, Mr. Steinback has conducted background, archival, cartographic, and documentary research and prepared the historic period background for fourteen (14) projects at the U.S. Military Academy at West Point, New York. These projects included twelve (12) Phase I cultural resources investigations (for the Stony Lonesome Child Development Center, the Stony Lonesome One-Stop Shopping Center [PX], the Cat Hollow Swamp/Beaver Pond timber harvest, the Long Pond/Stillwell Lake timber harvest, the Firebreak 2 timber harvest, the Turkey Mountain timber harvest, the Stony Lonesome By-Pass, the Hurricane Floyd timber harvest, the former Married Junior Officer's Quarters, the proposed Gross Olympic Center, and the proposed Range Road 22 and Mine Lake timber harvests); one Phase II investigation (for the Stony Lonesome PX); and one Phase III data recovery project (Revolutionary War Hut Site #6). In addition, he conducted documentary research and prepared a written historical context for the draft environmental impact statement for the proposed renovation of the Arvin Physical Development Center at the USMA, and served as technical editor for the report of NRHP Eligibility Evaluation and Impact Analysis Master Plan for the New Brick Housing Area.

He was project historian for the Phase IA Cultural Resources Investigation for the proposed Buffalo Intermodal District Support Facility, Marine Drive Project Area, City of Buffalo, Erie County, New York. He conducted archival and documentary research, including a review of New York State archaeological and historic site documentation and relevant cultural resources reports, and prepared the environmental background section and historic context for the project area, which was situated between the Marine Drive Apartments, the elevated New York State Route 5 ("the Skyway"), the Buffalo War Memorial Auditorium ("the Aud"), and Erie County Naval and Miltiary Servicemen's Park adjacent to Lake Erie in downtown Buffalo, New York. The Phase IA study was conducted for Foit-Albert Associates, Buffalo.

For the New York Power Authority (NYPA) under contract to URS Corporation, Mr. Steinback was PCI's project historian for the cultural resources report for the NYPA recertification for the Niagara Power Project in the City of Niagara Falls, the towns of Porter, Lewiston and Niagara, Niagara County, and the Town of Grand Island, Erie County, New York. He conducted archival and documentary research, reviewed the NRHP and New York State archaeological and historic site information and prepared the historic context for the extensive project area along the Niagara River. He also edited the submission to URS.

He was PCI's Co-Principal Investigator and project historian for the Phase II cultural resources investigation for the proposed Niagara County Water District Canal Crossing in Town of Pendleton, Niagara County, New York. The project area comprised areas adjacent to and including the Erie Barge Canal just south of the Pendleton-Lockport town line. Conducted for Wendel Duchscherer, Amherst, New York, the investigation included archival and documentary research, a walkover reconnaissance of the APE, photographic documentation of site conditions, and shovel testing. The general project area and vicinity had been severely disturbed as a result of construction activities associated with the expansion of Erie Canal and creation of the Erie Barge Canal between 1908 and 1918. As a result of twentieth-century canal expansion, the original canal towpath, which paralleled the canal on the west side, and prism was obliterated and Bear Ridge Road was relocated west to its current position on top of spoil derived from canal construction. No intact deposits and no significant cultural resources were identified as a result of the investigation.

For the National Fuel Gas Supply Corporation under contract to Northern Ecological Associates, Inc., Mr. Steinback was the project historian for the Phase I investigation for the proposed Northwinds natural gas pipeline in the cities of Buffalo and Lackawanna and towns of Hamburg and Eden, Erie County, New York. He conducted archival and documentary research, including a review of New York State archaeological and historic site documentation and relevant cultural resources reports, and prepared the historic context for the project areas. The approximately 18-mile long pipeline was to be placed primarily within railroad right-of-ways, and along the New York State Thruway (I-90), from south of East Eden to the City of Buffalo.

For the U.S. Air Force Center for Environmental Excellence (under subcontract to Tetra Tech, Inc.), Mr. Steinback conducted archival and background research and prepared the historic period overview section of the report for the Phase I archaeological investigation at Griffiss Air Force Base, Rome, New York. He also conducted intensive archival and documentary research and prepared the site-specific historic discussion section for the Phase II archaeological investigation of 20 sites at Griffiss Air Force Base. He also edited the draft and final reports of the Phase II. In 1997, he prepared the site-specific historic discussion for the Phase II investigation at PCI Site 3 at Griffiss Air Force Base and edited the draft report. In 1999 he edited the report discussing the archaeological monitoring investigation of NYSHPO AO6541.000438 (an historic period archaeological site) at the former Griffiss AFB (under contract to Peer Consulting).

Mr. Steinback co-authored the *Research Design: Phase I Cultural Resources Survey of Civil War and Postbellum Sites (1862-1892)* for U.S. Marine Corps Recruit Depot at Parris Island, South Carolina for Savannah District Corps of Engineers. He conducted additional archival, documentary and background research and prepared the historic period discussion for the Phase I and Phase II archaeological investigations of six (6) sites at the Marine Corps Recruit Depot at Parris Island and for the historical and archaeological resources protection plan for the Marine Corps Air Station, Beaufort, SC. Also for the Savannah District Corps of Engineers, he has conducted background and archival research in preparation for the development of a Historical and Archaeological Resources Protection Plan (HARP) for the Beaufort-Marine Corps Air Station, Beaufort, South Carolina. The focus of the research was pre-installation land use activities. He prepared the historic period discussion for these documents.

For the New York District Corps of Engineers, Mr. Steinback conducted background research and prepared the historic period and environmental background sections for the archaeological and historic structures investigation of selected sites within the Fort Hamilton Military Reservation, Fort Hamilton, Brooklyn, New York. He was also principal historian for cultural resource investigations of the Morris Canal Right-of-Way for the Joseph G. Minish Passaic River Waterfront Park and Historic Area, Newark, New Jersey, under subcontract to Northern Ecological Associates, Inc.

For the New York District, USACE, Mr. Steinback has conducted research and written historic period background sections for the Phase I investigation for the proposed Wallkill River Streambank Restoration project, Rosendale, Ulster County, New York, the Phase I survey at the airfield area at Seneca Army Depot Activities, Romulus, New York, and for the Phase I survey of the Upper Basin of the Green Brook Flood Control Project, Union and Somerset Counties, New Jersey, and its addendum for the Stony Brook Sub-Basin. He also edited the final report for each of the above mentioned projects.

For the Jacksonville District, USACE, Mr. Steinback edited the report for cultural resource survey of the Río Ojo de Agua flood protection project in the Municipio of Aguadilla, Puerto Rico, and the report for the cultural resource survey of the Río Loco flood protection project in the Municipio of Guánica, Puerto Rico.