

**ATLANTIC COAST OF NEW YORK, EAST ROCKAWAY INLET TO ROCKAWAY INLET
AND JAMAICA BAY
INTEGRATED HURRICANE SANDY GENERAL REEVALUATION REPORT AND
ENVIRONMENTAL IMPACT STATEMENT**

APPENDIX H – PERTINENT CORRESPONDENCE

AUGUST 2016



United States Department of the Interior

NATIONAL PARK SERVICE
Northeast Region
United States Custom House
200 Chestnut Street
Philadelphia, PA 19106

IN REPLY REFER TO:

A.1.2.(NER-RSS)

JUL 21 2016

Mr. Clifford S. Jones
Chief, Planning Division
Department of the Army
U.S. Corps of Engineers, New York District
Jacob K. Javits Federal Building
26 Federal Plaza
New York, NY 10278-0090

Dear Mr. Jones:

Thank you for your letter dated June 29, 2016, requesting that the National Park Service (NPS) be a cooperating agency in the National Environmental Policy Act (NEPA) process for the integrated Hurricane Sandy General Reevaluation Report/Environmental Impact Statement (HSGRR/EIS) to examine coastal storm management problems and opportunities for the East Rockaway Inlet to Rockaway Inlet and Jamaica Bay area.

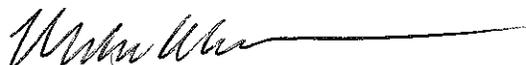
The NPS is pleased to accept the role of cooperating agency in the HSGRR/EIS being prepared by the United States Army Corps of Engineers, New York District (USACE). In addition, the NPS also requests to participate as a consulting party in the USACE's consultation process under Section 106 of the National Historic Preservation Act for the HSGRR/EIS.

We believe it is to our mutual benefit for the NPS to cooperate in the preparation of this plan. The NPS mission is to manage our lands for the preservation of and access to natural, cultural and recreational resources in perpetuity. In addition, by working collaboratively we can ensure that the HSGRR/EIS is mutually acceptable to the Secretary of the Interior and the Secretary of the Army and consistent with Gateway National Recreation Area (GATE) enabling legislation (16 U.S. Code Subchapter LXXXVII). Understanding that the HSGRR/EIS is necessary for the protection of the adjacent communities, NPS is committed to working with USACE to avoid and minimize adverse impacts on NPS resources while advancing the goals of this project. By working closely with USACE throughout the NEPA and Section 106 processes, the NPS can assist in identifying park resources of concern as well as potential issues and impacts to park resources and park visitors that need to be addressed in the NEPA and 106 review. The NPS can

also assist in identifying appropriate mitigation measures to avoid and minimize impacts to NPS resources.

We look forward to continuing to work with you as a cooperating agency and consulting party as you move forward with this project. If you have any questions, please contact Jen Nersesian, Superintendent, Gateway National Recreation Area (jen_nersesian@nps.gov , 718-354-4665).

Sincerely,



Michael A. Caldwell
Regional Director
National Park Service

cc:

Colonel David A. Caldwell, Commander and District Engineer, USACE New York District
Peter Wepler, Chief, Environmental Analysis Branch, USACE New York District
Robert Smith, Environmental Analysis Branch, USACE New York District
Dan Falt, Project Manager, USACE New York District
Andrew Raddant, Regional Environmental Officer, DOI
Frank Hays, Associate Regional Director, Resource Stewardship, NERO, NPS
Acting Chief, Division of Resource Planning and Compliance, NERO, NPS
Jacki Katzmire, Regional Environmental Coordinator, Division of Resource Planning & Compliance, NERO, NPS
Joshua Laird, Commissioner, National Parks of New York Harbor
Jennifer Nersesian, Superintendent, GATE
Minka Sendich, Deputy Superintendent, GATE
Patti Rafferty, Resource Stewardship, GATE
Dave Taft, Coordinator, JBU-GATE
Marilou Erhler, Cultural Resource Stewardship Division, GATE
Doug Adamo, Natural Resource Management Division, GATE



DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT
JACOB K. JAVITS FEDERAL BUILDING
26 FEDERAL PLAZA
NEW YORK NY 10278-0090

Commander

AUG 01 2016

The Honorable Charles E. Schumer
United States Senate
322 Hart Senate Office Building
Washington, DC 20510

Dear Senator Schumer:

Thank you for your letter dated June 24th, 2016 regarding the public release of the Draft General Reevaluation Report (GRR) and Environmental Impact Statement (EIS) for the East Rockaway Inlet to Rockaway Inlet and Jamaica Bay, NY Reformulation Study. I appreciate your direct engagement and involvement in this issue, and agree that the timeliness of this report is of extreme importance.

The U.S. Army Corps of Engineers (Corps) has been coordinating with the State of New York, the City of New York and the U.S. Department of Interior in anticipation of the release of this report. Our path forward includes revisions to certain sections of the report that address comments from those agencies. Our report will now also include the results of a City of New York water quality study that will provide valuable information to reviewers on complex environmental and water quality issues. This should afford additional confidence for decision making in the future.

We expect the official public release of the Draft GRR and EIS during the week of August 15th, 2016, followed by a formal 60 day public review period to ensure ample opportunity for public comment. During this period, several public information sessions will be held, and local leaders will be engaged to ensure feedback is received on this proposed project.

We look forward to continued cooperation as we complete this significant effort. If you have any additional questions please call me, or Mr. Anthony Ciorra at (917) 790-8000.

Sincerely,

A handwritten signature in black ink, appearing to read "D. Caldwell", written over a white background.

David A. Caldwell
Colonel, U.S. Army
Commander



DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT
JACOB K. JAVITS FEDERAL BUILDING
26 FEDERAL PLAZA
NEW YORK NY 10278-0090

Commander

The Honorable Phillip Goldfeder
New York State Assembly
9516 Rockaway Beach Boulevard
Rockaway Beach, NY 11693

AUG 01 2016

Dear Mr. Goldfeder:

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Sincerely,

A handwritten signature in black ink, appearing to read "D. Caldwell".

David A. Caldwell
Colonel, U.S. Army
Commander



United States Department of the Interior

NATIONAL PARK SERVICE
Gateway National Recreation Area
210 New York Ave., Staten Island, N.Y. 10305

IN REPLY REFER TO:

July 20, 2016

Colonel David A. Caldwell
Commander and District Engineer
United States Army Corps of Engineers, New York District
26 Federal Plaza
New York, NY 10278-0090

RE: Hurricane Sandy General Reevaluation Report/Environmental Impact Statement

Dear Colonel Caldwell:

I am writing in response to Peter Weppeler's June 22, 2016 request that the National Park Service (NPS) provide a fatal flaw review of the pre-public draft Hurricane Sandy General Reevaluation Report/Environmental Impact Statement (HSGRR/EIS). I appreciate that your staff have provided Gateway National Recreation Area (GATE) with an opportunity to review the pre-public document. I also want to acknowledge the collaboration and dialogue that has been offered by your staff in its development, which has been excellent and will undoubtedly result in a stronger, more comprehensive plan.

NPS is committed to working with USACE to reduce storm damage risks to communities within the project area, while also minimizing adverse impacts to National Park Service (NPS) resources. We realize this is a difficult balance with competing and often conflicting interests and priorities, and that the safety of the people in harm's way is of paramount consideration. It is our goal to work with you, the other involved agencies, and the public to ensure that the proper level of protection is achieved, and to do so in an expeditious manner.

It is also our goal to ensure that within that framework of protection we are maximizing every opportunity to preserve the natural, cultural and recreational resource values for which the NPS lands and waters within the project area were preserved. We are confident that by working together we can refine the proposal to better reflect both of our federally mandated missions—protection and stewardship—as they intersect in the Jamaica Bay and the Rockaway shoreline environments. In some cases we are hopeful that potential impacts to these resources can be reduced; and where impacts are unavoidable to safeguard the well-being of the surrounding communities, we will work with you to identify mitigation measures at the appropriate scale to compensate for the loss of an irreplaceable, publicly held good. With that in mind we offer the following initial observations and comments:

The HSGRR/EIS does not acknowledge that any plan must be mutually acceptable to the Department of the Interior as well as the Army Corps of Engineers (USACE). GATE enabling legislation (16 U.S. Code Subchapter LXXXVII) states that “The authority of the Secretary of the Army to undertake or contribute to water resource developments, including shore erosion control, beach protection, and navigation improvements (including the deepening of the shipping channel from the Atlantic Ocean to the New York harbor) on land and/or waters within the recreation area shall be exercised in accordance with plans which are mutually acceptable to the Secretary of the Interior and the Secretary of the Army and which are consistent with both the purpose of this subchapter and the purpose of existing statutes dealing with water and related land resource development.”

The Tentatively Selected Plan (TSP) will have significant, persistent and irreversible impacts to GATE natural, cultural and recreational resources. The TSP will result in the loss of coastal natural resources, alteration of natural coastal function, alteration of the setting, feeling and association of six Historic Districts within GATE, and alteration of visitor experiences and opportunities. The NPS’s authority to conserve and manage park resource is derived from the Organic Act of 1916, which states that “the fundamental purpose of the said parks...is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations.” Given the magnitude and permanence of the preferred alternative, following full NEPA analysis, the NPS will likely have to conclude that the project will result in impairment of park resources.

The TSP requires extensive construction on NPS property. NPS has not yet identified a legal means to authorize construction and confer long-term liability and maintenance responsibility in perpetuity to an outside entity. As we work towards resolution on this issue for the South Shore of Staten Island Coastal Storm Risk Management Study we hope to identify a pathway forward that will be applicable to this project as well.

USACE has invited and NPS has accepted cooperating agency status under the National Environmental Policy Act (NEPA) on the HSGRR/EIS. Cooperating agency status will facilitate NPS adoption of the HSGRR/EIS in order to issue a NPS Record of Decision. The impact analysis of the HSGRR/EIS is insufficient to meet NPS NEPA requirements. In addition, conclusions of the impact analysis for no impact or long-term beneficial impact are often inconsistent with how NPS would evaluate some of the impacts identified in the HSGRR/EIS. The policies and procedures by which NPS meets NEPA requirements are provided on-line (<https://www.nps.gov/subjects/nepa/policy.htm>).

The plan does not adequately support the need for a tie-in that spans nearly all GATE property on the Rockaway Peninsula. The HSGRR/EIS does not evaluate tie-in alternatives that minimize impacts to GATE resources. NPS has previously discussed with USACE tie-in alternatives that would minimize impacts to NPS natural, cultural and visitor resources. These alternatives included elevation of Rockaway Point Boulevard to provide Roxbury with protection from ocean derived storm surge and tie-in along existing bayside floodwall and east end of Jacob Riis Park.

The plan does not offer a mitigation plan to compensate for the impacts to nationally significant natural, cultural, and recreational resources. We understand that additional work will be

conducted to fully identify mitigation requirements for the bay components of the project; however, mitigation for impacts to sediment transport west of the Rockaway Beach Shorefront Coastal Management Units is not identified in the plan. The existing Rockaway groin field has resulted in interruption of sediment transport processes and increased vulnerability of park resources to storm damage at Jacob Riis Park and Fort Tilden. Additional groins will be constructed as part of this project. NPS has previously requested notching or shortening of the terminal groin and/or nourishment of NPS beaches concurrent with nourishment cycles for the Rockaway Beach Shorefront to mitigate for the impact to the sediment transport.

Tribal consultation should include the Stockbridge Munsee Tribe as well as the tribes currently identified in the report (Shinecock Indian Nation, Delaware Tribe of Indians, and Delaware Nation).

The report fails to identify NPS projects as cumulative impacts. These include Sandy resilience projects at Fort Tilden, Jacob Riis Park, West Pond and Floyd Bennett Field.

Again, we are committed to seeing this plan move forward in an expeditious manner to better protect the communities in and around Jamaica Bay and the Rockaway Peninsula, and are standing by to work with you on solutions that will address the concerns conveyed in this letter. If you have any questions regarding our fatal flaw review or wish to discuss next steps, please contact me (jen_nersesian@nps.gov, 718-354-4665) or Patti Rafferty (patricia_rafferty@nps.gov, 718-354-4625), our Chief of Resource Stewardship for the park. We appreciate your ongoing collaboration in this effort.

Sincerely,



Jennifer T. Nersesian
Superintendent, Gateway National Recreation Area

cc:

Peter Wepler, Chief, Environmental Analysis Branch, USACE New York District
Dan Falt, Project Manager, USACE New York District
Frank Hays, Associate Regional Director, Resource Stewardship, NERO, NPS
Joshua Laird, Commissioner, National Parks of New York Harbor
Minka Sendich, Deputy Superintendent, GATE
Patti Rafferty, Resource Stewardship, GATE
Dave Taft, Coordinator, Jamaica Bay Unit, GATE
Pam McLay, Business Services, GATE
Marilou Erhler, Cultural Resource Stewardship, GATE
Doug Adamo, Natural Resource Stewardship, GATE



DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT
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June 29, 2016

Planning Division

Jennifer T. Nersesian, Superintendent
National Park Service
Gateway National Recreation Area
210 New York Avenue
Staten Island, NY 10305

Dear Ms. Nersesian:

With the passage of the Hurricane Sandy Disaster Relief Appropriations Act of 2013 (Public Law 113-2), the U.S. Army Corps of Engineers has been given the authority and funding to complete ongoing coastal storm damage risk reduction projects and studies in the Northeast. As part of the planning process, the New York District is preparing an integrated Draft Hurricane Sandy General Reevaluation Report/Environmental Impact Statement (HSGRR/EIS) examining coastal storm management (CSR) problems and opportunities for the East Rockaway Inlet to Rockaway Inlet and Jamaica Bay area which was devastated by the impacts of Hurricane Sandy in 2012. The goal of the Draft HSGRR/EIS is to identify solutions that will reduce Atlantic shoreline and Jamaica Bay vulnerability to storm damage.

As a federal agency, the U.S. Army Corps of Engineers, New York District is required to evaluate the potential environmental impacts of its Proposed Actions and alternatives to Proposed Actions, in order to make an informed decision in defining a proposed project for implementation. The New York District must consider and incorporate, to the extent practicable, measures to avoid, minimize or mitigate adverse impacts to the human environment. The environmental analysis is conducted in compliance with NEPA, the President's Council on Environmental Quality (CEQ) regulations implementing NEPA at 40 Code of Federal Regulation (CFR) Parts 1500-1508, FEMA's regulations at 44 CFR Part 10, and the State Environmental Quality Review Act ("SEQRA") and City Environmental Quality Review.

For the purposes of this NEPA environmental review, the New York District is serving as the Lead Agency. In accordance with 40 CFR 1501.6 of the Council on Environmental Quality's (CEQ) Regulations for Implementing the Procedural Provision of the National Environmental Policy Act, the New York District is requesting that the National Park Service, Gateway National Recreation Area (GATE) to be a cooperating agency. This request is based on the following: 1) GATE's jurisdiction over the lands within the Jamaica Bay Unit of GATE and 2) in order for the Secretary of the Army to undertake or contribute to water resource developments, including shore erosion control, beach protection, and navigation improvements on land and/or waters within the recreation area shall be exercised in accordance with plans which are mutually acceptable to the Secretary of the Interior and the Secretary of the Army and which are consistent with both the purpose of existing statutes dealing with water and related land

resource development. Note that designation as a cooperating agency does not imply that your agency supports the proposed project.

As a cooperating agency, you have the right to expect that the NEPA document will enable you to discharge your jurisdictional responsibilities. Likewise, you have the obligation to tell us if, at any point in the process, your agency's requirements are not being met. We expect that, at the end of the NEPA process, the final HSGRR/EIS will satisfy your NEPA requirements including those related to project alternatives, environmental consequences and if needed, mitigation. Further, we intend to utilize the HSGRR/EIS and subsequent Record of Decision (ROD) as our decision-making documents and as the basis for any required GATE permits. We expect the permit application to proceed concurrently with the HSGRR/EIS approval process.

If your agency will participate in the review as a cooperating agency, please contact Robert Smith at the New York District, Coastal Section, at 917-790-8729, or by email at Robert.J.Smith@usace.army.mil. If a response from you within 30 days from this letter, your consent will be assumed.

Thank you for your cooperation and interest in this project.

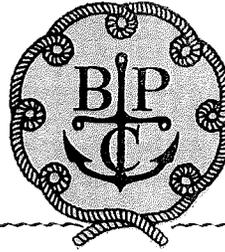
Sincerely,

A handwritten signature in blue ink, appearing to read 'CSJ', with a long horizontal flourish extending to the right.

Clifford S. Jones
Chief, Planning Division

cc:
Raddant - Regional Environmental Officer-DOI

BREEZY POINT COOPERATIVE, INC.



202-30 ROCKAWAY POINT BLVD.
ROCKAWAY POINT
NEW YORK 11697
Tel. 718-945-2300
Fax: 718-634-0261

Tuesday, May 03, 2016

Daniel Falt
U.S. Army Corps of Engineers, New York District
Programs and Project Management Division, Civil Works Programs Branch
26 Federal Plaza, Room 2127
New York, NY 10279-0090

**RE: Atlantic Coast of New York
East Rockaway Inlet to Rockaway Inlet and Jamaica Bay Project**

Dear Mr. Falt:

Initially allow me to thank you for including the Breezy Point Cooperative, Inc. in the meeting on April 19, 2016 to discuss the above referenced project. Your invitation was greatly appreciated as the Cooperative is very interested in gaining information as well as an understanding of how the project may impact our community in the future.

That being said, there are several components of the project that the Cooperative respectfully requests additional clarification on in order to gain a more complete understanding of the potential effects on the community. These items include:

1. The proposed alignment of the project components, particularly the location and design of the tidal barrier are important. Do you have a rendering of what the tidal barrier would look like?
2. The proposed uniform composite dune across the entire oceanfront appears to be the most reasonable alternative, and is initially supported by the Cooperative.
3. The proposed effect that the hurricane barrier might have on backwater flooding in the Cooperative is of the utmost importance. Please provide the Corp's engineering analysis of the potential backwater effect of a tidal barrier.
4. The Cooperative desires to fully integrate the ongoing FEMA HMGP project with USACE Rockaway Resiliency Project. Please provide us with any relevant information on how this is being accomplished.
5. What was the outcome of the USACE meeting with MTA on the Gil Hodges Bridge?
6. The Cooperative requests use of Jamaica Bay Federal Navigation Channel dredge materials for nature based projects to increase resiliency and habitat within the Cooperative and surrounding area. We understand this may also involve the Corp's Operation Division and as such, who might be the project manager that we should contact?

Any information, documentation or assistance you may provide in addressing the above items would be greatly appreciated. We also look forward to receiving the final draft report and participating in community engagement sessions.

Sincerely,
Breezy Point Cooperative, Inc.



Arthur Lighthall
General Manager

Cc: Board of Directors, Denise Neibel, Aram Terchunian



United States Department of the Interior

NATIONAL PARK SERVICE
Northeast Region
United States Custom House
200 Chestnut Street
Philadelphia, PA 19106

IN REPLY REFER TO:

A.1.2.(NER-RSS)

JUL 21 2016

Mr. Clifford S. Jones
Chief, Planning Division
Department of the Army
U.S. Corps of Engineers, New York District
Jacob K. Javits Federal Building
26 Federal Plaza
New York, NY 10278-0090

Dear Mr. Jones:

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DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS, NORTH ATLANTIC DIVISION
FOR HAMILTON MILITARY COMMUNITY
302 GENERAL LEE AVENUE
BROOKLYN, NEW YORK 11252-6700

CENAD-PD

20 August 2014

MEMORANDUM FOR Deputy Chief for Civil Works, Headquarters, U.S. Army Corps of Engineers, (CECW-NAD/Ms. Cathy Shuman), 441 G Street, NW, Washington DC 20314-1000

SUBJECT: Atlantic Coast of New York, East Rockaway Inlet to Rockaway Inlet and Jamaica Bay, New York (Rockaway Project) - Completion Strategy

1. The New York District developed the enclosed completion strategy titled "Atlantic Coast of New York, East Rockaway Inlet to Rockaway Inlet and Jamaica Bay, Queens (Rockaway), New York - Coastal Storm Risk Management" (20 Aug 2014). The North Atlantic Division has reviewed this proposed strategy and supports this approach to evaluate coastal and storm damage risk reduction and resiliency for this area.
2. The North Atlantic Division requests approval of the enclosed completion strategy for the 100% federally-funded Rockaway project. The completion strategy outlines the proposed approach to examine various factors and project elements of the Jamaica Bay (back-bay) and the Atlantic Ocean shorefront. This comprehensive system approach will assist in expediting the overall project, as well as address community concerns about Rockaway.
3. The comprehensive system reformulation will be presented in a single report (Hurricane Sandy General Reevaluation Report and Environmental Impact Statement (HSGRR/EIS)). The reformulation will evaluate various methods to provide risk reduction including different dimensions of beach-fill and hard structures, both as protective measures and to reduce costs for an additional 50 years of re-nourishment. Consistent with the implementation guidance received under PL 113-2, the project will be formulated with the primary purpose of Coastal Storm Risk Management (CSRM) and is treating the area as a complete system that considers the influence of the Atlantic Ocean shorefront conditions on the back-bay system.
4. I have reviewed and concur with the recommendations outlined in the enclosed completion strategy.
5. My point of contact is Mr. Joseph Forcina, Chief, Hurricane Sandy Coastal Management Division, at 347-370-4584, or Joseph.Forcina2@usace.army.mil.

Encl


DAVID J. LEACH, P.E., SES
Director of Programs

ATLANTIC COAST OF NEW YORK, EAST ROCKAWAY INLET TO ROCKAWAY INLET, AND JAMAICA BAY, QUEENS, NY - Coastal Storm Risk Management 20 AUG 2014

Overview: The Atlantic Coast of New York, East Rockaway Inlet to Rockaway Inlet and Jamaica Bay, Queens, New York Project is a previously authorized project that was undergoing a reformulation at the time Hurricane Sandy impacted the area. The reformulation effort was considering changes to the original project in the interest of coastal storm risk reduction, to address vulnerability to erosion, waves and surge, address measures to reduce long-term renourishment costs, and to address extending federal participation in the project for up to 50 years. A Design Agreement was executed in May 2003, with an initial study cost of \$3,000,000. The Project Management Plan (PMP) identified two areas of focus: Area 1 to address the Atlantic Ocean shorefront problems, and Area 2 to address the back-bay problems in Jamaica Bay. The original PMP scope and budget prioritized Area 1, the Atlantic coastline efforts, based upon funds availability, the immediate need, and local sponsor preference.

Authorization: The 1965 authorized plan calls for a beach at elevation +10 ft NAVD and a width of 100 ft for the area from Beach 19th Street to Beach 149th Street. The authorized project also included measures to provide hurricane protection, including a seawall and an inlet closure structure. The project authorization was modified to allow the beach-fill component of the plan to be constructed separately from the hurricane protection features, and these hurricane protection features were subsequently de-authorized in WRDA 1986.

Overall Approach: The Rockaway Reformulation will be conducted in a comprehensive, systematic and holistic manner and presented in a single report (Hurricane Sandy General Reevaluation Report and Environmental Impact Statement [HSGRR/EIS]). Consistent with the implementation guidance received under PL 113-2, the project will be formulated with the primary purpose of Coastal Storm Risk Management (CSRM). A HSGRR is being prepared to reevaluate methods to provide risk management along the Atlantic Ocean, including different dimensions of beach-fill, hard structures both as protective measures, and to reduce renourishment needs, and an additional 50 years of renourishment. The reformulation effort is also evaluating methods to address coastal storm risk management in Jamaica Bay, and is treating the area as a complete system, considering the influence of the Atlantic Ocean shorefront conditions on the back-bay system.

Prior to Hurricane Sandy, the reformulation focused on shorefront measures, since there was a clear need and local sponsor support for a project in this area. The shorefront features of the Atlantic Coastline have been developed as alternatives for addressing shorefront damages and local sponsor concurrence with features and alternatives is underway. Refinements to the proposed features and the storm history used in the economic and engineering analysis are being refined to reflect Sandy impacts. Alternatives include various combinations of beach-fill with and without coastal structures to reduce long-term renourishment needs, or for increased inundation protection (consideration for a Sandy-scale event).

The formulation for the back-bay communities (Area 2) had not been significantly advanced, prior to Hurricane Sandy, due to funding constraints and prioritization of reformulation efforts. Following Hurricane Sandy, the team is reinvigorating this portion of the reformulation effort, utilizing information that has been generated in several local study efforts following Hurricane Sandy. The team is proposing a schedule that would meet the Alternatives milestone in six months, followed by identification of a Tentative Selected Plan in 9 months that would be integrated into the shorefront plans, and feed into a draft GRR and EIS.

Cost-sharing: All recommendations for initial construction of CSRM features resulting from this reformulation will be considered as updates to the previously authorized plan to account for current science and engineering. Since this project is classified as “ongoing construction” (i.e. received construction funding within last three years), all initial construction features along the shoreline and back-bay identified in this HSGRR/EIS will be recommended for 100% Federal cost-sharing. Any future renourishment efforts will be subject to additional funding appropriations and cost-sharing.

Reformulation Rationale: The following information supports the rationale for the overall approach.

1. During Hurricane Sandy, Rockaway and Jamaica Bay were severely impacted. Hurricane Sandy was estimated as a 350-yr event along the Rockaway coast, and an 800-yr event in Jamaica Bay, based upon the pre-Sandy stage frequency curves. The area was subjected to extreme erosion, surge and wave damage along the Atlantic Ocean shoreline, and extreme flooding in Jamaica Bay. The Atlantic Ocean surge and wave effects exceeded the island height, resulted in flow of water across the island, and contributed to the flooding along the Jamaica Bay shoreline. Hurricane Sandy illustrated the need to address the entire peninsula and back-bay area as a system, when considering risk-management measures.
2. Following Hurricane Sandy, New York City has stated a preference to provide a very high level of risk reduction. New York City conducted an alternatives analysis and recommended a storm surge barrier across Rockaway Inlet as the solution to protect Jamaica Bay from a Sandy-type event. A storm surge barrier plan, or other plans that provide a high level of risk reduction for the bay, require consideration for an equally high level of protection along the shoreline (which would likely require integration of a hard structure as the line of defense, and continuous line of protection that would not be needed for a plan that solely addresses shoreline development).
3. The area of Rockaway and Jamaica Bay has garnered significant attention following Hurricane Sandy, and has been the focus of many initiatives, including the North Atlantic Coast Comprehensive Study (NACCS), which emphasizes a systems approach considering the full array of measures including non-structural approaches and natural and nature based features. Rockaway needs to be addressed as a system in order to be consistent with this new approach.
4. Since the originally authorized Rockaway Project is a constructed project, it has qualified for repair and restoration to design conditions under the FCCE efforts funded under PL 113-2. Construction is presently underway which, in combination with locally-funded betterments, will restore the shoreline to a condition that contains a dune at +16 ft NAVD, and a beach berm fronting it, consistent with the previously authorized design. These construction efforts will provide a short-term level of risk reduction significantly greater than has previously existed for Rockaway. While there is an urgency to move forward, the immediate need for risk reduction has been met, and based upon historic trends, there is approximately a 4 year window before erosion rates will trigger the need for renourishment of the beach.

Challenges: The following Plan Formulation Challenges have been identified for this Project:

1. Integrating the advanced plan formulation effort for the shoreline with the relatively recent planning effort for the back-bay. The shoreline portion of the project has been progressing for some time while the back-bay formulation is in its earlier stages. An effort is being made to advance the analysis of alternatives in the back-bay on an aggressive schedule that fast-

tracks the overall schedule. The intent is to engage the vertical team on all aspects of the project, following the Planning Modernization principles.

2. Integration of nature-based features and non-structural measures with the overall planning effort. The Reformulation will be undertaken as a single-purpose CSRSM project considering the applicability of the full array of measures including non-structural measures and nature-based features. There is a strong interest by all levels of government and stakeholder groups in the evaluation of natural and nature-based features (NNBF) and the physical setting of Jamaica Bay may be conducive to these alternatives as well as non-structural approaches. As project is to be advanced under the provisions of PL 113-2, all alternatives will be justified based upon CSRSM benefits. Other benefits that NNBF may provide to habitat and species of concern will be discussed qualitatively. Alternatives milestone meetings will be utilized to confirm vertical team support for this approach.
3. Schedule Concerns in identifying a recommended plan for Jamaica Bay. In order to address schedule concerns that may arise, the Corps will engage the vertical team to address issues regarding complexity of the issue, competing needs within the bay, and the potential scope, and costs associated with the alternatives under consideration. The Corps recognizes that there will be differences of opinion on plans, but expects that the discussion of alternatives and agreement on alternatives can be facilitated utilizing the vertical team and agency representatives of the policy group, Jamaica Bay Resiliency Institute.

Major Milestones:

Atlantic Shorefront Optimized Alternatives	October 2014
Back Bay Alternatives Milestone	October 2014
Tentatively Selected Plan	June 2015
DRAFT GRR & Programmatic EIS	August 2015
Final DRAFT GRR & Programmatic EIS	August 2016
Approval of final GRR and Programmatic EIS	December 2016

Completion Strategy:

A diagram illustrating the completion strategy is attached. This diagram has been assembled to capture the following points:

- The integration of shorefront and back-bay alternatives
- The integration of alternatives previously evaluated under the Jamaica Bay Study, and the relationship to the Hudson Raritan Estuary (HRE) effort

The figure illustrates that presently the alternative analyses are proceeding on separate parallel paths for the shorefront and back-bay. The shorefront alternatives have had a greater amount of effort in their development and have progressed further, both in the development of the alternatives and in the necessary analytical tools to evaluate the alternatives. The schedule shows that in October 2014, the District expects to have the shorefront alternatives developed to a point to have identified the optimized plan, when considering the need to address shorefront risk management. At the same time, the District is scheduled to have developed back-bay alternatives to a level of detail to satisfy the alternatives milestone, including definition of the problem, identification of the full range of alternatives, and the evaluation of alternatives sufficient to focus the planning to a short-list of alternatives. It is expected that at this point, the bayside analysis could provide input on how the shorefront alternatives would mesh with the

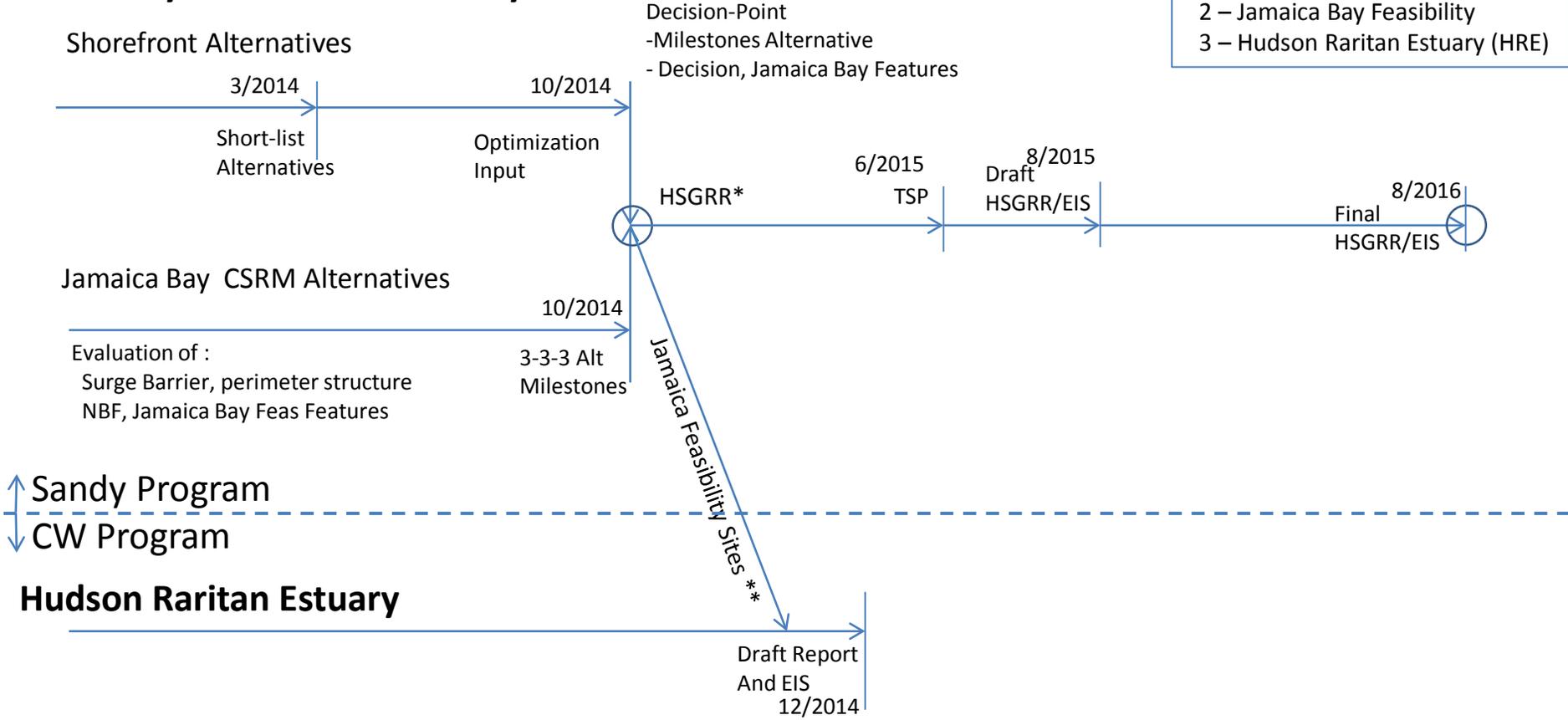
range of back-bay alternatives under consideration, and if refinements to the shorefront alternatives need to be considered in a systems approach.

This October 2014 milestone will satisfy the Corp's "Alternatives Milestone", and is intended to achieve Corps vertical team, and sponsor alignment of the Alternatives, and the effort involved for further alternative analysis. This will include a decision on the potential for inclusion of the features previously evaluated under the Jamaica Bay feasibility study.

The next milestone is the June 2015 Identification of a Tentatively Selected Plan (TSP). This milestone is expected to identify the recommended plan for Rockaway and Jamaica Bay that integrates both shorefront and back-bay measures. This plan will identify the fully-optimized and integrated plan of protection along the shorefront and back-bay. After vertical team agreement on the TSP, the information described in the TSP milestone would be assembled into a Draft GRR, and EIS that would be circulated for all of the necessary reviews.

Rockaway Reformulation Study

3 Efforts:
 1 – Rockaway Reformulation
 2 – Jamaica Bay Feasibility
 3 – Hudson Raritan Estuary (HRE)



- * The Alternatives milestone will be used to document the decision on alternatives, and obtain concurrence on Path Forward
 - Will present shorefront alternatives to a greater level of detail than backbay (identify scaled alternatives for shorefront)
 - Expect to obtain agreement on integration of shorefront & backbay, approach for evaluating NNBF
 - Identify to the extent the Jamaica Bay Feasibility sites will be included as a component of the CSRM measures in Rockaway
- ** Based upon the alternatives milestone, Jamaica Bay sites not included in Rockaway would be recommended under HRE

**ATLANTIC COAST OF NEW YORK CITY
EAST ROCKAWAY INLET TO ROCKAWAY INLET
AND JAMAICA BAY, NEW YORK
SECTION 934 STUDY
BORROW AREAS 1A AND B
REMOTE SENSING SURVEY**

**Prepared for the U.S. Army Corps of Engineers
New York District
Under Contract # DACW51-92-D-0003**

ATLANTIC COAST OF NEW YORK CITY
EAST ROCKAWAY INLET TO ROCKAWAY INLET
AND JAMAICA BAY, NEW YORK
SECTION 934 STUDY
BORROW AREAS 1A AND B
REMOTE SENSING SURVEY

Prepared For:

NEW YORK DISTRICT
CORPS OF ENGINEERS
26 FEDERAL PLAZA
NEW YORK, NY 10278

Under Contract Number
DACW51-92-D-0003

Principal Investigator:


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February 11, 1993

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ABSTRACT

As part of the planning studies for the Atlantic Coast of New York City, East Rockaway Inlet to Rockaway Inlet and Jamaica Bay, New York, Section 934 Study, WCH Industries, Inc., in association with Boston Affiliates, Inc. conducted a remote sensing survey for possible cultural remains in two areas near Ambrose Channel, New York, which are designated as probable sand borrow areas. Historical research by Pickman (1990) indicated that there was a possibility that significant cultural remains, specifically shipwrecks, are extant in the area. The Corps of Engineers requested the present study to determine if any significant sites might be in the two survey areas.

Data from the survey indicates the presence of ten possible cultural resources and one probable significant cultural resource in the two areas. The latter appears to be the site of one or more wooden vessel remains. Recommendations are for avoidance of the eleven sites, as planned, plus the possible inspection of the apparent shipwreck site..

INTRODUCTION

The New York District, U.S. Army Corps of Engineers (Corps), is completing planning studies as part of the Atlantic Coast of New York City, East Rockaway Inlet to Rockaway Inlet and Jamaica Bay, New York, Section 934 Study. The Corps has certain responsibilities concerning the protection and preservation of cultural resources. Federal statutes and regulations require identification of significant cultural resources, and mitigation of adverse impacts to such resources, if identified. Significant cultural resources are any material remains of human activity that are eligible for inclusion in the National Register of Historic Places.

Previous research (Ferguson, 1986; Gardner & Riess, 1990; Nowak & Riess, 1989; Pickman, 1990) indicates the possibility of historic shipwreck remains in two borrow sites being considered for the nourishment project. The Corps, therefore, contracted with WCH Industries, Inc. to conduct a remote sensing archaeological survey of the two areas to determine the location and extent of any possible historic shipwreck sites so that they might be avoided. Boston Affiliates, as subcontractor to WCH Industries, conducted the survey, with Dr. Warren Riess as principal investigator.

In general, the scope of work called for 1) the development of a remote sensing survey plan for each borrow area; 2) conducting a remote sensing survey of each area; 3) preparation of an interim report of the field work and preliminary results; 4) analyzing the remote sensing data; and 5) preparation of a final report.

PROJECT DESCRIPTION

Area Description

The project area is located offshore of Coney Island in the Borough of Brooklyn in the City of New York (See Figure 1). Staten Island is west of the area, separated by a body of water known as the Lower Bay. East of the area is Jamaica Bay, accessible via the Rockaway Inlet. The Atlantic Ocean is south of the area.

The surrounding area consists of navigable water extending into New York and New Jersey on both sides of the project area. The Lower Bay extends northward into the Upper New York Bay and the mouth of the Hudson River. Navigation channels provide access to numerous shipping interests; piers and transshipment facilities can be seen along the shorelines of New York Harbor.

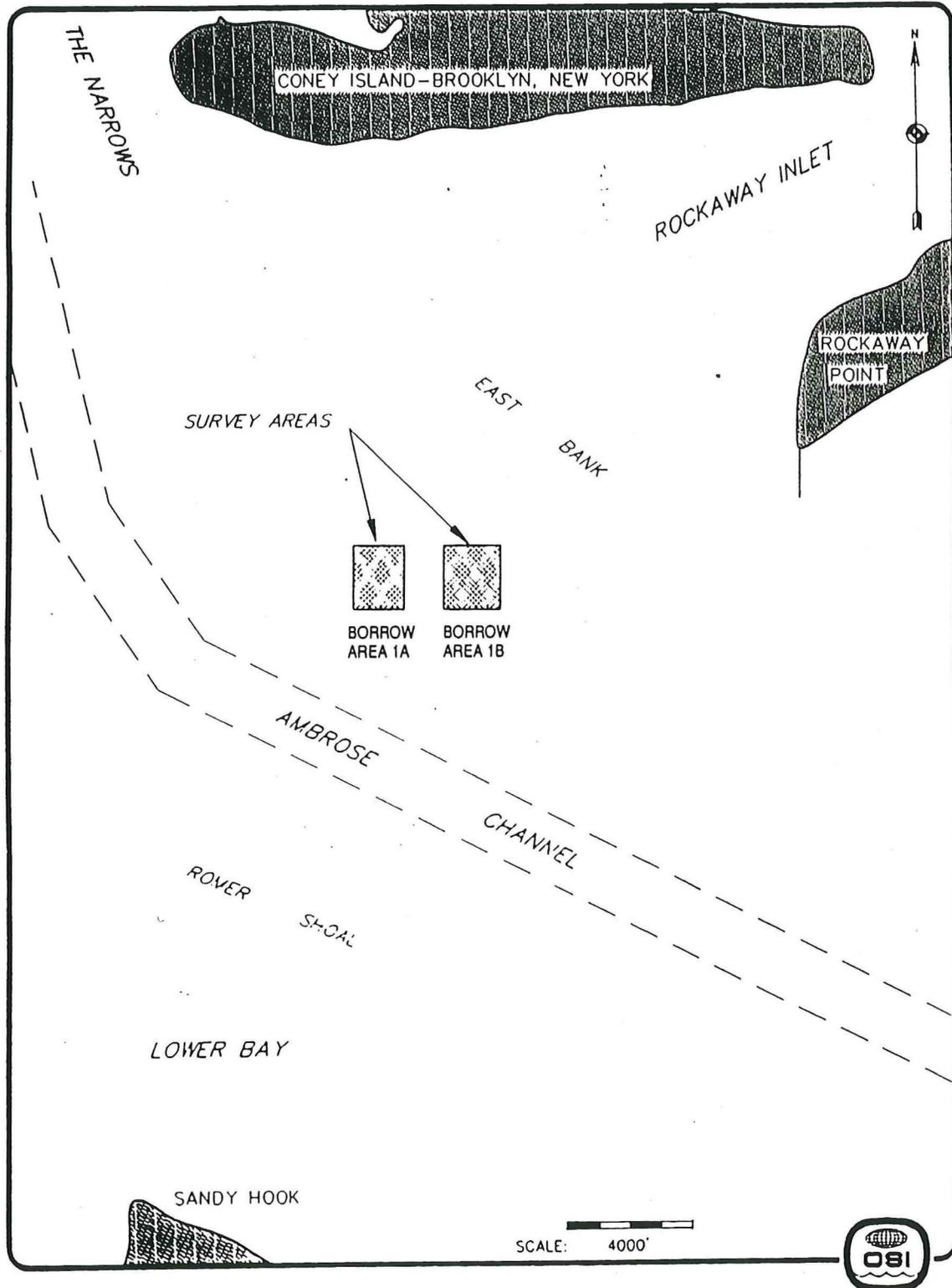
Site Description

The borrow areas are located approximately 3 nautical miles to the southwest of Rockaway Point, adjacent to the borrow areas used in the original 1977 project. A remote sensing survey was not conducted in this area prior to its dredging for the original project. The east borrow area (1B) measures 2,000 feet long by 1,800 feet wide. The west borrow area (1A) is slightly smaller, measuring 2,000 feet long by 1,600 feet wide.

Project Plans

Current Corps project plans call for the placement of sand along Rockaway Beach, Queens, New York, from Beach 19th Street to Beach 149th Street. Sand for this renourishment will be taken from borrow areas located to the southwest of the project area (Borrow Areas 1A and 1B) and from a second borrow area just offshore Rockaway Beach (Borrow Area 2). No underwater inspections of targets or anomalies will be undertaken at this time. All targets and anomalies identified by the remote sensing survey as potential cultural resources, particularly those identified as possible shipwrecks, will be avoided during sand dredging.

Figure 1. Proposed Borrow Areas 1A and B, Atlantic Coast of New York City, East Rockaway Inlet to Rockaway Inlet and Jamaica Bay, New York, Section 934 Study. Per OSI.



BACKGROUND ANALYSIS

Previous research (Ferguson, 1986; Gardner & Riess, 1990; Nowak & Riess, 1989; Pickman, 1990) indicates the probable previous destruction of any prehistoric aboriginal sites and the possibility of historic shipwreck remains in Borrow Areas 1A and B being considered for the nourishment project. The studies indicate that the areas have a high potential for historic shipwreck sites because of many losses in the general area after centuries of intense shipping. Since the Dutch established a trading post in New Amsterdam (New York) in the mid-seventeenth century, the port of New York steadily increased to become one of the world's largest trade centers in the twentieth century. Shipping, and therefore shipping losses, have increased as the port's business increased.

The latest study (Gardner & Riess, 1990) narrowed the results of the former studies to 11 possible shipwreck sites in the study area which includes the Borrow Areas 1A and B (see Table 1). Gardner and Riess pointed out that since the studies mostly relied upon secondary sources, which were only interested in larger vessels, one must assume the area has the potential to include the remains of other, small vessels as well. The remains of pre-twentieth century small oceanic and coastal vessels would be particularly significant due to their archaeologically important cargoes and hulls. However, the vessels typically did not carry a great deal of iron armament, and some of these vessels may have carried no guns at all, thereby reducing the probability of locating the wrecks with a marine magnetometer. Therefore even relatively small magnetic anomalies, especially ones with some side scan sonar signature, must be considered possible cultural remains.

Table 1. Possible Shipwrecks in the East Bank Area.

<u>Year</u>	<u>Name</u>	<u>Type</u>	<u>Disp.</u>	<u>Location</u>
1744	No name	Sloop	Lost	Near East Bank
1747	Shrewsbury	Sloop	Wrecked	On Coney Island
1753	No name	Sloop	Lost	On East Bank
1776	Generous Friends	Troop Transport	Sunk	Near Coney Island
1789	Sally	Merchantman	Wrecked	On Coney Island
1818	Albion	Merchantman	Wrecked	On Coney Island
1831	Speculator	Schooner	Sunk	Off Coney Island
1876	Louis	Steam Screw	Stranded	Coney Island
1888	Governor	Tug	Sunk	Between Rockaway Point and Swash Channel
1897	George L. Garlick	Steam Tug	Wrecked	Coney Island
1900	Boyle	Schooner	Wrecked	West of Rockaway Point
1900	Evelyn	Schooner	Wrecked	West of Rockaway Point
1900	Kenyon	Schooner	Wrecked	West of Rockaway Point
1923	Halcyon	Steam Screw	Foundered	Coney Island
1923	Phillip J. Kenny	Steam Screw	Burned	Off Ambrose Channel
?	"Golden Nugget"	?	Sunk	West of Rockaway Inlet

Source: Gardner & Riess, 1990, p.18.

SITE SURVEY

Methodology

To perform the remote sensing surveys Boston Affiliates contracted for the services and equipment of Ocean Surveys, Inc. (OSI) of Old Saybrook, Connecticut. OSI mobilized a survey team which set up its three navigation stations and base magnetometer, and launched a boat at New York on November 16, 1992 (See Appendix A, OSI Report). Warren Riess, principal investigator, joined them that evening in New York.

Plans called for the systematic survey of the two sites using OSI's 24 ft. R/V *Able* and an onboard computer navigation system linked to a RACAL microwave system with three transceiver stations. The navigation system enables the survey crew to predefine the coverage and lane spacing, follow individual track lines, and confirm a completed accurate survey through real-time and post-run plots of the vessel's tracks. The computer system also links the various remote sensing data to the navigation data and digitally records the magnetometer data. Sensing equipment included an EG&G base magnetometer set in a quiet area ashore, an EG&G 866 marine magnetometer, a Klein 500/100 KHz side scan sonar, and a bathymeter to help analyze the magnetometer data.

Because of high seas, the survey team was not able to reach either of the survey areas on November 17. However, the team did spend the morning testing the navigation system by cruising as far out as it could safely venture, testing the survey equipment aboard, and checking the base magnetometer at Coney Island Light. The wind shifted, coming from the north on November 18 and 19, making the seas calm enough for the survey to take place. The team worked for long hours to finish the site on November 19.

Data acquisition was conducted on north-south parallel track lines spaced 60 feet apart. The track lines were planned to provide extra coverage for approximately 100 feet around the prescribed sites. Magnetic, navigation, and bathymetric data were taken on every line, while side scan data were recorded on every other line because of the greater range of side scan. When a side scan target or magnetic anomaly suggested a possible cultural resource, the side scan was also activated on return track lines to acquire additional data. In addition, at least two east-west cross tie lines per site were run while recording magnetic, side scan, and bathymetric data. The cross ties were field designed to pass near suspected cultural remains to obtain relevant data. A field check of the data indicated that it was more than sufficient.

Analysis

After field acquisition, the navigational data was used to create post-plots of the actual track lines. The magnetometer data was adjusted to daily changes in the field by reference to the base station magnetometer records. The data was then plotted, adjusting for the magnetometer head layback, and a contour chart of the magnetic field intensity was created for each site.

In order to determine the presence of any possible significant cultural resources that should be avoided, the magnetic field contour chart, original magnetic data, side scan data, and bathymetric data were compared for each site. Every possible magnetic anomaly or sonar target was cross referenced with the other data for proper analysis.

The quality of the magnetic data allowed even small ferrous objects to be seen as anomalies in the field. Therefore, small side scan targets without corresponding magnetic anomalies were not considered possible significant cultural remains, because even small colonial shipwreck sites would contain at least enough ferrous material to produce a small magnetic anomaly. All magnetic anomalies of more than 5 gammas were considered possible cultural resources (PCR) and those with related appropriate sonar targets were considered probable significant cultural resources (PSCR).

Results

One PSCR and ten PCR's were gleaned from the data (see Table 2). The PSCR and six PCR's were in Area 1A (west) and four PCR's were in Area 1B (east) (See Figures 2 and 3).

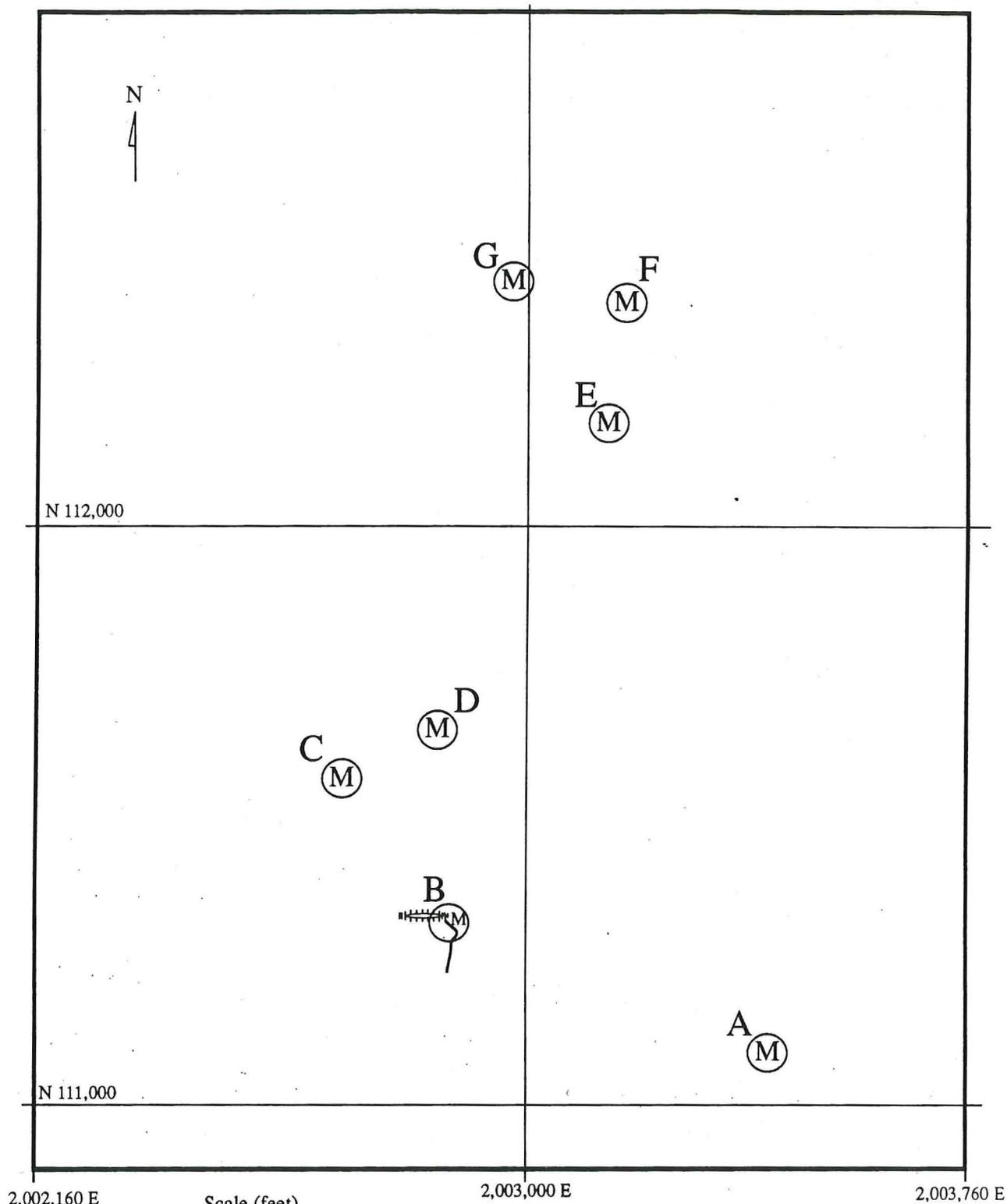
Target B, the PSCR, is a complex magnetic anomaly and side scan sonar target; it appears to be one or more shipwrecks. The survey team recorded Target B on several north-south and east-west tracklines. The sonar records indicate two distinct features more or less perpendicular to each other approximately 30 feet apart. The northern feature has the appearance of a series of ship or barge frames around an oblong patch of sand. It could also be an oblong mound over a buried feature with a series of sand waves formed by currents around the mound. The southern feature provides a hard sonar return. Its shape is not clear from the sonar records; however, the feature could be the side of a hull whose other side is buried in the sediment. The complex magnetic anomaly which is within the general area of Target B is large, as high as 649 gammas in one place. However, one would expect a ferrous ship or barge hull to produce a larger anomaly. The target therefore appears to be one or more wooden hulled vessels with associated large ferrous objects, such as an engine, anchors, cannon, shot locker, ballast, or cargo. Because a wooden hulled vessel is typically older than a ferrous vessel, Target B should be considered a probable significant cultural resource until it is inspected (See Figure 4).

Table 2. Possible and probable significant cultural resources for Borrow Areas 1A and B.

Target	Location	Description	Magnetic Anom. gammas	Class
Area 1 (west)				
A	111,090 N 2,003,420 E	Mag. dipole, no sonar trgt.	20	PCR
B	111,320 N 2,002,870 E	Complex sonar and mag. target. 100-110' long, 15-20' wide. Poss. shipwreck(s).	649	PSCR
C	111,570 N 2,002,680 E	Mag. monopole, no sonar trgt.	23	PCR
D	111,660 N 2,002,840 E	Mag. monopole, no sonar trgt.	38	PCR
E	112,180 N 2,003,140 E	Strong mag. dipole, no sonar trgt.	598	PCR
F	112,400 N 2,003,170 E	Strong mag. dipole, no sonar trgt.	229	PCR
G	112,430 N 2,002,980 E	Mag. dipole, no sonar trgt.	92	PCR
Area 2 (east)				
H	111,050 N 2,006,740 E	Mag. dipole, no sonar trgt.	46	PCR
I	111,230 N 2,006,000E	Mag. monopole, may be assoc. w/ sonar trgt. 10-15' long, 4-5' wide	166	PCR
J	112,080 N 2,005,860 E	mag. monopole, no sonar trgt.	23	PCR
K	112,390 N 2,006,740 E*	mag. dipole, possibly associated with sonar target to east of Area 2	34	PCR

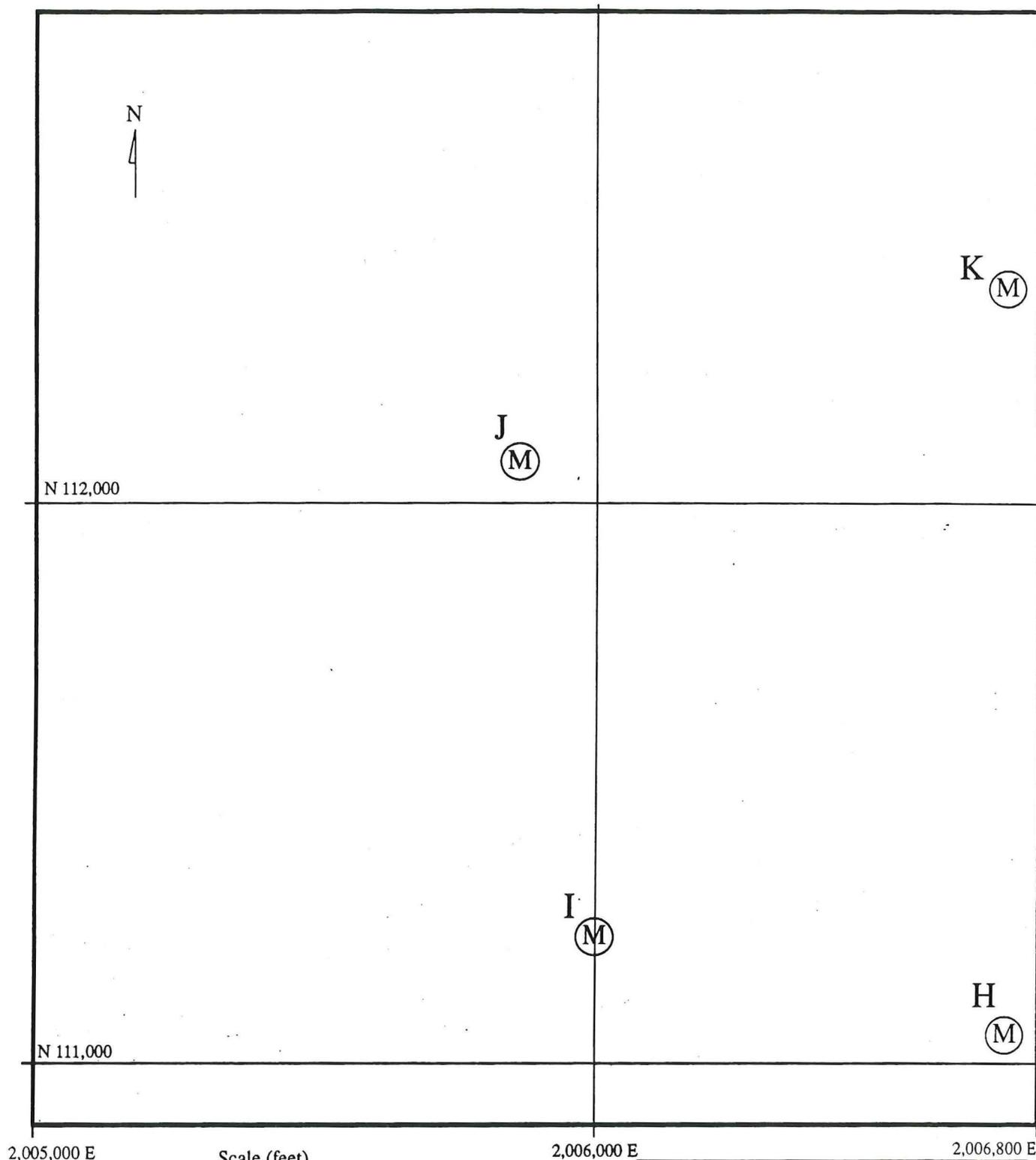
* May be farther east, outside of study area.

Figure 2: Sketch of Targets in West Block (Area 1A)



Atlantic Coast of New York City
East Rockaway Inlet to Rockaway Inlet
and Jamaica Bay, New York
Section 934 Study
Borrow Areas Remote Sensing Survey
February 1993 Boston Affiliates

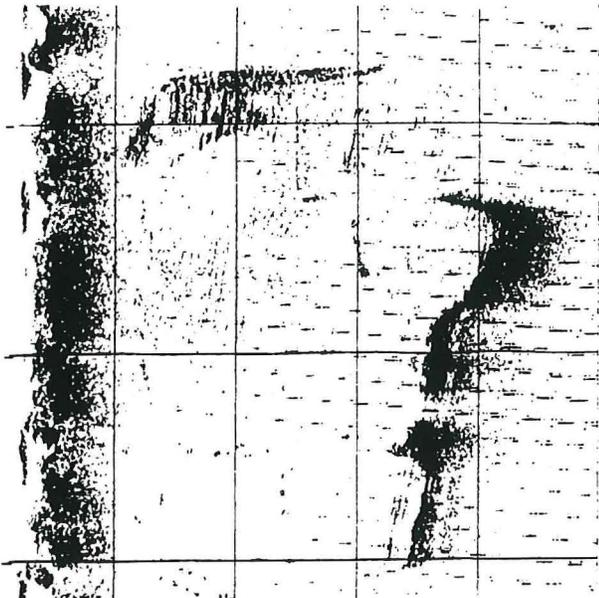
Figure 3. Sketch of Targets in East Block (Area 1B)



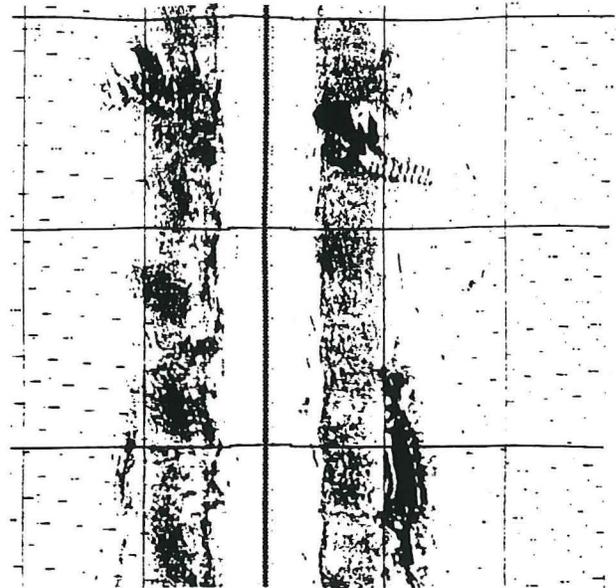
(M) = magnetic anomaly

Atlantic Coast of New York City
East Rockaway Inlet to Rockaway Inlet
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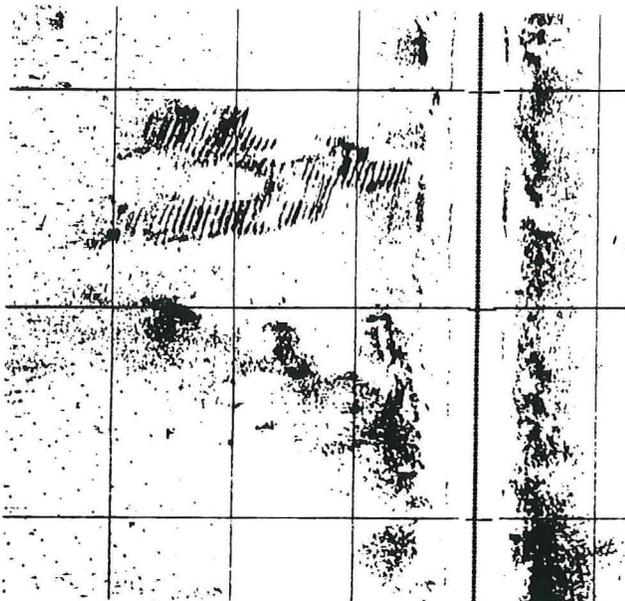
Figure 4. Target B: Side Scan Sonar Records and Magnetic Contour Chart.



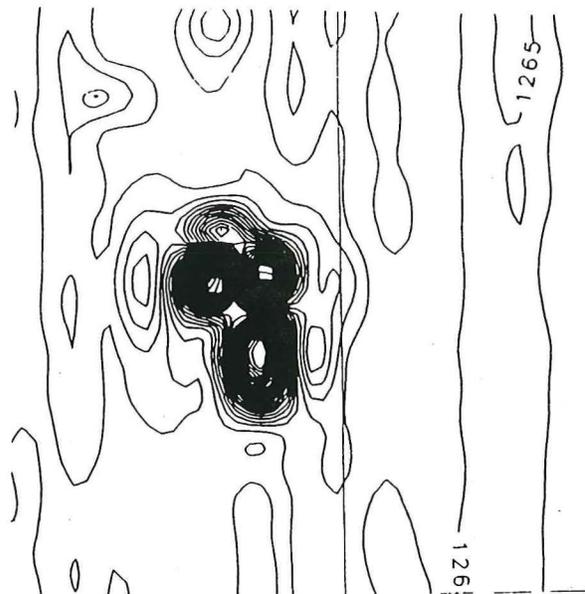
A. 100 khz side scan sonar return, passing to the west of Target B, line 11.



B. 500 khz side scan sonar return, passing over northern feature of Target B, line 12.



C. 500 khz side scan sonar return, passing over southern feature of Target B, line 13.



D. Contours of magnetic field intensities at Target B.

Nine of the other targets in the two areas are magnetic anomalies without any discernible associated sonar target . They indicate the presence of ferrous artifacts which may or may not be associated with significant cultural resources. Target I, in Area 1B (east), is a magnetic anomaly that may be associated with a low sonar target that appears to be near it, rather than at the same location. All ten of these targets are designated PCR's because the nature of the data does not indicate whether any are, or are not, significant cultural resources.

RECOMMENDATIONS

The Corps has indicated its intention to avoid any possible significant cultural resources during its dredging operations. For most of the targets, the Corps should consider a 100 ft. radius safety zone around the reported location of each target. In a most significant situation, most of the targets produce a magnetic anomaly that might be the anchor(s) of a small local colonial vessel. As ferrous objects these also indicate some hazard to dredging equipment. A 100 ft. radius should insure no adverse impact on such a site or on dredging equipment. It should be noted that not only the actual dredging equipment, but also dropped and dragged large anchors from the dredging vessel would adversely affect any cultural resource. Therefore any such activity should be kept at least 100 feet away from any of the target locations, except for targets B and E in Area 1A (west) where greater distances are recommended.

Target B extends over a large area. It is probably something archaeologically significant and may represent a hazard to dredging equipment. Its safety zone should be 250 ft. in radius from the reported location. In addition, the Corps may consider inspecting Target B. As the existence of a possible historic shipwreck may suggest more problems than are actually present once the site is identified, an underwater inspection, either conducted separately or as part of another project, is suggested. The cost of such an inspection is estimated at \$25,000 - \$30,000. This cost includes research, an underwater survey of three days plus a weather day, stabilization of artifacts recovered, and report preparation. All expenses and rental of equipment needed to perform the survey are included in the cost.

Target E is a large enough magnetic anomaly, both in intensity and in area, to warrant a safety zone of 150 ft. in radius. This safety zone would overlap with or come very close to those of Targets F and G.

If the Corps' plans are such that the target safety zones are a major impediment to the borrow project, any or all of the targets could be inspected. Typically, upon inspection, most PCR's in such an area are found to be modern, insignificant debris such as steel cables, modern anchors, or steel drums. Since only two of the eleven targets have a sonar signature, inspection would include some probing and excavation. All of this can be achieved by diving archaeologists with standard underwater archaeology equipment.

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APPENDIX A

OSI REPORT

**FINAL REPORT
MARINE ARCHAEOLOGICAL SURVEY
OFFSHORE SAND BORROW AREAS 1A AND B
ATLANTIC COAST OF NEW YORK CITY,
EAST ROCKAWAY INLET
TO ROCKAWAY INLET AND
JAMAICA BAY, NEW YORK
SECTION 934 STUDY
ARMY CORPS OF ENGINEERS**

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11 December, 1992

FINAL REPORT
MARINE ARCHAEOLOGICAL SURVEY
OFFSHORE SAND BORROW AREAS 1A AND B
ATLANTIC COAST OF NEW YORK CITY,
EAST ROCKAWAY INLET TO ROCKAWAY INLET
AND JAMAICA BAY, NEW YORK
SECTION 934 STUDY
ARMY CORPS OF ENGINEERS

17

1.0 INTRODUCTION

During the period 16-19 November 1992, Ocean Surveys, Inc. (OSI) under subcontract to Dr. W.C. Riess (Darling Marine Center) conducted marine archaeological surveys at borrow sites (1A and B) in New York Harbor, offshore Coney Island, for the U.S. Army Corps of Engineers, New York District (NYCOE) (Figure 1). This work was completed in compliance with NYCOE contract number DACW51-92-D-0003.

The surveys were undertaken as part of a NYCOE project to identify and delineate offshore sand resources for the restoration of Rockaway Beach. Specifically, the survey was designed to locate possible cultural resources, especially shipwrecks, in two sites previously identified as candidate areas of satisfactory beach renourishment sands. Current NYCOE plans call for the avoidance of any possible cultural resources identified as the result of this survey during final dredging-renourishment operations.

1.1 Project Summary

The marine archeological survey was conducted in two areas measuring 1600' X 2000' and 1800' X 2000', respectively. To adequately meet project objectives, side scan sonar and marine magnetometer data were acquired in these areas along tracklines spaced 60' apart and oriented in a north-south direction. In total, approximately 20 trackline miles of remote sensing data were acquired. Trackline spacing and orientation provided in excess of 100% side scan sonar coverage and sufficient magnetometer coverage to distinguish those targets/objects deemed significant to the project's objectives.

To accomplish the field survey OSI employed a 25' survey vessel equipped with an array of state-of-the-art positioning and geophysical equipment. The navigation system used to position the survey vessel was a Racal "Micro-Fix" microwave positioning system. A

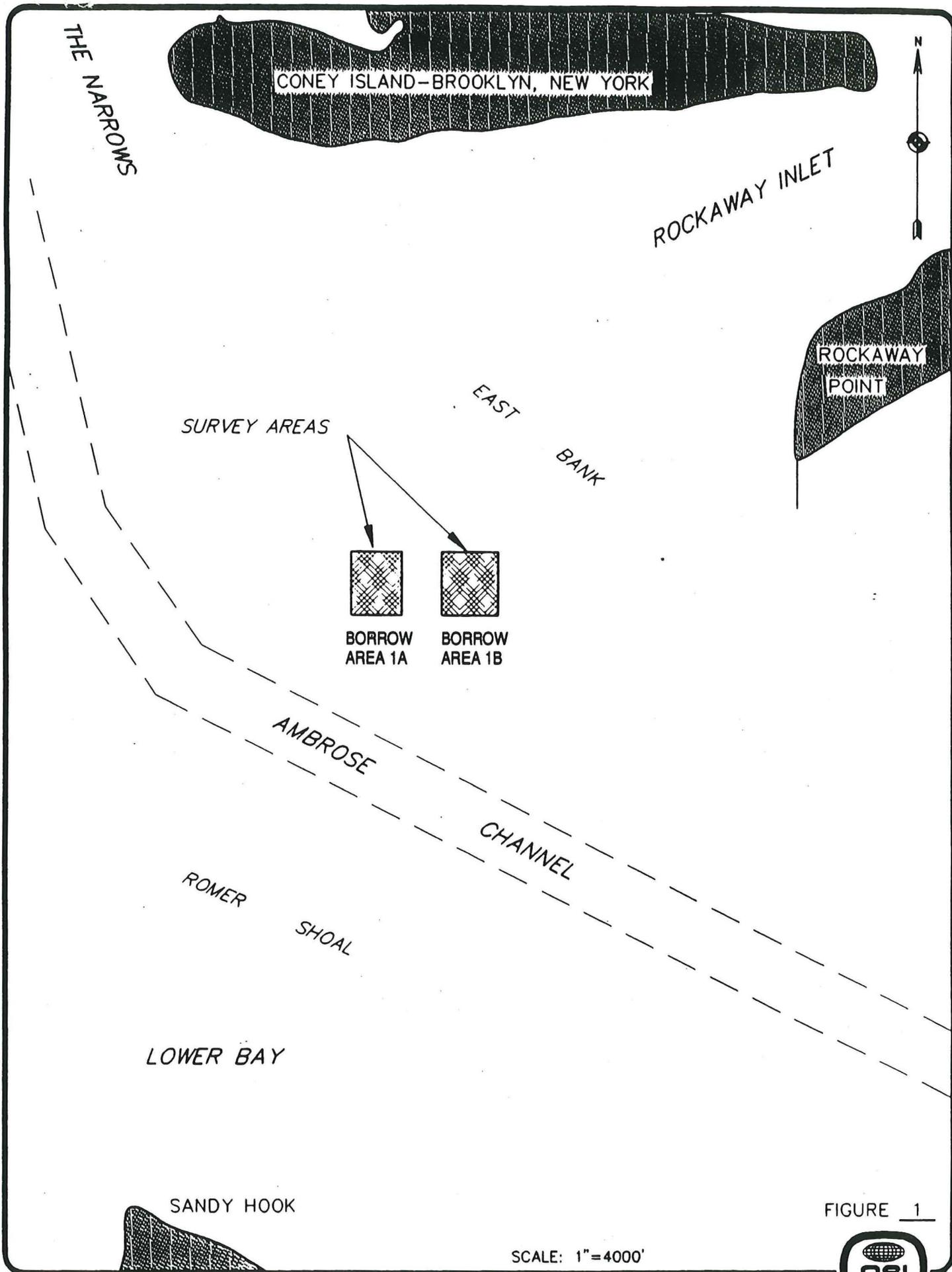


FIGURE 1

SCALE: 1"=4000'



Klein Model 595 side scan recorder, coupled with a 100/500 Khz. towfish, was employed to record side scan sonar imagery. Total magnetic field intensity measurements were obtained using an EG&G Model 866 marine proton precession magnetometer. During survey operations an EG&G 856 base station magnetometer was deployed to detect fluctuations in background field strengths.

2.0 EQUIPMENT AND PROCEDURES

The following sections outline the equipment and procedures used during the marine archaeological survey completed in the two proposed sand borrow areas located on the East Bank of New York Harbor and discusses survey methodologies. Specification sheets for all instrumentation employed are included in Appendix I and should be referenced for additional information.

2.1 Horizontal Control

Horizontal control for this study employed three permanent points established by government agencies. The station names, agency which originally established each, and coordinates referenced to the New York State Grid System, Long Island Lambert Zone (NAD 1927), are listed below:

STATION NAME	AGENCY	EASTING	NORTHING
AMBROSE LIGHT TOWER	NOAA	2047042.98'	85373.97'
CONEY ISLAND LIGHTHOUSE ECCENTRIC	NOAA	1996613.10'	127864.06
KINGSBORO COLLEGE	USCOE	2018229.20'	128022.10'

2.2 Navigation

2.2.1 Racal Micro-Fix Navigation System

The Micro-Fix system is a high resolution, line-of-sight, dynamic positioning system which combines established microwave ranging techniques with advanced microprocessor technology. The system consists of a Microwave Transponder (TR) unit set up at each horizontal control point located on the shore, and a Master TR linked to a Control Measurement Unit (CMU) located on the survey vessel. Range measurements to the shore stations are updated at one-second intervals.

The shore station transponders incorporate a fully automatic calibration capability to compensate for errors resulting from "turn-around delays" associated with microwave ranging systems. This feature eliminates the need for predeployment calibration and insures that the shore station transponders can be interchanged as required, while maintaining a system accuracy of +/-1 meter under a wide range of environmental conditions.

2.2.2 OSI "Maretrack II" Trackline Control and Data Logging System

Survey vessel trackline control was obtained by utilizing an OSI PC-based navigation software package (Maretrack-Mareplot II) in conjunction with the Racal "Micro-Fix" electronic navigation system. During operations the Maretrack II computer receives range data from the "Micro-Fix" CMU and processes these data into X,Y coordinates. These X,Y data are used to guide the survey vessel accurately along preselected tracklines in real time. While surveying, the incoming range data, as well as, the processed X,Y data are logged on computer disk for post-processing and plotting. In addition, vessel positions are continually updated on a video monitor (interfaced with the navigation computer) in real time in order to visualize actual tracklines being surveyed. Pre-survey tracklines along with a digitized representation of the shoreline and locations of control stations are also projected on the video monitor relative to the location of the survey vessel.

2.4 Side Scan Sonar

Side scan sonar images were obtained employing a Klein Model 595 high resolution, dual-channel sonar system operating at a frequency of 500 and 100 kHz. The system was

operated at a sweep width of 50 meters (164') per channel providing image resolution allowing detection of discrete objects as well as changes in bottom morphology.

The side scan sonar system consists of three units: a tow fish which houses the transducers and signal amplifiers, a reinforced cable acting as a transmission and tow cable simultaneously, and a thermal paper recorder. The side scan sonar derives its information from reflected acoustic energy. The set of transducers mounted on the compact towfish generate high- power, short duration acoustic pulses which are emitted in a thin fan-shaped pattern that spreads downward to either side of the towfish in a plane perpendicular to its path. As the towfish progresses along the survey vessel's track, this beam sequentially scans the seafloor area from a point directly beneath the fish outward on each side of the survey vessel trackline.

Acoustic energy reflected from bottom discontinuities is received by the set of transducers, amplified and transmitted to the survey vessel via the tow cable, where it is further amplified, processed, and converted to a paper record by the side scan recorder. The sequence of reflections from the series of pulses is displayed in real time on a dual-channel thermal recorder. The output is essentially analogous to a high angle oblique "photograph" providing detailed representation of the seafloor features and characteristics.

Strong reflectors such as rocks, shipwrecks, debris, and/or natural features with positive relief are represented by darkened areas on the records. Depressions and "shadow" areas behind features with positive relief are indicated by light areas on the records. Examination of the side scan records thus allows recognition of significant features and objects on the seafloor.

During data acquisition the 100 and 500 khz. side scan return signals were displayed side by side on the 595 graphic recorder. All graphic records were annotated with relevant supporting information, field observations, line number, run number and navigation event numbers via the computer for later interpretation and correlation with vessel position data.

2.5 Magnetometer Investigation

2.5.1 Marine Magnetometer

Total magnetic field intensity measurements were acquired using an EG&G Geometrics Model 866-M digital marine proton precession magnetometer which has an instrument

sensitivity of 0.1 gamma. The sensor was towed astern the survey vessel slightly below the water's surface. Magnetic data were acquired along with date and time at a 1.2 second sampling rate and printed on the 866 strip chart recorder. Magnetic data were also logged digitally and merged with navigation data via the Maretrack computer interface. During data acquisition, all records were annotated with the relevant supporting information, field observations, line number, run number, and navigation event numbers for later interpretation.

Functionally, a proton precession magnetometer operates by "polarizing" or aligning the hydrogen nuclei in a fluid contained in a small vial within the sensor. Polarization is effected by establishing a short duration, relatively high intensity magnetic field in coils surrounding the vial. When the established field is relaxed, the aligned nuclei precess as they attempt to realign themselves with the earth's magnetic field. The measured rate of precession is proportional to the difference between the impressed field (a constant) and the ambient field at that location (the variable to be measured).

Although the earth's magnetic field does change with both time and location, over short periods and distances the earth's field, in the absence of anomalies, can be viewed as being relatively constant. The presence of ferromagnetic material and/or magnetic minerals, however, can add to or subtract from the earth's magnetic field creating a magnetic "anomaly." Rapid changes in total magnetic field strength which are not associated with background fluctuations mark the locations of these anomalies.

2.5.2 Base Station Magnetometer

An EG&G Model 856 magnetometer was setup as a base station during the field survey to monitor diurnal variations in the earth's total magnetic field intensity. This microprocessor based instrument records magnetic readings and the time each reading was taken in solid state memory. The resulting magnetic field intensity data could thus be correlated by time with the marine magnetometer data collected on the survey vessel and any diurnal or other short-period variations removed during processing.

Magnetic data collected with the EG&G Model 856 utilized as a base station during the survey were downloaded at the end of survey operations and analyzed for diurnal variations which could impact on the interpretation of the marine magnetic data. Normal background fluctuations were observed throughout the survey period.

3.0 DATA PROCESSING AND PRESENTATION

Following field acquisition, all acquired data records were brought back to OSI's eastern regional office (Connecticut, USA) and reviewed. The following sections summarize the analysis for each data set.

3.1 Survey Trackline Reconstruction

Side scan sonar and magnetometer tracklines were reconstructed from the X-Y coordinates logged at each 1-second "fix" point and saved to the Maretrack-Mareplot II software. Once reconstructed these tracklines were adjusted for sensor layback and offsets relative to the "Micro-Fix" antenna and then plotted at a scale of 1"=200'. Plots were used for the subsequent task of remote sensing interpretation and construction of the plan view target location and magnetic intensity figures.

3.2 Side Scan Sonar Data

Side scan sonar records were analyzed for the presence of features or bottom characteristics of potential interest to the project. Once these targets or areas of interest were identified, their locations were plotted by correcting for sensor layback and slant range distances.

3.3 Magnetometer Data

Total magnetic field strength data recorded during field acquisition were processed on the computer. Residual magnetometer field values were produced by subtracting a component equal to the local minimum geomagnetic field as detected by the base station magnetometer.

The objective of the magnetic survey was to locate any near-surface objects which have archaeological significance. Anomalies of man-made origin typically have short wavelengths and high amplitudes and can easily be identified. In contrast, most geological features exhibit anomalies that are large in size and often cover a much greater area. Magnetometer data were reviewed and analyzed with the project objectives in mind. Digitally logged magnetometer data have been computer plotted at their appropriate X,Y locations at each site and computer contoured using "Surfer Version 4.01."

1. 1/1/19
