

5569Y (Q,K)
USACE 2004
See Also 5420Y, 5419Y

Contract No. DACW 51-01-D-0017-3
Delivery Order No. 0031



**U.S. Army Corps
of Engineers**
New York District

**PHASE IA DOCUMENTARY STUDY
FOR THE JAMAICA BAY ISLANDS
ECOSYSTEM RESTORATION PROJECT**

RECEIVED
ENVIRONMENTAL REVIEW
APR 12 2004
LANDMARKS PRESERVATION
COMMISSION

BROOKLYN (KINGS) AND QUEENS COUNTY, NEW YORK

DRAFT REPORT

April 2004

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

280

**PHASE IA DOCUMENTARY STUDY
FOR THE JAMAICA BAY ISLANDS
ECOSYSTEM RESTORATION PROJECT
BROOKLYN (KINGS) AND QUEENS COUNTY, NEW YORK**

Draft Report

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
26 Federal Plaza
New York, New York**

Prepared by:

**Arnold Pickman, M.A., RPA, Co-Principal Investigator/Primary Author
Michael A. Cinquino, Ph.D., RPA, Project Director/Co-Principal Investigator
Mark A. Steinback, M.A., Project Historian
Michele H. Hayward, Ph.D., RPA, Senior Archaeologist
Edward V. Curtin, Ph.D., Prehistorian**

**PANAMERICAN CONSULTANTS, INC.
Buffalo Branch Office
2390 Clinton Street
Buffalo, New York 14227**

**Contract # DACW51-01-D-0017-3
Work Order # 0031**

280

April 2004

ABSTRACT

Project Name. Phase IA Documentary Study for the Jamaica Bay Islands Ecosystem Restoration Project, Brooklyn (Kings), and Queens Counties, New York.

Project Location and Environmental Setting. The project area comprises two islands in Jamaica Bay: Elders Point and Yellow Bar, as well as portions of Floyd Bennett Field, which will be used as a staging area. Jamaica Bay is situated predominantly within the boroughs of Brooklyn and Queens on the southwest shoreline of Long Island, New York. Eight miles long and four miles wide, Jamaica Bay covers approximately 26 square miles and 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. Floyd Bennett Field is found east of Flatbush Avenue prior to the entrance to the Gil Hodges/Marine Parkway Memorial Bridge to the Rockaways. Elevations within the project area are approximately at sea level.

Purpose and Goals. Panamerican Consultants, Inc., conducted this documentary study under contract to Northern Ecological Associates, Inc., Portland, Maine, 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 proposed restoration activities, and to evaluate the potential of these activities to impact possibly significant cultural resources.

The objectives of the proposed ecosystem restoration project are to improve and restore tidal wetlands habitat in interior portions of Jamaica Bay that were previously a saltmarsh habitat. Restoration activities include debris removal, sediment re-nourishment, and wetland restoration. More than 60 percent of the interior islands have vanished, all of which were vegetated (USACE 2003:2).

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); Executive Order 11593; 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 site visit to the Floyd Bennett Field 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, Field Service Bureau; the New York Public Library, Map, Local History, and General Research divisions; New York Public Library, Science Business and Industry Library; the Queens Borough Public Library, Long Island Division; the City of New York Municipal Reference Library; and the Brooklyn Public Library, Brooklyn Division. No subsurface testing was conducted in the project area and site visits to Elders Point and Yellow Bar Island were not required, both as per the scope of work (USACE 2003:3-4).

Survey Results. The review of the environmental and culture history documentation for Jamaica Bay and Floyd Bennett Field provided an interpretive context for both the general bay region and for the two restoration sites and the staging areas.

Conclusions and Recommendations. No reported prehistoric cultural remains have been identified for the proposed Elders Point Island and Yellow Bar Island restoration areas or for the Floyd Bennett Field staging areas; and the proposed project will not involve excavation. Therefore, proposed project activities would result in the burying of any deposits that could be present, but unlikely, beneath fill, which would tend to protect them against future disturbance by natural or cultural processes.

Elders Point Island. No evidence of historic period occupation of Elders Point Island was identified, and there is a low probability that significant historic period cultural remains are on this island. If the proposed activities in this area remain the same, no further work is recommended.

Yellow Bar Island. During the late nineteenth century into the early twentieth century, five structures were depicted on maps from to this period. One of these was a "fishing station," and the others may be seasonally occupied fishermen's "shacks." The former locations of these structures were adjacent to the present shoreline, and may be indicated by the remains of pilings or associated piers. Any archaeological deposits associated with these structures would most likely be refuse middens. It is uncertain, however, if any such refuse deposits would remain in the area due to shoreline erosion and tidal action. In addition, a "chimney" was noted on the northeastern portion of the island in 1926 and may have been depicted on a 1924 aerial photograph. However, it does not appear on any other map examined for this project, and no documentary references to it have been found.

The proposed restoration project would not involve excavation, and any structural or artifactual remains associated with the utilization of the area should remain intact beneath any fill deposited as a result of the project. Therefore, a reconnaissance survey is recommended to determine if any surface remains are present at the site. This should include a surface inspection to identify any possible historic remains. Shovel testing or shovel probes may be appropriate based on the results of the surface reconnaissance. A marine reconnaissance should be considered depending on the location of the landing points on the island.

Floyd Bennett Field—Doppler Radar Site. It has been estimated that some six to ten feet of fill has been deposited on the portion of Barren Island that became Floyd Bennett Field (Linck 1981:232). Documentary research revealed that historical industrial and residential activities on Barren Island occurred well south of the Doppler Radar site. The proposed Doppler Radar staging area is located east of the Floyd Bennett Field National Register District and none of the early facilities at the Field were located here. The proposed staging area is west of the beach, and no potentially significant cultural resources are within this area. However, the beach and near-shore area east of the staging area, included the remains of a pier and a jetty associated with the pre-Floyd Bennett Field history of Barren Island and of a seaplane ramp possibly dating to the 1930s and associated with the second phase of construction at the airfield.

If the staging area is utilized within the current boundaries as proposed, no impact to cultural resources should occur and no further work is recommended. The location of the equipment to be used in transferring dredged sand to and from the storage areas is uncertain. Project operations associated with the deposition of dredged material in the storage area and the subsequent transfer of this material to the ecosystem restoration sites should avoid disturbance to the remains of the shorefront features noted above.

Floyd Bennett Field—Northeastern Runway Site. Prior to the construction of Floyd Bennett Field the greater part of the proposed Northeast Runway staging area was open water. No cultural resources and none of the early Floyd Bennett Field facilities were located in this area. The southwestern portion of the runway was constructed in 1942, and the northeastern-most 1,000 feet was constructed in 1952. No structures or features were recorded within or immediately adjacent to the staging area. If the proposed activities in this area remain the same, no further work is recommended.

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, and the New York City Landmarks Preservation Commission.

TABLE OF CONTENTS

Abstract.....	ii
List of Illustrations and Tables.....	vi
1.0 Introduction.....	1-1
1.1 Procedures.....	1-5
2.0 Environmental Setting.....	2-1
3.0 Cultural Background.....	3-1
3.1 Previous Cultural Resources Studies.....	3-1
3.2 Prehistoric Cultural Background.....	3-1
3.2.1 Prehistoric Sites – Kings County Jamaica Bay Shoreline.....	3-10
3.2.2 Potential for Unreported Prehistoric Sites.....	3-13
3.3 Historic Period Background.....	3-22
3.4 Yellow Bar and Elder Point Islands.....	3-26
3.5 Floyd Bennett Field.....	3-32
4.0 Summary and Recommendations.....	4-1
4.1 Potential Prehistoric Period Cultural Resources.....	4-1
4.2 Potential Historic Cultural Resources.....	4-1
5.0 References.....	5-1

Appendices

Appendix A. Scope of Work

Appendix B. Vitae of Project Principals

LIST OF ILLUSTRATIONS AND TABLES

FIGURE	PAGE
1a Location of proposed Jamaica Bay Island Ecosystem Restoration Sites and Floyd Bennett Field Staging Areas	1-2
1b Extent of the Gateway National Recreational Area (GNRA)	1-3
2 Elders Point Island, potential restoration and sediment source locations.....	1-4
3 Floyd Bennett Field Overview Map.....	1-6
4 Proposed Floyd Bennett Field Northeast Runway Area (outlined in yellow).....	1-7
5 Proposed Floyd Bennett Field Doppler Radar Area (outlined in yellow).....	1-8
6 Location of Native American groups in southeastern New York and vicinity during the Contact Period	3-9
7 Location of recorded prehistoric sites in Kings and Queens counties	3-11
8 Submergence curve for southern Long Island during the past 8,000 years	3-14
9 Yellow Bar Hassock and Elders Point Island (Elders Point Island is directly north of Duck Point Marshes)	3-17
10 Jamaica Bay in 1775; note no islands in Jamaica Bay	3-19
11 Jamaica Bay in 1776; note no islands in Jamaica Bay	3-19
12 Detail of map showing Plumb Island (which included Barren Island) in 1779. Note no islands in Jamaica Bay	3-20
13 Jamaica Bay ca. 1781; note no islands in Jamaica Bay	3-20
14 Detail of a 1777 map showing one island in the bay.....	3-21
15 Detail of a 1797 map showing islands or "marshes" in the bay.....	3-21
16 An 1859 map detailing numerous islands in Jamaica Bay	3-27
17 Yellow Bar Hassock, 1899.....	3-28
18 Yellow Bar Hassock, 1909.....	3-28
19 Yellow Bar Hassock, 1926.....	3-29

20	Detail of southwestern portion of Yellow Bar Hassock showing location of structures	3-30
21	Detail of northeastern portion of Yellow Bar Hassock showing possible structure at location of chimney.....	3-31
22	Yellow Bar Hassock, 1939.....	3-33
23	Yellow Bar and Elders Point Islands, 1986.....	3-34
24	Yellow Bar Island; approximate location of 1926 shoreline and structures superimposed on modern map.....	3-35
25	Elders Point Island at center (see 26 in triangle)	3-36
26	Elders Point Island north of Duck Point Marshes.....	3-37
27	Elders Point Island, 1939	3-38
28	Detail of map showing Gerritsen or Dead Horse Inlet separating Barren and Plumb Islands, 1873.....	3-40
29	Barren Island showing "Hotel"	3-41
30	Detail of coastal chart showing structures and facilities at southern shoreline of Barren Island, 1878.....	3-41
31	Factory / Industrial development on Barren Island, 1909.....	3-46
32	Development on Barren Island, 1911	3-47
33	Location of structures on Barren Island.....	3-47
34	Garbage processing plant on Barren Island in 1911	3-48
35	Residential community on Barren Island, 1930.....	3-48
36	Photographs showing a Roman Catholic Church and other buildings at Barren Island, east of Flatbush Avenue	3-49
37	Proposed Floyd Bennett Field staging areas shown in blue) on 1926 map of Barren Island.....	3-50
38	Barren Island/Floyd Bennett Field. Note long jetty south of CG Air Station at center right.....	3-51
39a	Southeastern portion of Barren Island including proposed Doppler Radar Staging Area, 1924	3-52

39b	Detail of aerial photograph showing pier and jetty	3-52
40	Proposed staging areas shown on 1986 map of Barren Island (Floyd Bennett Field).....	3-53
41	Aerial photograph showing offshore features bordering Doppler Radar Area. Features from north to south are Milner Feature JB-50 (former seaplane ramp), pier and jetty	3-54
42	Floyd Bennett Field offshore features: Pier at center of photograph, jetty in background, and portion of Milner Feature JB-50 in foreground, facing southwest.....	3-55
43	Remains of pier—Doppler Radar Staging Area, facing east.....	3-56
44	Remains of pier—Doppler Radar Staging Area. Note wooden pilings in foreground, concrete pilings at east end of feature. Three rows of pilings in foreground left probably a later addition, facing east	3-57
45	Doppler Radar Staging Area shoreline; stone jetty at center, remains of sheet pile bulkhead in foreground, and pier remains in background, facing north	3-59
46	Stone Jetty, detail, facing southeast	3-59
47	Doppler Radar Area; posts and timbers on beach south of jetty, remains of pilings and rock fill in background, facing south.....	3-60
48	Remains of pilings and rock fill at southern end of Doppler Radar Area. Remains of sheet pile bulkhead at right, facing south.....	3-61
49	Aerial photograph of Floyd Bennett Field showing locations of structures and features included in Cultural Resources Inventory.....	3-63
50	Doppler Radar Area showing portion of Milner Feature JB-64. Paved area—concrete "Block" in background, facing southwest.....	3-65
51	Doppler Radar Area, remains of former seaplane ramp (Milner Feature JB-50), facing east.....	3-65
52	Doppler Radar Area, detail of eastern end of former seaplane ramp, facing southeast	3-66
53	Brick "Steam Plant" Building south of Doppler Radar Area (Milner Structure HS-101), facing southeast.....	3-66
54	Interior of "Steam Plant," facing southeast.....	3-67

	PAGE
1 Barren Island Industries	3-43
2 Ferry Service, Jamaica Bay.....	3-44

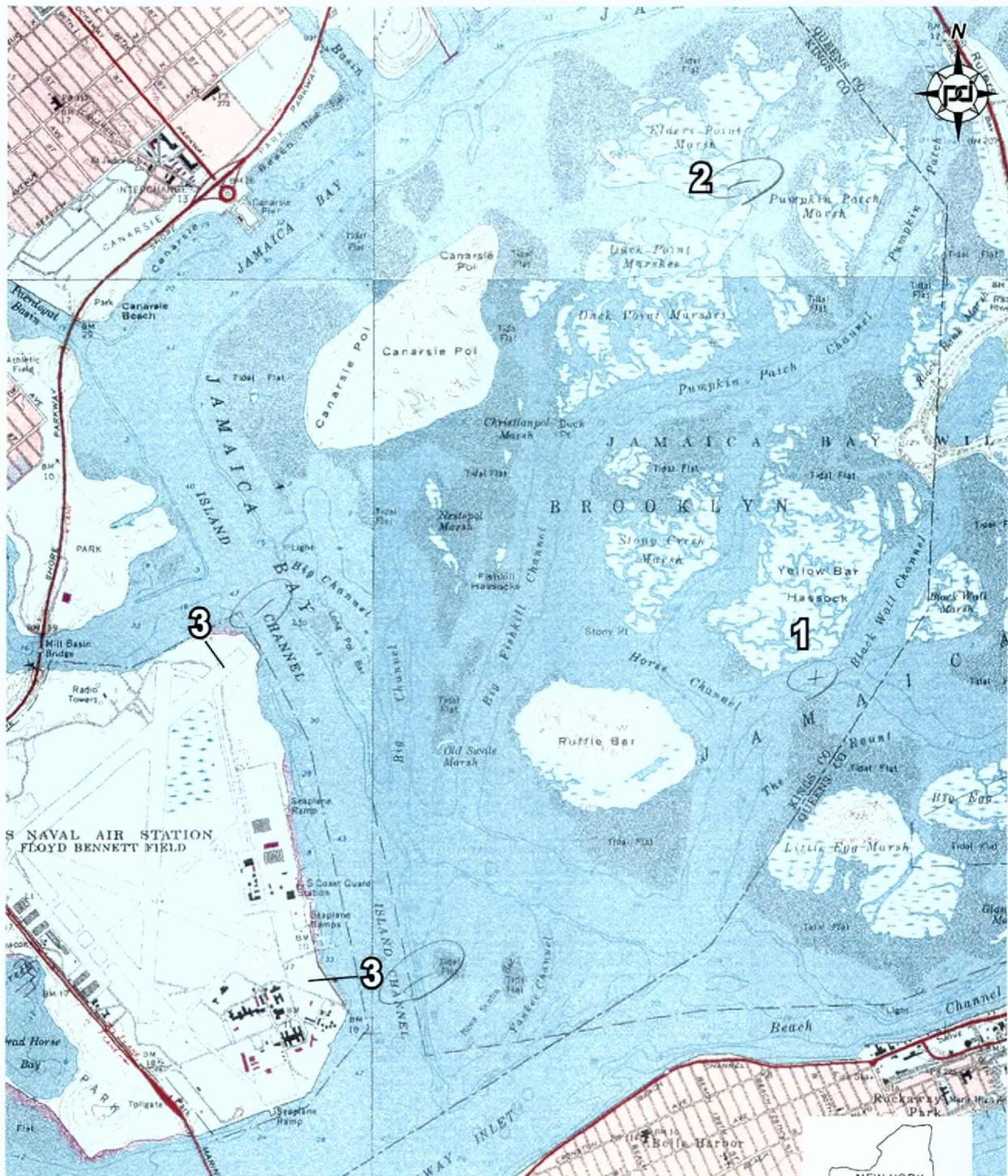
1.0 INTRODUCTION

Panamerican Consultants, Inc., under contract to Northern Ecological Associates, Inc., Portland, Maine, conducted a Phase IA documentary study of two islands in Jamaica Bay (Elders Point and Yellow Bar) and portions of Floyd Bennett Field for the U.S. Army Corps of Engineers, New York District (USACE). The USACE is undertaking a proposed ecosystem restoration project that comprises Elders Point Island and Yellow Bar Island (also known as Yellow Bar Hassock) in the bay. The islands are within the boundaries of Kings County (Borough of Brooklyn), New York (Figures 1a and 1b). This Phase IA documentary study was undertaken to assist USACE in meeting its cultural resources management responsibilities.

The 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); Executive Order 11593; 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). Under these statutes and regulations USACE is responsible for identifying and determining if any properties and/or sites within the project area are eligible for listing on the National Register of Historic Places (NRHP).

The overall objectives of this documentary study are to describe the prehistoric and historic occupation, use and development of the areas to be affected by the proposed project, to identify possibly significant cultural resources, and to evaluate the potential impact of the proposed ecosystem restoration project on any such resources. Panamerican personnel involved with the project consisted of Dr. Michael A. Cinquino, RPA, Project Director/Co-Principal Investigator; Mr. Arnold Pickman, M.A., Co-Principal Investigator and primary author; Mr. Mark A. Steinback, M.A., Senior Historian; and Dr. Michele H. Hayward, RPA, Senior Archaeologist. Dr. Edward V. Curtin drafted the prehistory of the project area. Mr. Chris Ricciardi was the USACE point-of-contact.

The proposed project will involve the deposition of dredged sand on Elders Point and Yellow Bar Islands. At the time that this study was undertaken, a complete written project description was not available. The nature and location of project impacts were determined by examination of available project maps and conversations with USACE personnel. The portions of Elders Point Island that may be impacted are shown on Figure 2. While no map is available indicating the proposed locations of spoil deposition on Yellow Bar Island, conversations with USACE personnel reveal that the area affected will constitute the major portion of this island.



Site
1000
fishery
station

RESTORATION SITES AND STAGING AREAS

- 1 YELLOW BAR HASSOCK
- 2 ELDERS POINT ISLAND
- 3 FLOYD BENNETT FIELD

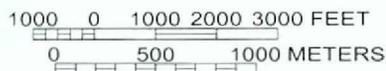


Figure 1a. Location of proposed Jamaica Bay Ecosystem Restoration Sites and Floyd Bennett Field Staging Areas. Jamaica Bay Islands, Kings and Queens Counties, New York (USGS 7.5' Quadrangles, Brooklyn, NY, 1975 [1967], Jamaica NY, 1975 [1966] Coney Island 1975 [1967], Far Rockaway NY, 1975 [1969]).



Figure 1b. Extent of the Gateway National Recreational Area (GNRA). Jamaica Bay Islands, Kings and Queens Counties, New York (National Park Service 1998).

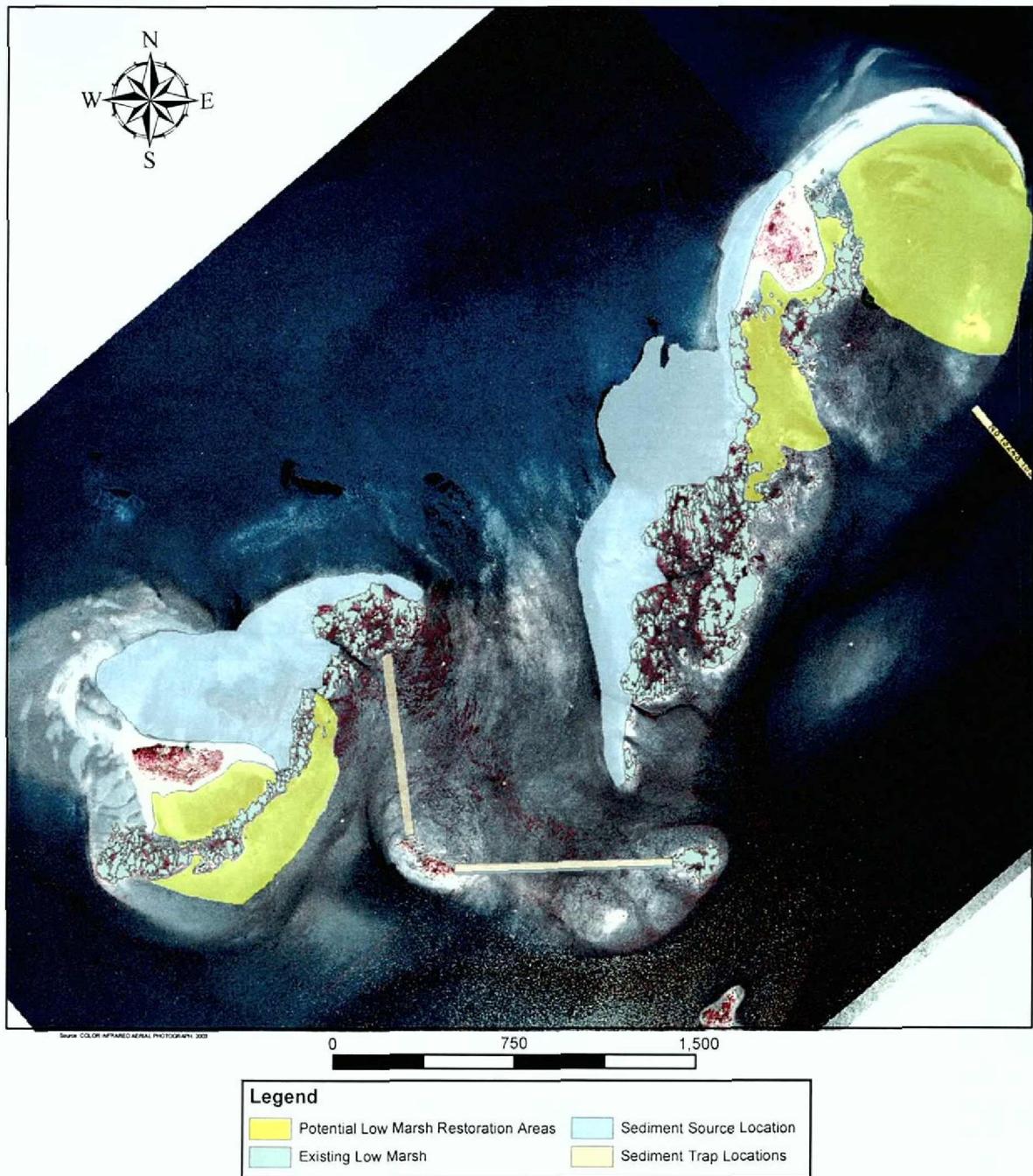


Figure 2. Elders Point Island, potential restoration and sediment source locations. Jamaica Bay Islands, Kings and Queens Counties, New York (USACE 2003).

In addition to the two Islands, a portion of Floyd Bennett Field, also located in the Borough of Brooklyn (see Figure 1), will be used as a staging area for the project, and this area is also included in the present study. According to USACE personnel, sand to be used for ecosystem restoration on Yellow Bar and Elders Point Islands will be dredged from Rockaway Inlet in the vicinity of the Marine Parkway Bridge. The area to be dredged has been determined not to include significant cultural resources (Mr. Chris Ricciardi, USACE, personal communication 2004) and was not included within the scope of work for this study. The dredged sand will be pumped onto a holding area located within Floyd Bennett Field. Two sites, referenced as the North Runway and Doppler Radar areas (Figures 3, 4, and 5), are being considered. Neither of these proposed holding areas are within the boundaries of the Floyd Bennett Field Historic District that was listed on the NRHP on April 11, 1980. The stored sand will subsequently be re-slurried and pumped onto the proposed Island ecosystem restoration sites.

The North Runway area consists of an approximately 2,100-foot (640.5-meter) long portion of the paved runway at its northeastern end. The southern portion of the Doppler Radar area is covered with scrub brush and small trees. An irregularly shaped area extending northward from its southern boundary is not included in the proposed holding area (see Figure 5). Much of the excluded area has been disturbed in connection with the construction of an archery range. The northern portion of the Doppler Radar area, adjacent to the facility now operated by the New York City Police Department, consists of a flat, open area, a large portion of which has the remains of a paved surface.

1.1 PROCEDURES

Archival and documentary research and a site visit to the Floyd Bennett Field were conducted in February 2004 as part of this documentary study. Background research included a review of files and documents from the following repositories: New York State Historic Preservation Office, Field Service Bureau; the New York Public Library, Map, Local History, and General Research divisions; New York Public Library, Science Business and Industry Library; the Queens Borough Public Library, Long Island Division; the City of New York Municipal Reference Library; and the Brooklyn Public Library, Brooklyn Division. A review of available cultural resource management reports also was conducted.

No subsurface testing was conducted in the project area and site visits to Elders Point and Yellow Bar Island were not required, both as per the scope of work (USACE 2003:3-4). Phase IA investigations do not normally include subsurface testing.



Figure 3. Floyd Bennett Field Overview Map. Jamaica Bay Islands, Kings and Queens Counties, New York (USACE 2003).



Figure 4. Proposed Floyd Bennett Field Northeast Runway Area (outlined in yellow). Jamaica Bay Islands, Kings and Queens Counties, New York (USACE 2003).



Figure 5. Proposed Floyd Bennett Field Doppler Radar Area (outlined in yellow). Jamaica Bay Islands, Kings and Queens Counties, New York (USACE 2003).

2.0 ENVIRONMENTAL SETTING

Jamaica Bay is a tidal waterway connected to the Lower Bay of New York Harbor by Rockaway Inlet (see Figure 1). By water, it is located 17 miles south and east of the Battery in New York City. The bay is 8 miles long, 4 miles wide, and covers an area of approximately 26 square miles. It contains numerous small meadows, hassocks and marshes that reduce the actual water surface to about 20 square miles. Elders Point and Yellow Bar are two of these marshy islands.

Large portions of the northern and eastern shores of Jamaica Bay 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 portion Kings, Queens and Nassau counties on the southwest shoreline of Long Island. A number of communities have developed along its shoreline and a large portion of the shoreline area has been filled 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, and several New York City parks also are located within the bounds of Jamaica Bay. Both Yellow Bar and Elders Point islands, as well as Floyd Bennett Field are within the boundaries of GNRA.

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 surficial material is "beach and eolian sand, medium to coarse grained, and [including] scattered shell fragments" (Dvirkin and Bartilucci 1985). These and other Holocene deposits are underlain by Pleistocene deposits followed by 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 that 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 included 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, rather than being completely surrounded by water (Yasso and Hartman 1975:14).

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

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 or lower for extended periods, with January and February being the coldest months. Average seasonal snowfall amounts hover around 30 inches (76.2 centimeters), although single snowfall amounts occasionally reach double digits.

During the warm, humid summer, the area's average temperature is 74°F (23°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 in (104 cm), with a fairly even distribution of moisture throughout the year.

3.0 CULTURAL BACKGROUND

3.1 PREVIOUS CULTURAL RESOURCES STUDIES

Several cultural resources studies have been completed within the Jamaica Bay Unit of the GNRA were reviewed. These include the Jamaica Bay Historic Resource Study (Black 1981), which presents an overall history of the bay. A general history of the GNRA areas was prepared in the mid-1970s (Wrenn 1975), and John Milner and Associates (1978) compiled an inventory of specific cultural resources within the GNRA. All of these studies reference resources within Floyd Bennett Field. None of these studies, however, mention resources on either of the two Islands included within the present project.

A cultural resources reconnaissance was conducted for the USACE Jamaica Bay Ecosystem Restoration project by Panamerican Consultants, Inc. (Hayward et al. 2003), which included an extensive literature review of cultural resources investigations undertaken conducted around the bay. The report focused on 12 sites around the bay being considered for ecosystem restoration. These sites included one at Dead Horse Bay, immediately west of Floyd Bennett Field, but did not include the Field, Elders Point Island or Yellow Bar Island.

In addition, the Historic Structures Report for Floyd Bennett Field includes sections assessing the site's history and archaeology (Blakemore and Linck 1981). The Floyd Bennett Field Historic District NRHP nomination form (Greenwood and Torres 1977) also was reviewed.

A Phase I cultural resources investigation was conducted for the National Park service at two locations within the Jamaica Bay Wildlife Refuge (Morin et al. 2002). The study areas for this project were immediately west of Cross Bay Boulevard, approximately one mile southeast of Elders Point Island and one mile northeast of Yellow Bar Island. This report cites an earlier Phase I report for the Refuge (Mueller 1991). Shovel testing for these projects did not identify any prehistoric or historic remains relevant to the present project.

3.2 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 (1991:136) 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. 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 identified the presence of many edible plants. Carbonized seeds were recovered by flotation. Some of the plants identified by these means included goosefoot

(*Chenopodium* sp.), ground cherry, blackberry, hawthorn plum, pokeweed, pigweed (*Amaranthus* sp.), smart weed (*Polygonum* sp.), wild lettuce, grape, hackberry, and meadow grass (Kraft 1986:4 1).

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 used by Paleo-Indian toolmakers. 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), and 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), and included 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.

Woodworking tools were developed during the Middle Archaic with the use of coarse-grained stones and river cobbles for their raw materials. These stones were commonly available in large sizes and allowed toolmakers 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 points, 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 that 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 point types, including 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 that dates to 2500 BC. Features of this culture include the use of small-stemmed points and atlatls for hunting. Flint working, 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 of 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 the manufacture and use of 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 both sides. The Orient culture derives its name from complex burial sites on northeastern Long Island, consisting 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 1 BC to AD 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 and 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 1983; 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, graters 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).

Contact Period. Various groups of Native Americans occupied the study area when Europeans first settled here in the early 17th 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, most likely would have controlled at least the eastern portion of the Rockaway peninsula (Trelease 1960; Figure 6). Both were reportedly part of the Metoac Confederacy, which comprised thirteen politically affiliated Long Island Algonquian subgroups.

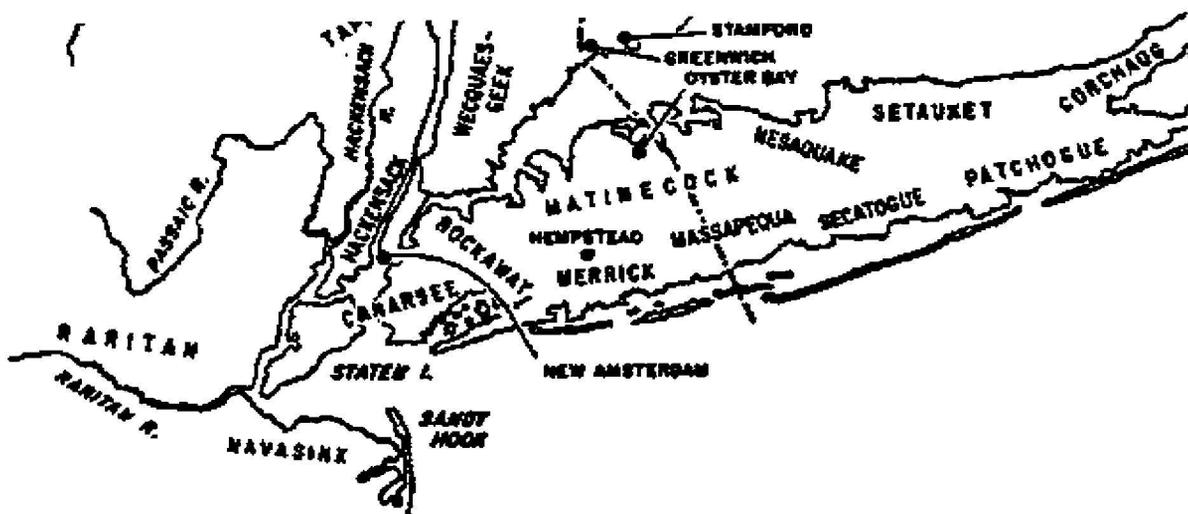


Figure 6. Location of Native American groups in southeastern New York and vicinity during the Contact Period. Jamaica Bay Islands, Kings and Queens Counties, New York (Trelease 1960:6).

Based on references in early colonial documents, it has been inferred (e.g., 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 the course of excavation for European-American graves (DuBois 1884, Armbruster 1919, O'Halloran 1950), there are no reports of Native American occupational refuse being recovered from this location (see also Pickman 1994). Bolton (1920) suggests that the principal Canarsie village sites were at Ryder's Pond and Canarsie at the site locations numbered #50 and #51 on his map (Figure 7; see discussion below). Some contact period material was recovered from the Ryder's Pond site. No analysis of material from the Canarsie site has been reported.

3.2.1 Prehistoric Sites - Kings County Jamaica Bay Shoreline

Most of the known prehistoric sites near the shoreline of Jamaica Bay were noted in compendia prepared in the early portion of the 20th century by Bolton (1920, 1922, 1934) and Parker (1922). Earlier, Harrington (1909) published a list of shell heaps in the New York City area. Most of the information included in these accounts was obtained from reports made in the nineteenth century into the early twentieth century by collectors and avocational archaeologists. Information in these sources was compiled prior to the later twentieth-century development that has obliterated surface indications of these sites. Thus, in most cases, only limited data are available as to their location, extent, functional nature and/or temporal affiliation.

The sites included in the files of the New York State Museum (NYSM) are largely the same ones noted in Parker (1922). However, there are a few sites recorded by Parker that are included in the NYSM files but were not included in his 1922 publication. Another source of information about Jamaica Bay sites is Solecki's (1941) account of sites examined by the Flushing Historical Society in the 1930s.

Four major prehistoric sites have been reported along the northern shore of Jamaica Bay: at Ryder's Pond, Bergen Island, and Canarsie, in Kings County, and at Aqueduct, in Queens County. Other sites, less extensive and less widely reported, have been identified in association with many of the tidal creeks that extended into the marshes present along Jamaica Bay's north shore prior to twentieth-century land filling. These sites are discussed by Hayward et al. (2003).

Two of the above sites are in the general vicinity of Floyd Bennett Field. The closest was located at what is now Bergen Beach. This site is shown as #52 on Bolton's 1922 and 1934 site maps (see Figure 7). According to Bolton, a path must have led

to a well defined native settlement at Bergen Beach, known to the natives as Winnippague, or 'fine water place.' Practically an island, it was reached from the Flatlands district only by passing over a tract of marsh-land through which a crooked waterway meandered. ... Scattered objects found upon the island indicate native residence there, and masses of discarded shells decide the position of a considerable Indian industry within its area. It was in fact one of the

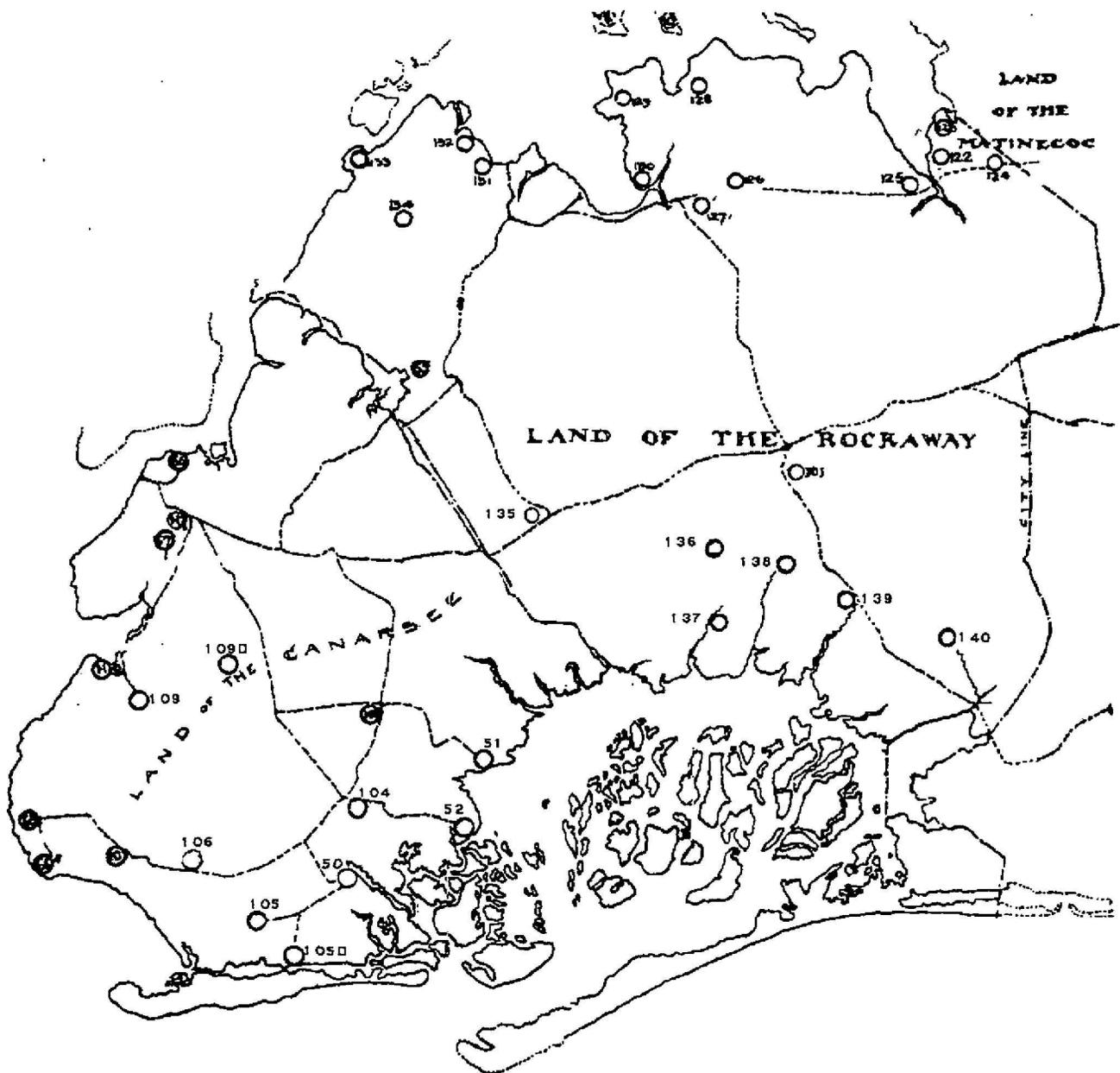


Figure 7. Location of recorded prehistoric sites in Kings and Queens counties. Jamaica Bay Islands, Kings and Queens Counties, New York (Bolton 1934:144, 148).

places where the important manufacture of wampum was carried on. The position of native residence might be expected to have been on the northern part of the island, near Avenue U and the Grand Esplanade, because that part was near a fresh-water supply, and had a good beach for use as a canoe landing, while the southern part was bordered by marsh and had no stream nearby [Bolton 1922:154-155].

Parker did not show the Bergen Beach site on his site map, but does mention the site in his 1922 compendium. Thompson (1918; cited by Parker 1922:581) mentioned "immense" shell heaps on Bergen Island. The site is included in the files of the NYSM as #7391. The site location is some 4,000 feet (1,220 m) northeast of the northern portion of Floyd Bennett Field. This portion of Floyd Bennett Field consists of landfill, as will be discussed below. Barren Island, which constituted the non-landfill portion of the Field, was approximately one-and-one-half to two miles from the Bergen Beach site and separated from it by tidal marsh and open water.

No Native American sites have been reported on Barren Island. It should be noted, however, that some sources mis-locate the Bergen Beach site on Barren Island. John Milner and Associates (1978:111), for example, maintains that a site referenced as "Equendito" was located here. The Canarsie place-name "Equendito" most likely did refer to Barren Island, although there is some confusion as to whether the term also referenced Plumb Island, which was apparently attached to Barren Island at certain times in the past. The shifting configuration of these islands is reflected in the term "the broken lands" indicated on some maps and documents, including a 1664 deed by which the Canarsie sold the island to Gravesend settlers John Tilton and Samuel Spicer (Dubois 1884:77-78). However, there is no indication in either the ethnohistoric or archaeological literature that there was actually a Native American settlement on Barren Island.

Seitz and Miller (1996:228-230) state that Barren Island was a "center of the wampum industry." They also cite Stayton (1999:77) as noting that "members of the Schenck family...built a mill on the Island and a bridge to the mainland." It is apparent that these authors are also confusing Bergen and Mill Islands with Barren Island, since the Schenck mill stood on Mill Island, not Barren Island (Black 1981:16).

The Ryders Pond site is located on the west side of Gerritsen's Creek, more than a mile west of the northern portion of Floyd Bennett Field. It is indicated as site #50 on Bolton's map (see Figure 7), and is included as #3608 in the NYSM site files. Parker does not show this site on his map, but does list it in his compendium as Kings County site #4. Based on a 1898 article in the *American Archaeologist*, Parker (1922) described this site as a "burial place in South Brooklyn found in 1897 on Avenue U and near Ryder's pond and Sheepshead Bay. He noted that "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." Bolton identified the site with a tract in Flatlands sold by Native Americans in 1664 and referred to in documents as Mashanscomacocke, "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. Artifact collections from this site (Lopez and Wisniewski 1971, 1972) suggest that it was occupied during the Archaic and Woodland periods into the period of Native American-European contact in the early seventeenth century.

The third major site along the south shore of Kings County was the Canarsie site. As reported in the literature, the site was located more than two miles northwest of Elders Point Island, and was separated from it by large areas of tidal marsh as well as open water. The site is indicated on Bolton's map (see Figure 7) as #51. The site also was noted by Parker (1922) and is included in the files of the NYSM as #7390. The NYSM site files note this site as being characterized by "immense shell heaps." Bolton (1934:146) described this "Canarsie" site as "a village site, and extensive planting field." He noted (1920:89) that "grooved axes and other artifacts" have been recovered from this site and states that it was "probably the principal village-site of the tribe of the same name." However, there is no archaeological data indicating that this site was actually occupied during the Contact period. Other smaller sites have been reported east of the Canarsie site between it and Fresh Creek (see Hayward et al. 2003).

The Aqueduct site in Queens County is well outside the project area. There have been no reports of prehistoric sites on any of the Jamaica Bay Islands.

3.2.2 Potential for Unreported Prehistoric Sites

Since Jamaica Bay is a backbarrier lagoon, an assessment of the potential for the presence of unreported prehistoric sites on the islands in the bay needs to consider the formation processes of barrier island-lagoon systems. Such systems formed under certain conditions as sea levels rose during the Holocene period.

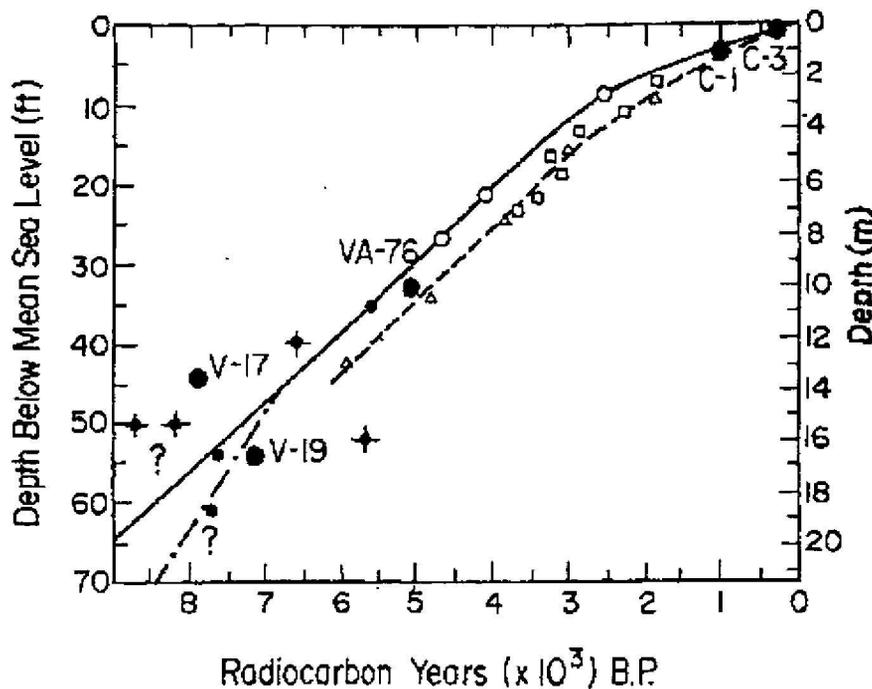
Sea Level Curves. During the final Pleistocene glaciation (e.g., Wisconsin), sea water was tied up in glacial ice and sea level was as much as 400 ft (120 m) lower than at present. The shoreline lay at the outer edge of the continental shelf, about 100 miles from the present shoreline. Since the end of the Wisconsin glaciation, approximately 10,000 years ago, sea level has risen as the glaciers melted (Belknap and Kraft 1977; Williams and Duane 1974:17; Kraft et al. 1983). 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 (Edwards and Emery 1977; Emery and Edwards 1966; Edwards and Merrill 1977).

A number of curves have been produced which show the time at which sea level reached various points below the present sea level. 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 with time are constructed.

Sea-level rise is a function of three factors: the world-wide (eustatic) rise in sea level caused by the release of water from the glacial ice; the (isostatic) rise in the land surface which occurred as the weight of glacial ice was removed; and any local crustal subsidence which may have occurred. Thus, sea-level curves vary with location (Kraft 1985; Newman 1966; Pardi 1983).

A sea-level curve for the south shore of Long Island area was published by Rampino (1979) and Rampino and Sanders (1980; Figure 8). 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 of sea level rise between ca. 7000 BP and 3000 BP, with a slowing rate of increase after the latter date. Prior to ca. 7000 BP, 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 of the data.



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

Barrier Island-Lagoon Systems. Barrier Island lagoons, such as Jamaica Bay, form behind offshore bars. Deposits of mud and marsh vegetation form during the process of siltation of the lagoon. The gradual inundation of the lagoon area that enables the marsh deposits to form also would result in relatively little disturbance to any archaeological sites that may have been present at the lagoon site prior to submergence.

Two processes have been proposed as affecting barrier islands in response to a rise in sea levels; landward migration and drowning in place. Where there is an adequate sediment supply relative to the rise in sea level the barriers would be continually replenished and would remain in place. During this time the sea-level rise would cause the lagoon behind the barrier to widen and deepen. If, on the other hand, an adequate sediment supply is not available to match the rate of sea-level rise, the seaward side of the barriers would be continuously eroded while at the same time sand would be deposited shoreward of the barrier in the form of washover fans and tidal deltas. The result would be a continuous migration of the barriers landward. Swift (1975:38) notes that

the lagoonal carpet of the Central Atlantic Shelf indicates that the modern barriers have retreated to their present positions from the shelf edge during the post-glacial transgression. Thus the immediate genesis of most central Atlantic barriers is a retreat in from the position of its immediate predecessor.

Long Island Shoreline Geomorphological Reconstruction. The barrier island-lagoon system along the south shore of Long Island has been studied by Sanders and Kumar (1975), Rampino (1979), and Rampino and Sanders (1980, 1981). These studies are based on an analysis of borings and vibracores taken both within the lagoon (Great South Bay) and offshore of Jones Beach and Cedar Beach.

The strata underlying those formed during the processes of Holocene marine transgression represent glacial outwash deposits laid down during the Pleistocene. Two Pleistocene glacial outwash stratigraphic units, consisting of brown sands and gravels, have been recognized. At present the surficial sediments proceeding southward from the Long Island mainland and across the lagoon to a point offshore of the barrier islands represent

- the submerged Pleistocene highland
- a fringe of brackish-to-salt marsh composed primarily of *Spartina* grasses
- open-lagoonal silty clays
- backbarrier tidal delta and washover sand lobes
- backbarrier-fringe salt marshes
- barrier island sands of beach-ridge, dune, beach-berm and inlet fill origin
- shoreface sands
- inner shelf sands

With a slow rise in sea levels salt marsh peats and/or organic silts/clays would have formed in lagoons behind the barrier islands. Rampino (1979) suggests that accumulation of marshy peat deposits as opposed to open lagoonal silts and clays would be related to the rate of submergence, with a slower rate of submergence enabling sedimentation to build the lagoon floor to a level at which marsh grass could become established. He thus relates the development of the extensive salt marshes in the present lagoon to the reduced rate of sea-level rise, which began ca. 3000 BP (see Figure 8). The lagoonal peats, silts and/or clays would immediately overlie any prehistoric archaeological deposits.

In the area immediately landward of the present barriers, the peat and lagoonal silts/clays are overlain or mixed with backbarrier sands. Such sands are deposited during storms, leading to the creation of "wash-over fans," or by tidal currents flowing through present or former inlets, which deposit "flood-tidal delta lobes."

Any prehistoric sites should be present in accumulations of soil that formed during the Holocene prior to marine transgression. These should be located immediately overlying the Pleistocene deposits and beneath the marsh/lagoonal deposits resulting from marine transgressive processes.

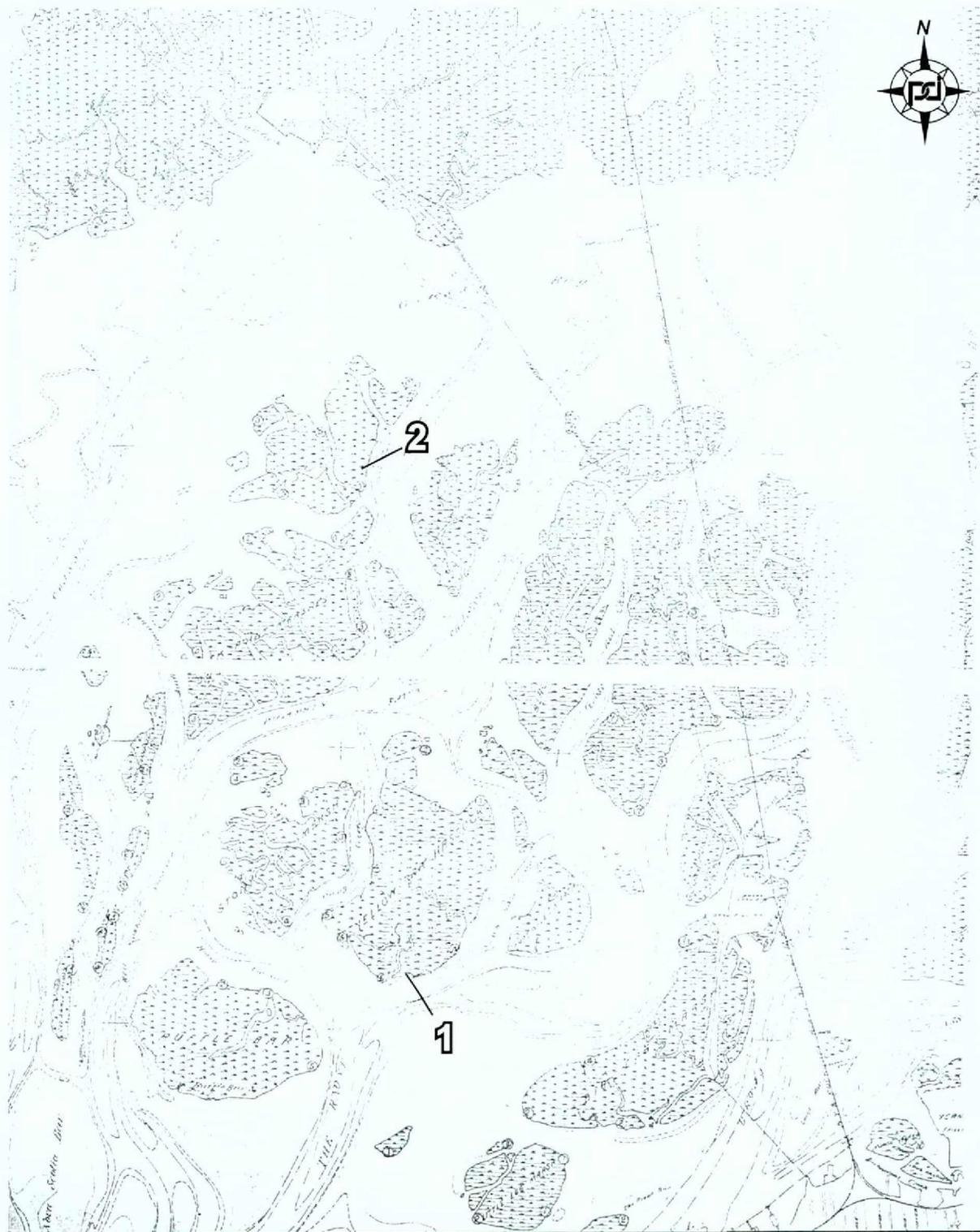
Fuller (1914:185) provided a description of the basic marsh formation process:

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).

It should be noted that in recent years there has been an imbalance between sea-level rise and marsh accretion rates, leading to a loss of tidal marsh on the Jamaica Bay Islands. This has been attributed to a lack of an adequate supply of sediments resulting from a number of factors (Hartig and Gornitz 2001). Approximately 76 acres of tidal wetlands on Elders Point Island were lost between 1974 and 1999 (NYSDEC 1999).

Jamaica Bay Islands. There are several indications that the Jamaica Bay marsh Islands were formed relatively recently. A 1907 Jamaica Bay Improvement Commission map (Figure 9) detailed the depth below the "meadow surface" at which



RESTORATION SITES: 1 YELLOW BAR HAS SOCK / 2 ELDERS POINT ISLAND

Figure 9. Yellow Bar Hassock and Elders Point Island (Elders Point Island is directly North of Duck Point Marshes). Jamaica Bay Islands, Kings and Queens Counties, New York (Jamaica Bay Improvement Commission 1907).

sand was encountered, and showed depths of 0-3 feet on Elders Point Island and 1-5 feet on Yellow Bar Island. A recent paper on marsh depths in Jamaica Bay (Peteet and Liberman 2001) reported the presence of some 1.9 meters (approximately 6.2 feet) of peat on Yellow Bar Island. This measurement is generally consistent with the approximate 5-foot depth reported in 1909, considering the average annual sea-level rise of 2.8mm/yr (measured at the Battery Park in New York City) in the past 150 years (Hartig and Gornitz 2001). The sea-level curve (see Figure 8) indicates that rising sea levels would have reached an elevation of approximately six feet below present sea level approximately 1,500 to 2,000 years ago. Consideration of the marsh-formation processes noted above would suggest that inundation of the portions of the lagoon where the present islands are located would have begun at that time and continued into historic times.

In addition, maps drawn during the Revolutionary War, if accurate, also suggest that the islands may be of recent formation or of insignificant size for period cartographers. Four of these maps (Figures 10 through 13) do not show any islands in Jamaica Bay, while the 1777 Des Barres map (Figure 14) depicted one island. Although some small islands may have been present at that time but not illustrated by the mapmakers, these maps, if accurate, suggest that much of the marsh formation in the bay may have occurred since the Revolution. However, a 1797 map (Figure 15) depicted several marsh islands in the bay.

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

Shell heaps were identified along Cedar Creek, a tidal creek in Wantagh, Nassau County, in the area where a water-pollution control plant was constructed in the 1960s and are now buried under fill. Information about these shell heaps was provided by Mr. Ron Wyatt, director of the Nassau County Museum (Pickman 1982).

The heaps were located on the western shore of Cedar Creek with a portion of each heap bordering the creek. The largest of these heaps measured approximately 1,000 ft by 200 to 250 feet. The other two measured approximately 250 by 200 feet. The heaped shells were fragmentary, and narrow lenses of soil with a high charcoal content were noted. The tests conducted by the Nassau County Museum yielded only about a dozen chert and jasper flakes. Wyatt stated that since villages along the south shore of Long Island were 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 process led to the accumulation of large shell heaps and is in keeping with the relative scarcity of artifacts found in these deposits.

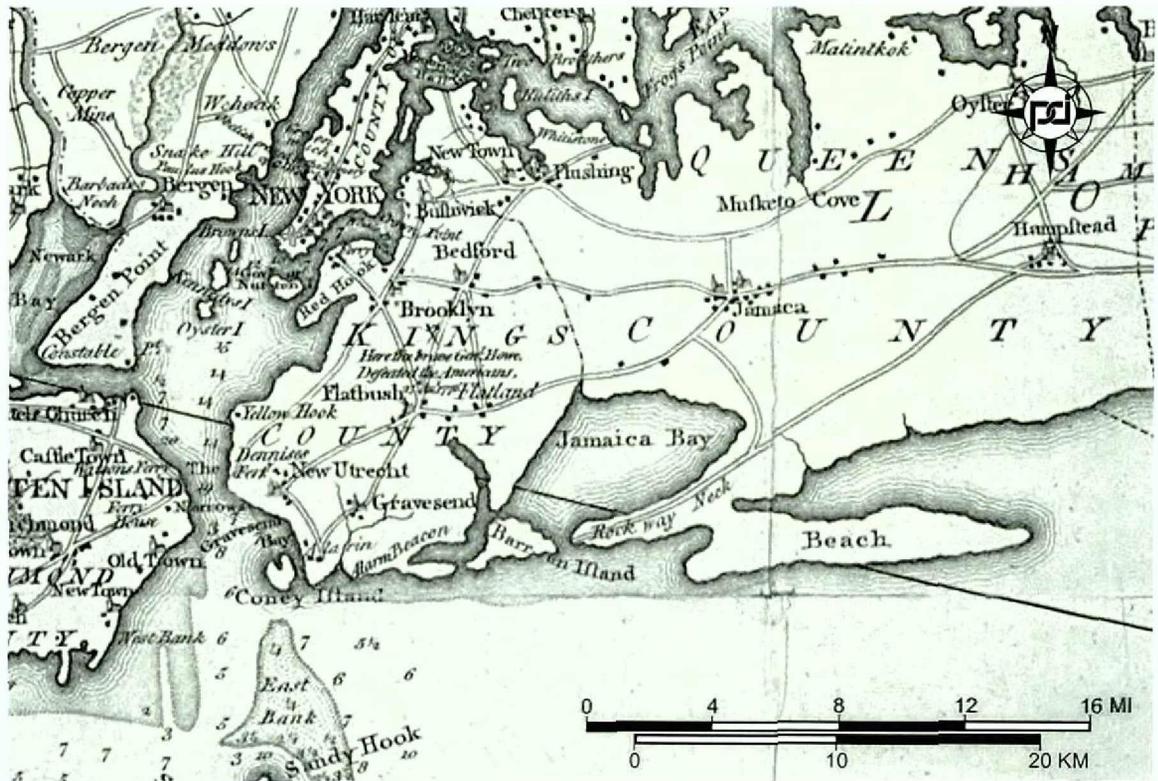


Figure 10. Jamaica Bay in 1775; note no islands in Jamaica Bay. Jamaica Bay Islands, Kings and Queens Counties, New York (Montessoro 1775).

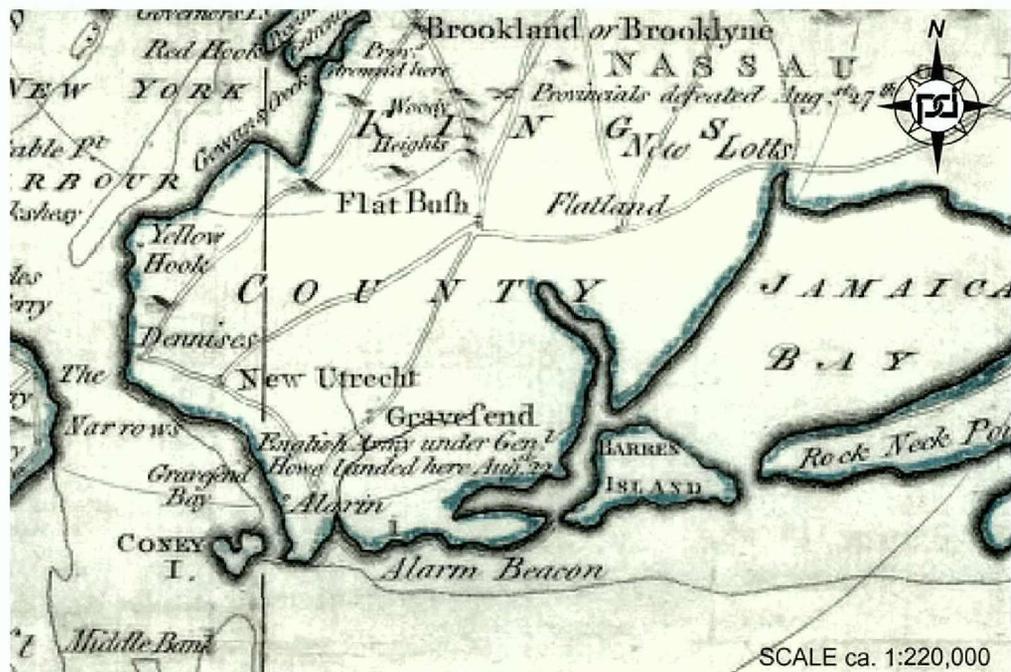


Figure 11. Jamaica Bay in 1776; note no islands in Jamaica Bay. Jamaica Bay Islands, Kings and Queens Counties, New York (Barber 1776)

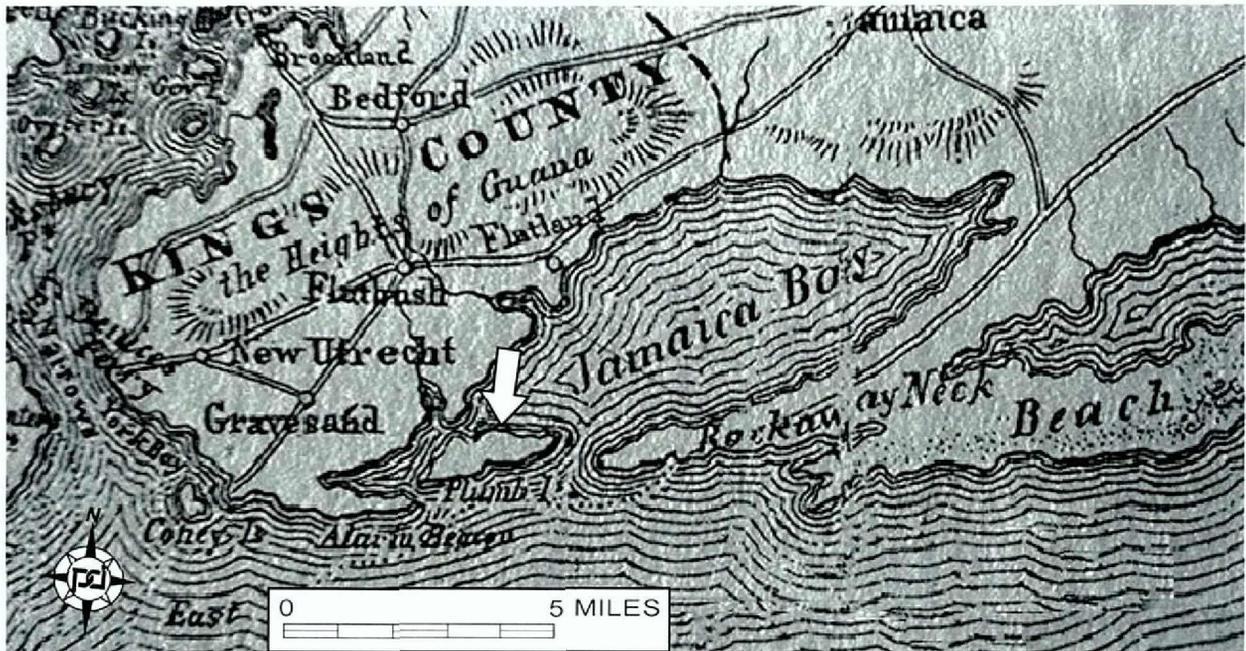


Figure 12. Detail of map showing Plumb Island (which included Barren Island) in 1779. Note no islands in Jamaica Bay. Jamaica Bay Islands, Kings and Queens Counties, New York (Sauthier 1779).

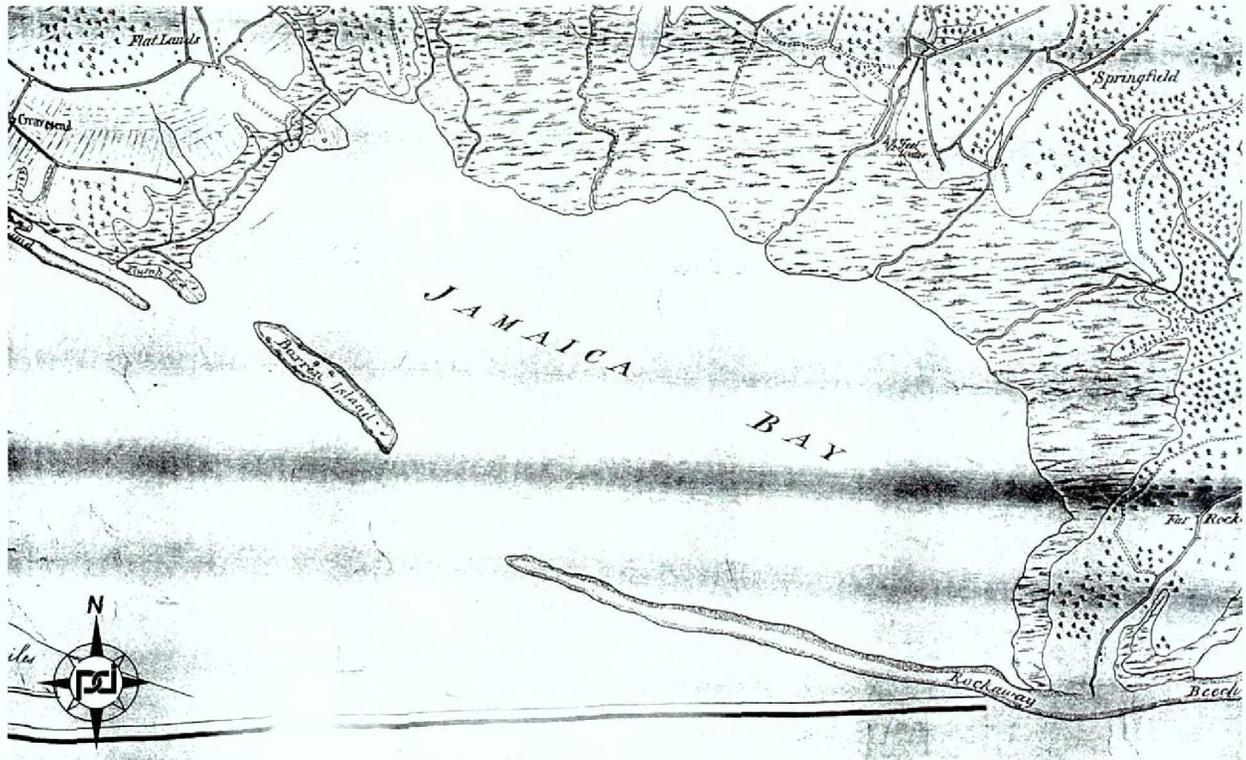


Figure 13. Jamaica Bay ca. 1781; note no islands in Jamaica Bay. Jamaica Bay Islands, Kings and Queens Counties, New York (Taylor and Skinner 1781)

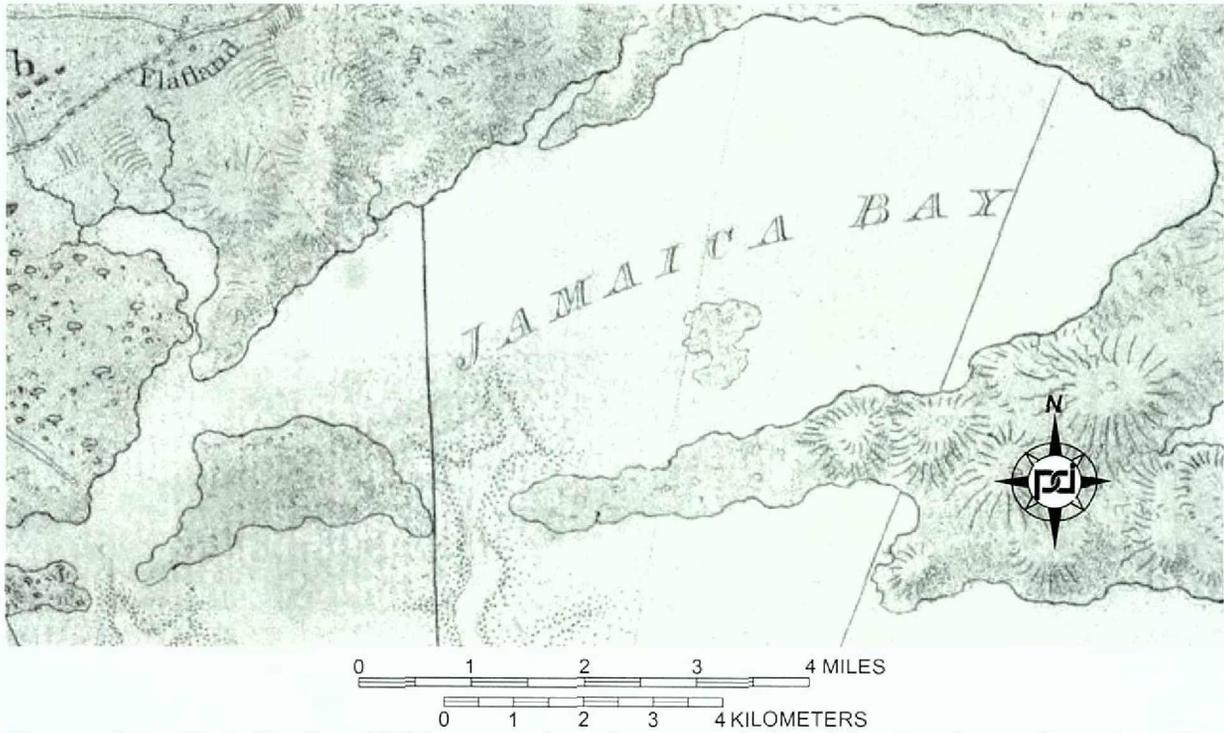


Figure 14. Detail of a 1777 map showing one island in the bay. Jamaica Bay Islands, Kings and Queens Counties, New York (DesBarres 1777).

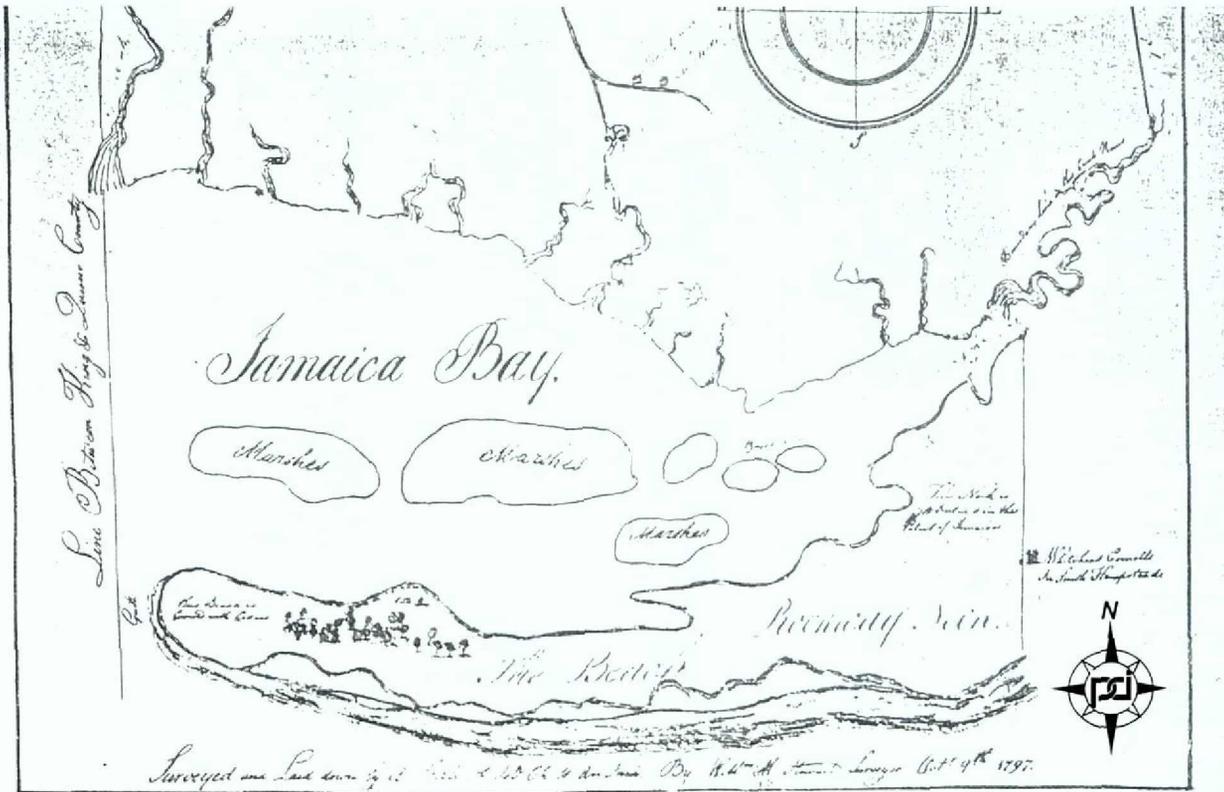


Figure 15. Detail of a 1797 map showing islands or "marshes" in the bay. Jamaica Bay Islands, Kings and Queens Counties, New York (Stewart 1797).

Of particular interest is the fact that all except the uppermost portion of the Cedar Creek shell heaps were below the surface of the marshes that bordered the creek, which ranged from 3 to 15 feet in depth. The heap was tested to a depth of 10 feet but extended below this depth. 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 indicates 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 the marsh deposits accumulated around the heap as the sea level rose. Radiocarbon dates obtained from the shell were all restricted to the first millennium AD.

Shell heaps have been reported along other tidal creeks in Nassau County, as well as the marshy islands in Hempstead and South Oyster Bays (see Pickman 1982). No definitive reports of this type of site have occurred in the Jamaica Bay area. However, an early twentieth-century source referred to "shell banks in the marshes all around" in the vicinity of Bayswater on the Rockaway peninsula near Far Rockaway (Works Progress Administration 1938:1, 173). While no prehistoric sites on Jamaica Bay islands have been recorded, a site was noted on Hog Island in what is now Hempstead Bay in Nassau County. Munsell (1882) reported the presence of a large shell heap on this Island and Parker (1922) included the site in his compendium.

If any unreported prehistoric sites are located on the Jamaica Bay islands they would most likely include shell deposits such as those noted above in marshy areas along Long Island's south shore. Such deposits would have been formed prior to the inundation of the sandy surface underlying existing marsh deposits. Unless such deposits reached the elevation of the present marsh surface, or have otherwise been exposed by erosion, their locations could only be determined by subsurface probes or remote sensing.

3.3 HISTORIC PERIOD BACKGROUND

The Canarsie sachems sold the land bordering the present-day Brooklyn portion of Jamaica Bay to European settlers in three separate 1636 transactions. The land was described in the deeds as comprising three "flats," collectively called "Casteteuw" (other spellings are given in the literature). Tooker (1911:36) translated this term as "where grass is cut or mowed." This suggests that the sale included the marshes bordering Jamaica Bay. It is likely that the sale also included the areas of drier ground bordering the marshes as reflected by the phrase in the deed that the tracts extended "into the woods."

The boundaries of the three tracts sold by the sachems are vague and, in fact, the boundaries of the central tract as given in the deeds are identical to those of the easternmost (i.e., "in width from a certain valley eastward also into the woods"; Fernow 1883:XIV:2). Bolton (1922:157) maintained that this central tract was the

"tract which now includes Canarsie Beach Park, and is bounded on the westward by the Bestevaars Kill or Paerdegat Basin."

In 1665, local Native Americans deeded a tract of land at "Canarrissen" to the Town of Flatlands (then named New Amersfort). The conveyance referred to the Native Americans' use of the land for cultivation and provided that the purchasers should provide a fence for the protection for this cultivated tract (Tooker 1911; Minsky 1963). This led to Bolton's characterization of the Canarsie site as including "planting lands."

Barren Island was apparently the island named Equendito by the Canarsie, although there is some confusion as to whether it refers also to Plumb Island, which was apparently attached to Barren Island at certain times in the past. The shifting configuration of these islands is reflected in the term "the broken lands" indicated on some maps and documents, including a 1664 deed by which the Canarsie sold the island to Gravesend settlers John Tilton and Samuel Spicer (Dubois 1884:77-78).

Prior to the latter portion of the nineteenth century, Kings County included five separate towns in addition to the City of Brooklyn, including the towns of Flatlands and Flatbush. The portion of the Jamaica Bay shoreline that included Barren Island and the present Floyd Bennett Field was within the boundaries of Flatlands.

The town of Flatbush included the portion of the county called as New Lots until 1852, when it became a separate town. The boundary between Flatlands and New Lots was a short distance to the west of Fresh Creek, placing the portion of the Kings County shoreline closest to Elders Point Island within the Town of New Lots. 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) notes "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 that subsequently emerged within the town. 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 to the north of the Jamaica Bay marshes.

Early Historic Period Land Use. Despite acquisition by Europeans in the seventeenth century, most of the area bordering Jamaica Bay remained marshland that was unoccupied through the early nineteenth century. Nevertheless, the European settlers utilized the land much as it had been by the Native American occupants.

One valuable resource was the marsh vegetation. A 1679 journal entry describing Flatlands noted that

there is toward the sea (the bay), a large piece of low flat which is overflowed at every tide...which produces a species of hard salt grass or reed grass. Such a place they call *valey* [sic] 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].

Like the Native Americans before them, the settlers in the vicinity of the bay also made use of its fish, shellfish and wildlife resources for food. These food-procurement activities were carried out as recreational and/or subsistence endeavors rather than as commercial ventures until the mid-nineteenth century (Black 1981:24-26).

Agriculture was the major economic activity of settlers of the villages surrounding Jamaica Bay. Thus, there was a need for mills to process the agricultural products. The tidal creeks adjacent to the bay were utilized for this purpose. The mills were constructed on upland areas where the uplands penetrated the surrounding marshes and adjoined the creeks.

Grist mills stood along three tidal creeks in Kings County: Gerritsen Creek, Fresh Creek and Spring Creek. These mills were shown on the 1781 Taylor and Skinner map (see Figure 13), which is the earliest to detail structures adjacent to the Jamaica Bay shoreline. The 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 and the water trapped in the pond. When the tide fell sufficiently, the gates were opened and the water was released through a millrace to turn the mill wheel. Approximately five hours milling time would have been available for each of the two daily tides (Hampshire County Council 1999).

There is no indication that the early settlers utilized the Jamaica Bay islands. In fact, as noted, Revolutionary War era maps (see Figures 10 through 14) suggest that most of the present islands may have formed after this period.

Late Nineteenth-Century and Twentieth-Century Land Use. Human utilization of Jamaica Bay during the first half of the nineteenth century remained essentially unchanged (Black 1981). 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 led to the demise of the shellfish beds. Other nineteenth-century commercial uses of the bay shores were focused on the Barren Island fertilizer and fish oil industries (see below).

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 shoreline. Paradoxically, the same period saw development of parkland around the bay shores, largely through the efforts of Robert Moses (Black 1981).

With the increase of leisure time among the working and middle classes of the city, the Rockaways, the bay islands, Canarsie and other areas around Jamaica Bay became attractive as destinations for sport fishing, bathing and other leisure time activities. The construction of a railroad trestle across the bay to the Rockaways in 1880, and the subsequent opening of Cross Bay Boulevard facilitated these pursuits. Access to the Jamaica Bay shore was aided further by the opening of the Belt Parkway. Construction of the portion of this roadway east of Fort Hamilton took place between 1936 and 1940 and the parkway was 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 increasing population of New York City also led to the development of permanent housing on filled-in marshland adjacent to the shores of Jamaica Bay.

Finally, at the beginning of the twenty-first century, the Jamaica Bay Ecosystem Restoration Project reflects a desire to undo the changes to the bay shoreline and restore the natural environments that at one time existed along them.

There was apparently no substantial occupation of the Jamaica Bay islands until the latter portion of the nineteenth century, although Black (1981:63) notes a temporary occupancy of Ruffle Bar prior to the Civil War. Unlike most of the Islands, Ruffle Bar included a substantial area of upland along its southern shore.

The opening of the railroad in 1880 stimulated more intensive occupation of the islands, and a village was established on Big Egg Marsh (now the location of Broad Channel) during this period (WPA 1939:590). Subsequently, 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, west of the Raunt (Black (1981:62):

During this period a substantial community developed on Ruffle Bar, eventually comprising some 40 buildings (Black 1981:63; Seitz and Miller 1996:42). A hotel, possibly built in the nineteenth century was reportedly located on this island, and the remains of a wooden pier were noted here in the 1970s (John Milner and Associates 1978:133). Recently, an archaeological field school from the State University of New York at Stony Brook mapped surface remains of nineteenth-century and twentieth-century features at Ruffle Bar (Bernstein 2003).

During the late nineteenth century shacks were built by fishing clubs and squatters at various locations on the islands in Jamaica Bay. After the Department of Docks

assumed administration of the bay in 1897, the city took over leases to previous occupants and granted new ones (Black 1981:60).

By 1939 the islands in Jamaica Bay were home to some 4,000 people, nearly all of whom lived on Broad Channel. Approximately 80 people lived on other islands and most of them 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].

3.4 YELLOW BAR AND ELDERS POINT ISLANDS

Both Yellow Bar Island (or Hassock) and Elders Point Island had formed by 1845, although their morphology is somewhat different from that shown on more recent maps (U.S. Coast Survey 1845). Maps dating prior to the end of the nineteenth century (e.g., Figure 16) provide no indication of any occupation of either of the islands in the study area.

Yellow Bar Island. Examination of maps and documentary sources dating from the late nineteenth century through the mid-twentieth century reveals that structures were located on Yellow Bar Island during this period. The earliest depiction of structures is an 1899 map (Figure 17), which showed five structures on the southwestern shoreline of the island. At least one of these structures was a "fishing station." In 1901 two missing persons were reported to have landed safely at "Morris' fishing station" on Yellow Bar Hassock (*Brooklyn Eagle* 1901; *New York Times* 1901). The structures shown in 1899 also were depicted on the 1909 edition of this map (Figure 18). The 1926 marine chart (Figure 19) also depicted five structures on the southwestern shoreline of Yellow Bar Hassock, although only three of these were illustrated at the same locations as those shown in 1899.

The annual reports of the New York City Department of Docks and Ferries, which administered the Jamaica Bay islands in the early twentieth century, included a list of leaseholders. No leaseholders were noted for Yellow Bar Hassock during the first three decades of the twentieth century (Department of Docks and Ferries 1901, 1910, 1911, 1916, 1918-1922, 1924-1927). The structures on the island delineated on historic maps probably were occupied by "squatters."

A 1924 aerial photograph (Figure 20) is not sufficiently detailed to clearly depict structures on the southern portion of Yellow Bar Island. However, several piers appeared to be have been shown along the island's southwestern shoreline.

The 1926 marine chart (Figure 19) indicated a "chimney" on the northeastern portion of the island. The 1924 aerial photograph (Figure 21) showed some kind of structure

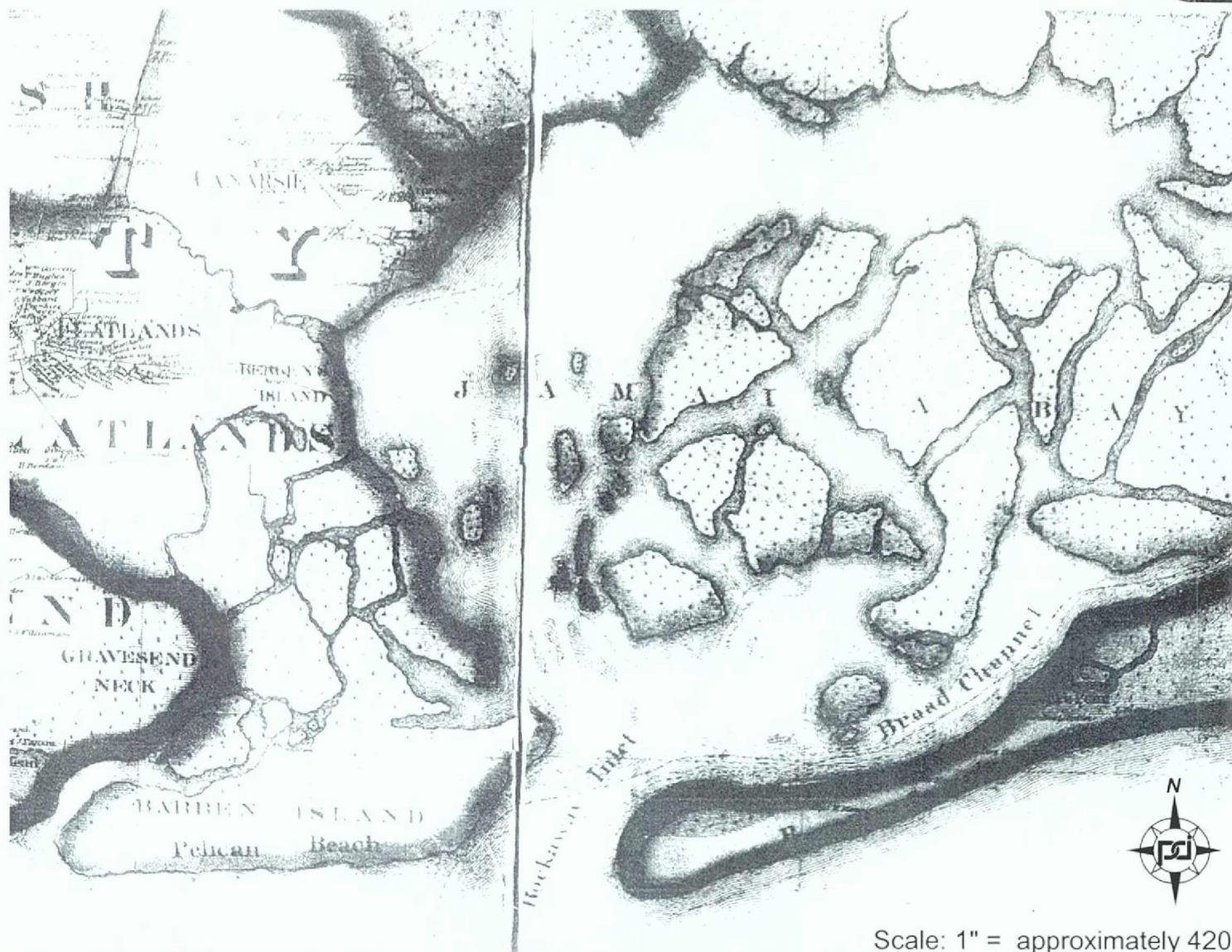


Figure 16. An 1859 map detailing numerous islands in Jamaica Bay. Jamaica Bay Islands, Kings and Queens Counties, New York (Walling 1859).

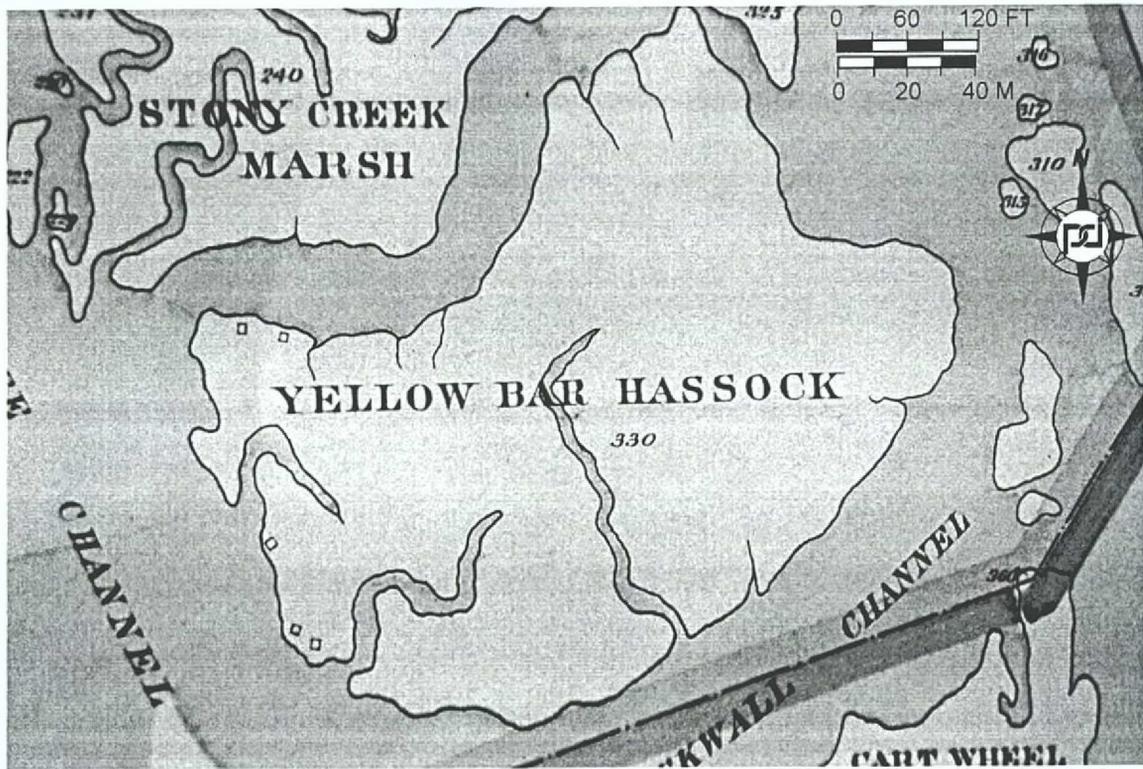


Figure 17. Yellow Bar Hassock. Jamaica Bay Islands, Kings and Queens Counties, New York (Hyde 1899: Vol. 3, Plate 33).

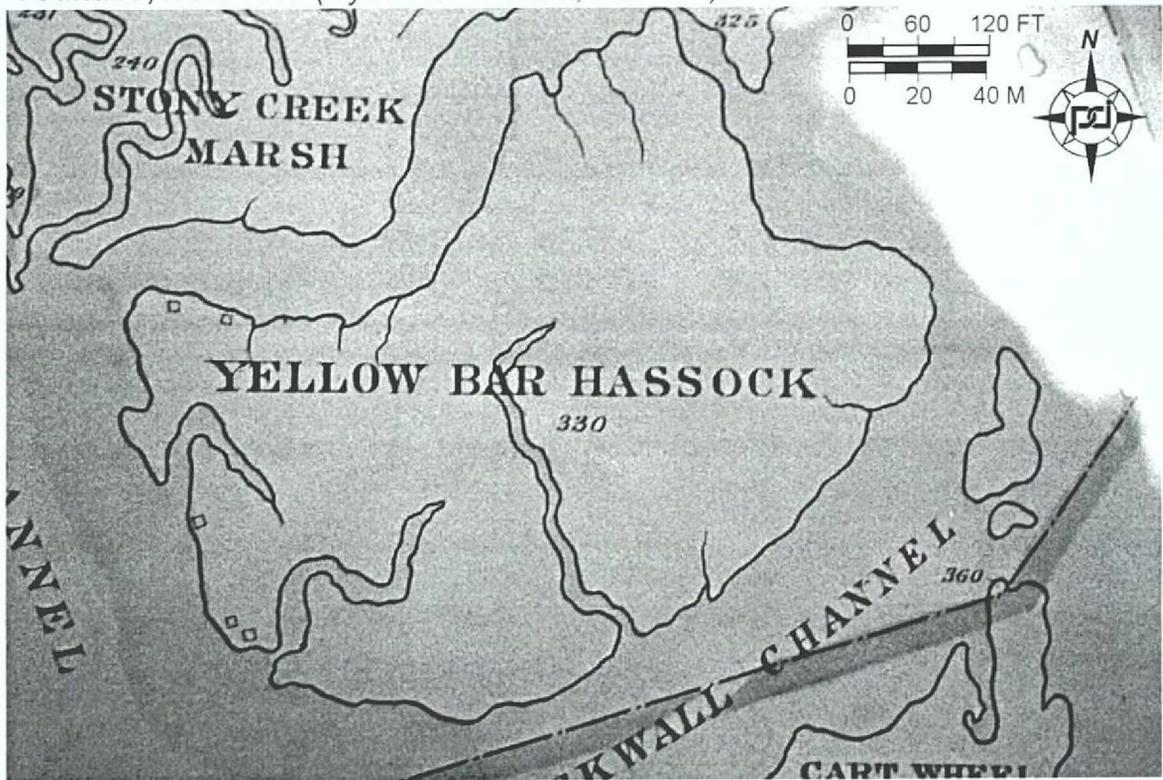


Figure 18. Yellow Bar Hassock. Jamaica Bay Islands, Kings and Queens Counties, New York (Hyde 1909: Vol. 8, Plate 34).

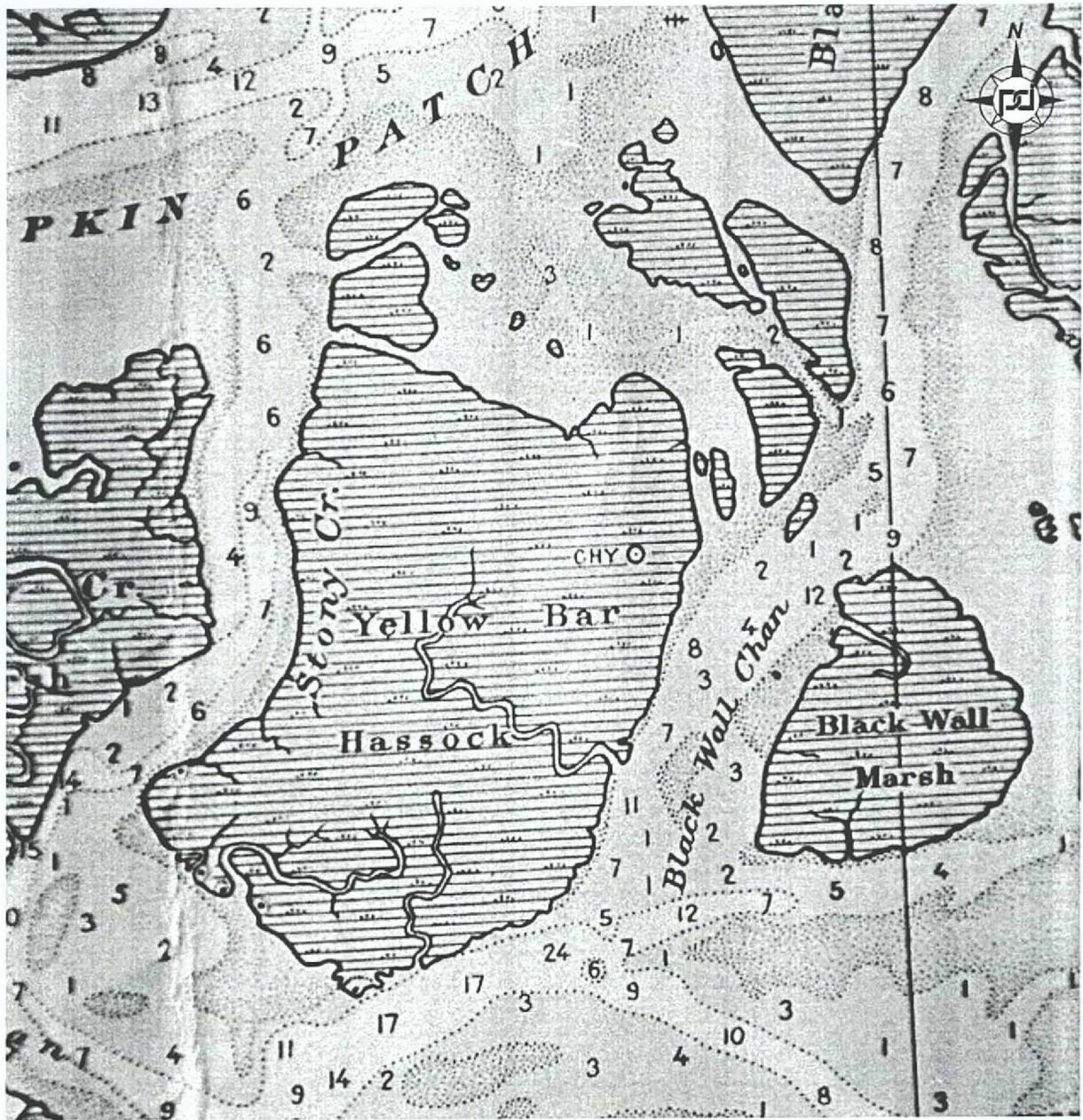


Figure 19. Yellow Bar Hassock. Jamaica Bay Islands, Kings and Queens Counties, New York (USCGS 1926).

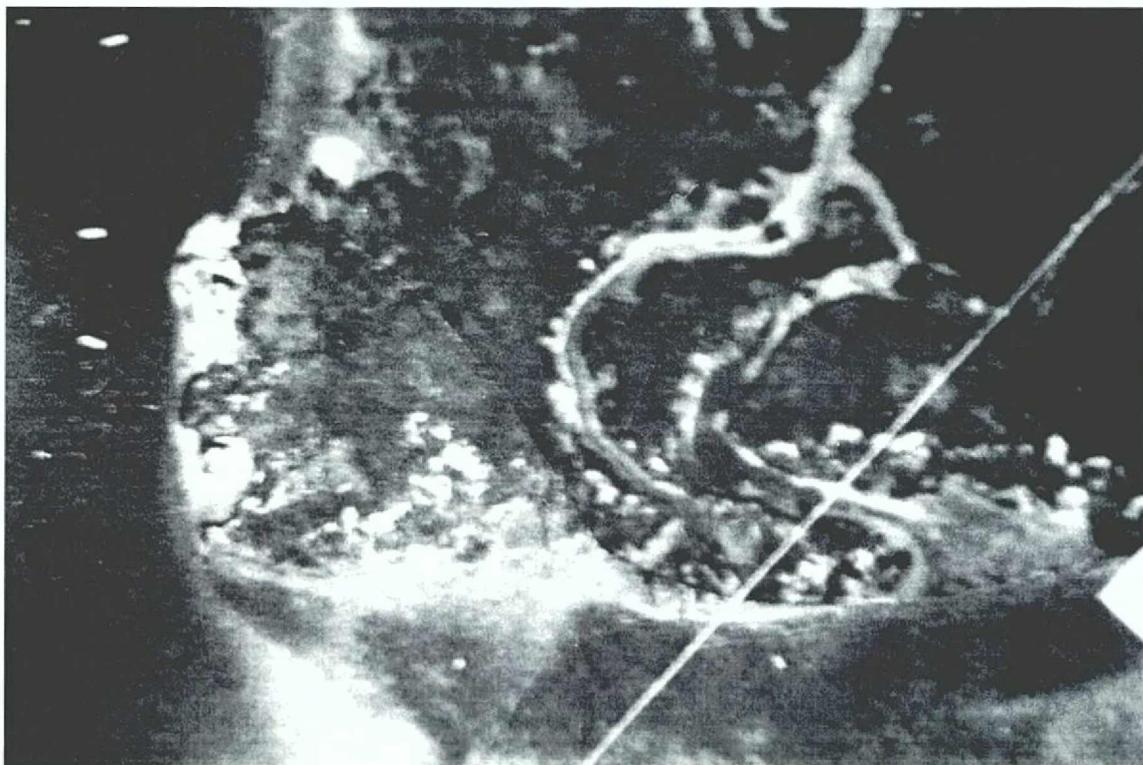


Figure 20. Detail of southwestern portion of Yellow Bar Hassock showing location of structures. Jamaica Bay Islands, Kings and Queens Counties, New York (*Fairchild Aerial Camera Company 1924: Sheet 24c*).



Figure 21. Detail of northeastern portion of Yellow Bar Hassock showing possible structure at location of chimney. Jamaica Bay Islands, Kings and Queens Counties, New York (*Fairchild Aerial Camera Company 1924: Sheet 24c*).

on this part of the island. No other reference to this facility has been identified and its nature remains undetermined. The chimney may have been associated with a facility constructed to burn refuse. Refuse collected by the New York City in the Borough of Brooklyn was delivered to waterfront facilities operated by the Brooklyn Ash Removal Company under contract to the city. "At many of these locations the contractors operated small incinerators" (Department of Street Cleaning 1926). No indication of such a facility located on Yellow Bar Island was found in the annual reports of either the Department of Docks or the Department of Street Cleaning for the mid-1920s (Department of Docks and Ferries 1918-1922, 1924-1927; Department of Street Cleaning 1921, 1924-1926).

A 1933 newspaper article suggested that Yellow Bar Hassock was occupied at that time. Discussing a lone house on Stony Creek Marsh, west of Yellow Bar Hassock, the article noted that the nearest house was "across Stony Creek, on Yellow Bar Hassock" (*New York Times* 1933). Ca. 1939, five structures were detailed in what appears to be the same five locations as structures depicted in 1926, although the chimney was no longer shown (U.S. Coast and Geodetic Survey 1939; Figure 22). The five structures were also rendered on the 1948 and 1969 editions of the marine chart, but are no longer shown in 1986 (Figure 23). Examination of recent aerial photographs suggests that the chimney may have been located on a small area of upland in the surrounding marshes.

Erosion of the shorelines of the marshy islands in the bay has been noted. To determine whether any of the structures shown on the 1926 map would have been within the boundaries of the present Yellow Bar Island shoreline, the 1926 marine chart have been overlain on the 1986 chart (Figure 24). It appears that the site of one of the five structures shown on the southern portion of the island in 1926 (the one located in the center of the island's southwestern shoreline, east of the creek shown on the 1986 map) would be inland of the 1986 shoreline boundaries. The site of the westernmost structure also would be along the present shoreline. The other three early twentieth-century structure sites would be somewhat bayward of the 1986 shoreline.

Elder's Point Island. Examination of numerous late nineteenth-century and twentieth-century maps, including those that depict structures on Yellow Bar Island, reveals that no structures were ever built on Elders Point Island (Figures 25 through 27).

3.5 FLOYD BENNETT FIELD

Barren Island. Barren Island was originally known by the Dutch name of "t Beeren Eylant," which translates into English as Bears Island. The name Barren Island is a corruption of the original Dutch name. It was also referenced as "Bearn Island" in seventeenth-century documents (Van Wyck 1924:13).

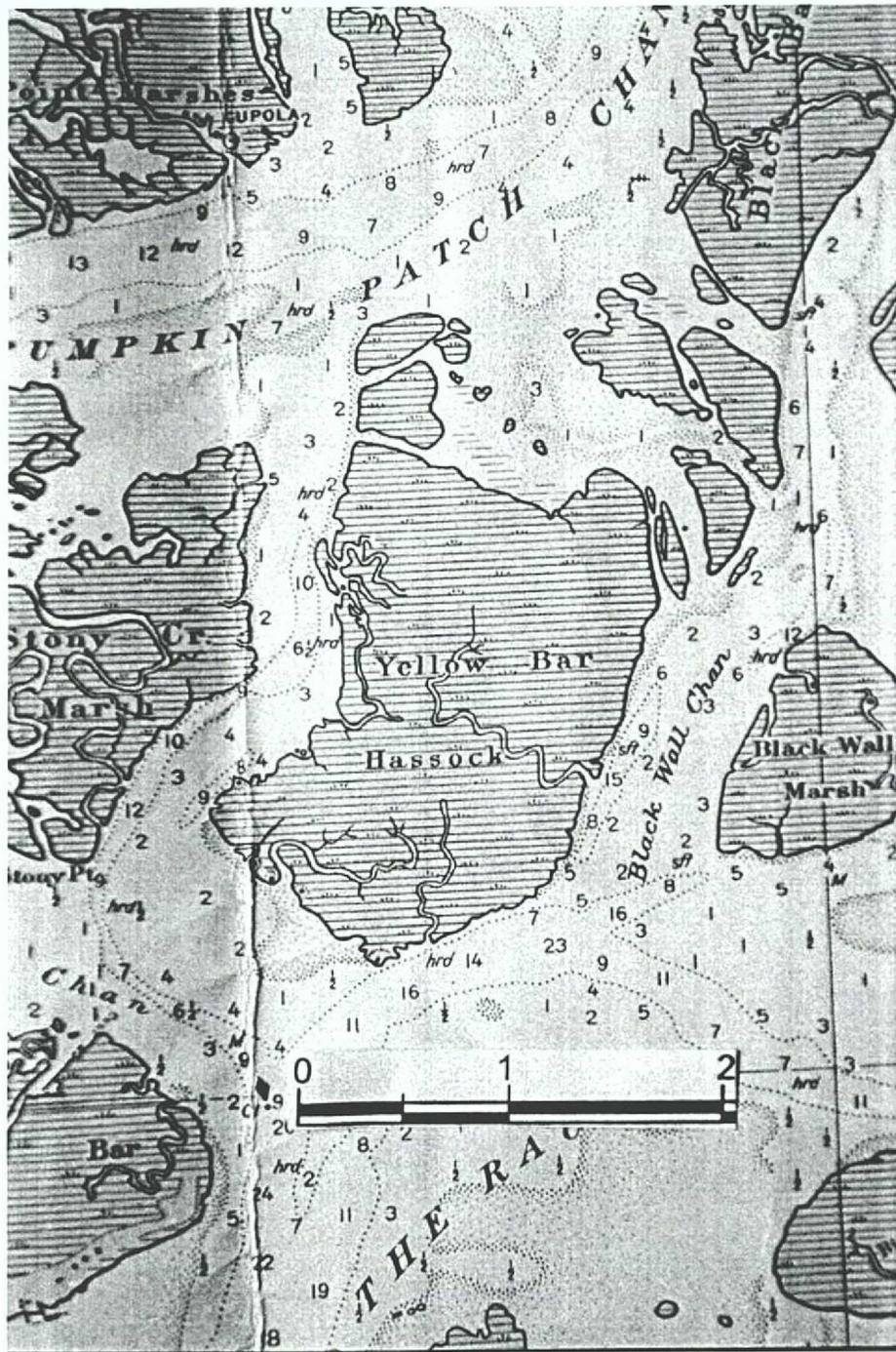
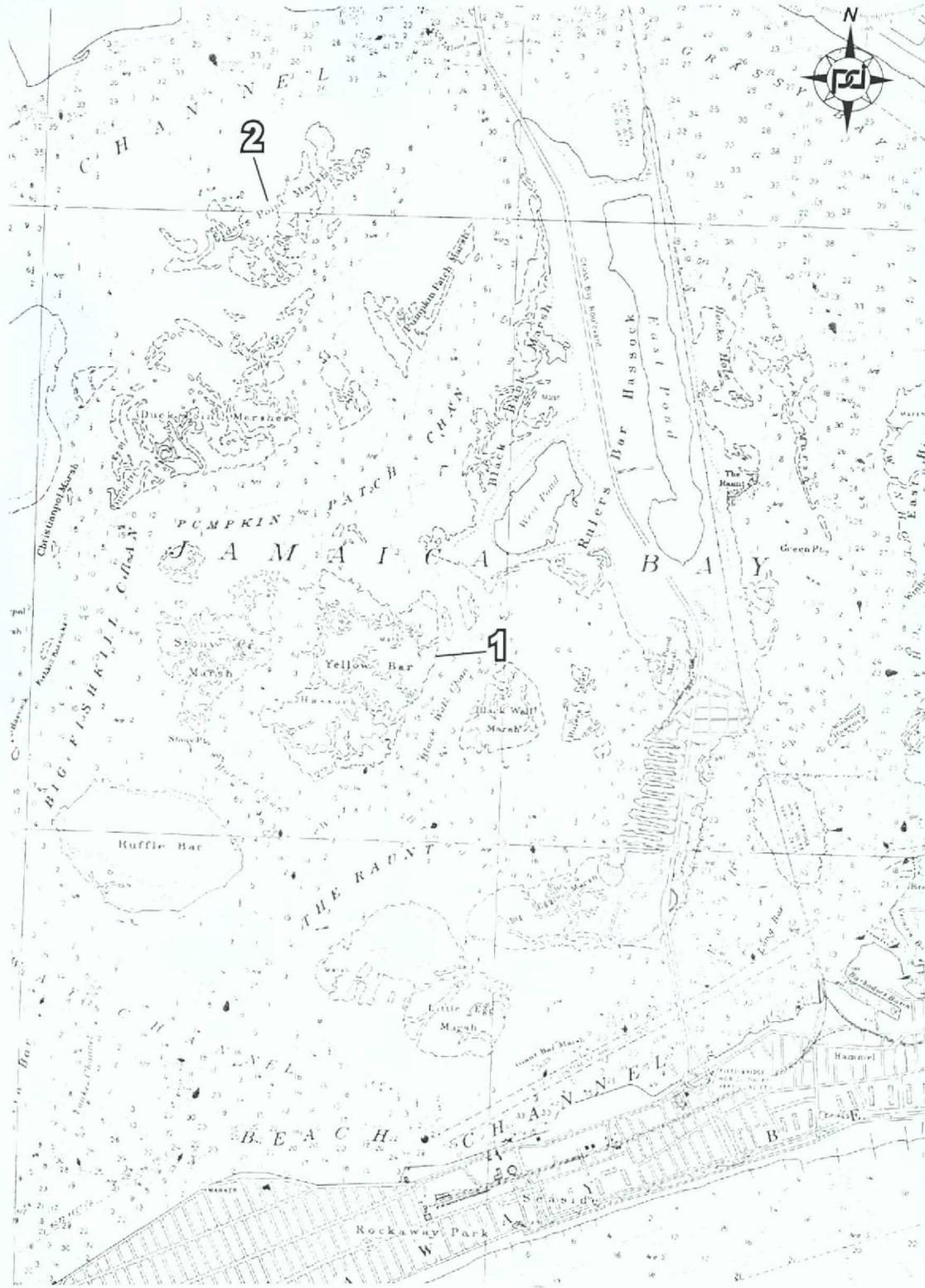
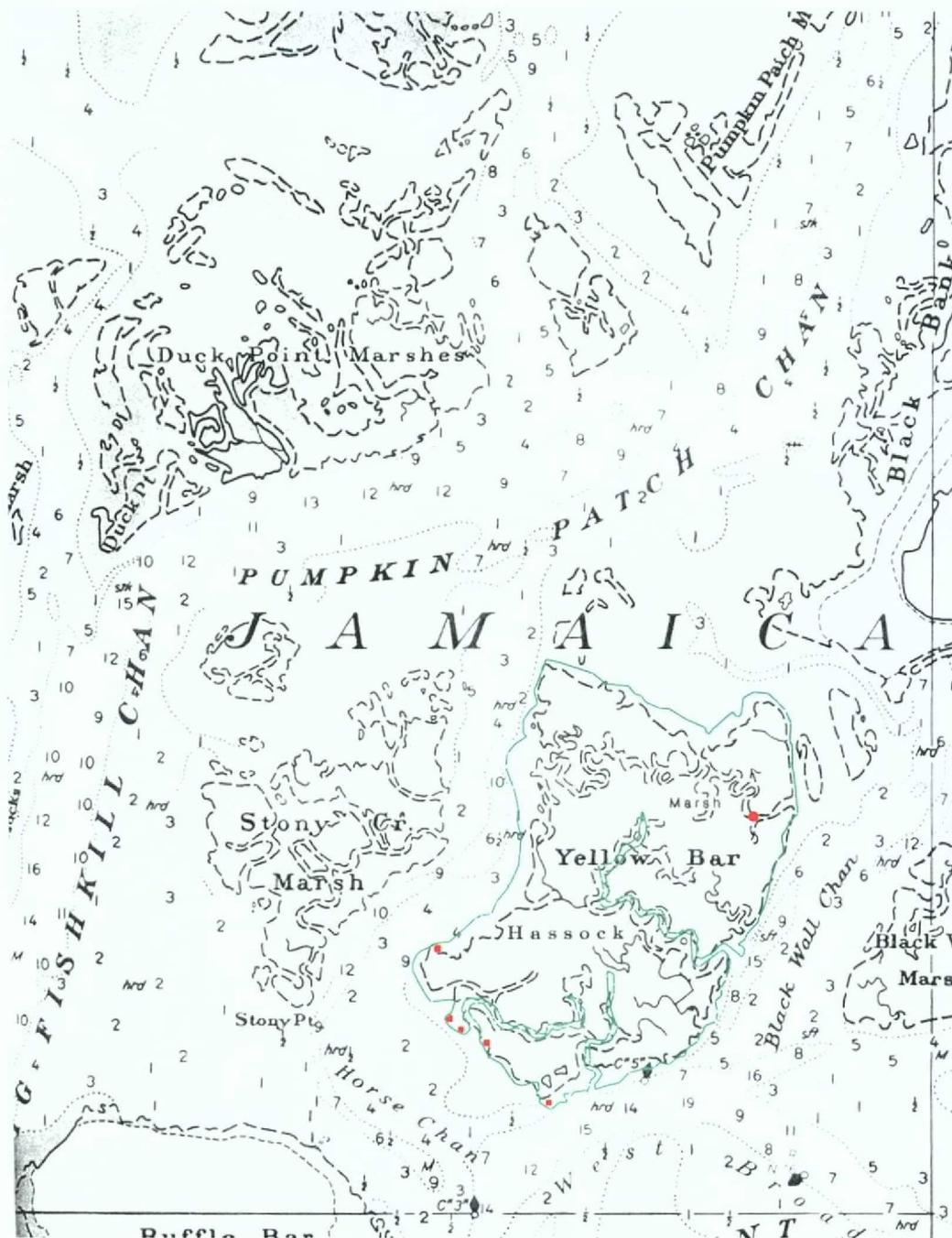


Figure 22. Yellow Bar Hassock. Jamaica Bay Islands, Kings and Queens Counties, New York (USCGS 1939).



RESTORATION SITES: 1 YELLOW BAR HASSOCK / 2 ELDERS POINT ISLAND SCALE 1" = 1666'

Figure 23. Yellow Bar and Elders Point Islands. Jamaica Bay Islands, Kings and Queens Counties, New York (NOAA Marine Chart 1986).



KEY

- = 1926 Shoreline
- = 1926 Structures
- = Chimney



Figure 24. Yellow Bar Island; approximate location of 1926 shoreline and structures superimposed in modern map. Jamaica Bay Islands, Kings and Queens Counties, New York (Base Map: NOAA 1986).

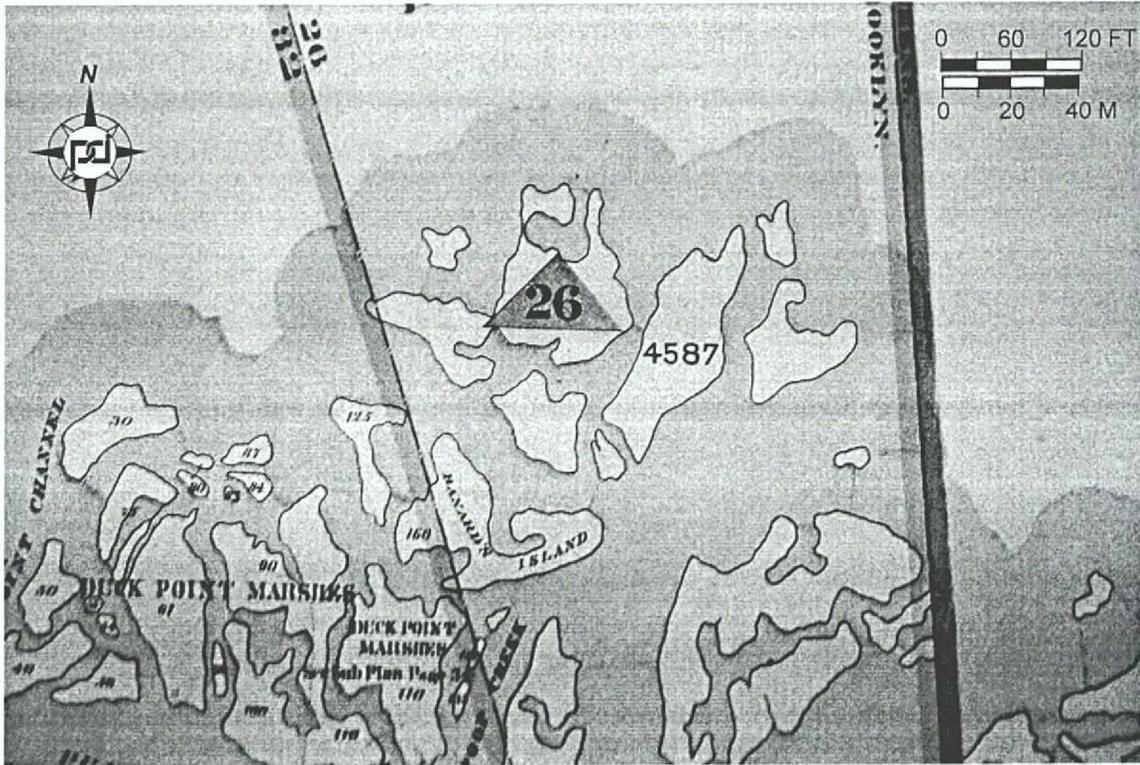


Figure 25. Elgers Point Island at center (see 26 in triangle). Jamaica Bay Islands, Kings and Queens Counties, New York (Hyde 1899: Vol. 3, Plate 33).

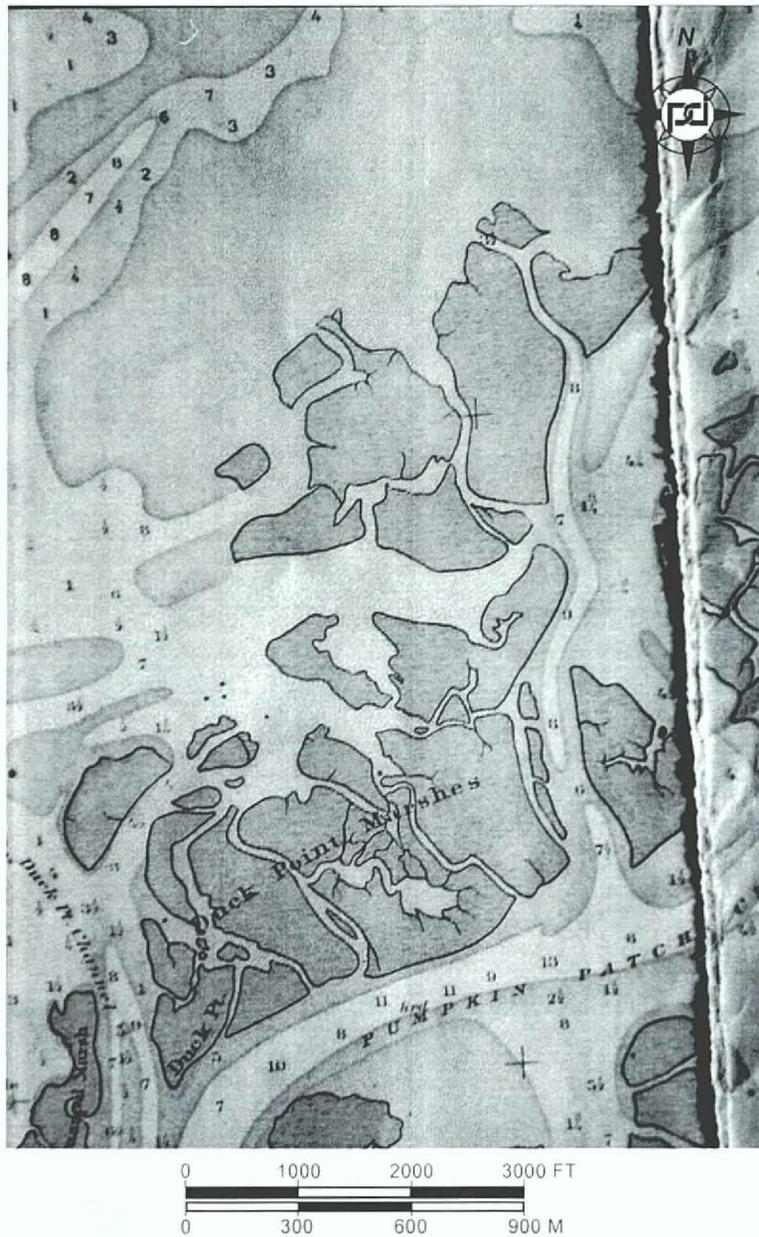


Figure 26. Elders Point Island north of Duck Point Marshes. Jamaica Bay Islands, Kings and Queens Counties, New York (USCGS 1926).

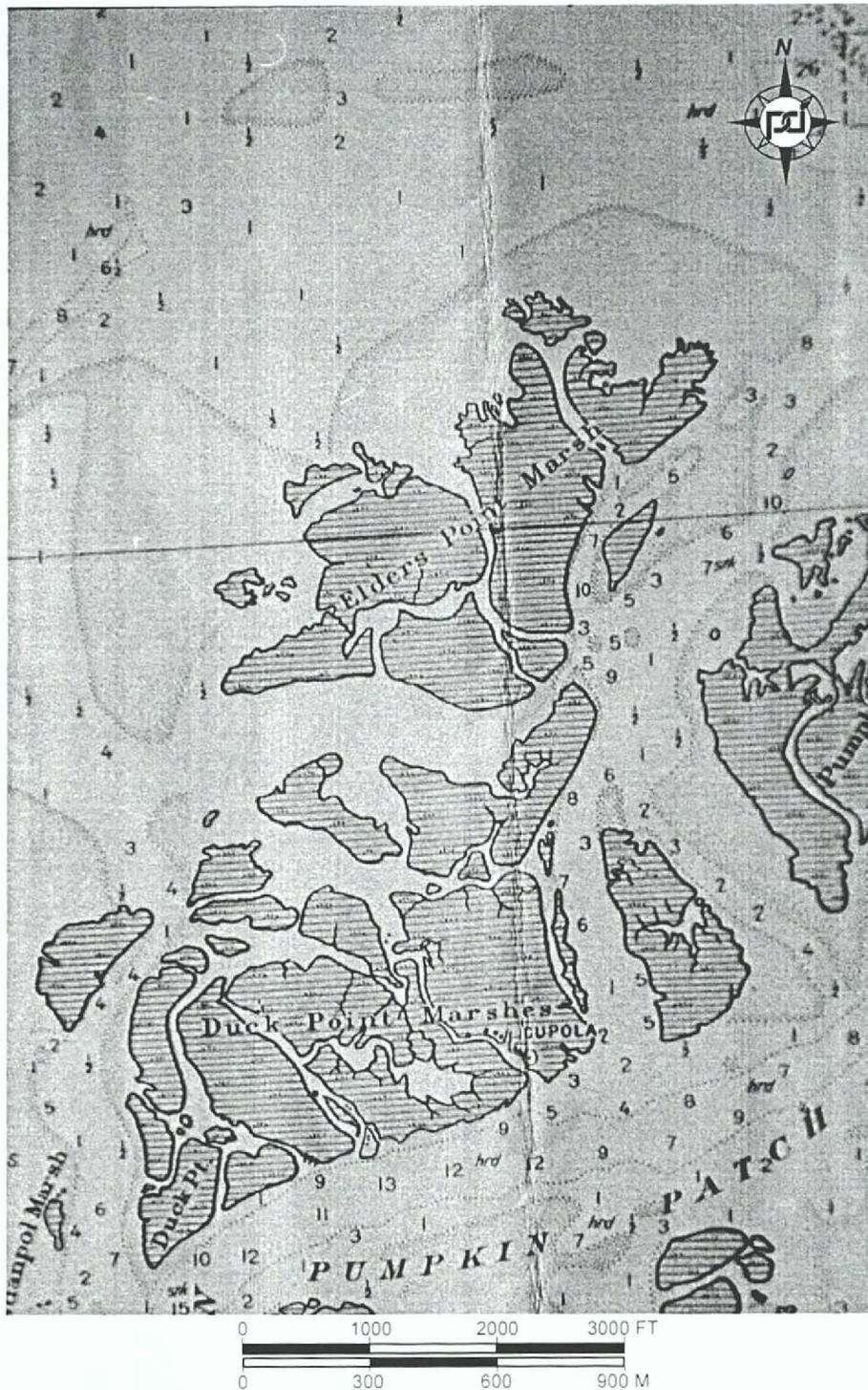


Figure 27. Elders Point Island. Jamaica Bay Islands, Kings and Queens Counties, New York (USCGS 1939).

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).

Maps dating to the latter portion of the eighteenth century through the mid-nineteenth century show Barren Island with a different configuration than that shown on late nineteenth-century and early twentieth-century maps. The 1781 Taylor and Skinner map (see Figure 13) shows the island as a long, thin body of land oriented northeast/southwest. Other Revolutionary War era maps (see Figures 10, 11, 12, 14) as well as maps dating to the 1840s (U.S. Coast Survey 1845) show Plumb Island and Barren Island attached, rather than separated by Gerritsen (Dead Horse) Inlet as at present. By 1873 Gerritsen (Dead Horse) Inlet had formed, separating the two islands (Figure 28).

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].

In 1899 the present Dead Horse Bay was labeled Dooley's Cove, apparently after the former pub keeper (Hyde 1899). In 1830 a fugitive pirate named Gibbs reputedly stayed at the public house and buried "a large number of Mexican Dollars" in the sand" (Dubois 1884:78). The 1852 Dripps map (Figure 29) showed this "hotel" on the extreme eastern end of the island. It appears that this structure was located on the same portion of the island as the later nineteenth century-early twentieth century community noted below (Figure 30).

The first of the factories to be 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 that would subsequently be established on the island, dead animals from New York and Brooklyn were processed into fertilizer and other products. The Swift factory was apparently destroyed by a windstorm and a new one built 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 a complex of five buildings by 1884 and 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.... [It is described as]...an immense building, 360 x 224 feet with yards and dock... [and] ...a 160 horse power engine and 80 men (sometimes more)



Figure 28. Detail of map showing Gerritsen or Dead Horse Inlet separating Barren and Plumb Islands, 1873. Jamaica Bay, Kings and Queens Counties, New York (Beers 1873).

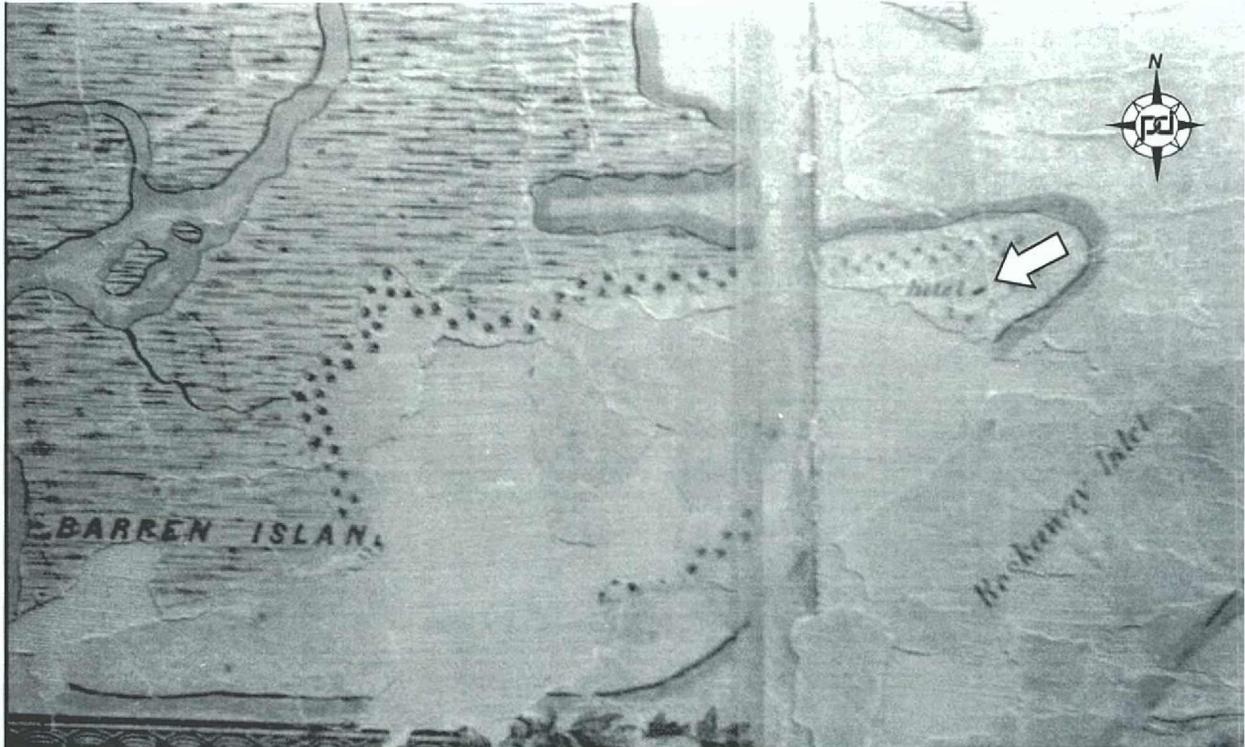


Figure 29. Barren Island showing "Hotel." Kings and Queens Counties, New York (Dripps 1852).

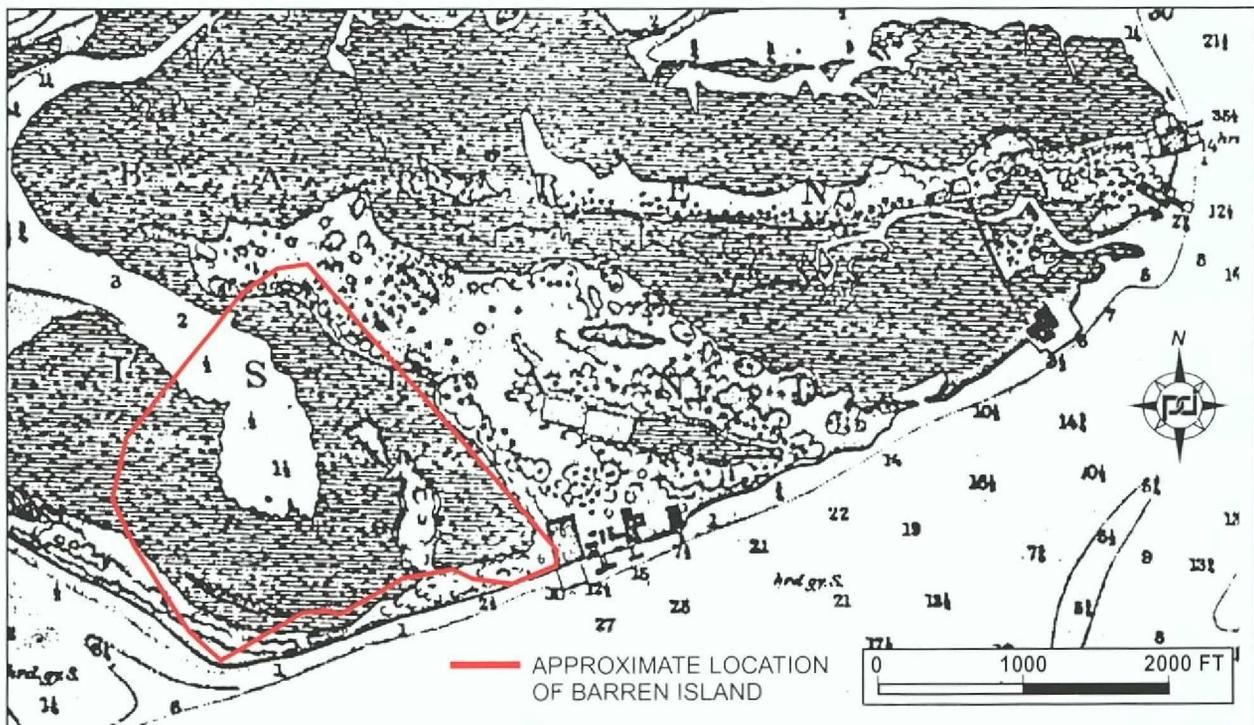


Figure 30. Detail of coastal chart showing structures and facilities at the southern shoreline of Barren Island, 1878. Jamaica Bay Islands. Kings and Queens Counties, New York (U.S. Coast Survey 1878).

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 Barren Island fertilizer factories had been joined by five fish-oil factories. The first was constructed on the island's north side by Smith & Co. ca. 1860. Another such factory was built on the east side of the island by Valantine Coon and subsequently operated by C. De Homage, M.D., who built a new building in the vicinity of the original structures. 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-ft-x-70-ft 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 island's west end (Dubois 1884:78).

Brockett (1884:756-757) gave 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, as opposed to the earlier date given by Dubois. Census records examined by Black (1981:31) revealed that in 1890 dormitory facilities or boarding houses were located on Barren Island occupied by the workers in the various factories.

By the late nineteenth century, the menhaden processed by the fish oil factories had become scarce, and these factories were succeeded by a plant that 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 people had developed on the island by this time, most of these people worked in the island's factories (Anonymous 1904).

The garbage disposal plant was operated by the New York Sanitary Utilization Company. The buildings were located on the southeastern corner of the island. In 1907, a building then under construction and a pier, at which the garbage scows were tied up, were washed away by the Rockaway Inlet tidal currents (Anonymous 1907). Black (1981) compiled a list of companies known to have operated on Barren Island (Table 1).

The odors emanating from the Barren Island factories were so powerful that the aroma reached the Rockaways. In the latter years of the nineteenth century and during the early twentieth century, residents of the various communities that bordered Jamaica Bay formed an "Anti-Barren Island League," and after numerous efforts the plants were eventually shuttered (*Brooklyn Eagle* 1899; Young 1956).

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 the plant in 1935. All of the abandoned factory buildings on the island were dismantled shortly thereafter (Black 1981:36).

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

Company	Activity	Dates	Location	Comments
Cornell East	Fertilizer	1859	unknown	Destroyed by fire; moved to Flatbush
West Factory	Fertilizer	1859-1860	unknown	Owner may have been William Reynolds
Smith & Company	Menhaden	1868-1871	unknown	
Steinfeld & Company	unknown	1869-1873	unknown	
Simpson	unknown	1869	unknown	
Goodkind Brothers	Menhaden	1872-1877	unknown	
Swift & White	Fertilizer	1870-1881	unknown	Closed 1873-4; taken over by P. White
Hawkins Brothers	Menhaden	1872-1888	Lot #4, West. Div.	
Jones & Company	Menhaden	1872-1881	unknown	
Valentine Koon	Menhaden	1872-1874	unknown	
Barren Island Manufacturing	Fertilizer	1875-1888	Lot #4, West. Div.	Taken over by White and then by Barren Island Oil & Bone
Thomas A. Shae	Fertilizer	1875-1881	unknown	
E. F. Coe	Fertilizer	1878-1895	Lot #5, West Div.	
Barren Island Bone	Fertilizer	1884-1893	Lot #4, West. Div.	
P. White & Sons	Fertilizer	1884-	South Shore	
Robinson	unknown	1886-1887	unknown	
Barren Island Fertilizer & Oil	unknown	1890-1895	Lot #4, West. Div.	
Andrew Wessel	unknown	1895	Lot #1, East. Div.	
Read & Company	unknown	1879-1883	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	1905-1919	East Shore	
Products Manufacturing	Disposal	-1934	unknown	
Vaniderstine & Sons	Hides	1910	South Shore	
Cove Chemical	unknown	1911	South Shore	

Until the opening of the railroad trestle across Jamaica Bay in 1880, much of the travel to the Rockaways was conducted by ferries that ran from various points on the north shore of the bay. Ferry service continued through the 1930s, ending after the opening of Cross Bay Boulevard and the Marine Parkway Bridge. Black (1981:70) compiled a list of these ferry operations (Table 2), five of which were recorded as having made stops at Barren Island, the earliest beginning operation in 1905.

In the late 1920s an airport, which eventually became Floyd Bennett Field, was established on Barren Island (Wurm 1985:60). At that time the airfield occupied only a portion of the present Floyd Bennett Field tract. 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 Marine Parkway Bridge linking the Flatbush Avenue extension with the Rockaways was constructed in 1936-1937 (WPA 1939: 505). It was determined to be eligible for listing on the National Register of Historic Places in 1997 due to its architectural and engineering merits (SRI International 1998).

Table 2. Ferry Service, Jamaica Bay
(from 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, Rockaway Point	Barren Island	1905-1930s
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

Most members 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 members of the Barren Island community were evicted from the island in 1942 (*New York Times* 1942).

Although fertilizer factories were reputedly established on Barren Island as early as the 1840s (e.g., Dubois 1884), the first map to depict these facilities was an 1878 U.S. Coast Survey chart (see Figure 30). This map shows the fertilizer factories along the southern and southeastern shorelines of the island. Comparison of this map with later maps reveals that the portion of the island where the easternmost facility was

located was subsequently removed by erosion. The 1909 Jamaica Bay Improvement Commission map (Figure 31) as well as the 1911 and 1926 U.S. Coast and Geodetic Survey charts (Figures 32 and 33) detailed further development of the factories along the island's south shore. The garbage processing facility was shown on these maps on the eastern end of the island (Figure 34). These maps also illustrated the associated residential community, which was located along the strip of upland extending westward from the garbage processing facilities. The Barren Island community was shown in greater detail on the 1930 Sanborn map (Figure 35). This community included some substantial structures, including a public school and a church, as shown in various early twentieth-century photographs (see e.g. Figure 36)

Landfilling associated with the subsequent development of Floyd Bennett Field has substantially modified the area. Flatbush Avenue was extended across Flatlands Bay to Barren Island by 1923 (Black 1981:79; U.S. Coast and Geodetic Survey 1926; see Figure 33). Figure 37 shows the location of the proposed Floyd Bennett Field staging areas on the 1926 map. As can be seen the processing plants, as well as the Barren Island community, are located south and southeast of the proposed Doppler Radar staging area. No structures were located in the vicinity of the Northeast Runway staging area, most of which was open water in 1926.

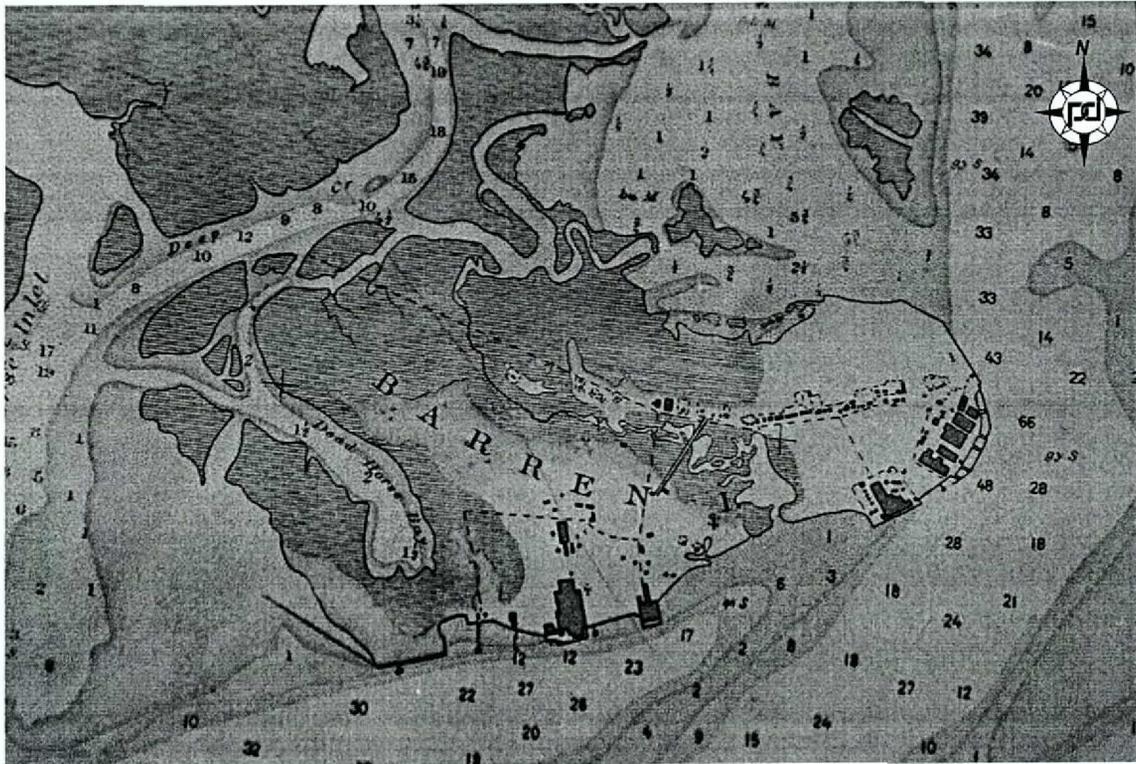
Shoreline Features. A large pier was shown on both the 1926 and 1939 U.S. Coast and Geodetic Survey (USCGS) maps (Figures 33 and 38), as well as the 1930 Sanborn map (see Figure 35), extending eastward from the shoreline adjacent to the proposed staging area (see also Figure 37). The pier was also shown on the 1924 aerial photograph (Figures 39a and b). This structure was most likely the "concrete pier" constructed in 1921 by the New York City Department of Docks on the eastern side of Barren Island "to enable the Street Cleaning Department to dispose of waste material suitable for fill purposes and in order to reclaim this vast stretch of waste salt marsh" (Department of Docks and Ferries 1921:7). The pier was labeled "DOCK" on the 1930 Sanborn map (see Figure 35). The large pier continues to be shown on 1948 and 1965 marine charts. What appear to be remains of the pier are indicated on the 1986 chart (Figure 40) and are visible in a recent aerial photograph (Figure 41). Linck (1981) includes a sketch map labeling this feature as an "old city dock."

During the reconnaissance for this project, pilings were noted on the beach and extending into the bay at the location of the pier as shown on the early twentieth-century maps (Figures 42 and 43). The pilings are approximately aligned with the roadway that extends across the Doppler Radar Area approximately 400 feet south of its northern boundary (see Figure 5). The pilings at the western end of the feature are wooden but are concrete at the eastern end (Figure 44), which is wider than the western end. Three rows of wooden pilings and a metal outfall pipe at the northwestern end of the feature (see Figures 43 and 44) are most likely later additions.

As shown in the 1924 aerial photograph (see Figure 39b) the wider eastern end of the pier appears brighter, which may indicate that this end may have had concrete



Figure 31. Factory / Industrial development on Barren Island. Jamaica Bay Islands, Kings and Queens Counties, New York (Jamaica Bay Improvement Commission 1909).



Scale 1/20 000

Figure 32. Development on Barren Island, Jamaica Bay Islands, Kings and Queens Counties, New York (USCGS 1911).

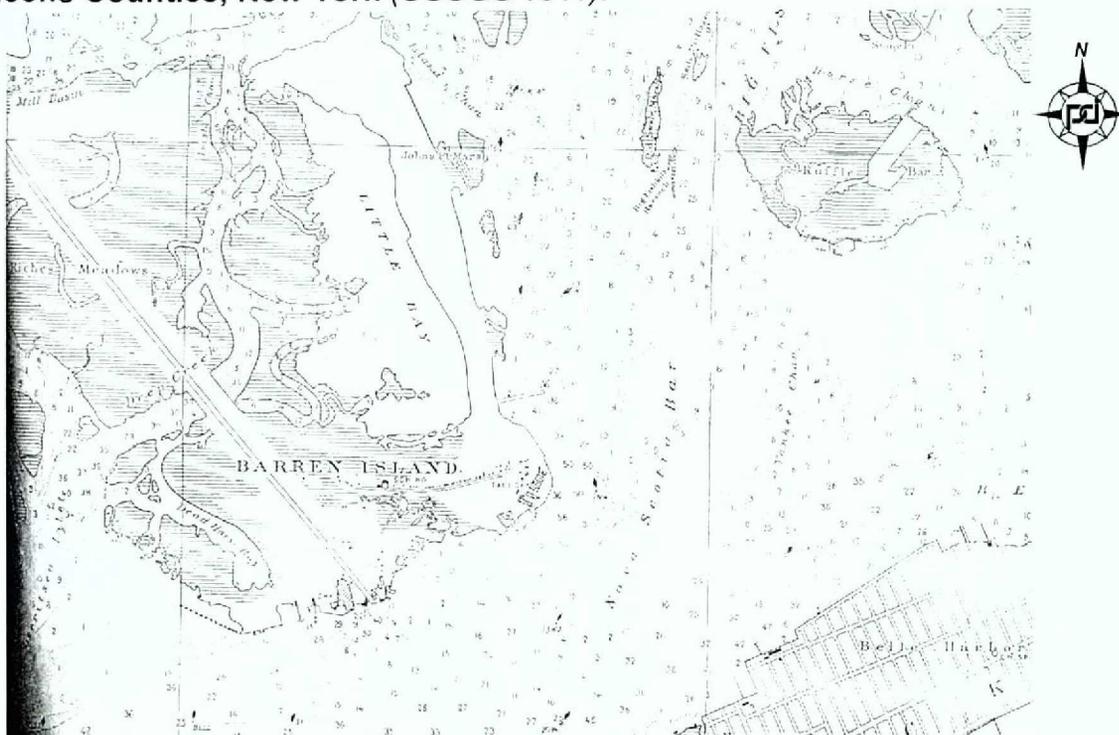


Figure 33. Location of structures on Barren Island, Jamaica Bay Islands, Kings and Queens Counties, New York (USCGS 1926).

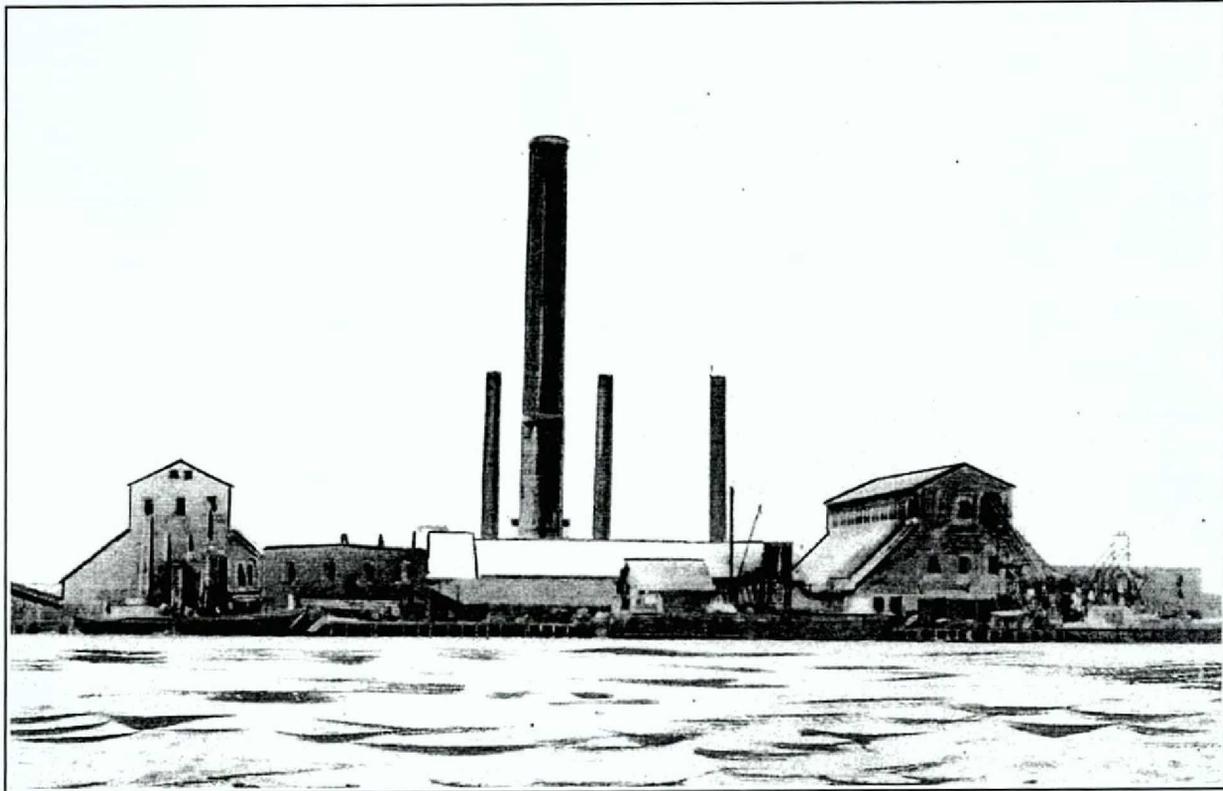


Figure 34. Garbage processing plant on Barren Island in 1911. Jamaica Bay Islands, Kings and Queens Counties, New York (*Brooklyn Public Library 1911*).

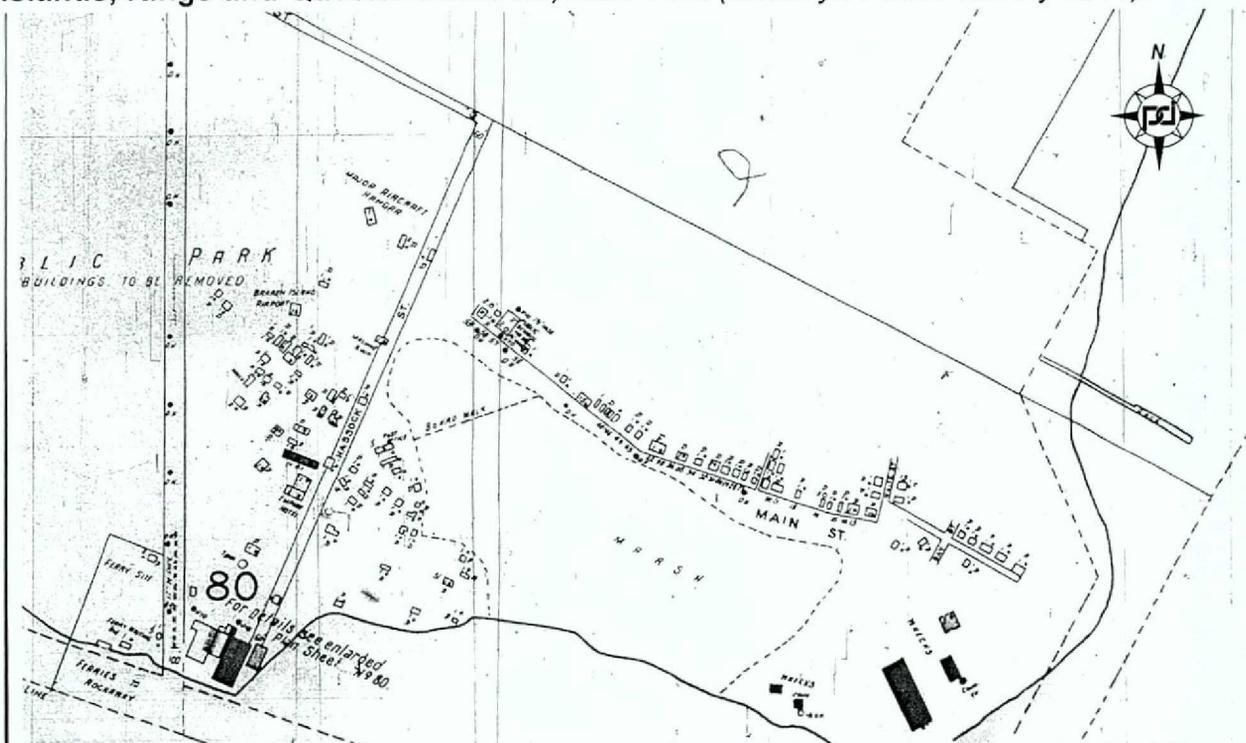


Figure 35. Residential Community on Barren Island. Jamaica Bay Islands, Kings and Queens Counties, New York (*Sanborn Map Co. 1930*).

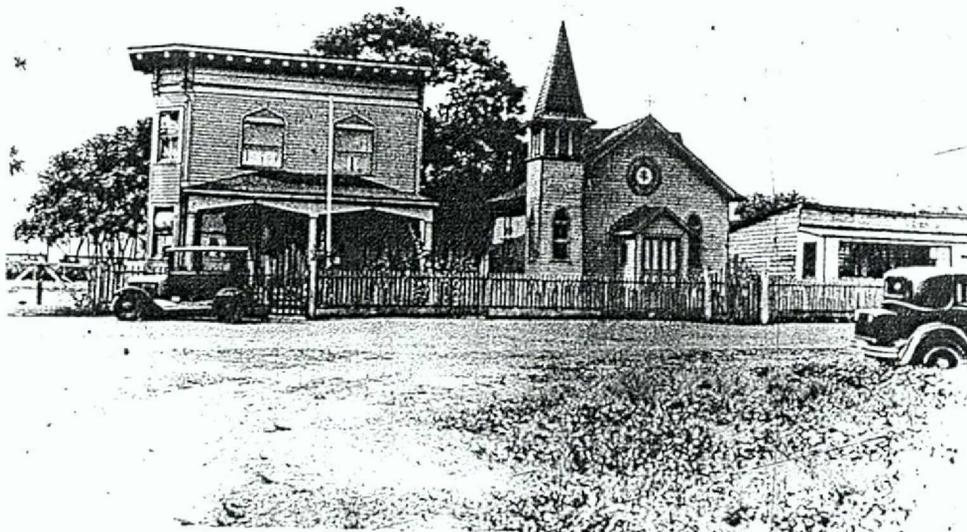


Figure 36. Photographs showing a Roman Catholic Church and other buildings at Barren Island, east of Flatbush Avenue (P.D. Sperr - Collection of the New York Public Library 1931).

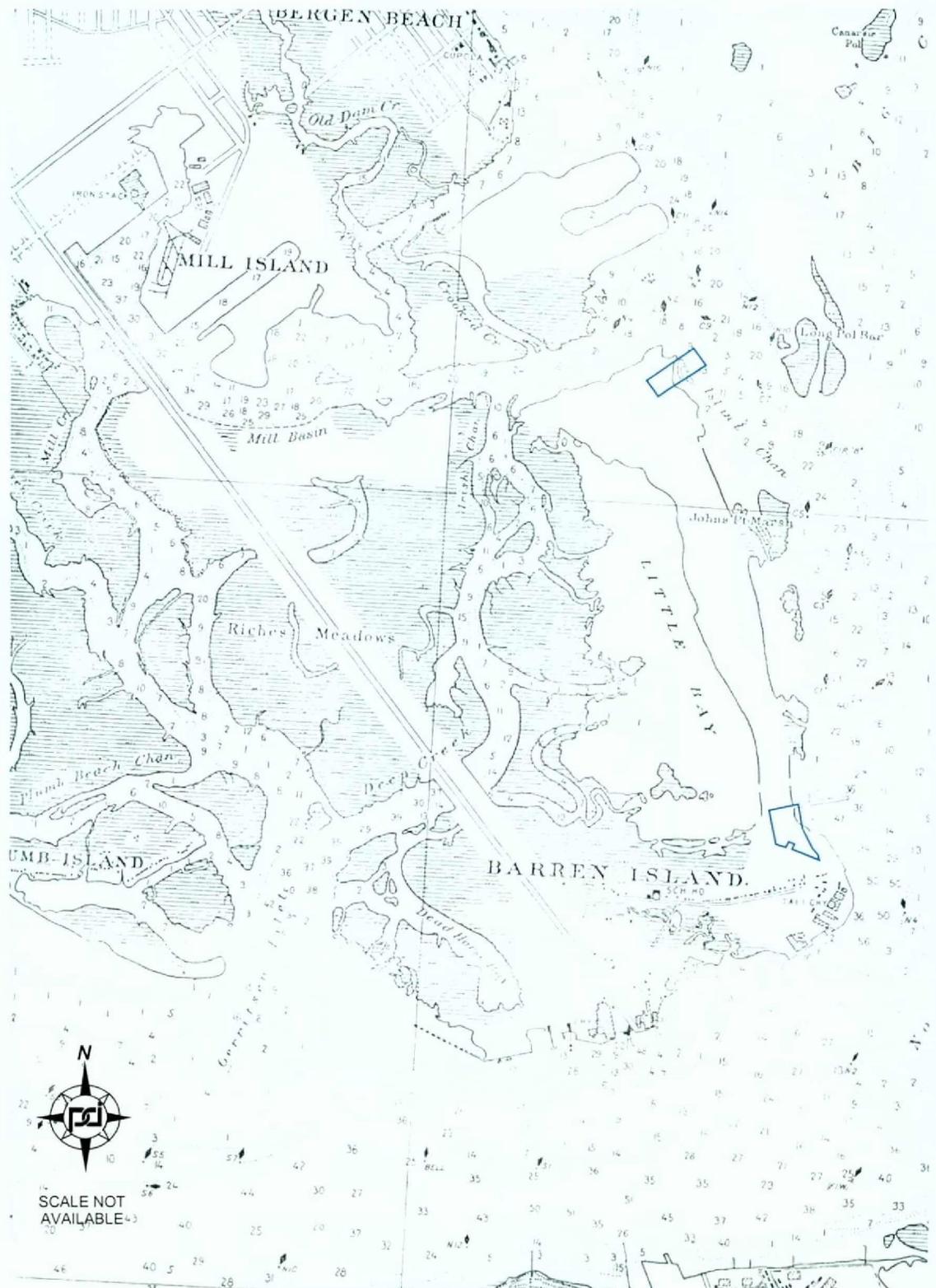


Figure 37. Proposed Floyd Bennett Field staging areas shown in blue on 1926 map of Barren Islands, Jamaica Bay Islands, Kings and Queens counties, New York. (USCGS 1926)

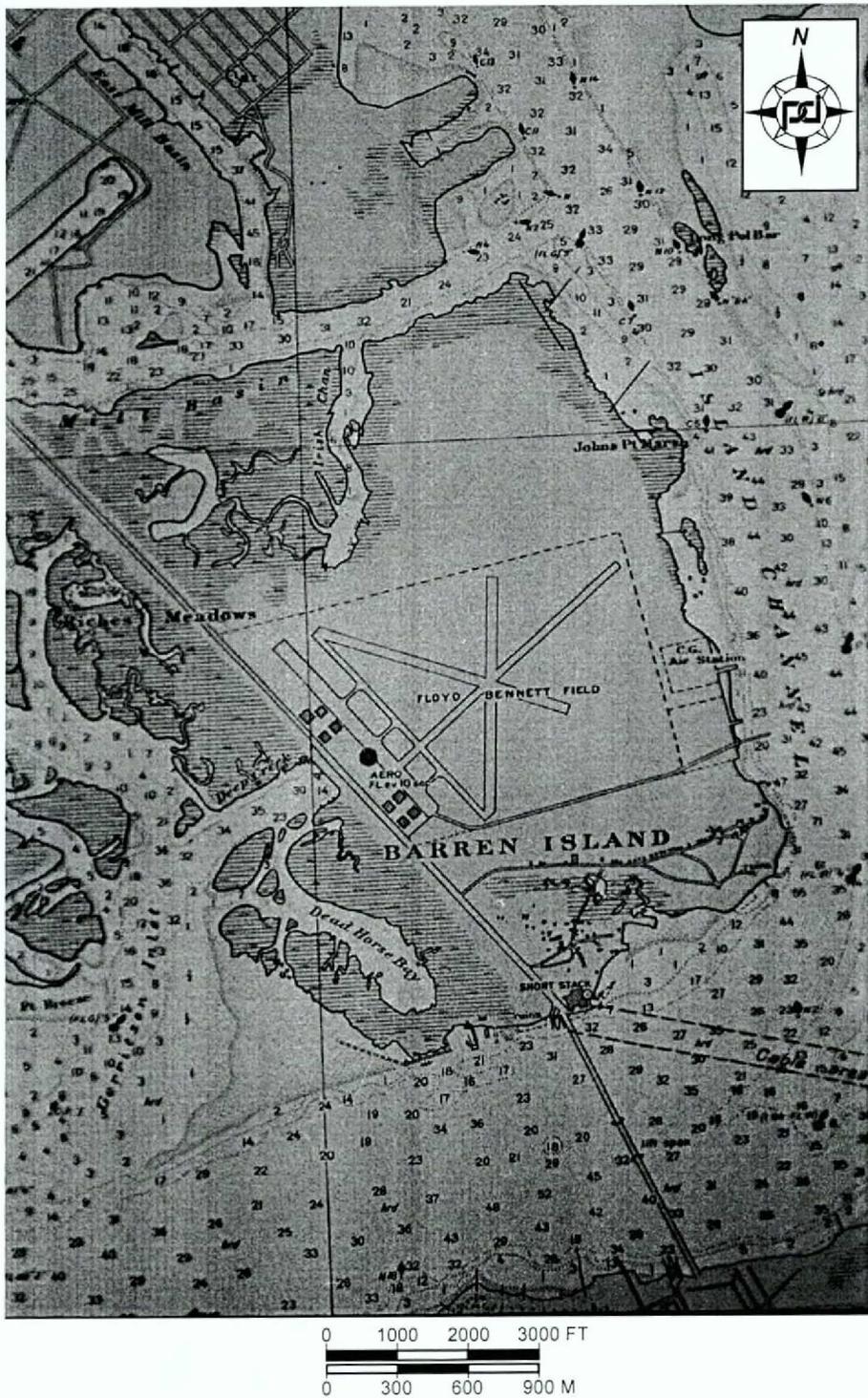


Figure 38. Barren Island/Floyd Bennett Field. Note long jetty south of CG Air Station at center right. Jamaica Bay Islands, Kings and Queens Counties, New York (USCGS 1939).



Figure 39a. Southeastern portion of Barren Island including proposed Dopple Radar Staging Area. Jamaica Bay Islands, Kings and Queens Counties, New York (Fairchild Aerial Camera Company 1924: Sheet 29B).



Figure 39b. Detail of aerial photograph (above) showing pier and jetty. Jamaica Bay Islands, Kings and Queens counties, New York (Fairchild Aerial Camera Company 1924: Sheet 29B).

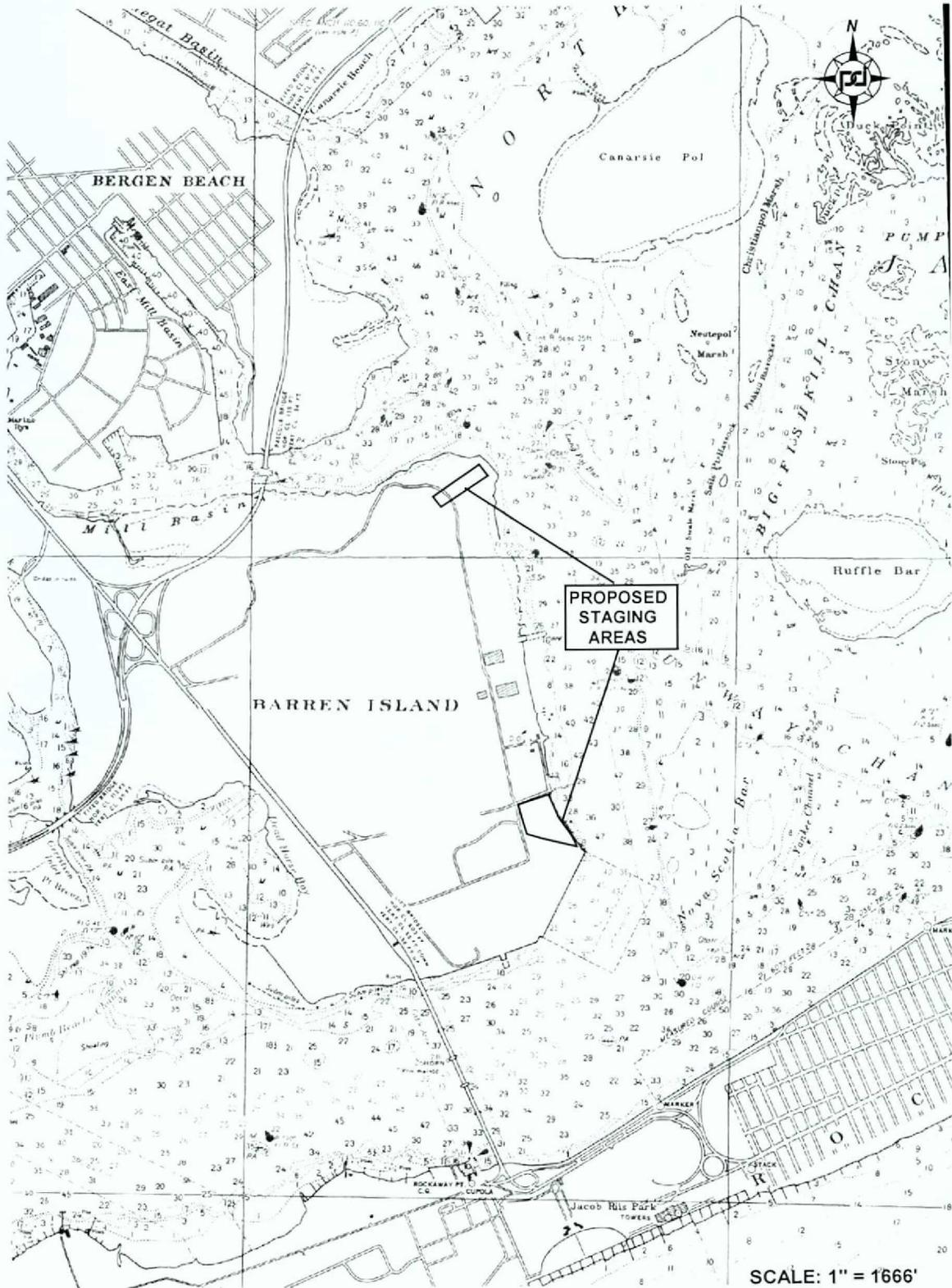


Figure 40. Proposed staging area shown on 1986 map of Barren Island (Floyd Bennett Field). Jamaica Bay Islands, Kings and Queens Counties, New York (NOAA 1986).



Figure 41. Aerial photograph showing offshore features bordering Doppler Radar Area. Features from north to south are Milner Feature JB-50 (former seaplane ramp), pier and jetty. Jamaica Bay Islands, Kings and Queens Counties, New York (*New York City Department of Environmental Protection 2002*).



Figure 42. Floyd Bennett Field offshore features: Pier at center of photograph, jetty in background, and portion of Milner Feature JB-50 in foreground, facing southwest. Jamaica Bay Islands, Kings and Queens Counties, New York (*Pickman 2004*).

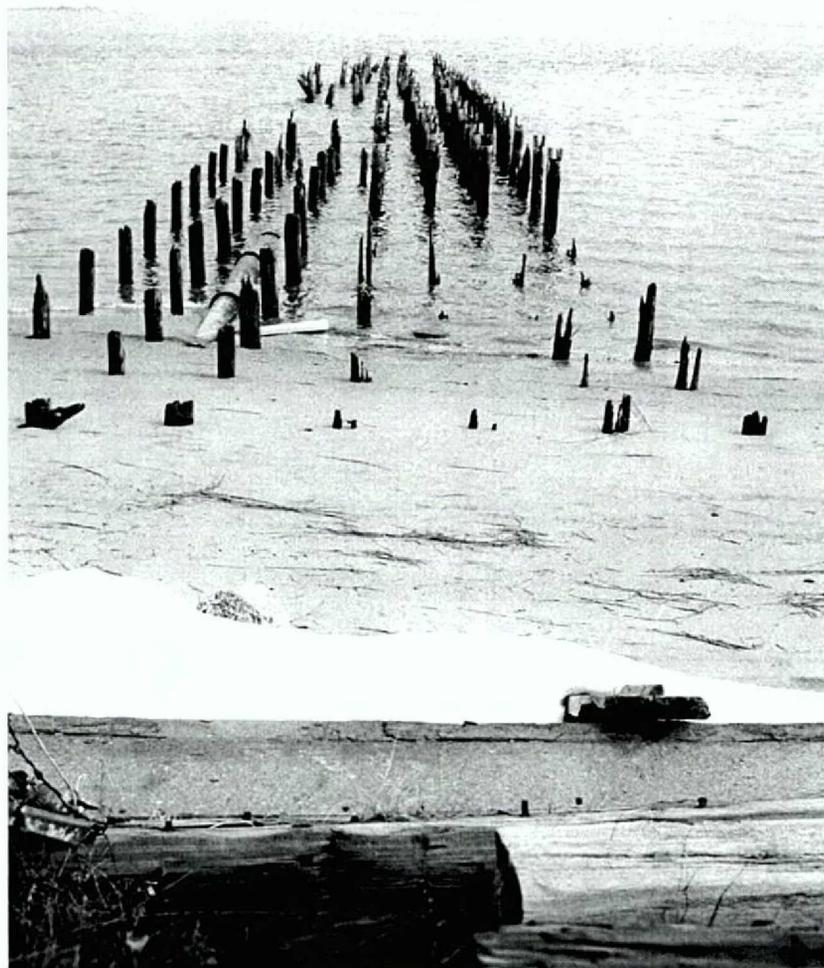


Figure 43. Remains of pier--Doppler Radar Staging Area, facing east. Jamaica Bay Islands, Kings and Queens Counties, New York (Pickman 2004).

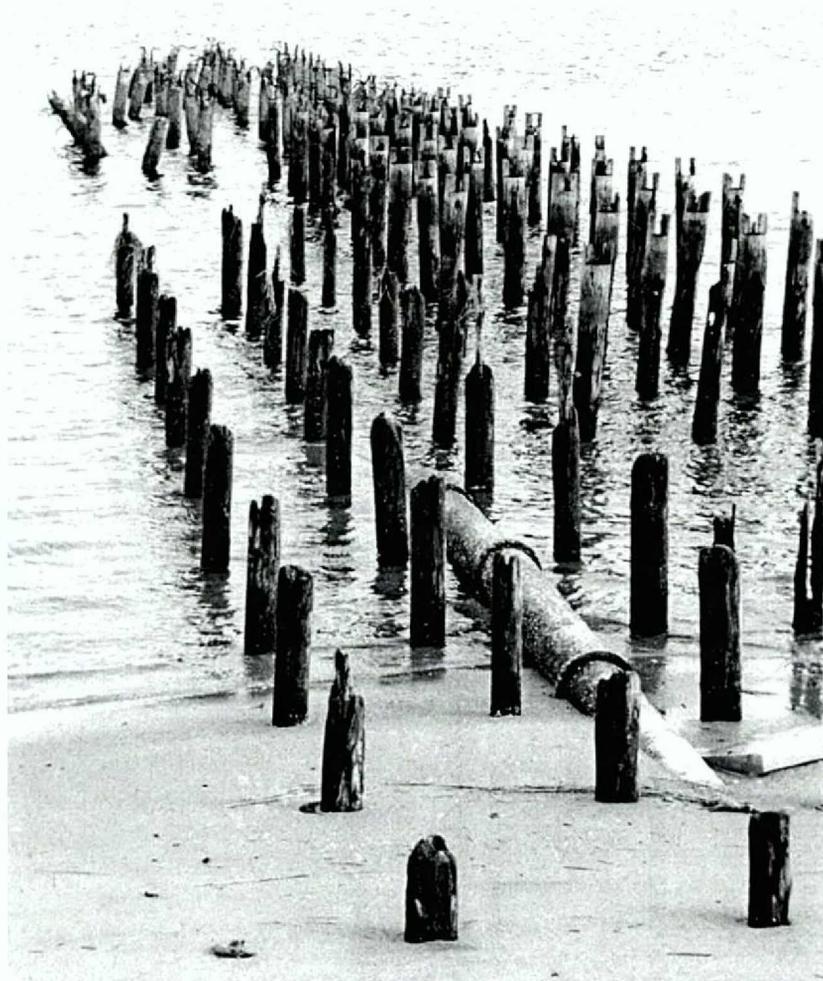


Figure 44. Remains of pier--Doppler Radar Staging Area. Note wooden pilings in foreground, concrete pilings at east end of feature. Three rows of pilings in foreground left probably a later addition, facing east. Jamaica Bay Islands, Kings and Queens Counties, New York (Pickman 2004).

decking, while the western end may have had wooden decking as well as pilings. The difference in construction suggests that the pier may have been extended at some point after its original construction and that the "concrete" pier mentioned in the documentation may have referred to the new construction at its eastern end.

The 1924 aerial photograph (see Figure 39b) also illustrated what appears to be a jetty along Barren Island's eastern shoreline south of the pier. A stone jetty was noted at this location during the site reconnaissance (Figures 45 and 46). This jetty was most likely associated with the garbage processing plant at the southeastern tip of the island. Annual reports of the Department of Docks and Ferries stated that beginning in 1911 and continuing through the 1920s the N.Y. Sanitary Utilization Company was renting "land under water for jetties (2) along easterly side of Barren Island." The 1911 document also reported that the Department of Docks had begun construction of a jetty on the eastern side of the Island to be used by the company.

During the reconnaissance, the upper portion of what appear to be posts and timbers were noted extending in an arc along the beach immediately south of the jetty (Figure 47). The nature of this feature is uncertain. It may represent remains of a barge or other vessel embedded in the beach sands.

The landfill east of the beach area at the Doppler Radar site is supported by a sheet-pile bulkhead. At the southern end of the site, the fill behind the bulkhead has been eroded by wave action and the rusted bulkhead is exposed (see Figure 45). At this end of the site there may have been a previous bulkhead and wharf some 30 feet east of the sheet pile bulkhead. Rows of pilings and what may represent the remains of rock fill were noted here (Figures 47 and 48).

Floyd Bennett Field. The history of Floyd Bennett Field is presented by Wrenn (1975), Greenwood and Torres (1977), and Blakemore (1981). Unless otherwise noted the following summary is based on the discussion in these sources.

Construction of Floyd Bennett Field, New York's first municipal airport, began in 1928. The Barren Island site was chosen because it was relatively flat and had no obstructions to approaches from the air. Further, ongoing and planned dredging operations in Jamaica Bay provided likely sources of fill material. By 1929 filling of some 387 acres to a depth of 16 feet above mean low water had been completed, the fill having been obtained from Mill Basin Channel, Rockaway Inlet Shoal and the Jamaica Bay Main Interior Channel. Construction was completed and the airport was officially opened in 1931, although the field was already in use by that time. The field was named for Floyd Bennett, a local aviator who flew with Admiral Byrd on his polar flights and subsequently lost his life during a rescue mission. The initial construction at Floyd Bennett Field was in the western portion of the present site, east of Flatbush Avenue, and included eight hangars and an administration building as well as two runways. These facilities are included within the National Register District. None are in the vicinity of the proposed project staging areas.



Figure 45. Doppler Radar Staging Area shoreline; stone jetty at center, remains of sheet pile bulkhead in foreground, and pier remains in background, facing north. Jamaica Bay Islands, Kings and Queens Counties, New York (Pickman 2004).



Figure 46. Stone Jetty, detail, facing southeast. Jamaica Bay Islands, Kings and Queens Counties, New York (Pickman 2004).



Figure 47. Doppler Radar Area; posts and timbers on beach south of jetty, remains of pilings and rock fill in background, facing south. Jamaica Bay Islands, Kings and Queens Counties, New York (*Pickman 2004*)



Figure 48. Remains of pilings and rock fill at southern end of Doppler Radar Area. Remains of sheet pile bulkhead at right, facing south. Jamaica Bay Islands, Kings and Queens Counties, New York (Pickman 2004).

Floyd Bennett Field never became a commercial success. During the late 1920s and 1930s most commercial flights, as well as airmail flights to the New York City area, went to Newark Airport, which had opened in 1928. While Floyd Bennett Field was no farther from Manhattan than Newark, transportation connections to the latter area were much more direct and easier to use. The lack of scheduled commercial traffic, however, as well as the long runways at Floyd Bennett Field made the field attractive to fliers who aimed at setting aviation records. During the 1930s several transcontinental, trans-Atlantic and around-the-world speed records began and/or terminated at this facility. Although most scheduled flights to the New York City area went to Newark, Floyd Bennett Field apparently had a high volume of unscheduled landings, probably because weather conditions were usually better there than at Newark.

A second construction phase at Floyd Bennett Field was undertaken by the WPA between 1934 and 1938. This included construction of new structures and expansion of the runway and taxiway system. In 1938, the City of New York leased 9.7 acres in the eastern portion of Floyd Bennett Field to the Coast Guard. This facility had its own hangar, seaplane ramp and flying boats. It played a major role in the development of the helicopter for use in search-and-rescue operations. The Coast Guard operated this facility, located immediately north of the proposed Doppler Radar staging area, until 1998 when it was transferred to the New York Police Department's Aviation Unit. This unit had previously operated from a facility at the Field located closer to Flatbush Avenue (Historic Floyd Bennett Field and [hereafter referenced as HFBF]).

With the opening of LaGuardia Airport in 1939, Floyd Bennett Field was no longer commercially viable. In May 1941, it closed to commercial service and was sold to the U.S. Navy. This facility became known as the Naval Air Station, New York and, alternatively, as the Brooklyn Naval Air Station. During World War II, Floyd Bennett Field housed a number of operational combat units including long-range anti-submarine patrol squadrons. It also served as an embarkation point for newly manufactured naval aircraft (HFBF and). The Navy continued to operate the field until 1971. In 1972 Floyd Bennett Field was turned over to the National Park Service and incorporated into the Gateway National Recreation Area.

Documented Cultural Resources—Doppler Radar Area. An inventory of structures and features at Floyd Bennett Field was compiled in 1978. Four of these were noted within or immediately adjacent to the boundaries of the proposed Doppler Radar staging area. None of these were considered to be eligible for nomination to the National Register of Historic Places (John Milner and Associates 1978). Their locations are shown on Figure 49.

Building HS-206 is described as a "pump house" associated with the U.S. Navy complex that was located in the southern portion of Floyd Bennett Field. This complex was considered to "considerably post-date" the construction of the Floyd

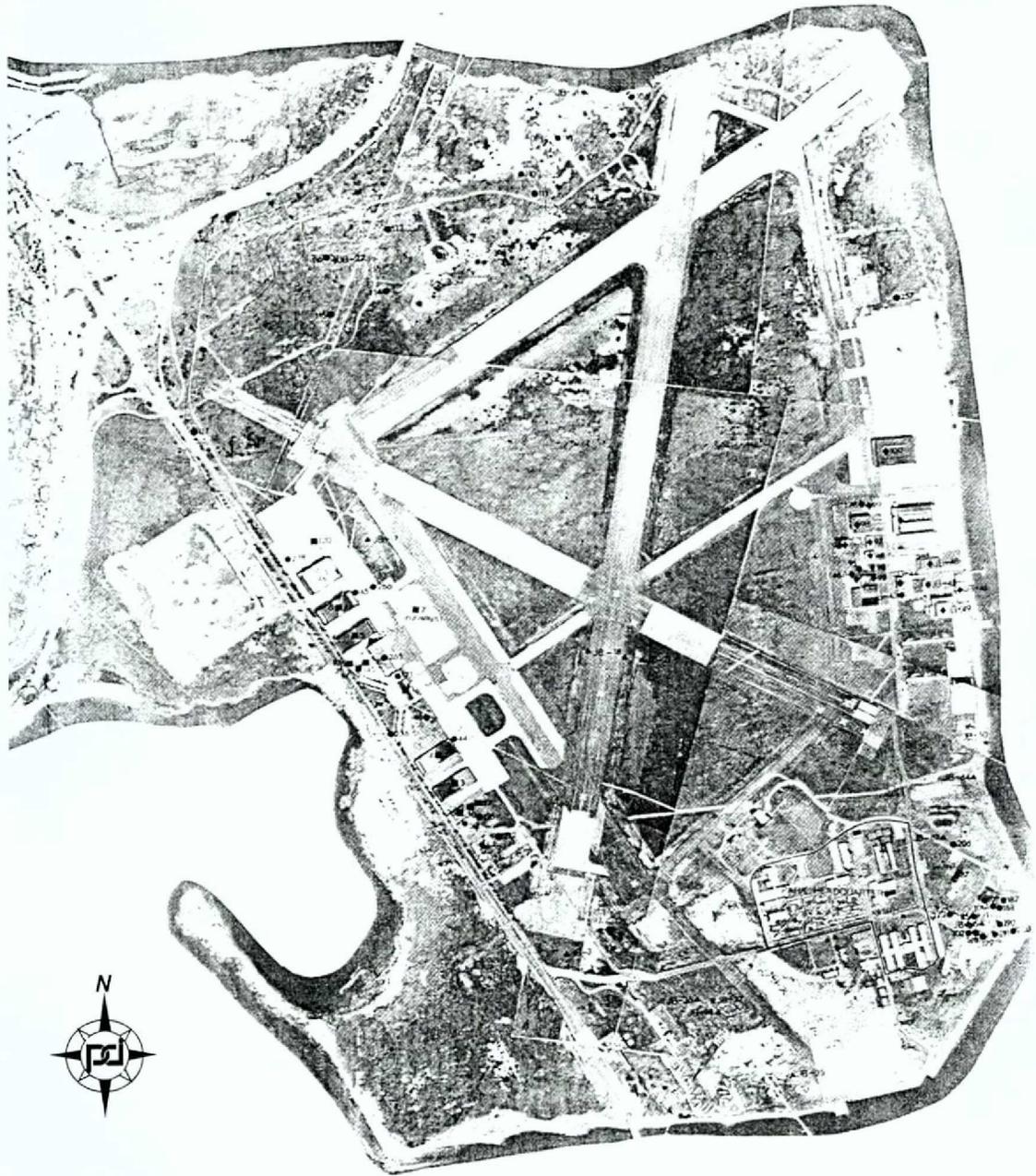


Figure 49. Aerial photograph of Floyd Bennett Field showing locations of structures and features included in Cultural Resources Inventory. Jamaica Bay Islands, Kings and Queens Counties, New York (John Milner and Associates 1978).

Bennett Field Historic District structures (John Milner and Associates 1978). No indications of this structure were noted during the reconnaissance.

Feature JB-62 is described as a "Small Concrete Feature—Located just east of Park Headquarters at Floyd Bennett Field, this feature is a small concrete utility structure, measuring approximately four feet on a side. Its function and precise origin are not known" (John Milner and Associates 1978). This feature would be located within the present "archery range" area, which is not included within the proposed staging area. No remains of this feature were noted during the reconnaissance.

Feature JB-64 is identified as

Concrete and Rubble Feature. This feature consists primarily of a large concrete foundation or platform, even with existing grade, and measuring about 60 by 25 feet in size. Also associated with this feature are two small concrete 'blocks', each about eight feet square, as well as a considerable amount of iron and wood rubble. Located near the eastern shore of Floyd Bennett Field, the associated features probably post-date World War II considerably [John Milner and Associates 1978].

A paved area and concrete "blocks" were noted during the reconnaissance at the approximate location indicated (Figure 50).

Feature JB-50 is described as

Wooden Pylons—Just to the south of the contemporary Coast Guard complex, there is a long series of vertically aligned wooden pylons stretching for some distance into Jamaica Bay. This feature undoubtedly represents the remnants of a long seaplane ramp or pier constructed c. 1939 to facilitate the local maneuvering of seaplanes [John Milner and Associates 1978].

This feature (Figure 51) was noted during the reconnaissance at the location cited, approximately 150 to 175 feet north of the pier remains. It consists of two portions. The northernmost appears to represent a slipway that may have functioned to permit seaplanes to enter and leave the bay. At its western end, only the pilings supporting the slipway remain (see Figure 51). The eastern end of the feature, exposed at low tide, consists of horizontal timbers that supported the bayward end of the slipway (Figure 52). The southern portion of the feature consists of a double row of pilings, higher than those of the slipway. These may represent the remains of a pier that extended along the slipway to facilitate access to the seaplanes.

In addition to the above, there is a large standing structure located some 225 feet south of the southeastern corner of the Doppler Radar Area (Figure 53). This brick building was designated building HS-101 and described as a "steam plant" (John Milner and Associates 1978:129). It is located within the U.S. Navy complex, "although the exact date of construction of the structures comprising this complex is not known, it is certain that it considerably post-dates the construction of the structures comprising the Floyd Bennett Field Historic District" (John Milner and



Figure 50. Doppler Radar Area showing portion of Milner Feature JB-64. Paved area-concrete "Block" in background, facing southwest. Jamaica Bay Islands, Kings and Queens Counties, New York (Pickman 2004).



Figure 51. Doppler Radar Area, remains of former seaplane ramp (Milner Feature JB-50), facing east. Jamaica Bay Islands, Kings and Queens Counties, New York (Pickman 2004).



Figure 52. Doppler Radar Area, detail of eastern end of former seaplane ramp, facing southeast. Jamaica Bay Islands, Kings and Queens Counties, New York (Pickman 2004).

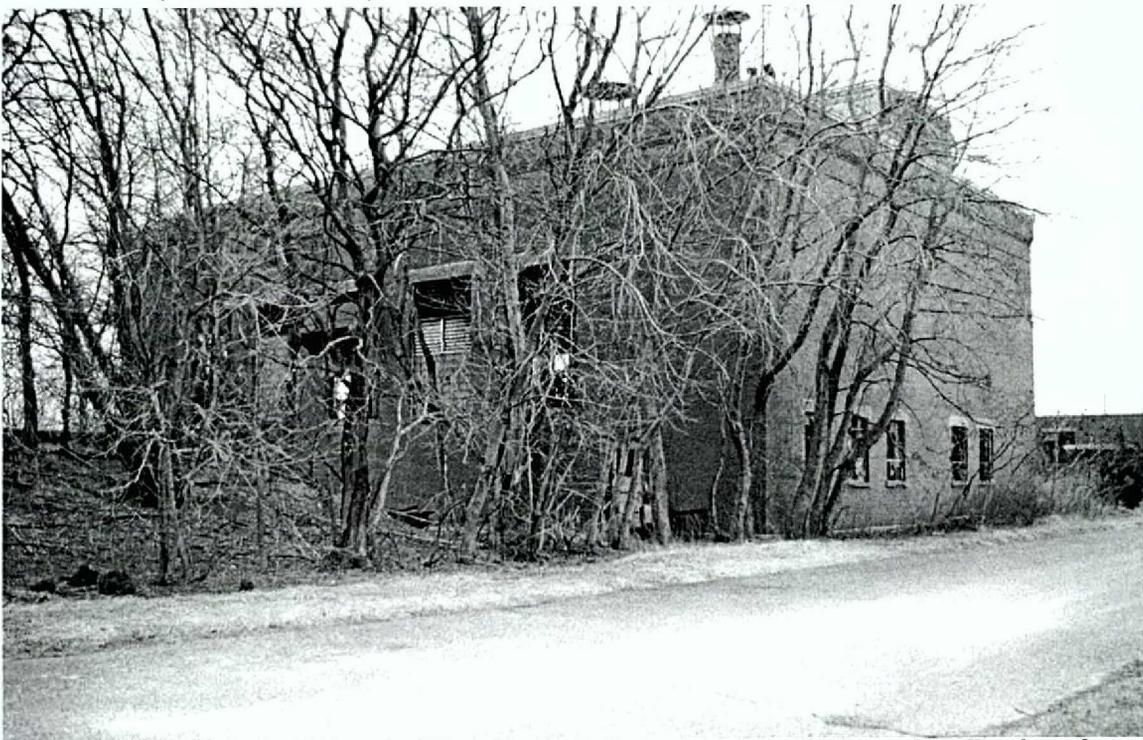


Figure 53. Brick "Steam Plant" Building south of Doppler Radar Area (Milner Structure HS-101), facing southeast. Jamaica Bay Islands, Kings and Queens Counties, New York (Pickman 2004).

Associates 1978). The steam generating machinery remains substantially intact in the interior of this structure (Figure 54).

Documented Cultural Resources—Northeast Runway Area. This runway is referenced as Runway 6-24 (new) (HFBF nd). "Constructed in 1942, this 5000 x 300 foot runway was lengthened to 6000 feet in 1952. It runs perpendicular to Flatbush Avenue on the North side of the field."

The inventory does not indicate any structures or features adjacent to the proposed staging area, which represents the northeastern portion of the runway (John Milner and Associates 1978). The nearest feature noted by the inventory is approximately 500 feet west of the staging area.



Figure 54. Interior of "Steam Plant," facing southeast. Jamaica Bay Islands, Kings and Queens Counties, New York (*Pickman 2004*).

4.0 SUMMARY AND RECOMMENDATIONS

4.1 POTENTIAL PREHISTORIC PERIOD CULTURAL RESOURCES

No reported prehistoric cultural remains have been identified for the Elders Point Island and Yellow Bar Island ecosystem restoration areas or for the Floyd Bennett Field staging areas. As discussed in Section 3.2.2, it is theoretically possible that prehistoric shell heaps could be buried beneath the surface of the marshes on the Jamaica Bay islands. Such deposits would most likely be encountered within five to six feet of the present marsh surface. It is likely that if any major shell heaps were present within the proposed ecosystem restoration areas, they would have been previously reported. Smaller accumulations may have gone unnoticed, however. It would be possible to test for the presence of such deposits around the shoreline of the islands using a probe rod or other methodologies. However, in the absence of any reported deposits it would be difficult to narrow the area to be tested. Furthermore, the proposed project will not involve excavation. The result of the project would be to bury any deposits that could be present beneath fill, which would tend to protect them against future disturbance by natural or cultural processes.

4.2 POTENTIAL HISTORIC PERIOD CULTURAL RESOURCES

Elders Point Island. Documentary research has uncovered no evidence of historic period occupation of Elders Point Island, and there is a low probability that significant historic period cultural remains are on this island.

Summary Recommendation. If the proposed activities in this area remain the same, no further work is recommended.

Yellow Bar Island. A number of structures were located along the shoreline of the southern portion of Yellow Bar Island in the late nineteenth century into the early twentieth century. Five structures were shown on maps dating to this period. One of these was a "fishing station." Others may represent seasonally occupied fishermen's "shacks." The sites of most of these structures would be along or immediately adjacent to the present island shoreline, and may be indicated by the remains of pilings that supported them or by associated piers. Any archaeological deposits associated with the occupation of these structures would most likely be in the form of refuse middens. Occupants would most likely have discarded refuse either into the bay along the shoreline or onto the surface of the adjacent marshes. Archaeological investigation of any such material remains of these late nineteenth-century-early twentieth-century baymen would be of interest. It is uncertain, however, if any such refuse deposits would remain in the area due to shoreline erosion and tidal action.

In addition to the above residential occupations, a "chimney" was noted on the northeastern portion of Yellow Bar Island in 1926. This facility also appears to be shown on a 1924 aerial photograph. However, it does not appear on any other map

examined for this project, and no documentary references to such a facility have been found.

As noted above, the proposed ecosystem restoration project would not involve excavation, and any structural or artifactual remains associated with the occupation or utilization of the area should remain intact beneath any fill deposited as a result of the project. Nevertheless, prior to the initiation of the ecosystem project construction, it would be advisable to conduct a pedestrian and/or marine reconnaissance of the portions of Yellow Bar Island where the resources noted are depicted on the historic maps to identify any structural remains. This would facilitate future archaeological examination. Any such remains should be photographed, noted on present maps, and coordinates recorded utilizing a GPS receiver.

Summary Recommendation. A reconnaissance survey is recommended to determine if any surface remains are present at the site. This should include a surface inspection to identify any possible historic remains. Shovel testing or shovel probes may be appropriate based on the results of the surface reconnaissance. A marine reconnaissance should be considered depending on the location of the landing points on the island.

Floyd Bennett Field—Doppler Radar Site. Consideration of cultural resources at this site included the periods before and after the construction of Floyd Bennett Field in the late 1920s.

Pre-Floyd Bennett Field Resources. While much of the area of the future airfield was marshland and open water, an area of upland was located in the southern portion of Barren Island and served as the site of various industrial facilities and a community of workers associated with these facilities.

Linck (1981) reported that fill had been deposited on the portion of Barren Island that later became Floyd Bennett Field prior to the landfilling associated with construction of the airfield. Considering this fill, the additional amount deposited during the construction of the airfield, and the pre-landfilling topography, he concludes (Linck 1981:232) that the surface prior to the beginning of landfilling would be some six to ten feet below the present ground surface. It is possible that remains associated with the workers' community could be preserved beneath the fill. However, analysis of maps reveals that the nineteenth-century and early twentieth-century industrial facilities and residential community would have been located south of the Doppler Radar site. Furthermore, the proposed project activities in this area are restricted to the deposition of dredge spoil on the surface. There would be no excavation in this area.

A 1926 map and a 1924 aerial photograph show a large pier extending eastward into Jamaica Bay adjacent to the proposed Doppler Radar staging area. This pier most likely is the one constructed by the City of New York in 1921 in connection with landfilling on Barren Island. Pilings that may represent the remains of this pier were

noted during the site reconnaissance. What appears to be a jetty is shown on the 1924 photograph south of the pier, which may represent one of the jetties constructed in the early twentieth century in association with the operation of the Barren Island garbage processing plant. Remains of the jetty were noted during the reconnaissance. While these features are certainly generic in construction their potential significance lies in the fact that they are among the few physical remains associated with the history of Barren Island that pre-date the construction of Floyd Bennett Field.

Other features noted along the beach bordering the Doppler Radar area include what may represent the remains of an early bulkhead or wharf, and possible remains of a small vessel embedded in the beach sands.

Floyd Bennett Field Resources. The Doppler Radar site is located east of the boundaries of the Floyd Bennett Field National Register District and none of the early facilities at the Field were located here. The remains of a seaplane ramp, possibly dating to the 1930s, were noted along the beach adjacent to the northern portion of the Doppler Radar area.

The boundaries of the proposed Doppler Radar staging area (see Figure 5) would be west of the beach area. There are no potentially significant cultural resources within this area. The beach and near-shore area east of the staging area, however, include the remains of a pier and a jetty associated with the pre-Floyd Bennett Field history of Barren Island and remains of a seaplane ramp possibly associated with the second phase of construction at Floyd Bennett Field.

Summary Recommendation. If the current staging area is utilized within the current boundaries as proposed, no impact to cultural resources should occur and no further work is recommended.

The location of the equipment to be used in transferring dredged sand to and from the storage areas is uncertain. Project operations associated with the deposition of dredged material in the storage area and the subsequent transfer of this material to the ecosystem restoration sites should avoid disturbance to the remains of the shorefront features noted above.

Floyd Bennett Field—Northeastern Runway Site

Pre-Floyd Bennett Field Resources. Prior to the construction of Floyd Bennett Field the greater part of the present Northeast Runway staging area consisted of open water. No cultural resources were located in this area.

Floyd Bennett Field Resources. None of the early Floyd Bennett Field facilities were located in this area. The southwestern portion of the runway itself was initially constructed in 1942. However the northeastern most 1000 feet was constructed in

1952. No structures or features were recorded within or immediately adjacent to the staging area (John Milner and Associates 1978).

Summary Recommendation. If the proposed activities in this area remain the same, no further work is recommended.

5.0 REFERENCES

Anonymous

1904 "Horse Factories'...Over at Barren Island" dated December. Vertical File, "Barren Island." Unidentified newspaper article in the Collection of the Queens Borough Public Library, Long Island Division.

1907 "More of Barren Isle Drops into the Bay" dated April 19. Vertical File, "Barren Island." Unidentified newspaper article in the Collection of the Queens Borough Public Library, Long Island Division.

Armbruster, Eugene L.

1919 *The Ferry Road on Long Island*. Self-published, New York.

J. Barber

1776 *The Country Twenty Five Miles Round New York, Drawn By A Gentleman From That City*. W. Hawkes, London.

Beers, F. W.

1873 *Atlas of Long Island, New York*. Beers, Comstock and Cline, New York.

1886 *New Map of Kings and Queens Counties, New York*. F.W. Beers & Co., New York

Belknap, D.F., and J.C. Kraft

1977 "Holocene Relative Sea-level Changes and Coastal Stratigraphic Units on the Northwest Flank of the Baltimore Canyon Trough Geosyncline." *Journal of Sedimentary Petrology* 47:610-629.

Bender, Susan J., and Edward V. Curtin

1990 *A Prehistoric Context for the Upper Hudson Valley: Report of the Survey and Planning Project*. Department of Sociology, Anthropology, and Social Work, Skidmore College, Saratoga Springs, NY. Prepared for the New York State Office of Parks, Recreation and Historic Preservation, Peebles Island, Waterford, and the National Park Service.

Bernstein, D. (ed.)

2003 "News from Stony Brook University." *New York Archaeological Council Newsletter* Fall:5-7.

Black, Frederick R.

1981 *Historic Resource Study: Jamaica Bay—A History, Gateway National Recreation Area, New York-New Jersey*. Cultural Resources Management Study No. 3. Prepared for the Division of Cultural Resources, North Atlantic Regional Office, National Park Service, U.S. Department of the Interior.

Blakemore, Porter R.

1981 Historical Data Section in *Historic Structures Report, Historical Data Section; Archaeological Data Section, Floyd Bennett Field, Gateway National Recreation Area*. Vol. 1. U.S. Department of the Interior, National Park Service, Denver Service Center.

Blakemore, Porter R., and Dana C. Linck

1981 *Historic Structures Report, Historical Data Section; Archaeological Data Section, Floyd Bennett Field, Gateway National Recreation Area*. Vol. 1. U.S. Department of the Interior, National Park Service, Denver Service Center.

Bolton, Reginald Pelham

1920 New York City in Indian Possession. *Indian Notes and Monographs*. Vol. II, No. 7. Museum of the American Indian, Heye Foundation, New York

1922 Indian Paths in the Great Metropolis. *Indian Notes and Monographs*. Misc. No. 23. New York: Museum of the American Indian, Heye Foundation, New York.

1934 *Indian Life of Long Ago in the City of New York*. Joseph Graham, New York.

Bourn, Richard Q., Jr.

1972 "New Submerged Sites of Coastal Connecticut." *Bulletin of the Archeological Society of Connecticut* 37:5-16.

Brennan, Louis A.

1977 "The Lower Hudson: The Archaic." In *Amerinds and Their Paleoenvironments in Northeastern North America*, Walter S. Newman and Bert Salwen, editors. Annals of the New York Academy of Sciences, No. 288.

Brockett, L. P.

1884 "The Manufacturing Interests of Brooklyn and Kings County" in *The Civil, Political, Professional and Ecclesiastical History and Commercial and Industrial Record of the County of Kings and the City of Brooklyn, New York from 1683 to 1884*, compiled by Henry Stiles, pp. 668 -828. Vol. I. W.W. Munsell Co., New York.

Brooklyn Eagle

1899 "Barren Island's New Era" dated May 8. Vertical File, "Barren Island." Collection of the Queens Borough Public Library, Long Island Division.

1901 "Missing Boating Party," dated August 14, p. 8. Collection of the Queens Borough Public Library, Long Island Division.

1936 "Barren Island Squatters Ordered Off by Moses," dated March 13. Collection of the Queens Borough Public Library, Long Island Division.

Brooklyn Public Library

1911 Photograph of Barren Island garbage processing plant, June 19. Collection of Brooklyn Public Library, New York.

Cassedy, Daniel, Paul Webb, Tracy Millis, and Heather Millis

1993 New Data on Maize Horticulture and Subsistence in Southwestern Connecticut. Paper presented at the Annual Meeting of the Northeastern Anthropological Association, Danbury, CT.

Ceci, Lynn

1990 Radiocarbon Dating "Village" Sites in Coastal New York: Settlement Pattern Change in the Middle to Late Woodland. *Man in the Northeast* 39:1-28.

Cronon, William

1983 *Changes in the Land: Indians, Colonists, and the Ecology of New England*. Hill and Wang, New York.

Curtin, Edward V.

1996 Late Archaic Period Technology and Land Use Patterns: Lessons Learned from the Mattice No. 2 Site. In *A Golden Chronograph for Robert E. Funk*, edited by Christopher Lindner and Edward V. Curtin, pp. 119-128. Occasional Publications in Northeastern Anthropology. No. 15, Archaeological Services, Bethlehem, CT.

Dankers, Jaspas, and Peter Sluyter

1867 *Journal of a Voyage to New York and a Tour in Several of the American Colonies in 1678-80*. Translated and edited by Henry C. Murphy. Long Island Historical Society, Brooklyn [Reprinted 1966, University Microfilms, Ann Arbor, MI].

Dent, Richard J.

1991 Archaeology in the Upper Delaware Valley: The Earliest Populations. In *The People of Minisink*, edited by D.G. Orr and D.V. Campana, pp. 117-144. National Park Service, Philadelphia

Department of Docks and Ferries, City of New York

1909 *Rent-roll of Leases and Permits in Force December 31, 1909*. Department of Docks and Ferries, City of New York.

1901 *Annual Report*. Department of Docks and Ferries, City of New York.

1910 *Annual Report*. Department of Docks and Ferries, City of New York.

1911 *Annual Report*. Department of Docks and Ferries, City of New York.

1916 *Annual Report*. Department of Docks and Ferries, City of New York.

1918-1922 *Annual Report*. Department of Docks and Ferries, City of New York.

1924-1927 *Annual Report*. Department of Docks and Ferries, City of New York.

Department of Street Cleaning, City of New York

1921 *Annual Report*. Department of Street Cleaning, City of New York

1924 *Annual Report*. Department of Street Cleaning, City of New York

1925 *Annual Report*. Department of Street Cleaning, City of New York

1926 *Annual Report*. Department of Street Cleaning, City of New York

Des Barres, J.F.W.

1777 *Sketch of the Operations of His Majesty's Fleet and Army Under the Command of Vice Admiral the Rt. Hble. Lord Viscount Howe and Genl. Sr. Wm. Howe, K.B. in 1776.* np

Dripps, Matthew

1852 *Map of Kings and a Part of Queens Counties, Long Island, New York.* R.E.O. Connor and Matthew Dripps, New York.

Dvirkin and Bartilucci, Consulting Engineers

1985 *201 Wastewater Facilities Plan for the Barrier Beach Area, Volume IV, Selected Plan and Environmental Assessment.* Dvirkin and Bartilucci, Consulting Engineers, np. Prepared for the Nassau County Department of Public Works. Syosset, NY.

DuBois, Anson

1884 "History of the Town of Flatlands" in *The Civil, Political, Professional and Ecclesiastical History and Commercial and Industrial Record of the County of Kings and the City of Brooklyn, New York from 1683 to 1884*, compiled by Henry P. Stiles, pp. 64-79. Vol. I. W.W. Munsell Co., New York.

Edwards, Robert L., and K.O. Emery

1977 Man on the Continental Shelf. In *Amerinds and Their Paleoenvironments in Eastern North America*, edited by W.S. Newman and B. Salwen. New York Academy of Sciences (Annals of the New York Academy of Sciences, Vol. 288). pp. 245-256.

Edwards, Robert L., and Arthur S. Merrill

1977 A Reconstruction of the Continental Shelf Areas of Eastern North America for the Times 9,500 B.P. and 12,500 B.P. *Archaeology of Eastern North America* 5:1-43.

Eisenberg, Leonard

1978 *Paleo-Indian Settlement Pattern in the Hudson and Delaware River Drainages.* Occasional Publications in Northeastern Anthropology No. 4, Franklin Pierce College, Rindge, NH.

Emery, K.O., and R.L. Edwards

1966 Archaeological Potential of the Atlantic Continental Shelf. *American Antiquity*. 31:733-737.

Fernow, B., ed.

1883 *Documents Relating to the Colonial History of the State of New York.* Vol. XIV. Weed Parsons & Co., Albany.

Fairchild Aerial Camera Company

1924 *Aerial Photographs of New York City.* New York City, Board of Estimate and Apportionment.

Fritz, Gayle

1990 Multiple Pathways to Farming in Precontact Eastern North America. *Journal of World Prehistory* 4:387-435.

- Fuller, Myron L.
1914 *The Geology of Long Island, New York*. U.S. Geological Survey Professional Paper 82. U.S. Government Printing Office, Washington, D.C.
- Funk, Robert E.
1972 "Early Man in the Northeast and the Late Glacial Environment." *Man in the Northeast* 4:7-39.

1976 "Recent Contributions to Hudson Valley Prehistory." *New York State Museum and Science Service Memoir* No. 22, Albany.
- Funk, Robert E., and David W. Steadman
1994 *Archaeological and Paleoenvironmental Investigations in the Dutchess Quarry Caves, Orange County, New York*. Partners Press, Buffalo.
- Glynn, Frank
1953 "The Pilots Point Submerged Sites." *Bulletin of the Archeological Society of Connecticut*, No. 27:11-29.
- Greenwood, Richard, and Ricardo Torres
1977 *Floyd Bennett Field Historic District, National Register of Historic Places, Inventory - Nomination Form*.
- Gwynne, Gretchen A.
1984 A Late Archaic House Pattern on Long Island. *The Bulletin*, New York State Archaeological Association 88:1-8.
- Hampshire County Council
1999 Eling Tide Mill. Description of tide mill. Online (available)
<http://www.hants.gov.uk/leisure/millmons/elingtid/>
- Handsman, Russell, and Charles McNett
1974 The Middle Woodland in the Middle Atlantic: Chronology, Adaptation and Contact. Paper presented at the Middle Atlantic Archaeological Conference, Baltimore.
- Harrington, M.R.
1909 "Ancient Shell Heaps Near New York City" in *The Indians of Greater New York and the Lower Hudson*, edited by Clark Wissler, pp. 169-179. Anthropological Papers of the American Museum of Natural History, Vol. III. Reprint edition [1975]. AMS Press, Inc., New York.

1924 An Ancient Village Site of the Shinnecock Indians. *Anthropological Papers of The American Museum Of Natural History*, Vol. XXII. Pt. V. New York
- Hartig, Ellen K, and Vivien Gornitz
2001 The Vanishing Marshes of Jamaica Bay: Sea Level Rise or Environmental Degradation? New York, NASA, Goddard Institute of Space Studies. Online (available) <http://www.giss.nasa.gov/research/intro/hartiq-01>

Hayward, Michele H., Arnold Pickman, Mark A. Steinback, Stephen R. James, Edward V. Curtin, and Michael A. Cinquino

2003 *Cultural Resources Baseline Study, Jamaica Bay Ecosystem Restoration Project, Kings, Queens and Nassau Counties, New York*. Panamerican Consultants, Inc., Buffalo Branch, Buffalo.

Historic Floyd Bennett Field

2003 Information pertaining to the History of Floyd Bennett Field. Online (Available) http://www.geocities.com/floyd_bennett_field/

Hyde & Co.

1899 *Atlas of the Borough of Brooklyn of the City of New York*. Vol. 3. Hyde & Co., Brooklyn.

Hyde, E. Belcher

1909 *Atlas of the Borough of Brooklyn, City of New York*. 1909 edition updated to 1912. Vol. 8. E. Belcher Hyde, New York.

Jamaica Bay Improvement Commission

1907 Map of Jamaica Bay in *Progress Report of 1909 of the Jamaica Bay Improvement Commission*. Jamaica Bay Improvement Commission, Jamaica, NY.

1909 *Progress Report of the Jamaica Bay Improvement Commission*. Submitted December 27, 1909. Jamaica Bay Improvement Commission, Jamaica, NY.

1909a Western Portion of Jamaica Bay, New York. (Topographic survey made under the direction of the Jamaica Bay Improvement Commission.) Sept. to Dec. 1909. Plate VIII in *Progress Report of 1909 of the Jamaica Bay Improvement Commission*. Jamaica Bay Improvement Commission, Jamaica, NY.

John Milner & Associates

1978 *A Cultural Resources Inventory of the Gateway National Recreation Area, New York and New Jersey*. John Milner & Associates, Inc., West Chester, PA.

Kraft, Herbert C.

1977 The Paleo-Indian Sites at Port Mobil, Staten Island. In *Current Perspectives in Northeastern Archeology. Essays in Honor of William A. Ritchie*, edited by Robert E. Funk and Charles F. Hayes, III, pp. 1-19. *Researches and Transactions of the New York State Archeological Association*, 17(1). Albany.

1986 *The Lenape: Archaeology, History and Ethnology*. New Jersey Historical Society, Newark.

Kraft, Herbert C., and Ronald A. Mounier

1982 The Archaic Period in New Jersey (ca. 8000 BC-1000 BC). In *New Jersey's Archaeological Resources from the Paleo-Indian Period to the Present: A Review of Research Problems and Survey Priorities*, edited by Olga Chesler, pp. 52-102. Office of Cultural and Environmental Services, Department of Environmental Protection, Trenton.

- Kraft, John C.
1985 Marine Environments: Paleogeographic Reconstruction in the Littoral Region. In *Archaeological Sediments in Context*, edited by Julie K. Stein and William R. Farrand, pp. 111-125. Center for the Study of Early Man, Orono, ME.
- Kraft, J.C., D.F. Belknap, and I. Kayan
1983 Potentials of Discovery of Human Occupation Sites on the Continental Shelves and Nearshore Coastal Zone. In *Quaternary Coastlines and Marine Archaeology*, edited by P.M. Masters and N.C. Fleming, pp. 87-120. Academic Press, London.
- Linck, Dana C.
1981 Archaeological Data Section in *Historic Structures Report, Historical Data Section; Archaeological Data Section, Floyd Bennett Field, Gateway National Recreation Area*. Vol. 1. U.S. Department of the Interior, National Park Service, Denver Service Center.
- Lopez, Julius, and Stanley Wiesniewski
1971 "The Ryders Pond Site, Kings County, New York." *New York State Archaeological Association Bulletin* 53:2-21.
1972 "The Ryders Pond Site II." *New York State Archaeological Association Bulletin* 55:6-20.
- Marshall, Sydne B.
1982 Aboriginal Settlement in New Jersey During the Paleo-Indian Cultural Period, ca. 10,000 BC-6000 BC. In *New Jersey's Archaeological Resources from the Paleo-Indian Period to the Present: A Review of Research Problems and Survey Priorities*, edited by Olga Chesler, pp. 10-51. Office of Cultural and Environmental Services, Department of Environmental Protection, Trenton.
- Minsky, Pearl G.
1963 Canarsie Place-Names. M.A. Thesis, Brooklyn College. On file, Collection of the New York City Municipal Reference Library.
- Montresor, John
1775 *A Map of the Province of New York*. A. Drury, London.
- Morin, Edward M., Jeffrey Harbison, and Ingrid Wuebber
2002 *Phase I Archeological Investigations within the Gateway National Wildlife Refuge, Broad Channel Island, Jamaica Bay, New York*. URS Corporation. On file at New York State Department of Parks, Recreation and Historic Preservation, Peebles Island, New York.
- Mueller, James W.
1991 *Management Report, Archeological Investigations at Jamaica Bay Wildlife Refuge, Gate 187A-43, Gateway National Recreation Area*. Applied Archeology Center, Denver Service Center, National Park Service.
- Murphy, Larry E.
1990 8SL17: *Natural Site-Formation Processes of a Multiple-Component Underwater Site in Florida*. Southwest Cultural Resources Center Professional Papers No. 39.

Submerged Cultural Resources Unit, Southwest Cultural Resources Center,
Southwest Region, National Park Service, Sante Fe, NM.

NOAA

1986 *United States, East Coast, New York, Jamaica Bay and Rockaway Inlet. Chart 12350.* National Ocean Service, National Oceanographic and Atmospheric Administration, Washington, D.C.

New York City Department of Environmental Protection
2000 Aerial Photographs of New York City. Online (available)
<http://www.oasisnyc.net/mapsearch.asp>

New York State Department of Environmental Conservation
1999 Strategy for Addressing Loss of Intertidal Marsh in the Marine District. Online
(available) <http://www.dec.state.ny.us/website/dfwmr/marine/twloss.html>.

New York Times

1901 "Three in a Boat Not Drowned," dated August 14. *New York Times*, p.1.

1933 "Icebound 10 Days on Island in City," dated February 12, *New York Times*, p. 3.

1942 "Barren Island's Last 25 Squatters Routed by Expansion of Naval Base," dated
January 18. *New York Times*

Newman, Walter S.

1966 Late Pleistocene Environments of the Western Long Island Area. Unpublished
Ph.D. dissertation, New York University.

Nicholas, George P. (editor)

1988 Ecological Leveling: The Archaeology and Environmental Dynamics of Early
Postglacial Land Use. In *Holocene Human Ecology in Northeastern North America*,
pp.257-296. Plenum Press, New York.

O'Halloran, John

1950 "Canarsee Indian Village Sites". *Long Island Forum*. XIII:63-64, 66, 75.

Pardi, Richard R.

1983 "Changing Sea Level and Shoreline" (Appendix II, Section II) in *Westside Highway
Cultural Resource Survey, Archeological Work Program: Cultural Resources Research*,
pp. A7-A22. Historic Conservation and Interpretation, Inc., West Orange, NJ.

Parker, Arthur C.

1922 The Archaeological History of New York, Part Two. *New York State Museum
Bulletin*, Nos. 237, 238. Albany.

Peteet, Dorothy M. and Liberman, Louisa

2001 "Millennial Climate and Land Use History from Jamaica Bay Marshes, New York."
Abstract of Paper given at Geological Society of America, Annual Meeting, November
5-8, 2001. Online (available)
http://gas.confex.com/gsa/2001AM/finalprogram/abstract_27182.htm

Pickman, Arnold

1982 *Reconnaissance Level Cultural Resources Investigation, Jones Inlet- Freeport Channel, Nassau County, New York*. Arnold Pickman, Consulting Archaeologist, New York. Submitted to U.S. Army Corps of Engineers, New York District, New York.

1994 *Archaeological Documentary Study, 1267-1279 East 35th street, Brooklyn, New York, CEQR 94-BSA-30K*. Arnold Pickman, Consulting Archaeologist, New York. Submitted to Yeshiva Tiferes Yisrael. On file, New York City Landmarks Preservation Commission.

Powell, Bernard W.

1965 Spruce Swamp: A Partially Drowned Coastal Midden in Connecticut. *American Antiquity* 30: 460-469

Rampino, Michael R

1979 Holocene Submergence of Southern Long Island, New York. *Nature* 280:132-134.

Rampino, Michael R., and John E. Sanders

1980 Holocene Transgression in South-Central Long Island, New York. *Journal of Sedimentary Petrology* 50:1063-1080.

Ritchie, William A.

1980 *The Archaeology of New York State*. Harbor Hill Books, Harrison, NY.

Ritchie, William A. and Robert E. Funk

1971 Evidence for Early Archaic Occupations on Staten Island. *Pennsylvania Archeologist* 41. No. 3, 45-49.

1973 "Aboriginal Settlement Patterns in the Northeast." *New York State Museum and Science Service Memoir* No. 20. Albany.

Robbins, Maurice

1960 *Wapanucket No. 6, An Archaic Village in Middleboro, Massachusetts*. Cohannet Chapter, Massachusetts Archaeological Society, Inc., Attleboro.

Salwen, Bert

1968 "New York University Test Excavations at the Charleston Beach Site STD 21-3." On file, office of Arnold Pickman, New York.

Sanborn Map Company

1930 *Insurance Maps of the Borough of Brooklyn, City of New York*. Vol. 19. Sanborn Map Company, New York.

Sanders, John E., and Naresh Kumar

1975 "Evidence of Shoreface Retreat and In-Place 'Drowning' during Holocene Submergence of Barriers, Shelf Off Fire Island, New York." *Geological Society of America Bulletin* 86:65-76.

- Sauthier, Claude Joseph
1779 *A Chorographical Map of the Province of New York in North America*. William Faden, London.
- Schuyler, Robert L.
1977 Archaeology of the New York Metropolis. *The Bulletin of the New York State Archaeological Association* 69:1-19.
- Seitz, Sharon and Stuart Miller
1996 *The Other Islands of New York City—A Historical Companion*. The Countrymen Press, Woodstock, VT.
- Smith, Carlyle Shreeve
1950 *The Archaeology of Coastal New York*. Anthropological Papers of the Museum of Natural History, Vol. 43 Part 2, New York.
- Snow, Dean
1980 *The Archaeology of New England*. Academic Press, New York.
- Solecki, Ralph
1941 The Indians Lived Here in So *This is Flushing*. Pamphlet in the collection of the Queens Borough Public Library. Long Island Division.
- SRI International
1998 *Final Environmental Impact Statement for Terminal Doppler Weather Radar to Serve John F. Kennedy International and LaGuardia Airports, New York, New York*. SRI International, Menlo Park, CA. On file, New York State Office of Parks, Recreation and Historic Preservation, Peebles Island, Waterford.
- Stayton, Kevin L.
1990 *Dutch By Design: Tradition and Change in Two Brooklyn Houses*. The Brooklyn Museum, Brooklyn.
- Stewart, William M.
1797 *Map of Jamaica Bay*. Copied by Edward A Bond, State of New York, Office of the State Engineer and Surveyor, Albany. [1903]
- Strong, John A.
1985 Late Woodland Dog Ceremonialism on Long Island in Comparative and Temporal Perspective. *The Bulletin of the New York State Archaeological Association* 91:32-38.
- Swift, Donald J.P.
1975 "Barrier-Island Genesis: Evidence from the Central Atlantic Shelf, Eastern U.S.A." *Sedimentary Geology* 14: 1-43.
- Taylor, George, and Andrew Skinner
1781 *Map of New York and Staten Island and Part of Long Island Surveyed by Order of His Excellency General Sir Henry Clinton, K.B.* Collection of the New York Public Library.

- Thompson, Benjamin F.
1918 *History of Long Island*. 3rd edition. Rpt 1962. Ira J. Friedman, Inc., Port Washington, NY.
- Tooker, William Wallace
1911 *The Indian Place-Names on Long Island and Islands Adjacent*. Rpt 1962. Ira J. Friedman, Port Washington, NY.
- Trelease, Allen W.
1960 *Indian Affairs in Colonial New York*. Rpt edition 1997. University of Nebraska Press, Lincoln.
- USACE (U.S. Army Corps of Engineers, New York District)
1965a *Cooperative Beach Erosion Control Study and an Interim Hurricane Survey of the Atlantic Coast of New York City from East Rockaway Inlet to Rockaway Inlet and Jamaica Bay, New York*. Included in House Document No. 215, 89th Congress, 1st Session. U.S. Government Printing Office, Washington, D.C.
- 1965b *Beach Erosion Control and Interim Hurricane Study for the Atlantic Coast of Long Island, Jones Inlet to East Rockaway Inlet*. U.S. Army Corps of Engineers, New York District, New York.
- 1973 *Atlantic Coast of New York City from Rockaway Inlet to Norton Point, New York (Coney Island Area), Cooperative Beach Erosion Control and Interim Hurricane Study (Survey)*. Department of the Army, New York District, Corps of Engineers, New York.
- 1974 *Atlantic Coast of New York City from East Rockaway Inlet to Rockaway Inlet and Jamaica Bay, New York. Beach Erosion Control and Hurricane Protection Project, General Design Memorandum No. 1, Beach Erosion Control*. Department of the Army, New York District, Corps of Engineers, New York.
- 2003 *Scope of Work and Request for Proposal for a Phase IA—Documentary Study for the Jamaica Bay Islands Ecosystem Restoration Project, Brooklyn (Kings) and Queens County, New York*. U.S. Army Corps of Engineers, New York District, New York.
- U.S. Coast Survey
1845 *Map of New-York Bay and Harbor and the Environs*. U.S. Coast Survey,
- 1878 *Rockaway Inlet and Western Part of Jamaica Bay, Long Island, New York*. U.S. Coast Survey,
- U.S. Coast and Geodetic Survey
1911 *Jamaica Bay and Rockaway Inlet, Long Island, New York*. Chart #542. U.S. Coast and Geodetic Survey
- 1926 *U.S. East Coast, New York, Jamaica Bay and Rockaway Inlet*. Chart #542. U.S. Coast and Geodetic Survey

- 1939 *U.S. East Coast, New York, Jamaica Bay and Rockaway Inlet*. Chart #542. U.S. Coast and Geodetic Survey
- 1948 *U.S. East Coast, New York, Jamaica Bay and Rockaway Inlet*. Chart #542. U.S. Coast and Geodetic Survey
- Van Wyck, Frederick
1924 *Keskachauge or The First White Settlement on Long Island*. G.P. Putnam's Sons, New York.
- Walling, H.F.
1859 *Topographical Map of the Counties of Kings and Queens, New York*. H.F. Walling, New York.
- Williams, S. Jeffress
1976 *Geomorphology, Shallow Subbottom Structure, and Sediments of the Atlantic Inner Continental Shelf Off Long Island*. New York. U.S. Army Corps of Engineers, Coastal Engineering Research Center Technical Paper No. 76-2. Fort Belvoir, VA.
- Williams, S. Jeffress, and David B. Duane
1974 *Geomorphology and Sediments of the Inner New York Bight Continental Shelf*. Technical Memorandum No. 45. U.S. Army, Corps of Engineers, Coastal Engineering Research Center, Fort Belvoir, VA.
- Works Progress Administration
1938 Historical Collections of the Borough of Queens. Bound Volumes in the Collection of the Queens Borough Public Library, Long Island Division.
- 1939 *New York City Guide*. Federal Writers Project. Random House, New York.
- Wrenn, Tony P.
1975 *General History of the Jamaica Bay, Breezy Point and Staten Island Units, Gateway National Recreation Area*. National Park Service.
- Wurm, Michael V.
1985 "Gateway News" dated January 24. *Rockaway Press*, p. 6
- W.W. Munsell and Co.
1882 *History of Queens County, New York*. W.W. Munsell and Co., New York.
- Yasso, Warren E., and Elliott M. Hartman, Jr.
1975 *Beach Forms and Coastal Processes*. Mesa New York Bight Atlas Monograph 11. New York Sea Grant Institute, Albany.
- Young, John C.
1956 Untitled Article, September 27, 1956 in bound collection of columns "Reminiscing with Old-Timer" from *The Wave of Long Island*. Collection of the Queens Borough Public Library, Long Island Division. 5 Vols.

APPENDIX A
Scope of Work

**SCOPE OF WORK AND REQUEST FOR PROPOSAL FOR A
PHASE 1A – DOCUMENTARY STUDY FOR THE
JAMAICA BAY ISLANDS ECOSYSTEM RESTORATION PROJECT
BROOKLYN (KINGS) AND QUEENS COUNTY, NEW YORK
DECEMBER 2003**

I. Introduction

The United States Army Corps of Engineers, New York District (USACE), is currently undertaking an Ecosystem Restoration Report within Jamaica Bay, Brooklyn (Kings County) and Queens County, New York. Restoration will occur on two islands within the bay, Elders Point and Yellow Bar, as well as using portions of Floyd Bennett Field as a staging area. This Scope of Work requires the completion of a Phase 1A Documentary Study of the Project Area.

As an agency of the Federal Government, the USACE has certain responsibilities concerning the protection and preservation of cultural resources within the project area. The USACE is responsible for identifying and determining if any properties and/or sites within the project area are eligible for listing on the National Register of Historic Places (NRHP). The federal statutes regarding these responsibilities include Section 106 of the National Historic Preservation Act of 1966, as amended, Executive Order 11593, and the Advisory Council on Historic Preservation Procedures for the Protection of Historic and Cultural Properties (36 CFR Part 800).

The USACE is working in conjunction with the non-Federal sponsor, The New York State Department of Environmental Conservation (NYS DEC). The National Park Service (NPS) and the New York City Landmarks Preservation Commission (NYC LPC) are working with the USACE as interested parties. Coordination with the New York State Office of Parks, Recreation and Historic Preservation (NYSOPRHP), the reviewing authority for this project, has also commenced.

This Purchase, Request and Commitment is to be contracted through NEA. NEA, along with its Cultural Resources subcontractor, Panamerican Consultants, has shown technical expertise within this field and project area, having previously completed a Phase 1A Study as part of the overall Jamaica Bay Ecosystem Restoration Project (JABERP), and having previously demonstrated performance on similar projects.

II. The Study Location and Description

Jamaica Bay, situated within the Boroughs of Brooklyn and Queens, New York City, is about eight miles long, four miles wide, covers twenty-six square miles and opens into the Atlantic Ocean via Rockaway Inlet. Floyd Bennett Field is located to the east and west of Flatbush Avenue just prior to the entrance to the Gil Hodges/Marine Parkway Memorial Bridge to the Rockaway's.

The objectives of this proposed project are to improve and restore tidal wetland habitat in interior portions of Jamaica Bay that previously were occupied by saltmarsh habitat. This area has been identified as having extensive restoration potential. The project has the following goals:

- Identify and design habitat improvement measures within the project area, including the restoration of tidal wetlands. Several areas have been identified for potential restoration and these alternative sites will be evaluated during the Ecosystem Restoration Report phase to determine the most effective site(s).
- Restoration of the areas with the greatest restoration potential, as defined by the Blue Ribbon Panel Report on the Jamaica Bay Islands and cooperative discussions between all agencies involved. Restoration includes debris removal, sediment re-nourishment, and wetland restoration. Over sixty percent of the interior islands have vanished, all of which were vegetated. In particular, sediment starvation, in part from the two navigation channels that surround the historic central marsh complex, has been identified as a major concern for any long-term restoration.

III. Previous Research

Although rich in history, there are currently no known Pre- or Historic sites, properties or structures on Elders Point and Yellow Bar Islands. Historic and possible Pre-historic sites are present within Floyd Bennett Field.

Although not overly urbanized, the Jamaica Bay area has seen significant changes in its history. Development has occurred within the marshlands and the first City of New York Municipal Airfield was constructed at Floyd Bennett Field as well as serving as a military base during World War II. There are several Cultural Resource Management Reports on the project area. The USACE recently completed a Phase 1 study of the Jamaica Bay Ecosystem Restoration Project area:

Panamerican Consultants, Inc.

2003 *Cultural Resource Baseline Study – Jamaica Bay Ecosystem Restoration Project – Kings, Queens and Nassau Counties, New York – Final Report July 2003.*

As part of the Scope of Work, these, and other, reports must be viewed and incorporated into the final product, as appropriate. The USACE can provide copies of the various reports that are in our archive, but others will have to be obtained from outside sources.

IV. Contractor Services and Required Investigations

The general services to be provided under this portion of the work order are those required to conduct research and fieldwork to determine the presence or absence of cultural resources within the project area. If resources are revealed an assessment of what additional studies should be presented.

The Contractor shall be responsible for conducting, in the manner prescribed and on schedule, the work detailed below. The Contractor must furnish professional quality draft and final reports. Failure to fully meet the requirements of this scope of work may be cause for termination of work for default of the work order, or for an evaluation of unsatisfactory upon completion of the project.

This scope of work requires the completion of the following tasks:

Task 1: Background Research

Documentary information may be located at the following: the NYSOPRHP, the NYC LPC, the NPS, the New York State Museum, New York City Department of Parks and Recreation's, Natural Resource Group (NRG) and Map Room, New York Historical Society, New York Public Library's Map Room, the Brooklyn History Reading Room at the Brooklyn Public Library – Grand Army Plaza and the Special Collections Room at the Jamaica Public Library, as well as other local collections may have records indicating previous work within the project area. A review of previous site files, maps and other supporting information should be conducted. Copies of historic maps of the project area will be obtained, referenced and included in the written report. Secondary materials, such as local histories, should be reviewed and used for background and reference materials. If possible, local informants should be consulted.

The report shall outline the prehistory and history of: Elders Point and Yellow Bar Islands and Floyd Bennett Field. The impact of the various alternatives planned on the possible resources should be discussed. Recommendations for future work, based on the research, shall be provided.

Task 2: Site Visit/Field Investigations

Fieldwork shall include a pedestrian survey to identify any surface indications of archaeological sites, particularly in locations in which background research and/or environmental conditions suggest sensitivity for resources. This scope of work requires a walking survey of the project area. A site map should be produced and detail the area surveyed. If possible locations are observed these areas must be noted on the site map. No subsurface testing will be conducted at this time.

Although no subsurface testing will be conducted as part of this Scope of Work, a pedestrian survey of Floyd Bennett Field should occur. Unless deemed necessary, field visits to Elders Point and Yellow Bar Islands are not necessary as these tidal, marshy islands can only be viewed from water.

The Contractor will provide a safe working environment for all persons in his/her employ as prescribed by 29 CFR 1910 EM 385-1-1, "Safety and Health Requirements" dated April 1981 and applicable U.S. Army USACE of Engineers regulations. The Contractor will be responsible for all damages to persons and property that occur in connection with the work and services under this work order, without recourse against the Government. The Contractor is responsible for having adequate insurance coverage for all activities required under this work order.

Task 3: Conduct data analyses in order to synthesize the results of the background documentary gathering and the field inspection.

The following information will be provided to the degree possible within the parameters of this Scope:

- a. List of current NRHP properties and/or districts within the project area
- b. Recommendation for further study within the project area

The recommendations for future work should take into consideration the proposed restoration plan. What, if any, mitigation will be required to meet with NYSOPRHP requirements under NEPA/NHPA?

Task 4: Report Preparation

The Contractor will prepare a detailed draft and final report to the standards specified in this Scope of Work. Photographs and maps should be included in all reports.

Four (4) copies of the draft report will be prepared and submitted to the District according to the schedule established in Section X "Project Schedule". The draft report will be reviewed by the USACE, the NYSOPRHP, the New York City Landmarks Preservation Commission (NYC LPC) and interested parties. All comments of the reviewing agencies and will be transmitted to the Contractor prior to the submission of the final report.

Six (6) copies of the final report shall be submitted to the USACE according to the schedule established in Section X "Project Schedule". The final report shall address all comments made on the draft report.

One (1) copy of the completed report will be submitted in digital format. This format will include a text version (i.e. MS Word 95 or greater format), electronic database and an Adobe Acrobat ".pdf" file (for text, charts, graphs, photographs, databases etc.).

The draft and final reports will clearly state whether additional studies are warranted. The reports will develop specific recommendations for conducting those studies.

Task 5: Project Management

The Contractor will be responsible for ensuring that all deliverables are provided on schedule and that all terms of this Scope of Work are satisfied. The Project Manager and the Principal Investigator shall consult with the USACE archaeologist throughout all project phases, as necessary.

V. Field Requirements

All measurements, if any, will be in metric.

Photographs will be done digitally. Photographs must be in 300dpi and saved in a TIFF format. All digital photographs will be included on a disk(s) submitted with the draft and final reports, as well as being insert into the written report.

All applicable OSHA safety standards will be observed. All work will be performed in accordance with the Health and Safety Plan and the USACE' *Safety and Health Requirements Manual*.

VI. Report Format and Content

The draft and final reports shall reflect and report on the fieldwork required by this Scope of Work. They shall be suitable for publication and be prepared in a format reflecting contemporary organizational and illustrative standards of professional archaeological journals. It must meet both the requirements for cultural resource protection and scientific standards of current research as defined in 36 CFR Part 800, SHPO Guidelines and the Council's Handbook.

The report will contain the following elements:

1. The **TITLE PAGE** will bear an appropriate inscription indicating the name and location of the project (city/village/town/county/state), authorship, including contributors, organizational affiliation and address, as well as the name and address of the prime/subcontractors, if applicable, the source of funds used to conduct the reported work, the agency and address to which the report was submitted and the date (month and year) the report was submitted.

2. If someone, other than Contract Principal Investigator, writes the report, the cover and title page of the publishable report must bear the inscription "Prepared Under the Supervision of (Name), Principal Investigator." The Principal Investigator is required to sign the original copy of the report. In addition, the Principal Investigator must at least prepare a foreword describing the overall research context of the report, the significance of the work, and any other background circumstances relating to the manner in which the work was undertaken.

3. The **TABLE OF CONTENTS** will provide a list of all chapters, figure, tables, appendices, etc. presented in the report.

4. A **BRIEF SYNOPSIS/ABSTRACT** of the project's findings and the documentation conducted shall appear in the front of the report and will be suitable for publication as an abstract. The following items are requested by the SHPO:

- a. The abstract should be limited to one or more pages and can be presented in outline or bullet form.

b. Project name/project title

c. Location, size, and boundaries of project area. Project area should include USGS citations, transportation boundaries, municipality and county names, survey boundaries, and approximate square miles.

d. The date of SHPO correspondence, if any.

e. Review authority.

f. Field and Recordation Methods.

g. Summary. Results should include the major facts of the report. For example, the number of targets investigated and documented.

h. Evaluations and impacts. This section includes a cursory assessment of the overall effects of the proposed project on the eligible sites.

i. Location where copies of this report on the survey area and sites within the survey area are on file.

5. An **INTRODUCTION** stating the purpose and goals of the report and summarizing all pertinent sections of the report. It should include the names of the project sponsor and contact person, the legislation relevant to the work being conducted, the geographic limits of the project area, approximate number of field hours, the dates of the study, the composition of the personnel, a project summary of findings, and a summary description of the documentation.

6. A **RESEARCH DESIGN** containing the following:

a. Objectives

b. Properties investigated and recorded

c. Methodology: Description of field and documentation methods used; discussion of how properties were selected; discussion of rationale for level of investigation and documentation; discussion of any deviation from original methodology and any problems or biases encountered during project.

7. A **DESCRIPTION OF THE PHYSICAL SETTING**, summarizing the natural and physical factors relating specifically to the location of cultural resources. Minimally, this should include, with maps if appropriate, information on the project area's, geology, soils, hydrology, climate, flora, built environment elements, listed or eligible New York or National Register buildings, sites, structures, objects, and/or districts in the area. This discussion should also address the urban/rural character of the environment, and recent human/natural disturbance. The discussion should also include a brief architectural analysis of the area, its general integrity, and overall physical conditions and layout.

8. A **LIMITED REVIEW OF PREVIOUS INVESTIGATIONS AND BACKGROUND RESEARCH** conducted in the study area and nearby, and should incorporate and reference information obtained from individuals and organizations knowledgeable about cultural resources in the project area.

9. An **OVERVIEW OF THE HISTORIC/TECHNOLOGICAL CONTEXT OF THE PROPERTIES** summarizing material presented in earlier reports and drawing upon new information gathered during the present investigations.

10. A **DESCRIPTION OF FIELD METHODS AND THEIR RATIONALE**, making explicit the manner in which the data were collected and analyzed.

11. A **DESCRIPTION OF THE RESULTS OF THE INVESTIGATIONS, AND DOCUMENTATION ACTIVITIES** synthesizing the previous research, field data, and laboratory analysis, if applicable. This should include specific statements about the significance of these canal-related resources and their preservation potential. Discuss the investigation work in detail, including the documentation efforts. Historic and current photographs, maps, plans, and other illustrations should be integrated into the text. In preparing the text, the authors should follow the requirements described in the Secretary of the Interior's *Standards and Guidelines for Archaeology and Historic Preservation* (48FR 44734-37), and the Advisory Council's handbook *Treatment of Archaeological Properties*.

12. **CONCLUSIONS/RECOMMENDATIONS** as to the potential NRHP listings.

13. A **REFERENCES CITED** section listing all references cited within the text and within any appendices, including all primary and secondary sources, the sources' location or repository, personal communications, interviews, and pertinent project correspondence. This list must be in the format used by professional archaeological journals, such as *Historical Archaeology*, *Journal for the Society for Historical Archaeology* or *IA*, *Journal for the Society for Industrial Archaeology*.

14. **APPENDICES** to the draft and final reports will include:

a. **LOG OF PERSONS/INSTITUTIONS**, etc contacted as part of this project, indicating their affiliation(s), address and areas of expertise. The log should include the date and means of the contact (telephone conversation, interview, or written communication).

b. **SUPPORTING DOCUMENTATION**

c. The **RESUME/CURRICULUM VITAE** of the key personnel

d. **SCOPE OF WORK**

14. **PAGE SIZE AND FORMAT.** Each report shall be produced on 8 1/2" x 11" paper, single-spaced, with double spacing between paragraphs. The printing of the text should be of good quality and should approximate letter quality. Maps, if necessary, may be produced on 8 1/2" by 17" paper. All text pages, including figures, tables, plates, and appendices, must be consecutively numbered.

15. **GRAPHIC PRESENTATION OF THE RESULTS.**

- a. All pages, including graphic presentations will be numbered sequentially.
- b. All tables shall have a number, title, appropriate explanatory notes and a source note.
- c. All figures shall have a title block containing the name of the project, county, and state, and will provide the reference, if applicable, as well as the name of the firm conducting the work.
- d. All maps shall display a north arrow, graphical scale, and key, where applicable. They will also include a reference, if applicable, and the name of the firm conducting the work.
- e. All graphic presentations, including maps, charts and diagrams, shall be referred to as "Figures." All figures must be sequentially numbered and cited by number within the body of the text.
- f. All graphic presentation should follow the page on which they were cited.
- g. Graphic presentation should include, but not be limited to, the following:
 - i. a project area base map, outlining clearly and accurately, the project boundaries on appropriate portion of the relevant U.S.G.S. quad sheet(s), with the name of the quad sheet(s) clearly indicated in the map title and year of issue.
 - ii. a cultural resources base map delineating the locations of test units and the properties that were documented during the investigation.

16. **PHOTOGRAPHS**

a. All photographs should be correctly keyed to the text and a principal map. Photographs should be counted as "Figures" in a single running series of illustrations. The captions underneath the photograph should also include the name of the photographer and the direction in which the camera is facing.

b. Digital photographs must be a minimum of 300dpi and in a TIFF format.

c. Aside from being included within the text, a separate disk(s) of the photographs should also be submitted. The disk(s) should be attached to the back of the submitted text within a closed/sealed CD envelope.

17. MAPS

a. A map of the project area should be included noting the location of the elements/structures which are being investigated.

b. The report should include the project area accurately delineated on a section of the USGS map and the appropriate quad labeled.

c. Maps should be integrated into the report and not appended. All maps should be correctly keyed to the text with photographed sites noted.

d. All maps, including reproductions of historic maps, should include a north arrow, delineation of the project area, legend, map title, bar scale, and year of publication.

18. OTHER ILLUSTRATIONS (IF NECESSARY)

a. Illustrations should be integrated and not appended. All illustrations should be correctly keyed to the text and the principal map.

b. Diagrams of engineering structures should include clearly labeled components.

c. Cross-sections, elevations, site plans, and profile drawings should include scale, elevation, orientation, location, title (historic name), construction date, and illustrator.

VII. Field Documentation

All original notes, forms, and maps will be retained and curated with the artifact collection as provided by 36 CFR Part 79.

VIII. Project Schedule

A. All reports should be submitted in a timely manner as stipulated below and with the notice to proceed:

1. The draft report will be submitted to the USACE four (4) weeks after the fieldwork ends. The USACE, the NYSOPRHP and the NYC LPC will review the draft report. One copy of the draft report will be returned to the Contractor with comments. The final report will address all comments provided with the draft report. The Contractor should receive comments from the draft report approximately six (6) to seven (7) weeks after submission.

3. The final report will be submitted to the USACE four (4) weeks after the Contractor receives comments on the draft report.

B. The number of copies for the draft and final reports will be submitted, according to the above schedule, as follows:

1. Four (4) copies of the draft report
2. Six (6) copies of the final report. One (1) copy of the final report must be bound in a 3-ring Binder. It is within this copy that the disk versions of the entire report and the photographs must be included. The other five (5) copies may be spiral or 3-Ring binder bound.
3. One (1) digital copy of the completed report will be submitted on a disk. The format should be a text version (in MS Word 95 or greater format), Adobe Acrobat “.pdf” file format (to best convert charts, graphs, photographs, text, etc.) and all databases.
4. Target dates for specific tasks include:
 - a. Field Work – completed approximately 30 business days beyond the contractors acceptance of the Notice to Proceed (no later than February 1, 2004)
 - b. Submission of Draft Report – completed approximately 20 business days beyond the completion of field work (no later than February 27, 2004)
 - c. Submission of Final Report – completed approximately 60 business days beyond the submission of the Draft Report (no later than May 1, 2004)

Note: These dates are based on an assumed Notice to Proceed being executed by December 29, 2003.

C. Scheduled completion date for the work specified in this scope is no later than June 1, 2004 from the notice to proceed.

IX. Additional Contract Requirements

A. The Contractor shall be responsible for the quality and validity of all products resulting from this delivery order. The Contractor’s Principal Investigator shall serve as the central point of contact for coordinating the preparation of all documents. The Contractor shall be responsible for total quality assurance through close technical review of all products delivered under this order. The Contractor shall direct the quality assurance function through technical analysis of all documentation to be performed by technical specialists in specific critical areas, as defined by current industry, and Army and District standards. In the event of a controversy or court challenge, Principal Investigators shall be required to testify on behalf of the government in support of findings presented in their reports.

B. If any member of the Contractor or Subcontractor’s team was not included in the original Base Contract submitted to the USACE, the team members qualifications, such as a Curriculum Vitae, must be included in the draft and final report.

C. Neither the Contractor nor his representatives shall release any sketch, photograph, report or other data, or material of any nature obtained or prepared under this work order without the specific written approval of the USACE prior to the time of final acceptance by the government.

C. The Contractor shall furnish all labor, transportation, instruments, survey equipment, and other associated materials to perform the work required by this Scope of Work.

X. Fiscal Arrangements

The Original Invoice shall be submitted to the USACE POC for review and certification. Payments will be made pursuant to the "Prompt Payment" and "Progress Payment" clauses of the contract.

The USACE Point of Contact for this project is:

Christopher Ricciardi, Archaeologist
U.S. Army USACE of Engineers - Planning Division
Jacob K. Javits Federal Building
26 Federal Plaza – Room 2131
New York, New York 10278-0090
Phone: (212) 264-0204
Fax: (212) 264-0961
E-mail: christopher.g.ricciardi@usace.army.mil

APPENDIX B
Vitae of Project Principals

PCI BUFFALO • TUSCALOOSA • MEMPHIS • TAMPA

Panamerican Consultants, Inc. • 2390 Clinton Street • Buffalo, NY 14227 • (716) 821-1650 • Fax (716) 821-1607

MICHAEL A. CINQUINO, Ph.D., RPA Senior Archaeologist/Senior Vice President

EDUCATION

- Ph.D. Anthropology, State University of New York at Stony Brook, 1986
- M.A. Anthropology, State University of New York at Stony Brook, 1977
- B.A. Sociology, St. John Fisher College, Rochester, New York, 1971

EXPERIENCE

Dr. Cinquino is currently Senior Vice President of Panamerican Consultants, Inc. (PCI) and director of the Buffalo (New York) Branch Office. A Senior Archaeologist, he has served as project manager/principal investigator on over 800 cultural resources projects throughout New York, Pennsylvania, New Jersey, Puerto Rico, the U.S. Virgin Islands, and the eastern United States. These projects include waterfront developments, natural gas pipelines, historic canals, transportation projects, flood control projects for the U.S. Army Corps of Engineers (USACE), interceptor sewers, construction monitoring, light rail rapid transit systems, fiber optic line installations, cellular communications towers, industrial parks, wastewater treatment plants, fuel storage projects, demolition projects, and at U.S. military installations. In addition, he prepared numerous cultural resource sections for environmental assessment, impact statements, environmental resource documents, and cultural resource management plans and environmental audits.

He is experienced at conducting cultural resource investigations on large-scale projects, including corridor/pipeline, fiber optic line and highway projects, military installations, wastewater projects, etc., which often require detailed archival and historic map research, design of field methodology including predictive site modeling strategies, all phases of archaeological field investigations, documentation and report preparation. He has conducted investigations at military installations throughout the eastern United States, Puerto Rico, and in the Virgin Islands.

Dr. Cinquino also has extensive regulatory experience on the federal and state levels as an archaeological consultant for the New York State Department of Environmental Conservation (NYSDEC) directing the cultural resource review for the NYSDEC permit program and State Environmental Quality Review Act (SEQRA) compliance, and as State Archaeologist and Review and Compliance Archaeologist for the Puerto Rico State Historic Preservation Office (SHPO). As an employee of Ebasco, he assisted in report reviews for the Federal Energy Regulatory Commission.

He is a member of the Register of Professional Archaeologists (RPA) and certified in Field Research and Archaeological Resource Management. Listed on the New York State SHPO's list of archaeologists, he is a member of the New York Archaeological Council (NYAC), certified to conduct all phases of investigations in prehistoric and historic archaeology, and is currently serving on the NYAC Board of Directors. Dr. Cinquino has completed the hazardous waste training course and is familiar with archaeological investigations in areas of potential hazard (e.g., hazardous materials, unexploded ordnance).

REPRESENTATIVE PANAMERICAN CONSULTANTS, INC. EXPERIENCE (1993-present)

Dr. Cinquino serves as project manager for PCI's contract and subcontracts with the New York District, U.S. Army Corps of Engineers (USACE). He has served or is serving as Project Manager and/or Principal Investigator for more than ninety (90) projects for the New York District, including the cultural resources assessment of T-groin Placement along the Atlantic Coast of New York, East Rockaway Inlet to Rockaway Inlet and Jamaica Bay, Queens County, NY; the cultural resources baseline study for the Jamaica Bay Ecosystem Restoration Project, Kings, Queens and Nassau Counties, NY; the preparation of Integrated Cultural Resource Management Plans for the Picatinny Arsenal, Dover, NJ, Watervliet Arsenal in Albany County, NY, and Fort Hamilton in Brooklyn, NY. PCI also has prepared under Dr. Conquino's direction an archaeological sensitivity model for Picatinny Arsenal, NJ, as well as ten archaeological and/or structural investigations at Picatinny Arsenal; three cultural resource investigations for the Joseph G. Minish Passaic River Waterfront Park in Newark, NJ, at least 20 archaeological and/or structural investigations at the U.S. Military Academy (USMA) at West Point, NY; and six cultural resource investigations (including structural evaluations) at the Green Brook Flood Control Project in northern New Jersey.

Dr. Cinquino served as Principal Investigator/Field Director and Project Manager for PCI's Phase IB Hazmat cultural resources investigation for the Forest Glen Superfund Site, Town of Niagara and City of Niagara Falls, NY. Conducted under contract to O'Brien & Gere Engineers, Inc., the Phase IB investigation was conducted on approximately 25 acres, 11 acres of which will be disturbed through implementation of the Forest Glen Superfund Site soil remedy. The additional area was tested in the event that future disturbance may be proposed in the northern portion of the site. The investigation included a review of appropriate environmental and background literature, and research conducted at the site, including surface inspection, shovel testing, and photographic documentation. Field work comprised a walkover reconnaissance of the entire site, excavation of 134 shovel tests throughout the property, and photographic documentation of site conditions and modern structures on the property. The initial walkover reconnaissance of the project area identified substantial areas of prior disturbance, industrial and commercial filling, topsoil removal, and evidence of current and past wetland conditions. These conditions were further documented by shovel testing in those areas and supported by the documentary review.

He served as Project Manager for a Phase II cultural resources investigation for a 12-acre portion of the Sayre & Fisher Brick Company Site (28Mi163) on River Road, Borough of Sayreville, NJ, for the Neptune Regional Transmission System, LLC. Conducted under contract to Ecology and Environment, Inc., the investigation also included a Phase IB investigation of an approximately 4,900-ft long proposed AC cable route surrounding the *Reliant Energy*® GPU Substation (Sayreville Power Plant). The Phase II investigation assessed the significance of all cultural resources within the Area of Potential Effect (APE). Specific research objectives include finding evidence of processes, technology and equipment used for brick manufacture at the Sayre & Fisher plant from the late nineteenth century through the early twentieth century. Historic maps were analyzed to assess archaeological sensitivity within the APE and determine locations with the highest research potential. The field investigation included pedestrian reconnaissance of the entire project area, photographic documentation, backhoe trench excavations and clearing, shovel testing, the excavation of one-by-one meter units, and recording the location of cultural features with a GPS unit. The pedestrian reconnaissance located 11 cultural features (typically structural remains [e.g. brick foundation or wall remains]). Four backhoe trenches were excavated, totaling 258 in length and uncovered five structural features below the present ground surface. The backhoe was also used to clear approximately 1,272 sq. ft. (338 sq. m) of rubble to further expose two features.

Dr. Cinquino served as Project Director and Co-Principal Investigator for the archaeological monitoring of overburden removal for the former Commercial Slip of the Erie Canal in the City of Buffalo as part of the Buffalo Inner Harbor Project, Erie County, New York. Conducted for Parsons, Brinckerhoff, and the Empire State Development Corporation, the archaeological monitoring ensured that the removal of approximately nine-to-ten feet of fill material from the former Commercial Slip would not impact any unexpected significant cultural resources. The investigation included preparation of a health and safety plan, monitoring of construction activities to assure no damage to the former slip or associated archaeological deposits occurred, documentation of archaeological deposits, limited collection of significant artifacts, cleaning, cataloging and artifact identification, photographic documentation, and report preparation.

He was Project Director for PCI's Phase IB cultural resources investigation at Clinton Square in the City of Syracuse, Onondaga County, New York. Prepared for Edward V. Curtin & Associates (under contract to Clough, Harbour & Associates, LLP), the investigation identified the presence and assessed the condition of the historic Erie Canal at Clinton Square. Phase IB investigations at Clinton Square involved backhoe monitoring in proposed areas of construction and hand excavation at six locations determined in consultation with Dr. Robert Kuhn of the New York SHPO.

Dr. Cinquino serves as PCI's Project Manager and/or Principal Investigator for pipeline projects conducted for National Fuel Gas Supply Corporation (NFGS) in Pennsylvania and New York (under contract to Northern Ecological Associates, Inc.). PCI's recent projects for NFGS were a Phase I cultural resource investigation of 18 miles of the proposed Northwinds natural gas pipeline route from the City of Buffalo south to the Town of Eden, including the cities of Buffalo and Lackawanna and the towns of Hamburg and Eden, Erie County, NY, and a Phase I investigation for the proposed Ellisburg Alternative pipeline in the towns of Allegany and Hebron, Potter County, PA. He served as Project Director for the Phase I investigation of the proposed Line X-M10 installation in the Town of Pendleton, Niagara County, New York; a Phase I for the proposed Line S-43 replacement in the Summit Township, Erie County, Pennsylvania, and a Phase I for the proposed Line K replacement in the Town of Orchard Park, Erie County, New York.

Dr. Cinquino was Co-Principal Investigator and Project Director for the cultural resources investigations conducted for the proposed Joseph G. Minish Passaic River Waterfront Park and Historic Area in Newark, New Jersey. Prepared for Northern Ecological Associates, Inc. under contract to the USACE, New York District, the study included the investigation and recordation of several industrial elements and structures that were components of properties eligible for listing in the National Register of Historic Places (NRHP), the enhancement of previously existing documentation conducted during earlier project phases, and the development of an archaeological sensitivity assessment for an area that was suspected of containing buried or submerge cultural resources. The investigation included extensive documentary and background research pertinent to the historic development of that portion of the Passaic River in Newark, supplemented by map research of three industrial sites; on-site inspection of the entire project area, with specific attention paid to the impacted cultural resources; a review of earlier reports addressing cultural resources affected during the first phase of the proposed project; and an architectural assessment and photographic documentation of numerous structures within the project area.

Dr. Cinquino was principal investigator for the Phase I archaeological investigation of approximately 1700 acres of Griffiss Air Force Base in Rome, Oneida County, New York, and annexes in Niagara County, under contract to Tetra Tech, Inc. He also served as Principal Investigator for the subsequent Phase II investigation of 20 archaeological sites at Griffiss Air Force Base to determine National Register eligibility of these resources. He later served as project manager for PCI's

archaeological monitoring during the removal of contaminated soil in the vicinity of archeological site PCI 16A (SHPO #AO6541.000438) at the former Griffiss Air Force Base. The project was conducted to ensure no adverse impacts occurred to the National Register-eligible site (two fieldstone wells) as a result of remediation work conducted by PEER Consultants, Inc.

ADDITIONAL EXPERIENCE

Dr. Cinquino was employed by Ebasco Environmental, Inc. as archaeologist. His responsibilities included providing technical support to FERC staff, reviewing cultural resource reports and preparing documentation for FERC certificated EISs and EAs. He conducted various cultural resource projects including serving as co-principal investigator for a Stage IA Cultural Resource Survey, Olean Superfund Site, Cattaraugus County, NY.

Puerto Rico State Historic Preservation Office (3 Years), San Juan, Puerto Rico

Dr. Cinquino served as State Archaeologist and Review and Compliance Archaeologist for the PRSHPO. His responsibilities included direction of Review and Compliance Section for Archaeology, review of Stage IA, IB, II, and III cultural resource reports, environmental assessments and impact statements for compliance of federal preservation laws and regulations, initial project assessment to determine level of archeological investigation, review of archeological proposals to conduct site testing (Stage II) and data recovery/mitigation (Stage III) investigations, site inspection visits through the island, review of cultural resources for eligibility to the National Register of Historic Places. He helped develop and implement formal field investigation and report documentation standards at the PRSHPO and for the PR Advisory Council guidelines for local projects.

NY State Department of Environmental Conservation, Regulatory Affairs, Albany

He was employed as Archaeological Consultant/Director of Cultural Resource Review for State Permits. His responsibilities included direction, coordination, and management of the statewide Uniform Procedure Act's permit program for compliance with the SHPA and SEQRA. Responsibilities included review of 300 to 400 annual permit applications determining level of cultural resource survey, site testing, and mitigation required; critical report review, and, if required, State Register review (National Register process); developed and implemented survey standards and guidelines for the program; conducted training sessions to educate statewide department personnel concerning cultural resource management and compliance with the SHPA and SEQRA; discussed cultural resource process and NYS permit regulations with applicants, consultants, and lawyers, and presented lectures to various interest groups.

Ecology and Environment, Inc., Buffalo, New York (1980-1986)

As Senior Archaeologist Dr. Cinquino's responsibilities included conducting and directing archaeological field surveys and subsequent report preparation, project management, preparing technical proposals, manpower needs, and costing; conducting archival research and site file searches, and client relations including detailing their responsibilities in complying with New York State and Federal cultural resource laws. Conducted and directed field surveys in New York, Puerto Rico, New Jersey, Ohio, Pennsylvania, and Massachusetts. Prepared cultural resource sections for environmental impact statements and environmental assessments for numerous projects throughout New York, Puerto Rico and the United States. Conducted cultural resource surveys for a diversity of projects including rapid transit systems, municipal wastewater treatment projects, shopping malls, light industrial parks, natural gas transmission lines, and U.S. Naval installations.

Panamerican Consultants, Inc.

Cinquino, p.

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 serving as Co-Principal Investigator conducted extensive documentary and background research and prepared the sensitivity assessment for a cultural resources baseline study of eight watershed areas for the Flushing Bay Ecosystem Restoration Project (FLUBERP), Queens County, New York. The investigation was conducted for the U.S. Army Corps of Engineers, New York District under contract to Northern Ecological Associates, Inc.

He also served as Co-Principal Investigator for the cultural resources baseline study of twelve proposed ecosystem restoration sites situated around Jamaica Bay, Kings, Queens and Nassau counties, New York, as part of the proposed Jamaica Bay Ecosystem Restoration Project, New York. As part of the study, he conducted background and documentary research and prepared the sensitivity assessment. The investigation was conducted for the U.S. Army Corps of Engineers, New York District under contract to Northern Ecological Associates, Inc.

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:

1. Cultural Resources Reconnaissance of the Atlantic Coast of Long Island, Jones Inlet to Rockaway Inlet, Long Beach Island, Nassau County, New York.
2. 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.
3. Archaeological Documentary Study and Field Testing, Sobel Court Park, Staten Island, New York. Conducted for New York City Department of Parks and Recreation.
4. Archaeological Documentary Study, South Jamaica Urban Renewal Area, Borough of Queens, New York. Conducted for New York City Department of Housing Preservation and Development.
5. 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.

PCI BUFFALO • TUSCALOOSA • MEMPHIS • TAMPA

Panamerican Consultants, Inc. • 2390 Clinton Street • Buffalo, NY 14227 • (716) 821-1650 • Fax (716) 821-1607

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 for Panamerican Consultants, Inc. (PCI) and serves as director of report and proposal production at the Buffalo (New York) Branch office. He has more than ten (10) years experience conducting archival and historic period research and analysis. His experience includes preparing historic contexts, local historic period summaries, site-specific historic period discussions, and historic site sensitivity assessments for statewide, regional, and local cultural resources and archaeological projects. These investigations include conducting archival, documentary, ethnohistoric, and cartographic research and preparing the historic period background of project sites; analyzing existing prehistoric and historic site and structure files, relevant federal and state census and deed research; and preparing written evaluations for inclusion in archaeological and cultural resources management reports and documents. Mr. Steinback exceeds the minimum professional qualification standards as delineated in 36 CFR Part 61 for History. He has a Masters degree in history and more than ten years of full-time experience in research, writing, teaching, and interpretation of historical data.

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 Corps and Navy), pipeline/corridor projects, and flood-control projects, which often require detailed archival and historic map research, design of research questions as part of field methodologies, and report preparation (including Historic American Building Survey [HABS]/Historic American Engineering Record [HAER]-level documentation). In addition, he has more than ten (10) years editorial experience and has edited more than seventy-five (75) cultural resource, archaeological, structural, and environmental assessment reports for both public and private sector clients. He has been with PCI since 1995.

Between 1991 and 1995 Mr. Steinback taught courses in American History and Western Civilization at Schenectady County Community College, Schenectady, New York, as an adjunct history instructor. He also has conducted research for state regulatory agencies, having worked for two years (1987-1989) at the New York State Department of Environmental Conservation (NYSDEC) in the Cultural Resources Section performing duties related to several major department projects. His early research interests focused on the development and practice of mercantilist theory as it concerned English colonization of North America and the Caribbean. His 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 Organization of American Historians and the New York State Historical Association.

REPRESENTATIVE PANAMERICAN CONSULTANTS, INC. EXPERIENCE (1995-present)

Since 1995, Mr. Steinback has served as project historian for more than 300 cultural resources investigations. Currently, he is PCI's project historian for the cultural resources investigation for the Federal Energy Regulatory Commission (FERC) recertification of the New York Power Authority's (NYPA) Niagara Power Project. PCI's investigation, under contract to URS Corporation, covers the American side of the Niagara River corridor, including the cities of Niagara Falls and North Tonawanda, the towns of Porter, Lewiston, Wheatfield, and Niagara, Niagara County, and the cities of Buffalo and Tonawanda, the towns of Grand Island, and Tonawanda, Erie County, New York. He is conducting archival, documentary and cartographic research, reviewing the NRHP and New York State archaeological and historic site information, and preparing the historic context for the extensive Niagara River project area.

As PCI's project historian, he prepared the Cold War historic contexts for the architectural inventory and National Register evaluation of historic structures at Fort Monmouth (New Jersey), Pine Bluff Arsenal (Arkansas), Umatilla Chemical Depot (Oregon), and the Soldier System Center (Natick, Massachusetts) under contract to the U.S. Army Medical Research and Materiel Command. For each installation, he conducted a site visit and installation-specific archival and documentary research and prepared a summary of the installation's history and a Cold War (1946-1989) historic context based on the Army Materiel Command (AMC) Cold War context. This context was used as part of the evaluation of historic structures at each installation for eligibility for listing in the NRHP.

Mr. Steinback served as 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, NY. 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, NY, the investigation included archival and documentary research, a walkover reconnaissance of the area of potential effect, 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.

He served as PCI's project historian for an extensive multi-site wetlands restoration project in central and northern New York State for the U.S. Department of Agriculture, Natural Resources Conservation Service, Syracuse Office. The project included 17 restoration sites in several counties, including Otsego, Montgomery, Jefferson, Broome, Lewis, Oneida, Oswego, Madison, and St. Lawrence counties. Mr. Steinback conducted background, cartographic, and documentary research and supervised the preparation of the historic context for each of ten (10) reports submitted for the project. He edited two of the reports.

Mr. Steinback was PCI's project historian for the Phase IA cultural resources investigation for the proposed Buffalo Inner Harbor and Waterfront Development Transportation Infrastructure 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, relevant cultural resources reports, and historic maps, and prepared

the environmental background section and historic context for the project area along Buffalo's waterfront and the historic, Erie Canal-associated Commercial Slip adjacent to Lake Erie. The Phase IA study was conducted for Foit-Albert Associates, Buffalo.

He edited, conducted background research and prepared sections of the historic period discussion for the National Register eligibility determination for the Doland House (Building 3119) and Buildings 3617, 3618 and others at the former Naval Air Rocket Test Station (NARTS), Test Area E, Picatinny Arsenal, Morris County, New Jersey. Both PCI reports were submitted to the U.S. Army Corps of Engineers (USACE), New York District, under contract to Northern Ecological Associates, Inc. The engine for the X-15 aircraft was developed at the NARTS facility.

Mr. Steinback has conducted background, archival, cartographic, and documentary research and prepared the historic period background for 17 projects at the U.S. Military Academy at West Point, New York. Conducted for the USACE, New York District, these projects included fourteen (14) 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 proposed Stony Lonesome By-Pass, the proposed Hurricane Floyd timber harvest, the former Married Junior Officer's Quarters, the proposed Gross Olympic Center, and the proposed Range Road 22 timber harvest); one Phase II investigation (for the Stony Lonesome PX); one Phase III data recovery project (Revolutionary War Hut Site #6), and one section for the Arvin Gym environmental impact statement. These projects were conducted for construction of a child development center, a new PX, an Olympic swimming center, a road relocation, and proposed timber harvests. Both prehistoric and historic period sites have been identified during the field investigations.

He was the project historian for the Phase IA cultural resources investigation for the proposed Erie County Convention Center alternatives in the City of Buffalo. 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 areas. Three sites within the City of Buffalo were identified for the location of the proposed convention center. The Phase IA study was conducted for the three proposed alternatives for the Erie County Department of Environment and Planning under contract to Ecology & Environment, Inc.

Mr. Steinback served as PCI's project historian and conducted historical and environmental research for a Phase I cultural resource investigation for the proposed Catskill Casino, Hamlet of Leeds, Town of Catskill, Greene County, New York. The project area comprised approximately 66 acres of primarily wooded hilly terrain. Conducted for URS Corporation, the investigation included a site file and literature check, archival and documentary research, and archaeological field work. The cultural resources investigation was conducted in compliance with the New York State Environmental Quality Review Act (SEQRA), the State Historic Preservation Act (SHPA), and appropriate federal legislation. Only a single, isolated Levanna projectile point was recovered from the surface of an area stripped of topsoil during the survey.

As PCI project historian, he also conducted environmental, archival and background research to develop the historical sensitivity for three fiber optic line installations in New York state, including Phase IA and Phase IB cultural resources investigations for the proposed Rensselaer County fiber optic line from Albany to the Massachusetts State Line through Rensselaer County,

NY (26 miles; for Telergy, Inc., North Syracuse, NY); a Phase IA and Phase IB cultural resources investigation for the proposed Long Haul fiber optic line from South Buffalo to the New York State-Pennsylvania Border through Erie, Cattaraugus, and Chautauqua Counties, NY (83 miles; for Parsons Brinckerhoff Network Services, Inc., Milford, MA); and Phase IA and Phase IB investigations for the proposed fiber optic line from Stephentown, Rensselaer County, to White Plains, Westchester County, NY along Routes 22 and 684 parallel to New York's borders with Massachusetts and Connecticut (130 miles; for Telergy, Inc.).

He was PCI's project historian for the Phase IA cultural resources investigation for the proposed restoration of vehicular traffic on Main Street, City of Buffalo, New York. Prepared for Environmental Resources Management, the investigation was conducted in support of the preparation of an environment assessment (EA) for the proposed restoration of vehicular traffic to approximately 6,600 linear feet of Main Street in the City of Buffalo. The project area for the proposed restoration is Main Street between Tupper Street at the north end and Scott Street at the south. Mr. Steinback conducted a site file and literature check, 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.

Mr. Steinback served as PCI's project historian for a Phase I cultural resources investigation as part of an emergency stream bank restoration study for the Walkkill River in the Town of Rosendale, Ulster County, New York. The investigation was completed for the USACE, New York District under contract to Barry A. Vittor & Associates, Inc., and was conducted to assist the USACE in meeting its cultural resource management responsibilities as articulated under Section 106 of the National Historic Preservation Act (as amended), as well as other federal statutes. The purpose of the study was to identify any cultural resources that may be impacted through stream bank restoration activities. The project area consisted of an approximately 1,300-foot stretch along the north bank of the Walkkill River where it parallels River Road in the Town of Rosendale. The investigation included a site file and literature check, archival and documentary research, and fieldwork. Field investigations included a thorough pedestrian survey, photographic documentation, and subsurface (shovel) testing. No significant cultural resources were identified during this investigation.

For the New York State Education Department's Cultural Resources Survey Program, Mr. Steinback served as PCI's project historian for four projects in western New York. These projects were a Phase I Archaeological and Architectural Reconnaissance Survey for PIN 5111.76.121, NYS Route 20 Bridge over Little Canadaway Creek (BIN 1015390) Lambertton, Town of Pomfret, Chautauqua County, New York (2001); Cultural Resources Site Examination Shoe-Last Factory Site (NYSM #11075) PIN 5576.71.121, Town of Ischua, Cattaraugus County, New York (2001); Phase I Archaeological and Architectural Reconnaissance Survey for PIN 5576.71.121, NYS Route 16 Bridge Replacements (BIN 10111700 and BIN 1095540) and Stream Work at BIN 1095540, Ischua, Cattaraugus County, New York (2000); Cultural Resource Reconnaissance Survey Report for Pin 4089.01.101 NYS Route 89 Bridge (BIN 1034330) Replacement, Town of Savannah, Wayne County, New York (2000).

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, Stewart Army Subpost, Gross Olympic Center, Bull Hill Road Extension, former Married Junior Officers' Quarters (Building 124), timber harvests at Turkey Mountain-Long Pond, Firebreak 2, and Range Road 22, Hurricane Floyd timber sale areas, and the 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, Oswego, Otsego, Lewis, Oneida, 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.

PROFESSIONAL AFFILIATIONS

Register of Professional Archaeologists
Society for Historic Archaeology
Society for Latin American Anthropology
Society for American Archaeology
American Anthropological Association
International Association for Caribbean Archaeology

REPRESENTATIVE PANAMERICAN CONSULTANTS, INC. EXPERIENCE (1992 to Present)

Dr. Hayward served as Co-Principal Investigator and prepared the sensitivity assessment for a cultural resources baseline study of eight watershed areas for the Flushing Bay Ecosystem Restoration Project (FLUBERP), Queens County, New York. The investigation was conducted for the U.S. Army Corps of Engineers, New York District under contract to Northern Ecological Associates, Inc.

She also served as Co-Principal Investigator and prepared the sensitivity assessment for the cultural resources baseline study of twelve proposed ecosystem restoration sites situated around Jamaica Bay, Kings, Queens and Nassau counties, New York, as part of the proposed Jamaica Bay Ecosystem Restoration Project, New York. The investigation was conducted for the U.S. Army Corps of Engineers, New York District under contract to Northern Ecological Associates, Inc.

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 contract to Parsons, Brinckerhoff, Quade & Douglas, Inc. for the Empire State Development Corporation of New York. Previous archaeological investigations had uncovered remnants of the Commercial Slip, which beginning in the 1800s linked the Buffalo River with the Erie Canal. The slip was subsequently filled in by 1926. The next phase of the slip and surrounding waterfront development project necessitated the removal of the overburden and exposure of the slip wall elements for assessment. 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. An intensive surface and subsurface examination of the adjoining 0.6-acre grounds was subsequently undertaken to locate any associated features or middens. A low concentration of historic and modern materials was recovered; no features were located; and a reworked terrain and vegetation profile were indicated.

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.

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.

Dr. Hayward served as Senior Researcher to prepare a Multiple Property Nomination with three individual rock art sites in Puerto Rico to the National Register of Historic Places (NRHP). The

project involved field, library, and archival investigations with the goal of nominating to the National Register island rock art sites in general along with three individual locations. Dr. Hayward in collaboration with Dr. Michael A. Cinquino of Panamerican completed the investigations with monies obtained from the National Park Service's Historic Preservation Fund Grant, administered by the PRSHPO.

Dr. Hayward, along with Dr. Michael A. Cinquino of Panamerican Consultatns and Dr. C.N. Dubelaar of the Netherlands, authored a book on Puerto Rican rock art—*Puerto Rican Rock Art: a Resource Guide*. The funds for the book's publication were obtained from the National Park Service's Historic Preservation Fund Grant administered by the PRSHPO. The book provides a history of the project, an outline of Puerto Rican rock art characteristics, a listing of rock art sites on the island, and associated bibliographic references.

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.