Final Independent External Peer Review Report for the Jamaica Bay, Marine Park, & Plumb Beach Environmental Restoration Project, Kings and Queens Counties, New York, Draft Interim Feasibility Report

Prepared by
Battelle Memorial Institute

Prepared for
Department of the Army
U.S. Army Corps of Engineers
Ecosystem Restoration Planning Center of Expertise
Rock Island District

Contract No. W912HQ-10-D-0002
Task Order: 0002

December 8, 2010

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FINAL

INDEPENDENT EXTERNAL PEER REVIEW REPORT

for the

Jamaica Bay, Marine Park, & Plumb Beach Environmental Restoration Project, Kings and Queens Counties, New York, Draft Interim Feasibility Report

EXECUTIVE SUMMARY

Jamaica Bay is a tidal waterway that lies in an urban area and is connected to the lower bay of New York Harbor. The bay is located approximately 22 miles from midtown Manhattan in New York City and lies between the city's two most populated boroughs, Brooklyn and Queens. The bay is surrounded by salt marshes, disturbed upland ecosystems, parks, landfills, residential communities, commercial and retail facilities, parkways and major roadways, and public transportation, including the John F. Kennedy International Airport.

In the 19th and 20th centuries, a series of human actions resulted in extensive habitat loss, severe degradation of much of the remaining habitats, and deterioration of the bay's chemical, physical, and biological environment. These actions included the filling of marshes and open water areas; hardening of shorelines; altering of the bathymetry of the bay bottom; and inputs from raw and treated sewage, combined sewage overflow, and landfill leachates, all of which impaired the ability of Jamaica Bay to function as an ecological system. Once an area that abounded with wildlife and was safe for fishing and other recreational uses, it is now surrounded by extensive development punctuated by sanitary waste treatment plants and landfills on one side and by one of the most heavily traveled airports in the country on the other side.

The overall purpose of the Jamaica Bay restoration project is to restore the historical productivity and diversity of Jamaica Bay. The alternatives described in the *Jamaica Bay, Marine Park & Plumb Beach, New York Environmental Restoration Project Draft Interim Feasibility Report, Kings and Queens Counties, New York* (hereinafter referred to as the Jamaica Bay Feasibility Report) include the restoration of wetland, riparian, and other aquatic ecosystems as targeted habitats, but also restoration of adjacent maritime forest and grasslands, as appropriate, to function as protective upland buffers. The acreage involved in these recommended restorations includes only a fraction of the estuarine habitat that historically existed in the area, but benefits of the restoration will be complemented first by the interactions among all the sites recommended in the Jamaica Bay Feasibility Report and further by the other restoration efforts in Jamaica Bay.

The U.S. Army Corps of Engineers (USACE) is conducting an Independent External Peer Review (IEPR) of the Jamaica Bay Feasibility Report. Battelle, as a 501(c)(3) non-profit science and technology organization with experience in establishing and administering peer review panels for USACE, was engaged to coordinate the IEPR of the Jamaica Bay Feasibility Report. Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analyses. The IEPR was external to the agency and conducted following USACE and Office of Management and Budget (OMB) guidance described in USACE (2010a), USACE

(2007), and OMB (2004). This final report describes the IEPR process, describes the panel members and their selection, and summarizes the Final Panel Comments of the IEPR Panel (the Panel). A review of the of the Evaluation of Planned Wetlands (EPW) Model, which is proposed for use in the Jamaica Bay Feasibility Report, is also being managed by Battelle and will be reported separately.

Five panel members were selected for the IEPR from more than 30 identified candidates. Based on the technical content of the Jamaica Bay Feasibility Report and the overall scope of the project, the final panel members were selected for their technical expertise in the following key areas: civil design and construction cost engineering, Civil Works planning, the National Environmental Policy Act (NEPA) and biology, coastal engineering, and economics. Although the Panel was disclosed to USACE, Battelle made the final decision on selecting the Panel.

The Panel received electronic versions of the Jamaica Bay Feasibility Report documents, totaling more than 1,500 pages, along with a charge that solicited comments on specific sections of the documents to be reviewed. The charge was prepared by Battelle to assist USACE in developing the charge questions that were to guide the peer review, according to guidance provided in USACE (2010a) and OMB (2004). USACE was given the opportunity to provide comments and revisions, and subsequently approved the final charge questions.

The USACE Project Delivery Team (PDT) briefed the Panel and Battelle during a kick-off meeting held via teleconference prior to the start of the review. Other than this teleconference, there was no direct communication between the Panel and USACE during the peer review process. The Panel produced more than 450 individual comments in response to the 126 charge questions.

IEPR panel members reviewed the Jamaica Bay Feasibility Report documents individually. The panel members then met via teleconference with Battelle to review key technical comments, discuss charge questions for which there were conflicting responses, and reach agreement on the Final Panel Comments to be provided to USACE. Each Final Panel Comment was documented using a four-part format consisting of: (1) a comment statement; (2) the basis for the comment; (3) the significance of the comment (high, medium, or low); and (4) recommendations on how to resolve the comment. Overall, 15 Final Panel Comments were identified and documented. Of these, five were identified as having high significance, eight had medium significance, and two had low significance.

Table ES-1 summarizes the Final Panel Comments by level of significance. Detailed information on each comment is contained in Appendix A of this report.

Table ES-1. Overview of 15 Final Panel Comments Identified by the Jamaica Bay Feasibility Report IEPR Panel

Significance – High	
1	Additional information on salinity measurements and freshwater inputs, specifically from combined sewer overflows (CSOs) throughout the study area, is needed to evaluate the success of the project.
2	The planning constraints statements do not specify actual or potential constraints to the project.
3	The importance of migratory bird habitat and upland restoration needs to be quantified and further linked to the discussions of problems and opportunities and of restoration goals and objectives.
4	The source of the cost estimates used for the alternatives analysis is not documented; therefore, the methodology used to determine the costs and the incremental analysis cannot be validated.
5	It is not clear how sea level rise is incorporated into the design of the various alternatives or how the elevations of the boundaries between the types of restored marshes may be affected under various sea level rise scenarios.
Significance – Medium	
6	Detailed information on hydrology, water quality (including salinity), and circulation model results would improve the analysis of restored wetlands productivity.
7	Prior studies and reports which inform the plan formulation process by serving as data sources, as plan formulation examples, and as input into the “future without project” condition have not been included in the Jamaica Bay Feasibility Report.
8	The screening process does not have sufficient detail to justify selection of the recommended plan.
9	The community types and existing conditions for the alternatives are not categorized through a consistent process, and costs are not presented in a manner that would facilitate comparative analysis.
10	A detailed protocol on how dredged material intended for onsite placement will undergo additional testing and characterization is required.
11	Comprehensive information on vegetation restoration planning, long-term monitoring, and costs is not provided for the Jamaica Bay restoration project.
12	The discussion of the design and monitoring for the hard structures planned for the Dead Horse Bay, Bayswater State Park, Dubos Point, and Brant Point restoration sites needs more detail in order to determine the potential impact on the project.
13	Project goals and objectives are not comprehensive and have not been integrated consistently into the plan formulation process.
Significance – Low	
14	The Jamaica Bay Feasibility Report does not present costs consistent with the Engineering Appendix; therefore, an assessment of the engineering methods used cannot be conducted.
15	Definition and delineation of the overall study area with additional mapping would improve the Jamaica Bay Feasibility Report.

The Panel agreed on its "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2010a; p. D-4) in the Jamaica Bay Feasibility Report. The Panel agreed that the Jamaica Bay restoration project presented many opportunities of great value to a highly populated urban area. The Jamaica Bay Feasibility Report was in general technically sound, the appendices were detailed, and the presentation of existing conditions was informative. Furthermore, agency coordination clearly was a factor in the strength of the project. The Panel, however, identified several issues that need to be addressed to make the Jamaica Bay restoration project more complete. The following statements summarize the Panel's findings, which are described in more detail in the Final Panel Comments (see Appendix A).

Plan Formulation:
The plan formulation logic is at times inconsistent. The Jamaica Bay Feasibility Report does not adequately describe the screening process for the final array of alternatives and does not have sufficient detail to justify selection of the recommended plan. A good case is presented on the importance of improving waterfowl habitat; specifically, the report states that improved waterfowl habitat should be considered when adding increments that, according to the Institute for Water Resources Planning Suite (IWR-PLAN) software, lie beyond cost break points. However, this is not previously discussed as a planning objective or opportunity. The Panel believes that the study should quantify, or at least provide evidence, that the added sites (Dead Horse Bay, Paerdegat Basin, and Spring Creek) would improve habitat for waterfowl.

The constraints listed for the specific sites are reasonable, but most of the constraints listed for the overall project are beneficial to the project or are required planning practices, and do not actually constrain the project. It is not clear how the constraints affected the planning of alternatives, or how the recommended plan resolves or addresses the listed constraints. Given the variety and intensity of neighboring land uses, linking constraints to the recommended plan analysis is crucial to ensure that the project can be successfully implemented. Similarly, the study should demonstrate how the recommended plan satisfies planning goals and objectives.

It is difficult to judge the adequacy of the plan selection process. The Jamaica Bay Feasibility Report should include a discussion/table to support plan selection that describes and analyzes the final 11 alternatives in terms of the following parameters: significance of outputs; plan acceptability, completeness, and effectiveness; the positive "unintended effects" on other environmental or ecosystem services outputs; support by a local sponsor or other interest group; and the effects on nearby stakeholders, size and location considerations, contribution to the migratory bird Atlantic Flyway, and other benefits not captured by the EPW analysis.

Economics:
The Jamaica Bay restoration project was technically sound from an economic perspective, and the development of alternatives was comprehensive. USACE advised the Panel that an older, uncertified version of IWR-PLAN was used for the cost effectiveness/incremental cost analysis (CE/ICA) and that the CE/ICA analysis will be updated using the certified version of IWR-PLAN.

However, the Panel is concerned that the alternative cost estimates might not be at a sufficient level of detail to realistically compares alternatives. No information on the assumptions used or how the costs were derived is provided. The Panel recommends that USACE test the sensitivity of the CE/ICA results to potential cost increases or provide some assurance that CE/ICA results would be the same if alternative costs reflected the cost increase apparent in the recommended plan cost estimate.

Engineering:
The hydrology of the eight project sites is not addressed in the Jamaica Bay Feasibility Report. The runoff contributions of CSOs (i.e., water quality and volumes) are not quantified, and the plans to mitigate associated problems are not discussed. It is not clear how sea level rise is incorporated into the design of the various alternatives or how the elevations of the boundaries between the types of restored marshes may be affected under various sea level rise scenarios. Also, a monitoring plan for the hard structures needs to be developed and incorporated into the project.

Environmental:
The goal for the utilization of dredged material for onsite placement is not clear. Migratory bird habitat and upland restoration need to be quantified and linked to problems and opportunities and to restoration goals and objectives. Waterfowl should be more prominent in the earlier plan formulation steps, and additional indication of benefits to waterfowl should be provided since waterfowl is not a specific output from the EPW model. Salinity measurements and freshwater inputs, specifically from CSOs throughout the study area, are needed because they may affect the success of the salt marsh restoration. The vegetation restoration plan is not comprehensive, and the monitoring plan for new vegetation does not specify target survivorship with clear milestones or triggers for action. Additionally, monitoring costs for the project are not adequately defined, and a description of an adaptive management plan should be incorporated.

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TABLE OF CONTENTS

EXECUTIVE SUMMARY i

1. INTRODUCTION 1

2. PURPOSE OF THE IEPR 2

3. METHODS 2
   - 3.1 Planning and Schedule 2
   - 3.2 Identification and Selection of IEPR Panel Members 4
   - 3.3 Preparation of the Charge and Conduct of the IEPR 7
   - 3.4 Review of Individual Comments 7
   - 3.5 IEPR Panel Teleconference 7
   - 3.6 Preparation of Final Panel Comments 8

4. PANEL DESCRIPTION 9

5. SUMMARY OF FINAL PANEL COMMENTS 17

6. REFERENCES 20

Appendix A Final Panel Comments on the Jamaica Bay Feasibility Report
Appendix B. Final Charge to the Independent External Peer Review Panel on the Jamaica Bay Feasibility Report

LIST OF TABLES

Table ES-1. Overview of 15 Final Panel Comments Identified by the Jamaica Bay Feasibility Report IEPR Panel iii
Table 1. Jamaica Bay Feasibility Report IEPR Schedule 3
Table 2. Jamaica Bay Feasibility Report IEPR Panel: Technical Criteria and Areas of Expertise 10
Table 3. Overview of 15 Final Panel Comments Identified by the Jamaica Bay Feasibility Report IEPR Panel 178

LIST OF ACRONYMS

AAFCU	Average Annual Functional Capacity Unit
ASCE	American Society of Civil Engineers
CE/ICA	Cost Effectiveness/Incremental Cost Analysis
CEM	Coastal Engineering Manual
CEQA	California Environmental Quality Act
CSO	Combined Sewer Overflows
COI	Conflict of Interest
DrChecks	Design Review and Checking System
EA	Environmental Assessment
EC	Engineering Circular
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPW	Evaluation of Planned Wetlands Model
FCU	Functional Capacity Unit
GIS	Geographic Information System
HEP	Habitat Evaluation Procedure
HRE	Hudson-Raritan Estuary
HTRW	Hazardous, Toxic and Radioactive Waste
IEPR	Independent External Peer Review
IWR-PLAN	Institute for Water Resources Planning Suite software
LERRD	Lands, Easements, Rights-of-way, and Relocations and Disposal/borrow areas
NEPA	National Environmental Policy Act
NER	National Ecosystem Restoration
NMFS	U.S. National Marine Fisheries Service
NPS	National Park Service
NTP	Notice to Proceed
NYCDEP	New York City Department of Environmental Protection
NYCDPR	New York City Department of Parks and Recreation
NYSDEC	New York State Department of Environmental Conservation
O&M	Operations and Maintenance
OMB	Office of Management and Budget
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PDT	Project Delivery Team
RTE	Rare, Threatened, and Endangered(species)
SAM	Spatial Analysis Model
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
WRDA	Water Resources Development Act

1. INTRODUCTION

Jamaica Bay is a tidal waterway that lies in an urban area and is connected to the lower bay of New York Harbor. The bay is located approximately 22 miles from midtown Manhattan in New York City and lies between the city's two most populated boroughs, Brooklyn and Queens. The bay is surrounded by salt marshes, disturbed upland ecosystems, parks, landfills, residential communities, commercial and retail facilities, parkways and major roadways, and public transportation, including the John F. Kennedy International Airport.

In the 19th and 20th centuries, a series of human actions resulted in extensive habitat loss, severe degradation of much of the remaining habitats, and deterioration of the bay's chemical, physical, and biological environment. These actions included the filling of marshes and open water areas; hardening of shorelines; altering of the bathymetry of the bay bottom; and inputs from raw and treated sewage, combined sewage overflow, and landfill leachates, all of which impaired the ability of Jamaica Bay to function as an ecological system. Once an area that abounded with wildlife and was safe for fishing and other recreational uses, it is now surrounded by extensive development punctuated by sanitary waste treatment plants and landfills on one side and by one of the most heavily traveled airports in the country on the other side.

The overall purpose of the Jamaica Bay restoration project is to restore the historical productivity and diversity of Jamaica Bay. The alternatives described in the *Jamaica Bay, Marine Park & Plumb Beach, New York Environmental Restoration Project Draft Interim Feasibility Report, Kings and Queens Counties, New York* (hereinafter referred to as the Jamaica Bay Feasibility Report) include the restoration of wetland, riparian, and other aquatic ecosystems as targeted habitats, but also restoration of adjacent maritime forest and grasslands, as appropriate, to function as protective upland buffers. The acreage involved in these recommended restorations includes only a fraction of the estuarine habitat that historically existed in the area, but benefits of the restoration will be complemented first by the interactions among all the sites recommended in the Jamaica Bay Feasibility Report, and further by the other restoration efforts in Jamaica Bay.

The objective of the work described here was to conduct an Independent External Peer Review (IEPR) of the Jamaica Bay Feasibility Report in accordance with procedures described in the Department of the Army, U.S. Army Corps of Engineers Engineer Circular *Civil Works Review Policy* (EC No. 1165-2-209) (USACE, 2010a), U.S. Army Corps of Engineers (USACE) CECW-CP memorandum *Peer Review Process* (USACE, 2007), and Office of Management and Budget (OMB) bulletin *Final Information Quality Bulletin for Peer Review* (OMB, 2004). Battelle, as a 501(c)(3) non-profit science and technology organization with experience in establishing and administering peer review panels, was engaged to coordinate the IEPR of the Jamaica Bay Feasibility Report. Independent, objective peer review is regarded as a critical element in ensuring the reliability of scientific analyses.

This final report details the IEPR process, describes the IEPR panel members and their selection, and summarizes the Final Panel Comments of the IEPR Panel on the existing environmental, economic, and engineering analyses contained in the Jamaica Bay Feasibility Report. Detailed

information on the Final Panel Comments is provided in Appendix A. A review of the of the Evaluation of Planned Wetlands (EPW) Model, which is proposed for use in the Jamaica Bay Feasibility Report, is also being managed by Battelle and will be reported separately.

2. PURPOSE OF THE IEPR

To ensure that USACE documents are supported by the best scientific and technical information, USACE has implemented a peer review process that uses IEPR to complement the Agency Technical Review, as described in USACE (2010a) and USACE (2007).

In general, the purpose of peer review is to strengthen the quality and credibility of the USACE decision documents in support of its Civil Works program. IEPR provides an independent assessment of the economic, engineering, and environmental analysis of the project study. In particular, the IEPR addresses the technical soundness of the project study's assumptions, methods, analyses, and calculations and identifies the need for additional data or analyses to make a good decision regarding implementation of alternatives and recommendations.

In this case, the IEPR of the Jamaica Bay Feasibility Report was conducted and managed using contract support from Battelle, which is an Outside Eligible Organization under Section 501(c)(3) of the U.S. Internal Revenue Code with experience conducting IEPRs for USACE.

3. METHODS

This section describes the method followed in selecting the members of the IEPR Panel (the Panel) and in planning and conducting the IEPR. The IEPR was conducted following procedures described by USACE (2010a) and in accordance with USACE (2007) and OMB (2004) guidance. Supplemental guidance on evaluation for conflicts of interest (COIs) was obtained from the *Policy on Committee Composition and Balance and Conflicts of Interest for Committees Used in the Development of Reports* (The National Academies, 2003).

3.1 Planning and Schedule

After receiving the notice to proceed (NTP), Battelle held a kick-off meeting with USACE to review the preliminary/suggested schedule, discuss the IEPR process, and address any questions regarding the scope (e.g., clarify expertise areas needed for panel members). Any revisions to the schedule were submitted as part of the final Work Plan.

Table 1 defines the schedule followed in executing the IEPR. Due dates for milestones and deliverables are based on the NTP date of June 8, 2010. Note that the work items listed in Task 7 occur after the submission of this report. Battelle will enter the 15 Final Panel Comments developed by the Panel into USACE's Design Review and Checking System (DrChecks), a Web-based software system for documenting and sharing comments on reports and design documents, so that USACE can review and respond to them. USACE will provide responses (Evaluator Responses) to the Final Panel Comments, and the Panel will respond (BackCheck Responses) to the Evaluator Responses. All USACE and Panel responses will be documented by Battelle.

Table 1. Jamaica Bay Feasibility Report IEPR Schedule

TASK	ACTION	DUE DATE
1	**Notice to Proceed (NTP)**	6/8/2010
	Review documents available	6/22/2010
	Battelle submits Draft Work Plan[a]	7/7/2010
	USACE provides comments on Draft Work Plan	7/14/2010
	Battelle submits Final Work Plan[a]	7/19/2010
2	Battelle requests input from USACE on the COI questionnaire	6/18/2010
	USACE Provides comments on COI	6/22/2010
	Battelle submits list of selected panel members[a]	7/9/2010
	USACE provides comments on selected panel members	7/13/2010
	Battelle completes subcontracts for panel members	8/3/2010
3	Battelle submits Draft Charge (combine with Draft Work Plan – Task 1)[a]	7/7/2010
	USACE provides comments on Draft Charge	7/14/2010
	Battelle submits Final Charge (combined with Final Work Plan – Task 1)[a]	7/19/2010
	USACE approves Final Charge	7/20/2010
4	USACE/Battelle Kick-off Meeting	6/18/2010
	Review documents sent to panel members	8/4/2010
	USACE/Battelle/Panel Kick-off Meeting with panel members	8/11/2010
	IEPR panel members complete their review	10/28/2010
5	Convene panel review teleconference	11/9/2010
	Panel members provide draft Final Panel Comments (FPCs) to Battelle	11/18/2010
6	Battelle submits Final IEPR Report to USACE[a]	12/8/2010
7[b]	Battelle inputs Final Panel Comments to DrChecks; Battelle provides Final Panel Comment response template to USACE	12/10/2010
	USACE Project Delivery Team (PDT) provides draft responses and clarifying questions to Battelle	12/17/2010
	Teleconference between Battelle, IEPR team, and PDT to discuss FPCs, draft responses and clarifying questions	12/29/2010
	USACE inputs final Evaluator responses in DrChecks	1/21/2011
	Battelle inputs BackCheck responses in DrChecks	2/11/2011
	Battelle submits pdf printout of DrChecks to USACE[a]	2/14/2011
	Project Closeout	4/19/2011

[a] Deliverable

[b] Task occurs after the submission of this report.

3.2 Identification and Selection of IEPR Panel Members

The candidates for the Panel were evaluated based on their technical expertise in the following key areas: civil design and construction cost engineering, Civil Works planning, the National Environmental Policy Act (NEPA) and biology, coastal engineering, and economics. These areas correspond to the technical content of the Jamaica Bay Feasibility Report and overall scope of the project.

To identify candidate panel members, Battelle reviewed experts in Battelle's Peer Reviewer Database, sought recommendations from colleagues, contacted former panel members, and conducted targeted Internet searches. Battelle initially identified more than 30 candidates for the Panel, evaluated their technical expertise, and inquired about potential COIs. Of these, Battelle chose eight of the most qualified candidates and confirmed their interest and availability. Of the eight candidates, five were proposed for the final Panel, and three were proposed as backup reviewers. Additionally, the Civil Works planning expert was proposed to serve on the EPW Model Review final Panel. Information about the candidate panel members, including brief biographical information, highest level of education attained, and years of experience, was provided to USACE for feedback. Battelle made the final selection of panel members according to the selection criteria described in the Work Plan.

The five proposed primary reviewers constituted the final Panel. The remaining candidates were not proposed for a variety of reasons, including lack of availability, disclosed COIs, or lack of the precise technical expertise required.

The candidates were screened for the following potential exclusion criteria or COIs.[1] These COI questions were intended to serve as a means of disclosure, and to better characterize a potential candidate's employment history and background. Providing a positive response to a COI screening question did not automatically preclude a candidate from serving on the Panel. For example, participation in previous USACE technical peer review committees and other technical review panel experience was included as a COI screening question. A positive response to this question could be considered a benefit.

- Involvement by you or your firm[2] in any part of the Jamaica Bay, Marine Park and Plumb Beach, Queens and Kings Counties, New York, Draft Interim Feasibility Report.
- Involvement by you or your firm[2] in any part of the Jamaica Bay, Marine Park and Plumb Beach, Queens and Kings Counties, New York, Draft Environmental Assessment and Technical Appendices.

[1] Battelle evaluated whether scientists in universities and consulting firms that are receiving USACE-funding have sufficient independence from USACE to be appropriate peer reviewers. See OMB (2004, p. 18), "….when a scientist is awarded a government research grant through an investigator-initiated, peer-reviewed competition, there generally should be no question as to that scientist's ability to offer independent scientific advice to the agency on other projects. This contrasts, for example, to a situation in which a scientist has a consulting or contractual arrangement with the agency or office sponsoring a peer review. Likewise, when the agency and a researcher work together (e.g., through a cooperative agreement) to design or implement a study, there is less independence from the agency. Furthermore, if a scientist has repeatedly served as a reviewer for the same agency, some may question whether that scientist is sufficiently independent from the agency to be employed as a peer reviewer on agency-sponsored projects."

[2] Includes any joint ventures in which your firm is involved.

- Involvement by you or your firm[2] in any part of the development, testing, or review of the Evaluation of Planned Wetlands (EPW) Model, including involvement in the development of the document entitled: *Evaluation for Planned Wetlands: A Procedure for Assessing Wetland Functions and a Guide to Functional Design.*
- Involvement by you or your firm[2] in any wetland assessment or ecosystem restoration studies in the Jamaica Bay, NY area.
- Involvement by you or your firm[2] in any part of the Jamaica Bay Ecosystem Restoration Study, including:
  - Report entitled "Jamaica Bay: Navigational Channels and Shoreline Environmental Surveys"
  - Gerritsen Creek and Spring Creek North marsh restoration projects
  - Penn and Fountain Landfills remediation and restoration projects
  - Rebuilding of seven bridges along the Belt Parkway
  - Restoration projects at Big Egg Marsh, Idlewild Park, White Island, Bergen Beach, Coney Island Creek, and Hendrix Creek
  - Creation of docks at John F Kennedy Airport, Fort Tilden, and Motts Basin; or
  - USACE Hudson-Raritan Estuary (HRE) Ecosystem Restoration Study
- Current employment by the U.S. Army Corps of Engineers (USACE).
- Involvement with paid or unpaid expert testimony related to the Jamaica Bay, Marine Park and Plumb Beach, Queens and Kings Counties, New York, Draft Interim Feasibility Report, or Draft Environmental Assessment and Technical Appendices.
- Involvement with paid or unpaid expert testimony related to the Evaluation of Planned Wetlands (EPW) Model.
- Current or previous employment or affiliation with the non-Federal sponsors or any of the following Federal, state, county, local and regional agencies, environmental organizations, and interested groups: New York City Department of Environmental Protection (NYCDEP), New York State Department of Environmental Conservation (NYSDEC), New York City Department of Parks and Recreation (NYCDPR), New York State Department of Parks, Recreation, and Historic Preservation, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service (USFWS), U.S. National Marine Fisheries Service (NMFS), U.S. Environmental Protection Agency (USEPA), National Park Service (NPS), or the Gateway National Recreation Area (for pay or pro bono).
- Past, current or future interests or involvements (financial or otherwise) by you, your spouse or children related to the Jamaica Bay, Marine Park and Plumb Beach, Queens and Kings Counties, New York, Draft Interim Feasibility Report, or Draft Environmental Assessment and Technical Appendices, including interest in related contracts or awards from USACE.
- Current firm[2] involvement with other USACE projects, including whether involvement was to author any manuals or guidance documents for USACE. If yes, provide titles of documents or description of project, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role. Please highlight and discuss in greater detail any projects that are *specifically* with the Institute for Water Resources or the New York District.
- Current firm[2] involvement with other USACE projects, *specifically* those projects/contracts that are with the Institute for Water Resources or the New York

District. If yes, provide title/description, dates, and location (USACE district, division, Headquarters, ERDC, etc.), and position/role.

- *Any* previous employment by the USACE as a direct employee or contractor (either as an individual or through your firm[2]) within the last 10 years, *notably* if those projects/contracts are with the Institute for Water Resources or the New York District. If yes, provide title/description, dates employed, and place of employment (district, division, Headquarters, ERDC, etc.), and position/role.
- Previous experience conducting technical peer reviews. If yes, please highlight and discuss any technical reviews concerning wetland assessment, ecosystem restoration, fisheries science, and population ecology and include the client/agency and duration of review (approximate dates).
- A significant portion (i.e., greater than 50%) of personal or firm[2] revenues within the last 3 years came from USACE contracts.
- Participation in relevant prior Federal studies/programs relevant to this project, including:
  - Jamaica Bay, Marine Park, and Plumb Beach, New York Combined Beach Erosion Control and Hurricane Protection Reconnaissance Study (USACE 1994)
  - Jamaica Bay Navigational Channels and Shoreline Environmental Surveys (USACE 1997)
  - Jamaica Bay Ecosystem Research and Restoration Team (JABERRT) report (USACE 2002)
  - Draft Cultural Resources Baseline Study (USACE 2000)
  - Existing Conditions, Future Without Project Conditions, Goals and Objectives Report (USACE 2002)
  - Draft HTRW Sampling Program Report (USACE 2002)
  - Draft Water Quality Modeling (USACE 2003)
  - Final Conceptual Plan Report (USACE 2003)
  - Summary of Water Level Data Report (USACE 2003)
  - Shoreline Stability Analysis Report (USACE 2003)
  - Jamaica Bay Study Area Report (USACE 2004)
- Participation in relevant prior non-Federal studies/programs relevant to this project.
- Any publicly documented statement (including, for example, advocating for or discouraging against) related to the Jamaica Bay, Marine Park and Plumb Beach, Queens and Kings Counties, New York, Draft Interim Feasibility Report, or Draft Environmental Assessment and Technical Appendices.
- Is there any past, present or future activity, relationship or interest (financial or otherwise) that could make it appear that you would be unable to provide unbiased services on this project? If so, please describe:

In selecting the final members of the Panel from the list of candidates, Battelle chose experts who best fit the expertise areas and had no COIs. The five final reviewers were affiliated with either academic institutions or consulting companies. Battelle established subcontracts with the panel members when they indicated their willingness to participate and confirmed the absence of COIs through a signed COI form. Although the Panel was disclosed to USACE, Battelle made the final decision on selecting the Panel. Section 4 of this report provides names and biographical information on the panel members.

Prior to beginning their review and within 6 days of their subcontracts being finalized, all members of the Panel attended a kick-off meeting via teleconference planned and facilitated by Battelle in order to review the IEPR process, the schedule, communication, and other pertinent information for the Panel.

3.3 Preparation of the Charge and Conduct of the IEPR

Battelle drafted a preliminary charge document, including specific charge questions and discussion points. The charge was prepared by Battelle to assist USACE in developing the charge questions that were to guide the peer review, according to guidance provided in USACE (2010a) and OMB (2004). The draft charge was submitted to USACE for evaluation as part of the draft Work Plan. USACE provided comments and revisions to the draft charge, which were used to produce the final charge. The final charge was submitted to USACE for approval. In addition to a list of 126 charge questions/discussion points, the final charge included general guidance for the Panel on the conduct of the peer review (provided in Appendix B of this final report).

Battelle planned and facilitated a final kick-off meeting via teleconference during which USACE presented project details to the Panel. Before the meeting, the IEPR Panel received an electronic version of the Jamaica Bay Feasibility Report documents and the final charge. A full list of the documents reviewed by the Panel is provided in Appendix B of this report. The Panel was instructed to address the charge questions/discussion points within a comment-response form provided by Battelle.

3.4 Review of Individual Comments

At the end of the review period, the Panel produced approximately 480 individual comments in response to the charge questions/discussion points. Battelle reviewed the comments to identify overall recurring themes, areas of potential conflict, and other overall impressions. As a result of the review, Battelle was able to summarize the 480 comments into a preliminary list of 19 overall comments and discussion points. Each panel member's individual comments were shared with the full Panel in a merged individual comments table.

3.5 IEPR Panel Teleconference

Battelle facilitated a 4-hour teleconference with the Panel so that the panel experts, many of whom are from diverse scientific backgrounds, could exchange technical information. The main goal of the teleconference was to identify which issues should be carried forward as Final Panel Comments in the IEPR report and decide which panel member would serve as the lead author for the development of each Final Panel Comment. This information exchange ensured that the final IEPR report would accurately represent the Panel's assessment of the project, including any conflicting opinions. The Panel engaged in a thorough discussion of the overall positive and negative comments, added any missing issues of high-level importance to the findings, and merged any related individual comments. In addition, Battelle confirmed each Final Panel Comment's level of significance to the Panel.

The Panel also discussed responses to five specific charge questions where there appeared to be disagreement among panel members. The conflicting comments were resolved based on the professional judgment of the Panel, and all sets of comments were determined not to be

conflicting. Each comment was either incorporated into a Final Panel Comment, determined to be consistent with other Final Panel Comments already developed, or determined to be a non-significant issue.

At the end of these discussions, the Panel identified 16 comments and discussion points that should be brought forward as Final Panel Comments.

3.6 Preparation of Final Panel Comments

Following the teleconference, Battelle prepared a summary memorandum for the Panel documenting each Final Panel Comment (organized by level of significance). The memorandum provided the following detailed guidance on the approach and format to be used to develop the Final Panel Comments for the Jamaica Bay Feasibility Report:

- Lead Responsibility: For each Final Panel Comment, one Panel member was identified as the lead author responsible for coordinating the development of the Final Panel Comment and submitting it to Battelle. Battelle modified lead assignments at the direction of the Panel. To assist each lead in the development of the Final Panel Comments, Battelle distributed the merged individual comments table, a summary detailing each draft final comment statement, an example Final Panel Comment following the four-part structure described below, and templates for the preparation of each Final Panel Comment.
- Directive to the Lead: Each lead was encouraged to communicate directly with other IEPR panel members as needed and to contribute to a particular Final Panel Comment. If a significant comment was identified that was not covered by one of the original Final Panel Comments, the appropriate lead was instructed to draft a new Final Panel Comment.
- Format for Final Comments: Each Final Panel Comment was presented as part of a four-part structure:
  1. Comment Statement (succinct summary statement of concern)
  2. Basis for Comment (details regarding the concern)
  3. Significance (high, medium, low; see description below)
  4. Recommendation(s) for Resolution (see description below).
- Criteria for Significance: The following were used as criteria for assigning a significance level to each Final Panel Comment:
  1. High: Describes a fundamental problem with the project that could affect the recommendation or justification of the project
  2. Medium: Affects the completeness or understanding of the reports/project
  3. Low: Affects the technical quality of the reports but will not affect the recommendation of the project.
- Guidance for Developing the Recommendations: The recommendations were to include specific actions that the USACE should consider to resolve the Final Panel Comment (e.g., suggestions on how and where to incorporate data into the analysis, how and where to address insufficiencies, areas where additional documentation is needed).

At the end of this process, 15 Final Panel Comments were prepared and assembled; one of the original 16 comments was merged with an existing Final Panel Comment. Battelle reviewed and edited the Final Panel Comments for clarity, consistency with the comment statement, and adherence to guidance on the Panel's overall charge, which included ensuring that there were no comments regarding either the appropriateness of the selected alternative or USACE policy. There was no direct communication between the Panel and USACE during the preparation of the Final Panel Comments. The Final Panel Comments are presented in Appendix A of this report.

4. PANEL DESCRIPTION

Candidates for the Panel were identified using Battelle's Peer Reviewer Database, targeted Internet searches using key words (e.g., technical area, geographic region), searches of websites of universities or other compiled expert sites, and referrals. Battelle prepared a draft list of primary and backup candidate panel members (who were screened for availability, technical background, and COIs), and provided it to USACE for feedback. Battelle made the final selection of panel members.

An overview of the credentials of the final five primary members of the Panel and their qualifications in relation to the technical evaluation criteria is presented in Table 2. More detailed biographical information regarding each panel member and his or her area of technical expertise is presented in the text that follows the table.

Table 2. Jamaica Bay Feasibility Report IEPR Panel: Technical Criteria and Areas of Expertise

	Love	Adams	Rein	Weggel	Burns
Civil Design and Construction Cost Engineering (one expert needed)	**X**				
Professional Engineer from academia, public agency, or consulting firm with a minimum of 10 years demonstrated experience in civil design/construction engineering	X				
Familiar with large, complex Civil Works projects with high public and interagency interests	X				
Demonstrated experience in performing cost engineering/construction management for all phases of ecosystem restoration or related projects	X				
Familiar with similar projects across the US and the related cost engineering	X				
Familiar with construction industry and practices used in wetland restoration	X				
Experience in associated contracting procedures	X				
Experience in total cost growth analysis	X				
Experience in cost risk analysis	X				
Degree in civil engineering or related field	X				
Civil Works Planning (one expert needed)		**X**			
Expert from academia, public agency, or consulting firm with a minimum of 10 years demonstrated experience in ecosystem restoration planning		X			
Familiar with large, complex Civil Works projects with high public and interagency interests		X			
Familiar with USACE planning standards and procedures		X			
Familiar with USACE ecosystem restoration planning policies		X			
Familiar with evaluation of alternative plans for ecosystem restoration projects		X			
Demonstrated experience/expertise with the application of models during the planning and evaluation of ecosystem restoration projects or regulated activities		X			
Experience in the planning of freshwater wetlands restoration		X			

	Love	Adams	Rein	Weggel	Burns
Degree in planning, biology, engineering, physical sciences, or related field		X			
NEPA and Biology (one expert needed)			**X**		
Expert from academia, public agency, or consulting firm with a minimum of 10 years demonstrated experience in biology and with NEPA			X		
Familiar with large, complex Civil Works projects with high public and interagency interests			X		
Knowledge of ecosystem restoration			X		
Familiar with all NEPA requirements			X		
Experience in wetland ecology of urban regions, preferably in the densely populated mid-Atlantic or Northeast			X		
M.S. degree or higher in biology or ecology			X		
Coastal Engineering (one expert needed)				**X**	
Professional Engineer from academia, public agency, or consulting firm with a minimum of 10 years demonstrated experience in coastal engineering				X	
Familiar with large, complex Civil Works projects with high public and interagency interests				X	
Experience in engineering analysis related to wetland restoration or related projects in the urban Northeast				X	
Familiar with the USACE Coastal Engineering Manual (CEM)				X	
M.S. degree or higher in civil or coastal engineering				X	
Economics (one expert needed)					**X**
Expert from academia, public agency, or consulting firm with a minimum of 10 years demonstrated experience in economic studies					X
Familiar with large, complex Civil Works projects with high public and interagency interests					X
Able to evaluate the appropriateness of cost effectiveness and incremental cost analysis (CE/ICA) as applied to dollar costs and ecosystem restoration benefits					X
Familiar with USACE tool for CE/ICA, called the Institute for Water Resources (IWR)-Planning Suite					X

	Love	Adams	Rein	Weggel	Burns
Experience with National Ecosystem Restoration (NER) analysis procedures					X
Degree in economics or related field					X

David Love, P.E.

Role: This panel member was chosen primarily for his civil design and construction cost engineering experience and expertise.
Affiliation: Belt Collins West

David Love (Civil Design/Construction Cost Engineering): Mr. Love is a principal and vice-president of Belt Collins West, which specializes in civil and water resource engineering for state, municipal, industrial, agricultural, and private sector clients. He earned his B.S. in Engineering Physics from the Colorado School of the Mines in 1972, has more than 38 years of experience in civil engineering, and is a licensed professional engineer in Colorado. He is familiar with large, high-visibility, complex Civil Works projects, having completed numerous floodplain and major drainage way master plans, all of which have included cost engineering and civil design such as the South Platte River Flood Control Improvement project in Denver. This $25 million project, with Mr. Love as principal in charge of all phase of the project, was master planned in 1995, followed by two physical-scale hydraulic models at the Colorado State University hydraulics laboratory and then three phases of design and construction. The project construction was completed in 2008; Federal Emergency Management Agency Letter of Map Revision approvals were received in 2009. He has extensive experience performing cost engineering/construction management for all phases of ecosystem restoration. Notable projects include the planning, design, and construction management of the University of Boulder Research Park, which was acclaimed by the USACE Omaha District as the model Wetland Restoration and Floodplain Mitigation Project for the nation. He is familiar with similar projects across the United States and the related cost engineering, having conducted cost engineering on similar projects in 10 states. Mr. Love is experienced with the construction industry procedures and practices for wetland restoration and the associated contracting procedures. His environmental design and wetland mitigation experience includes the St. Vrain River Restoration and Improvements, Instream and Bank Stabilization project at the Longmont Wastewater Treatment Plant, Longmont, Colorado. He is well-versed in the standard public bidding process, including bidding services, acceptability of contractors and substitute materials, pre-qualification of contractors, performance-based contracting, liquidated damages, and warrantee claims against a contractor. He is experienced in total cost growth analysis and is familiar with estimating how systems will handle future growth and demands, and the total cost of ownership that includes future operational and support costs. His expertise in cost risk analysis is a result of 38 years of experience analyzing construction-related issues that affect costs and risk and developing budgeting contingency factors. Mr. Love is a member of the American Society of Civil Engineers (ASCE), American Council of Engineering Consultants, Colorado Association of Stormwater and Floodplain Managers, Association of State Floodplain Managers, and National Society of Professional Engineers.

Thomas Adams

Role: This panel member was chosen primarily for his Civil Works planning experience and expertise.
Affiliation: HDR, Inc.

Thomas Adams (Civil Works Planner, IEPR/Model Review –Dual Role): Mr. Adams is a senior project manager for HDR, Inc. specializing in water resources planning and environmental

analysis. He has technical expertise in a wide range of water resources issues, including flood risk and environmental analysis, and ecosystem restoration. He earned his M.S. in Landscape Architecture in 1979 from California Polytechnic State University, Pomona. He has over 30 years of experience in the planning and economic analysis of multipurpose water resource projects that provide flood damage reduction, recreation, water supply, water quality, and ecosystem restoration for USACE (1979-2008) and most recently for the private sector. He is experienced with high-visibility, large, complex Civil Works projects and has planned and managed numerous such projects, including the Sacramento-San Joaquin Bay Delta Conservation Plan Environmental Impact Report-Environmental Impact Statement (EIR-EIS) and the Folsom Dam Joint Federal Project, a joint USACE-Bureau of Reclamation partnership. Mr. Adams is familiar with USACE planning standards, procedures, and ecosystem restoration policies, including the Planning Manual and ER1105-2-100, having successfully applied them on numerous USACE studies. For the Sacramento Bank Protection Project Decision Document (USACE), Mr. Adams is developing a plan of study and project management plan for a newly authorized project. The effort includes articulating issues on how the Decision Document will fit with USACE planning policy. In addition, he has taught the plan formulation class for USACE and supervised other planners. He is familiar with evaluation of alternative plans for ecosystem restoration projects and is experienced with incremental analysis, Institute for Water Resources Planning Suite (IWR-PLAN) software, cost-benefit analysis, and risk analysis. For the Bay Delta Conservation Plan EIR-EIS, Department of Water Resources, California, Mr. Adams is lead author for the affected environment and environmental impacts to flood management, impact assessment from construction and operation of freshwater bypass, and restoration alternatives intended to improve water supply reliability. As a landscape architect, he is also familiar with the formulation, design, and costing process of restoration measures and assembling them into alternatives. He has demonstrated expertise with application of models during the planning and evaluation of ecosystem restoration projects or regulated activities, and has used different habitat evaluation models to assign benefits to in-river, wetlands, and terrestrial habitats. He is familiar with various models, including the Spatial Analysis Model (SAM) and Habitat Evaluation Procedure (HEP) analysis models. For the Sacramento River protection plan, he is using output from SAM to assess impacts of actions at different sites. He has used the HEP analysis model on a number of restoration and mitigation studies. Mr. Adams is experienced in the planning of freshwater wetlands restoration and has been involved in relevant studies, including the South Sacramento County Streams Feasibility Study, the American River Long Term Study, and the Trukee River Restoration initial study. Mr. Adams has substantial formal planning training, including Hydrology and Hydraulics for Planners, Risk and Uncertainty Analysis, Environmental Laws and Regulations, Freshwater Wetlands Restoration, Planning Principles and Procedures, Public Involvement, and Bank Protection.

Felicia Orah Rein, Ph.D.

Role: This panel member was chosen primarily for her NEPA and biology experience and expertise.
Affiliation: Watershed Solutions, Inc.

Felicia Orah Rein (NEPA and Biology): Dr. Rein is president and senior scientist at Watershed Solutions, Inc., an environmental consulting and restoration services firm specializing in environmental restoration, environmental assessment and impact analyses, ecological

monitoring, water resource management, and reduction of sediment transport and erosion. She is also an affiliate professor at Florida Atlantic University. She earned her Ph.D. in ecosystem science/restoration ecology from the University of California at Santa Cruz in 2000 and has over 20 years of experience managing and carrying out large-scale multidisciplinary restoration ecology and resource protection projects. Dr. Rein has extensive experience with large complex Civil Works projects with high public visibility, including assessment of environmental impacts of the New York/New Jersey harbor-deepening project. For that project, she provided expertise in dredged material beneficial uses and source reduction and conducted vegetation and wetland mapping on coastal sites. Her NEPA expertise has involved collaboration with the National Marine Fisheries Service, California Department of Fish and Game, California State Water Resource Control Board, and USFWS. She has a strong knowledge of ecosystem restoration, having worked on projects such as the Far Rockaway, Averne site park and housing development projects. Her role focused on wetland restoration areas and on water quality and vegetation impacts. Dr. Rein has prepared numerous NEPA and California Environmental Quality Act (CEQA) documents. As a senior project manager, she has provided scientific expertise on environmental documents according to NEPA/CEQA guidelines and has worked closely with local, state, and federal governments as well as lawyers, environmentalists, and community groups on complex water rights assessments. She has experience in wetland ecology of urban regions, having worked in the initial phases of the fast-tracked wetland restoration projects in the New York/New Jersey region, including the hydrologic restoration of Liberty State Park and many smaller sites. She has conducted technical peer reviews and quality assurance/quality control reviews, and has acted as an expert witness in environmental damage disputes for engineering and consulting firms. Dr. Rein is a member of Sigma Xi National Scientific Research Society.

Richard Weggel, Ph.D.

Role: This panel member was chosen primarily for his coastal engineering experience and expertise.
Affiliation: Drexel University

Richard Weggel (Coastal Engineer): Dr. Weggel is Professor Emeritus in the Department of Civil, Architectural & Environmental Engineering at Drexel University, where he teaches, consults, and conducts research in the areas of hydraulics, hydrology, water resources engineering, and coastal and port engineering. He earned his Ph.D. in civil engineering (hydraulics/water resources) from the University of Illinois, Champaign-Urbana in 1968, is a licensed professional engineer in New Jersey, Pennsylvania, and Illinois, and is an ASCE-Academy of Coastal, Oceans, Port and Navigation Engineers Coastal Engineering Diplomate. He has over 45 years experience in the coastal engineering field, including 12 years in the U.S. Army Coastal Engineering Research Center as Special Assistant to Commander and Director, Technical Assistant to Chief, and finally Chief, Coastal Structures and Evaluation Branch. He is familiar with large, high-visibility, complex Civil Works projects on such studies as the AMTRAK coastal protection study in Niantic, Connecticut, where he developed shore protection, beach nourishment, and terminal groins for AMTRAK. Dr. Weggel is experienced in engineering analysis related to wetland restoration or related projects in the urban northeast, having consulted on several projects involving the creation of *Spartina* wetlands, such as Holts Landing State Park, Delaware, and wetlands fronting proposed bulkhead in North Wildwood,

New Jersey. He is experienced with the USACE Coastal Engineering Manual (CEM), having reviewed several CEM chapters (e.g., waves, navigation) and co-authored the CEM chapter on sand transport by wind and dune development. As Chief of the Coastal Structures and Evaluation Branch, Dr. Weggel managed the manpower and financial resources to conduct the research and technology transfer program of the branch. Research efforts included studies of weir jetty performance and design, numerical modeling of shore response to coastal structures, coastal data collection methods and interpretation, and evaluation of the performance of existing coastal projects to establish improved design techniques. Dr. Weggel has authored more than 80 journal papers and 110 consulting reports related to coastal engineering. He was awarded the USACE Outstanding Performance Rating six times, received the Commanders Award for Engineering Excellence US Army Coastal Engineering Research Center in 1982, and the ASCE Moffatt & Nichol Harbor and Coastal Engineering Award in 1993. He is a fellow and lifetime member of ASCE and member of the American Shore and Beach Preservation Association.

John Burns

Role: This panel member was chosen primarily for his economics experience and expertise.
Affiliation: CDM, Inc.

John Burns (Economist): Mr. Burns is a senior economist and program manager for CDM, Inc. specializing as a planner and economist. He earned his M.A. in Economics from Michigan State University in 1972. He has over 38 years of experience in the planning and economic analysis of multipurpose water resources projects that provide navigation, flood damage reduction, water supply, water quality, and ecosystem restoration for USACE (1972-2000) and most recently in the private sector. Mr. Burns is recognized as one of the preeminent experts in federal water resources project policy, planning, and economics. He is experienced with high-visibility, large, complex Civil Works projects as an economist, including his participation as the economics chairman in the 2004 Economics Independent Technical Review Team for the Ohio River Mainstem System Study. This study, conducted by the USACE Ohio River Division, was undertaken to develop a comprehensive plan for managing, maintaining, and improving the Ohio River navigation system. He has evaluated the appropriateness of cost effectiveness/incremental cost analysis (CE/ICA) as applied to dollar cost and ecosystem restoration benefits. For instance, he implemented this procedure to compare alternatives on the Louisiana Coastal Area Small Diversion at Convent/Blind River Project. He has extensive experience with the USACE CE/ICA tool IWR-PLAN for analyzing ecosystem restoration projects, having applied it both as a practitioner and as a reviewer. Most recently, he has used IWR-PLAN on the Louisiana Coastal Area Small Diversion at Convent/Blind River Project for USACE New Orleans District. Mr. Burns' experience with USACE Planning Guidance allowed for a quick kickoff on study-specific tasks for that project and an expedited completion of the Feasibility Study. He is also familiar with National Ecosystem Restoration (NER) analysis procedures and has extensive experience with USACE guidance for analyzing ecosystem restoration projects, both as a practitioner and reviewer.

5. SUMMARY OF FINAL PANEL COMMENTS

The Panel agreed on its "assessment of the adequacy and acceptability of the economic, engineering, and environmental methods, models, and analyses used" (USACE, 2010a; p. D-4) in the Jamaica Bay Feasibility Report. The Panel agreed that the Jamaica Bay restoration project presented many opportunities of great value to a highly populated urban area. The Jamaica Bay Feasibility Report was in general technically sound, the appendices were detailed, and the presentation of existing conditions was informative. Furthermore, agency coordination clearly was a factor in the strength of the project. The Panel, however, identified several issues that need to be addressed to make the Jamaica Bay restoration project more complete. The following statements summarize the Panel's findings, which are described in more detail in the Final Panel Comments (see Appendix A).

Plan Formulation:
The plan formulation logic is at times inconsistent. The Jamaica Bay Feasibility Report does not adequately describe the screening process for the final array of alternatives and does not have sufficient detail to justify selection of the recommended plan. A good case is presented on the importance of improving waterfowl habitat; specifically, the report states that improved waterfowl habitat should be considered when adding increments that, according to the Institute for Water Resources Planning Suite (IWR-PLAN) software, lie beyond cost break points. However, this is not previously discussed as a planning objective or opportunity. The Panel believes that the study should quantify, or at least provide evidence, that the added sites (Dead Horse Bay, Paerdegat Basin, and Spring Creek) would improve habitat for waterfowl.

The constraints listed for the specific sites are reasonable, but most of the constraints listed for the overall project are beneficial to the project or are required planning practices, and do not actually constrain the project. It is not clear how the constraints affected the planning of alternatives, or how the recommended plan resolves or addresses the listed constraints. Given the variety and intensity of neighboring land uses, linking constraints to the recommended plan analysis is crucial to ensure that the project can be successfully implemented. Similarly, the study should demonstrate how the recommended plan satisfies planning goals and objectives.

It is difficult to judge the adequacy of the plan selection process. The Jamaica Bay Feasibility Report should include a discussion/table to support plan selection that describes and analyzes the final 11 alternatives in terms of the following parameters: significance of outputs; plan acceptability, completeness, and effectiveness; the positive "unintended effects" on other environmental or ecosystem services outputs; support by a local sponsor or other interest group; and the effects on nearby stakeholders, size and location considerations, contribution to the migratory bird Atlantic Flyway, and other benefits not captured by the EPW analysis.

Economics:
The Jamaica Bay restoration project was technically sound from an economic perspective, and the development of alternatives was comprehensive. USACE advised the Panel that an older, uncertified version of IWR-PLAN was used for the cost effectiveness/incremental cost analysis (CE/ICA) and that the CE/ICA analysis will be updated using the certified version of IWR-PLAN.

However, the Panel is concerned that the alternative cost estimates might not be at a sufficient level of detail to realistically compares alternatives. No information on the assumptions used or how the costs were derived is provided. The Panel recommends that USACE test the sensitivity of the CE/ICA results to potential cost increases or provide some assurance that CE/ICA results would be the same if alternative costs reflected the cost increase apparent in the recommended plan cost estimate.

Engineering:
The hydrology of the eight project sites is not addressed in the Jamaica Bay Feasibility Report. The runoff contributions of CSOs (i.e., water quality and volumes) are not quantified, and the plans to mitigate associated problems are not discussed. It is not clear how sea level rise is incorporated into the design of the various alternatives or how the elevations of the boundaries between the types of restored marshes may be affected under various sea level rise scenarios. Also, a monitoring plan for the hard structures needs to be developed and incorporated into the project.

Environmental:
The goal for the utilization of dredged material for onsite placement is not clear. Migratory bird habitat and upland restoration need to be quantified and linked to problems and opportunities and to restoration goals and objectives. Waterfowl should be more prominent in the earlier plan formulation steps, and additional indication of benefits to waterfowl should be provided since waterfowl is not a specific output from the EPW model. Salinity measurements and freshwater inputs, specifically from CSOs throughout the study area, are needed because they may affect the success of the salt marsh restoration. The vegetation restoration plan is not comprehensive, and the monitoring plan for new vegetation does not specify target survivorship with clear milestones or triggers for action. Additionally, monitoring costs for the project are not adequately defined, and a description of an adaptive management plan should be incorporated.

Table 3. Overview of 15 Final Panel Comments Identified by the Jamaica Bay Feasibility Report IEPR Panel

Significance – High	
1	Additional information on salinity measurements and freshwater inputs, specifically from combined sewer overflows (CSOs) throughout the study area, is needed to evaluate the success of the project.
2	The planning constraints statements do not specify actual or potential constraints to the project.
3	The importance of migratory bird habitat and upland restoration needs to be quantified and further linked to the discussions of problems and opportunities and of restoration goals and objectives.
4	The source of the cost estimates used for the alternatives analysis is not documented; therefore, the methodology used to determine the costs and the incremental analysis cannot be validated.

5	It is not clear how sea level rise is incorporated into the design of the various alternatives or how the elevations of the boundaries between the types of restored marshes may be affected under various sea level rise scenarios.
Significance – Medium	
6	Detailed information on hydrology, water quality (including salinity), and circulation model results would improve the analysis of restored wetlands productivity.
7	Prior studies and reports which inform the plan formulation process by serving as data sources, as plan formulation examples, and as input into the “future without project” condition have not been included in the Jamaica Bay Feasibility Report.
8	The screening process does not have sufficient detail to justify selection of the recommended plan.
9	The community types and existing conditions for the alternatives are not categorized through a consistent process, and costs are not presented in a manner that would facilitate comparative analysis.
10	A detailed protocol on how dredged material intended for onsite placement will undergo additional testing and characterization is required.
11	Comprehensive information on vegetation restoration planning, long-term monitoring, and costs is not provided for the Jamaica Bay restoration project.
12	The discussion of the design and monitoring for the hard structures planned for the Dead Horse Bay, Bayswater State Park, Dubos Point, and Brant Point restoration sites needs more detail in order to determine the potential impact on the project.
13	Project goals and objectives are not comprehensive and have not been integrated consistently into the plan formulation process.
Significance – Low	
14	The Jamaica Bay Feasibility Report does not present costs consistent with the Engineering Appendix; therefore, an assessment of the engineering methods used cannot be conducted.
15	Definition and delineation of the overall study area with additional mapping would improve the Jamaica Bay Feasibility Report.

6. REFERENCES

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APPENDIX A

Final Panel Comments

on the

Jamaica Bay Feasibility Report

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Comment 1:

Additional information on salinity measurements and freshwater inputs, specifically from combined sewer overflows (CSOs) throughout the study area, is needed to evaluate the success of the project.

Basis for Comment:

Salinity has been shown to be an important issue in salt marsh restoration. Low salinity (potentially resulting from freshwater inputs from CSOs, wastewater treatment systems, and stormwater runoff) has been shown in other areas to be a major factor in loss of salt marshes. This project considers dissolved oxygen but not salinity. The Engineering Appendix (Appendix E, p. 126) states that additional monitoring may become necessary and specifically names salinity. The Panel believes that this is a significant issue because the target species for revegetation, *Spartina*, is sensitive to salinity. In addition, salinity is important in determining the susceptibility to invasion by *Phragmites*, the primary invasive species identified at the sites for removal. Because this has the potential to become a critical issue in this wetland restoration, collecting data on this parameter now is important in evaluating the success of the wetland restoration in this phase and understanding the role of salinity in planning the main marsh island project through a second feasibility phase ("phase two").

There is an overall lack of data regarding freshwater inputs, especially considering the changes planned for CSO facilities. The potential mixing of freshwater and salt water warrants additional analyses. Large quantities of storm water discharge at the headwaters of Paerdegat Basin and Fresh Creek could result in damage to the restored marshes.
The CSO is mentioned in existing conditions related to sewage and is on the list of problems, but little information is presented to define chemical constituents and quantity of inflow to the system originating from the CSOs. Proposed plans to ameliorate the CSO problem are mentioned several times in the feasibility report, but no information is provided on what is proposed. What is finally implemented may have some bearing on the success of the salt marsh restoration. The hydrology of the contributing watersheds needs to be discussed, along with the frequency of high freshwater inputs.

Significance – High:

Freshwater inputs from CSOs and other sources may lower salinity at the restoration site and may affect the success of the salt marsh restoration.

Recommendation(s) for Resolution:

1. Add the subject of salinity change to the list of impacts to salt marshes.
2. Include monitoring efforts for collecting salinity data to enable this parameter to be evaluated within the framework of the wetland restoration efforts.
3. Provide additional data on all the freshwater inputs categorized by sources, including estimates of what fraction of rainfall runs off. Drainage areas of streams discharging to restoration sites and drainage areas of the relevant CSOs should be provided, as well as more information on the planned CSO facilities upgrade.
4. List the chemical and biological contaminants in the CSOs and provide data on potential impacts to the restored marshes during storm events.

Comment 2:
The planning constraints statements do not specify actual or potential constraints to the project.
Basis for Comment:
Planning constraints should be stated so that they are a valuable, meaningful tool in the planning process. If constraints are properly stated and are specific, they may be linked to alternative evaluation to demonstrate that there has been an accounting of known constraints. Many of the constraints statements, and the lack of linkage to alternative evaluation, raise concerns that an existing condition or a law or regulation that could affect project implementation may have gone unrecognized. Many of the constraints, as stated on pp. 19-20 (at the end of Part 3, Problem and Opportunity Identification), are actually required planning practices and should be revised. For example, technical constraint number 2 states, "In compliance with sound engineering practice and Environmental Operating Principles." While the Panel agrees this is a required component of a planning practice, it should not be considered a constraint in the planning process or a restriction during the alternative formulation step. Technical constraint number 5, "consistent with existing local plans," is an example of a very generally stated, generic constraint. Specific local plans that would constrain the restoration plan should be cited either in the constraints statement or later in the alternative evaluation. In this example, the alternative evaluation should demonstrate that alternatives comply with existing local plans. Planning constraints listed for the individual sites should specifically demonstrate how alternatives avoid or otherwise satisfy planning constraints. • For example, a constraint listed in the description of restoration site alternatives is "possible presence of rare, threatened, and endangered (RTE) species." Since the presence of listed species can constrain a project, the document should be able to state what species are impacted and what the mitigation would be. If planning constraints state the presence of RTE species, an overall statement is needed that a survey for RTE species will be conducted, areas with identified RTE species will be protected or individuals will be transplanted, and the specific details of the contingency plan need to be defined. • For all the individual sites, the possible "presence of contaminants" is a constraint, but in Section 5.1 on p. 71, hazardous, toxic, and radioactive waste (HTRW) is reported to be at ambient levels. It is not clear why contaminants are a constraint if HTRW is at low levels. Contaminants might still be listed as a potential constraint if there is a significant risk that currently unknown HTRW could delay or reduce the size of the project. The alternative descriptions do not include contingency plans or other responses in the event HTRW is found. • The potential for bird strikes affecting flights in and out of John F. Kennedy Airport is a legitimate constraint for Hawtree Point, as stated in Section 4.6.5 on p. 41. This would seem to be a constraint for other sites as well. Given the variety of adjacent land uses around Jamaica Bay, other incompatible neighboring activities could constrain the

project. Automobile traffic or recreation areas are examples of neighboring activities that could be incompatible with restoration areas. It is possible that potential conflicts and possible constraints with incompatible land uses or activities will become apparent during the public review process.

- It is not clear how the constraints affected the formulation of alternative plans for all of the individual sites. For instance, there should be an analysis of how the Hawtree Point alternative avoids increased flight risk (presumably from an increased chance of bird strikes). There is no mention of how CSOs would affect the project alternatives at Paerdegat Basin or Fresh Creek.

Significance – High:

A succinct accounting of specific constraints and how these are resolved during the planning process is needed to ensure that the project can be successfully implemented.

Recommendation(s) for Resolution:

1. Rewrite planning constraints so that they are less generic and may be used as tools to formulate and screen alternatives.
2. Specifically cite any federal, state, or local regulations that would constrain restoration plans, either in the constraints statement or as part of alternative evaluation.
3. Demonstrate how alternatives avoid or otherwise satisfy planning constraints for the individual sites, including RTE species, hazardous waste, cultural resources, and John F. Kennedy Airport flight risk. For these examples, protocols should be stated to address the planning constraints.

Comment 3:
The importance of migratory bird habitat and upland restoration needs to be quantified and further linked to the discussions of problems and opportunities and of restoration goals and objectives.
Basis for Comment:
Improvement of migratory bird habitat is a key aspect of Jamaica Bay restoration because it is the basis to justify much of the recommended plan. Many of the recommended plan features depend on the rationale shown on pp. 57 and 58 (Section 4.10, National Ecosystem Restoration Plan or Best Buy Plan). While the technical quality of the rationale is good, it is of such importance that waterfowl should be more prominent in the earlier plan formulation steps. Lack of bird habitat is not included in the problems and opportunities discussion (Section 3.1, Problem Identification, on p. 13) or in the restoration goals and objectives discussion (Section 3.3, Goals, Objectives and Constraints, starting on p. 16). Information that quantifies an increase in habitat value is needed to better justify the recommended plan. The plan formulation process resulted in the recommended plan that opted for the more expensive Best Buy Plan 10 instead of Best Buy Plan 7. These are two break points in the incremental analysis representing a jump in cost, relative to benefits. Best Buy Plan 10 adds Dead Horse Bay, Paerdegat Fringe marsh, and Spring Creek tidal marsh to the recommended plan, as explained in Section 4.10, National Ecosystem Restoration Plan or Best Buy Plan, on p. 57. The benefit of improved migratory waterfowl habitat was the most important justification for the increased cost of adding these sites. Based on the desired new habitats (low marsh, high marsh, and upland areas), there will be substantially improved habitat for bird species and likely for other wildlife. The justification discussion is reasonable, but it appears to come as an afterthought. If it is important to increase migratory bird habitat, this should be discussed in Sections 3.1 and 3.3. The six-step planning process is iterative, so these sections may be revised if the incremental analysis reveals that improvement of waterfowl habitat should be emphasized. The rationale for adding Dead Horse Bay, Paerdegat Fringe marsh, and Spring Creek tidal marsh to the recommended plan is, in part, based on habitat improvement factors not measured by the Evaluation for Planned Wetland (EPW) model, such as synergies that come from the size of the restoration areas, and upland habitat. Since the EPW model does not include uplands in its wildlife function, the Jamaica Bay Feasibility Report might provide some indicators of the quantity of improved waterfowl habitat anticipated with the project. The research cited in the second full paragraph on p. 58 (fifth paragraph in Section 4.10, National Ecosystem Restoration Plan or Best Buy Plan) could possibly be applied to acres of restored migratory bird habitat to assess improvements for some of the bird species that are found in Jamaica Bay. Quantifying improved habitat could also be derived from an analysis of how upland areas (even those constructed by others and not a part of the present project) combine with the low marsh and high marsh to potentially increase waterfowl habitat.

Significance – High:
Quantifying the improvement in waterfowl habitat, considering it is not specific to the EPW model, would help in justifying a recommended plan.
Recommendation(s) for Resolution:
1. Include waterfowl habitat in the discussion of existing and future without project conditions. 2. Discuss waterfowl habitat in Sections 3.1 and 3.3. 3. Demonstrate how existing uplands and uplands restoration by others work in concert with restoration marshlands, and identify indicators of an increase in waterfowl habitat or bird populations. This would compensate for what the EPW model may not have captured for project benefits.

Comment 4:

The source of the cost estimates used for the alternatives analysis is not documented; therefore, the methodology used to determine the costs and the incremental analysis cannot be validated.

Basis for Comment:

The alternative costs are a major determinant of alternative rankings in cost effectiveness/incremental cost analysis (CE/ICA). These costs should be at a sufficient level of detail to realistically compare alternatives. The level of detail and assumptions used for the alternative cost estimate should be described. At this stage of analysis, cost estimates should be developed with line-item quantities and unit costs. Costs between alternatives should use the same assumptions and price level. Lands, easements, rights-of-way, and relocations and disposal/borrow areas (LERRD) costs should be reported. According to Section 4.11.2, Real Estate (p. 68), land costs should be insignificant. Relocation requirement assumptions should be noted. Planting new vegetation is a critical part of marsh restoration, common to all of the sites. Because costs of revegetation vary considerably depending on the method used, similar planting methods should be used across alternatives unless there is a reason to change.

Because the site restoration costs for the recommended plan increased significantly over the costs used for the cost effective analysis, there should be some assurance that CE/ICA results would be the same if alternative costs reflected the increased costs. This is a concern for this evaluation because the recommended plan costs at some sites appeared to have greater increases than other site costs. For example, the smallest increase was at Spring Creek, with a 145% increase, and the largest increase was at Hawtree Point, with a 495% increase. This is shown in the table below, which was developed by the Panel from costs in Table 4.10 on p. 51 and Table 4.16 on p. 70. It is not evident that if the new costs were applied to a CE/ICA, the same results would be derived. It may be that cost increases would not change the result, or that the cost increases could result in some previously justified measures dropping out. The sources of the increase would help answer this question.

Site	Alt #	Alt first cost (1) $1,000	Recom plan first cost (2) $1,000	Ratio of Increase
Dead Horse Bay	4	33,635	59,873	1.78
Paerdegat Basin	3	37,736	69,266	1.84
Fresh Cr	5	10,575	37,253	3.52
Spring Cr	3	40,259	58,213	1.45
Hawtree / Bergen	1	321	1,589	4.95
Bayswater St Park	2	2,417	4,767	1.97
Dubois Pt	3	2,865	7,914	2.76
Brant Pt	2	3,559	7,681	2.16

Reference:
1. Feasibility Report, Table 4.10, page 51

2. Feasibility Report, Table 4.16, page 70
Significance – High:
Because costs comprise half of a cost-benefit analysis, inconsistent assumptions of the alternative cost estimates, or costs that have subsequently changed relative to each other (due to inflation, markets, or other causes), can significantly impact the results of the CE/ICA, including derivation of Best Buy Plans and the recommended plan.
Recommendation(s) for Resolution:
1. Ensure that the alternative costs are at a level of detail needed to compare alternatives and that they are consistent between alternatives. 2. Revise the CE/ICA using current price-level costs, or provide assurance that the CE/ICA results are not sensitive to the cost increases that have occurred for the different alternatives.

Comment 5:

It is not clear how sea level rise is incorporated into the design of the various alternatives or how the elevations of the boundaries between the types of restored marshes may be affected under various sea level rise scenarios.

Basis for Comment:

Engineering Circular (EC) 1165-2-211 (USACE, 2009a) should be cited as the basis for determining sea levels at the end of the project lifetime in 2060. Discussion of the projected range of sea levels during the 50-year lifetime of the project is adequate; however, the Jamaica Bay Feasibility Report does not explain how the anticipated sea levels were used to design the restorations or how alternative sea levels will affect the recommended plan and its projected outputs at the eight sites. It is not clear how the sea-level rise issue is incorporated into the planned marsh elevations. Historical rates of land subsidence are assumed to continue through the project's lifetime but are not justified.

Range in Projected Sea Level Rise

The range of tidal water levels is very important in determining the boundaries between submerged land, low marsh, high marsh, and upland conditions. As time passes and sea level rises, these boundaries will change and the relative areas of each type of restoration will change. The overall character of the restored wetlands will be affected.

Elevations that Define Boundaries Between Various Marsh Types

The Jamaica Bay Feasibility Report does not explain how the present sea level was used to establish the boundaries between types of restoration, nor does it discuss how those boundaries might change with time. (The elevation at which low marsh transitions into high marsh is different at different sites.) Also, the report does not discuss how the uncertainty in projected sea levels might affect the project. If the high estimate of sea level occurs, much of the high marsh will be inundated. An adaptive management strategy for each site, based on a stand-alone monitoring plan, should identify conditions or events that will trigger project maintenance or modification.

Historical Subsidence Rates

The study assumes that future subsidence rates will equal past rates. Subsidence is usually the result of increased overburden due to construction or to extraction of groundwater. The report does not justify the selected subsidence rate.

Significance – High:

The success of the project and its sustainability depends on its ability to respond to sea level rise.

Recommendation(s) for Resolution:

1. Discuss how sea level rise was used in the design for the selected alternative at each site.
2. Discuss how the selected alternative at each site will respond to the high and low projections of sea level rise
3. Compare profiles of existing and designed wetlands to anticipated sea level rise for the selected alternative at each site.

4. Cite EC 1165-2-211 as appropriate, and use it as the basis for the sea level rise estimates.
5. Run the EPW model for the projected high and low sea level rise scenarios to determine the range of Average Annual Functional Capacity Units (AAFCUs) of the project.
6. Justify the subsidence rate adopted for the study.

Literature Cited:

USACE (2009a). Water Resource Policies and Authorities: Incorporating Sea-Level Change Considerations in Civil Works Programs. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Engineering Circular (EC) 1165-2-211. July 1.

Comment 6:
Detailed information on hydrology, water quality (including salinity), and circulation model results would improve the analysis of restored wetlands productivity.
Basis for Comment:
The characterization of and productivity of the restoration marshes depend in part on the amount and quality of available fresh water. Data on hydrology (specifically, the source and amount of fresh water) are important to help understand water quality and the amount of fresh water/salt water interaction that makes estuaries productive. Fresh water inflow can impact the survival of salt marsh plants. Paerdegat Basin, Fresh Creek, Spring Creek, and Hawtree/Bergen Basins receive runoff from watersheds, but there is no information on how extensive these watersheds are or how much fresh water is delivered to the site. Basic hydrologic information of the streams/storm drains entering Jamaica Bay is not presented. This includes descriptions and boundaries of drainage basins and the frequency of high flow rates. A map delineating the drainage areas contributing to each of the sites and to Jamaica Bay in general is important for understanding the hydrology. Flow data for wet, normal, and dry conditions would indicate the amount of fresh water entering the sites' estuaries. Given the nearby land uses that are a source of runoff, it is understandable that water quality is a vital issue that could potentially constrain restoration. Land use in the upstream drainages should be described and preferably mapped. Water quality should be discussed for each site. At the Fresh Creek site, it is noted that water quality is impaired based on the macroinvertebrate study. No other site description states the water quality issue this way. It is unclear if the bioassessment was conducted everywhere, or just at Fresh Creek. It seems that water quality is an overall issue, and the study should focus on this parameter at each site. In addition, there is little discussion about the circulation model of Jamaica Bay. There is only brief reference to the model, while the results are never mentioned. The Paerdegat Basin and Fresh Creek sites have been numerically modeled to assess local circulation changes. A discussion of the circulation studies would help the reader understand the hydrodynamics of the bay. This in turn is fundamental in determining the interaction and balance between tidal flow and fresh water surface runoff.
Significance – Medium:
Including basic hydrologic information is important to better predict the benefits of restoration but is not likely to affect project justification.

Recommendation(s) for Resolution:
1. Determine the contributing area and fresh water flow from watersheds draining to the individual sites. 2. Prepare maps of drainage areas contributing runoff to individual sites to better describe inflow to sites from runoff. 3. Investigate and report on the water quality of the runoff to the individual sites. It may be of value to identify land uses in the drainage areas that potentially affect water quality and make a determination of water quality from this information. 4. Summarize the results of the Jamaica Bay circulation model (described in the Engineering Appendix) in the Jamaica Bay Feasibility Report to describe water quality and fresh water/salt water interaction, and forecast how productivity of the restored marshes is affected.

Comment 7:

Prior studies and reports which inform the plan formulation process by serving as data sources, as plan formulation examples, and as input into the "future without project" condition have not been included in the Feasibility Report.

Basis for Comment:

A summary of relevant reports is needed for the Panel to understand the relationship of the proposed plan to other past and current efforts and how, in turn, these past efforts shape the plan formulation process for this effort. Section 1.6, Prior Studies and Reports, includes only a limited list of prior studies. It is limited primarily to past U.S. Army Corps of Engineers (USACE) studies.

Section 1.6 of the report lists several USACE reports and one report prepared by the Jamaica Bay Ecosystem Research and Restoration Team. Other federal, state, local, or academic reports have been prepared that are relevant to this project. For example, see http://nbii-nin.ciesin.columbia.edu/jamaicabay/resources/browse.jsp for a comprehensive bibliography that might include some relevant documents.

Although other studies are referenced throughout the Jamaica Bay Feasibility Report and the appendices, Section 1.6 does not provide the information the Panel needs to understand the extent of past studies or the relevance of these studies to the Jamaica Bay study.

The recently completed feasibility study titled *Louisiana Coastal Area, Louisiana, Ecosystem Restoration, Six Projects Authorized by Section 7006(e)(3) of Water Resources Development Act of 2007* (USACE, 2010b) provides an example of a more robust report section discussing prior studies and reports. It includes a table that lists all relevant projects and studies and denotes how each is relevant to the study, followed by a discussion/summary of important reports or projects.

Significance – Medium:

Without additional information on prior studies and reports, the Panel cannot understand the relationship of the Jamaica Bay study to past studies and projects. Specifically, the Panel cannot understand how these past efforts shaped the plan formulation process, from the identification of problems through the development of alternatives, and how this information was incorporated into the future without project condition.

Recommendation(s) for Resolution:

1. Compile a more complete list of prior reports and studies relevant to the Jamaica Bay study.
2. Include a table in Section 1.6 listing the relevant prior studies and reports that denotes the relevance of each to the Jamaica Bay study.
3. Include a brief summary/discussion of each important report or project.

Literature Cited:

USACE (2010b). Louisiana Coastal Area, Louisiana, Ecosystem Restoration, Six Projects Authorized by Section 7006(e)(3) of Water Resources Development Act of 2007. U.S. Army Corps of Engineers, New Orleans District. October. http://lca.gov/final_lca_reports.aspx.

Comment 8:
The screening process does not have sufficient detail to justify selection of the recommended plan.
Basis for Comment:
The selection of the recommended plan depends on the screening of alternatives. The Jamaica Bay Feasibility Report does not adequately describe the screening process or the alternatives that were screened out. Part 4, Plan Formulation, Evaluation, and Selection, includes only a limited discussion of initial and second-round screening. There is insufficient information for the Panel to understand the range of alternatives considered or the basis for screening. The second screening is described in Section 4.2 on p. 22 as being done by a panel of technical experts from USACE, the New York City Department of Environmental Protection (NYCDEP), the New York State Department of Environmental Conservation (NYSDEC), the National Park Service (NPS), the U.S. Fish and Wildlife Service (USFWS), and interested local groups. Appendix A is referenced and contains pertinent correspondence; however, a review of Appendix A did not identify any screening information. The sites were then screened into Tiers 1 and 2. "Ecological priority" was used to make decisions, but there is no definition of ecological priority. Clearly, much thought and work went into the screening analysis, but the process should be described in more detail. The panel of technical experts, with the concurrence of the stakeholders, decided on two parallel tracks of action: a pilot effort on the central marsh islands, while the feasibility study focused on sites along the periphery of the bay. The parallel track approach appears logical; however, it is not clearly documented in the report. For example, a brief statement on which marsh islands were selected and the criteria for their selection would help improve reader understanding of the screening process. A discussion on the tasks and scheduling of the marsh islands pilot project and subsequent decision document would better define the full scope and timing of the larger Jamaica Bay restoration project. The alternatives at each site are clearly detailed and defined in Section 4.6; however, the figures used to depict the different alternatives are not described in the report and it is difficult to compare the acreage of restoration with the costs for each alternative. The screening of the final array of 11 alternatives down to a recommended plan in Sections 4.9 and 4.10 notes that this screening is based on factors not reflected in the EPW and Institute for Water Resources Planning Suite software (IWR-PLAN) analyses. Although these factors are discussed, there is no quantitative information in the report to demonstrate how each of the 11 alternatives contributes to each of these factors and how this in turn influences plan selection through the screening process.
Significance – Medium:
The Jamaica Bay Feasibility Report does not adequately describe the screening process for the final array of alternatives, and the Panel cannot judge the reasonableness of the screening and plan selection process.

Recommendation(s) for Resolution:
1. List, describe, and discuss the basis for including or excluding each of the 39 sites investigated as part of initial screening. 2. Include a table showing (1) all 39 sites, (2) the panel of technical experts' and the local groups' evaluations for each site considered during secondary screening, and (3) the classification of each site as Tier 1 or Tier 2. 3. Define Tier 1 and Tier 2. 4. As part of the description of the parallel track approach, include a brief statement on which marsh islands were selected and the criteria for their selection. 5. Provide the basis for screening for each site at each stage of the screening process, including the specific criteria used to determine ecologic importance for retained sites. 6. For each of the eight sites, include summary tables that list the alternative; the acres of low marsh, high marsh, dune, and structures; cost per acre and per functional capacity unit (FCU), etc. 7. Include a figure showing the location and extent of areas to be restored for each of the alternatives at each of the eight sites discussed in Section 4.6. This might best be accomplished by further explaining and describing the figures in Section 4.6. 8. Discuss upland benefits for each of the final 11 alternatives 9. Include a discussion/table that describes and analyzes the final 11 alternatives in terms of the following parameters: significance of outputs; plan acceptability, completeness, and effectiveness; the positive "unintended effects" on other environmental or ecosystem services outputs; support by a local sponsor or other interest group; and the effects on nearby stakeholders, size and location considerations, contribution to the migratory bird Atlantic Flyway, and other benefits not captured by the EPW analysis.

Comment 9:
The community types and existing conditions for the alternatives are not categorized through a consistent process, and costs are not presented in a manner that would facilitate comparative analysis.
Basis for Comment:
The categorization of community types and issues (i.e., fill areas, invasive species) is inconsistent from site to site, making it difficult to analyze progress and success in a quantitative (before and after) scenario. Site-specific maps provided do not always clearly show the boundaries of the study areas and the locations of the different communities, hard structures, invasive species, and fill areas (or the absence of them). Comparing restoration alternatives is not straightforward because the community-type categorizations are not defined consistently at each site. For some project sites, community types are combined. The map of the existing conditions at Fresh Creek, for example, shows marsh habitat with the same symbol as forest and grassland (upland). The Panel believes that defining the acreage of each project area and the acreage in the proposed actions alternatives for each community type (e.g. low marsh, high marsh etc.) would facilitate analysis. Geographic information system (GIS) analysis will be a key tool in long-term project evaluation. In addition, the layout of the alternatives' acreage of restoration with the costs for each alternative is not consistent from site to site. It would be easier to compare if each alternative consistently compared costs per acre for each community type and costs per FCU.
Significance – Medium:
Consistent categorization and consistent presentation of cost data (per acre and per FCU) will enable comparative analysis and evaluation of project success.
Recommendation(s) for Resolution:
1. Define each community type at each site to enable careful tracking of all restoration components consistently and to evaluate progress and success. 2. Consistently categorize all target communities in GIS: low marsh, high marsh, grassland/maritime forest (maybe map as upland), pool/creeks, erosion control features, non-native species (*Phragmites*), and fill. All initial sites should start with these categorizations so areas are quantified under existing conditions, then mapped over time to analyze change and determine if the project is meeting restoration goals. 3. Use the same terminology for all maps (mudflat vs. flats) and separate different communities such as marsh and forest. 4. Present restoration alternatives for comparison with a per-acre cost and per-FCU cost.

Comment 10:
A detailed protocol on how dredged material intended for onsite placement will undergo additional testing and characterization is required.
Basis for Comment:
An underlying assumption of the project is that there will be dredged material available and that there is a goal for utilization of dredged material onsite, but it is not clear whether the material would be used for upland placement or benthic contouring, or both. The assumption that all excavated fill material and dredged material will be homogeneous is of concern to the Panel. Contaminated sediments that cannot be used onsite could be encountered during dredging, which may increase costs and decrease availability of suitable material needed for restoration activities. Materials originating from construction material fill are likely to be quite different in soil texture to the existing soils. Soil will need to be characterized before use to ensure that the texture of upland soils or benthic soils will benefit the system. Any plans to amend the soil should be stated. The expectation that all dredged material will qualify for onsite use is probable but not certain. Section 4.6 of the Jamaica Bay Feasibility Report lists planning constraints at each site. For example, Spring Creek (Section 4.6.4) and Bayswater State Park (Section 4.6.6) list a planning constraint to be the presence of hazardous waste or contaminated soil (e.g., polycyclic aromatic hydrocarbons [PAHs], heavy metals, polychlorinated biphenyls [PCBs]), yet overall restoration goals do not address the contaminated soils. There is no clear link between the stated planning constraint (contaminated soil) and the restoration alternatives. Therefore, it is unclear how the restoration alternative will address the stated planning constraint. There is clearly a plan to test the soils, but this plan is not clearly presented. A consistent protocol for testing dredged material should be defined. Dredged material must qualify in both physical and chemical characteristics for use onsite. An overall sentence stating the protocol for testing all dredged material is needed. If hotspots with higher levels of contamination than expected are encountered during dredging activities that preclude the material from being used onsite, this could substantially impact costs both for disposal and for obtaining sufficient material to implement the restoration alternative. It is important that these restoration efforts do not involve recontouring the land by placing contaminated soils onto clean soils.
Significance – Medium:
A clear protocol is needed to ensure that contaminated soils are not placed on clean upland or benthic soils and that soil textures are suitable for placement.

Recommendation(s) for Resolution:
1. Explain in detail the protocol for testing dredged material. 2. Link the defined protocol with the planning constraints to explain how the protocol addresses the presence of contaminated soils at each site. 3. State both the chemical and physical criteria that would qualify or disqualify dredged material for onsite use, and address the different material expected to be used in different environments. 4. Describe the different uses of the dredged material, such as upland restoration, benthic recontouring, or fill material in wetlands. 5. Add sampling and testing of soils between 6 and 7 of the construction sequencing, as described in Section 8.2 of the Draft Environmental Assessment, Engineering Appendix (p. 109). If sampling and testing are listed before excavation and grading, it will be clear that these steps will be conducted before upland placement and spreading of material begins.

Comment 11:

Comprehensive information on vegetation restoration planning, long-term monitoring, and costs is not provided for the Jamaica Bay restoration project.

Basis for Comment:

The Panel identified several specific issues that need to be addressed regarding vegetation restoration objectives, which are required to meet the restoration goals of the project.

Vegetation Restoration Plan

Although a critical component of the project, the vegetation restoration effort is not adequately addressed. There are insufficient details defined in the vegetation restoration plan, yet restoring the native, diverse plant community appears to be a restoration objective at most sites. Existing invasive species are not well described, nor how such species will be prevented from re-establishing after regarding and grubbing (such as in Section 4.6.5). The target species for restoring wetlands are mentioned in the Engineering Appendix only. The vegetation restoration plan should include details defining the invasive species, how they will be removed, and the specific planting method for the new vegetation. Methods for site preparation (erosion control, soil amendments, etc.) should be defined and may have substantial costs not currently included. The post-construction plant establishment period and monitoring is not described. Action triggers are not presented, making adaptive management application unclear. Long-term management should be presented - for example, if and when herbicides will be used - as well as other methods to protect restoration plantings.

Vegetation Monitoring

The plant monitoring plan detailed in the Jamaica Bay Feasibility Report does not provide details to implement monitoring that will help guarantee the long-term success of this project. It only specifies years one, three, and five for targeted monitoring. The first year provides monthly monitoring, but there is no monitoring at all planned for year two to determine if there is a problem and implement adaptive management.

Monitoring did not appear to be included in years two and four. Based on USACE Regulatory Guidance Letter No. 06-03 (USACE, 2006), yearly monitoring must occur for the first few years to ensure that the area is becoming established as a successful mitigation site. Many states (i.e., New Jersey Department of Environmental Protection) require a minimum of annual monitoring to evaluate performance standards. Based on this, year two should include at least annual monitoring with associated performance standards and estimated costs. The monitoring plan should detail the monitoring frequency needed in all years subsequent to year one.

The specific methodology for vegetation monitoring is not stated. It is not clear what percentage of plants in each community will be monitored and what method will be used to monitor them.

Performance standards should be defined that include measurable outcomes of a restoration project to help determine if a project meets its goals (USACE, 2006). The monitoring plan for new vegetation needs to specify target survivorship and actions needed. The planting plan

(p. 111) states that there is a guarantee of 85% survivorship in first year. This statement needs to have an action trigger that states replanting will occur if overall survivorship is less than 85% or if *Spartina* survival is less than 75%, for example. Targets can be species-specific or overall plant cover, but they should be defined. No other target survivorships are defined, such as 70% survivorship by the end of year two, or at what point replanting should occur in year three.

Section 2039 of WRDA 2007 (addressed in CECW-PB memorandum *Implementation Guidance for Section 2039 of the Water Resources Development Act of 2007 (WRDA 2007) – Monitoring Ecosystem Restoration* [USACE, 2009b]) requires a monitoring plan that details the vegetation, water quality, and shoreline stabilization monitoring. Such a monitoring plan should describe what will be monitored, how often monitoring will occur, and what methods will be used to monitor each parameter.

Monitoring Costs

In the cost estimating appendix in the Feasibility Report, percentages for operations and maintenance (O&M) and for monitoring are not clearly explained. The cost of monitoring is based on a percentage of the project's construction cost. A separate cost estimate for the monitoring program can be made which will better predict its cost. Estimating labor and materials for monitoring would not be difficult and would provide a more meaningful estimate. It would also allow USACE and local sponsors to agree on what constitutes adequate monitoring and what the sponsors' role in responding would be.

Monitoring for the first 10 years is treated as a project cost. The project life span is 50 years, but monitoring is only planned for 5 years. Longer-term monitoring is needed to evaluate the success of the restoration project and provide opportunities for adaptive management.

Significance – Medium:

Comprehensive information on vegetation restoration planning, long-term monitoring, and costs is required to provide a complete description of how project objectives will be achieved.

Recommendation(s) for Resolution:

1. Develop the vegetation component of the project by providing additional detail on the existing invasive species, the target species for restoration, the revegetation method, the site preparation method, and the method for preventing reinvasion.
2. Define specific targets with triggers for adaptive management, such as replanting if overall survivorship declines to 60%, or any one species declines to 50% or whatever is decided. These milestones need to be defined in the monitoring plans so success can be evaluated and adaptive management can actually occur in practice.
3. Develop a stand-alone monitoring plan as required by WRDA 2007 and as addressed in USACE memorandum CECW-PB (USACE, 2009b). The monitoring plan should clearly define all aspects of monitoring that will occur with respect to the project, including vegetation, erosion, and water quality. Salinity should be included in the monitoring efforts, as well as the effects of the hard structures to ensure that the placement of these training structures is effective and is not causing preferential erosion or scouring around the physical training structure, or any other unexpected impact.

4. Develop a cost analysis for the monitoring plan rather than simply using a percentage of the construction cost as a basis.

Literature Cited:

USACE (2006). Minimum Monitoring Requirements for Compensatory Mitigation Projects Involving the Creation, Restoration, and/or Enhancement of Aquatic Resources. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. Regulatory Guidance Letter No. 06-03, section 4aii. August 3.

USACE (2009b). Implementation Guidance for Section 2039 of the Water Resources Development Act of 2007 (WRDA 2007) – Monitoring Ecosystem Restoration. Department of the Army, U.S. Army Corps of Engineers, Washington, D.C. CECW-PB memorandum. August 31.

Comment 12:

The discussion of the design and monitoring for the hard structures planned for the Dead Horse Bay, Bayswater State Park, Dubos Point, and Brant Point restoration sites needs more detail in order to determine the potential impact on the project.

Basis for Comment:

The designs for the hard structures proposed at the four sites are not adequately documented. The structures are needed to prevent erosion or, for the training structures, to prevent the closure of newly established tidal creeks. For the training structures, their length needs to be justified. For the erosion control structures, the type of structures selected needs to be justified. In addition, a monitoring plan to assess the performance and environmental impact of the structures needs to be developed.

Proposed Erosion Control and Training Structures

Erosion control structures are necessary to prevent erosion of restored wetlands at Dubos Point and Brant Point. Also, training structures are necessary to prevent the shoaling of restored tidal creeks by longshore sand transport at Dead Horse Bay, Bayswater State Park, and Dubos Point.

There is insufficient discussion in the Jamaica Bay Feasibility Report about the design of the training structures at Dead Horse Bay, Bayswater State Park, and Dubos Point. Technical data presented seem to support the need for hard structures, and clearly the restoration efforts require shoaling protection and mitigation of erosion. A consistent design for each structure (or an explanation of why they differ) needs to be presented based on site-specific sand transport data, flow dynamics, and circulation models. Unless properly designed, hard structures have the potential to result in adverse environmental impacts. This is discussed to some extent in the Engineering Appendix, but site-specific details are not addressed in the main report.

The discussion of various types of shore protection is adequate; however, the selection of the erosion control breakwaters and revetment at Bayswater State Park and Dubos Point would benefit by investigating the actual performance of projects incorporating the types of shore protection under consideration. Many of the types considered in the structure selection matrix have not performed successfully where they have been used. The matrix can be misleading since it ranks many elements of the matrix much the same. While cost is weighted very heavily, structural integrity, functional performance, and maintenance requirements are equally important in a structure's long-term performance. Aesthetics is a subjective assessment that can vary significantly from person to person. "Permitability" of rubble mound structures is an issue based on misleading information that often leads to the selection of structures not suited for a given application.

The recommended plan for Dubos Point includes both training structures and toe protection. The toe protection replaces a failing bulkhead. The long revetment proposed for Dubos Point will fix the location of the shoreline and harden it; however, it is not clear why nearshore, detached, low-profile breakwaters would not provide the same protection at lower cost and allow users better access to the water. They would also provide habitat for juvenile fish. The stabilized shoreline behind the trapped barge at Brant Point indicates that such a scheme would be successful. Consequently, the revetment at Dubos Point should probably be ranked lower in

the decision matrix.

Impact of Training Structures
Training structures at tidal creek entrances are proposed. Because of alongshore sand transport, these structures are necessary to prevent sand from shoaling and closing the creek; however, their location near restored tidal creek entrances may be a factor in causing downdrift erosion. Further discussion in the Jamaica Bay Feasibility Report of potential downdrift impacts would provide added justification for including such structures into the plan.

Habitat of the endangered seabeach amaranth and the rare seabeach knotweed are sensitive to the effects of hard structures and should be taken into account before final placement of hard structures is decided. These species appear to need sandy beaches, functioning in a relatively natural and dynamic manner. These characteristics allow individuals to move around in the landscape as a fugitive species, occupying suitable habitat as it becomes available. Stabilizing features often lead to succession and displacement of their habitat. While individuals were not found exactly at the sites, both species are found within 2 miles of Jamaica Bay, and restoration efforts have the potential to create suitable habitat by reducing beach erosion.

Rubble structures can also provide habitat and protection for juvenile fish. The discussion of stabilization methods needs to weigh all of these potential benefits.
Also, there are some differences in the lengths of training structures recommended in the Engineering Appendix and those presented in the Feasibility Report.

Structure Monitoring
The Jamaica Bay Feasibility Report does not discuss monitoring the performance and environmental impact of the structures. The proposed monitoring plan presented in the Engineering Appendix addresses monitoring of habitat but not the impact of the structures and their performance during the project's lifetime. The potential for downdrift erosion at training structures is not discussed. Any planned response to observed adverse impacts is also missing.

A structured monitoring plan for this project could provide data for predicting erosion and sedimentation rates that might be applied to the marsh islands once the pilot study there is conducted.

Significance – Medium:

Restoration success may depend on the performance of the erosion control and training structures, but potential adverse impacts caused by these structures on the restored wetlands need to be considered and discussed further in the Feasibility Report. Monitoring these structures is essential to determine their effectiveness and their impact under this project.

Recommendation(s) for Resolution:

1. Provide further justification of the use of stabilizing structures. Explain their design more extensively and present their potential impact on the project.
2. Include monitoring of structural performance and environmental impact into the monitoring program.

Comment 13:
Project goals and objectives are not comprehensive and have not been integrated consistently into the plan formulation process.
Basis for Comment:
Ecological problems and restoration goals and objectives for each project site are not presented through a consistent process. The stated ecological problems listed at each project site are not consistent and do not result in clear restoration goals or objectives. For example, in Section 3.1, the ecological problems identified for Jamaica Bay do not specifically state impaired water quality, although this is a finding in many previous studies that have been conducted throughout Jamaica Bay. Water quality is listed as a functional unit in Table 4.1 in the stated restoration benefit discussion in Section 4.4, yet only a few sites list water quality impairment as an ecological problem. On a site-specific basis, issues discussed in the planning constraints do not translate into listed ecological problems at that project site. An example of this breakdown in linkage is in Section 4.6.7 at Dubos Point. Ecological problems listed do not include poor water quality or loss of habitat, although these problems are likely based on other problems listed. Dubos Point Alternative 2 discusses vehicle barriers, but vehicle use and access are not listed as an ecological problem, as they are at Hawtree Point in Section 4.6.5. Another ecological problem listed for Dubos Point is fill material that removed the marsh, but excavation or fill removal or restoration of marsh is not listed as a restoration goal and objective. Mosquito infestations resulting from pooling water are listed as an ecological problem, but again, are not addressed as a restoration goal and objective. Restoration goals and objectives should include improving tidal flushing and fish migration to improve the overall water quality and address mosquito infestations. These types of inconsistent links are found in many project site descriptions; therefore, it is unclear if the goals and objectives are capturing all the problems, and if the problems are described comprehensively. The Jamaica Bay Feasibility Report does not document how goals and objectives are actually used to develop and screen management measures and project alternatives. To facilitate comparative analysis, the Panel suggests adding information in the Jamaica Bay Feasibility Report that documents how each project alternative considered contributes to the overall Jamaica Bay study goals and objectives.
Significance – Medium:
The plan formulation process does not integrate problems into restoration goals and objectives and therefore may not address all ecological problems in the restoration plan.

Recommendation(s) for Resolution:
1. Consistently list all ecological problems at each project site. 2. Establish the connection between the problems and the restoration goals and objectives by making sure goals and objectives address all problems listed. 3. Include information in the Jamaica Bay Feasibility Report that documents how the different project alternatives considered contribute to the overall Jamaica Bay study goals and objectives.

Comment 14:
The Jamaica Bay Feasibility Report does not present costs consistent with the Engineering Appendix; therefore, an assessment of the engineering methods used cannot be conducted.
Basis for Comment
The Jamaica Bay Feasibility Report presents costs in Part 4, Plan Formulation, Evaluation, and Selection (Table 4.16) and repeats these costs in Part 6, Plan Implementation (Table 6.3). For these two tables in the report, the annualized costs associated with O&M and monitoring are estimated as a percentage of construction cost. The assumptions that the percentages of O&M and monitoring costs are based upon are not clearly stated. The Engineering Appendix provides detailed breakdowns of construction costs, most monitoring costs, potential corrective actions, and contingency inspections. However, monitoring of structures, land-based planting and water quality seems to be missing. It would be beneficial to the reader to include in the Jamaica Bay Feasibility Report the final detailed costs that are presented in the Engineering Appendix.
Significance – Low:
This information is needed to ensure that the project, as presented in the report, is accurate.
Recommendation(s) for Resolution:
1. State the basis for assumptions that use percentages of construction costs for O&M and monitoring in Table 4.16 and Table 6.3. 2. Add monitoring costs associated with structures, land-based planting, and water quality to Chapter 9 of the Engineering Appendix. 3. Include breakdowns of construction costs, monitoring costs, potential corrective actions, and contingency inspections in a final detailed cost estimate in the Feasibility Report.

Comment 15:
Definition and delineation of the overall study area with additional mapping would improve the Feasibility Report.
Basis for Comment:
The Jamaica Bay Feasibility Report lacks much information on the overall study area. As a result, it is difficult to understand the project in the context of the surrounding region and to understand continued, unmet restoration opportunities. The study area is not clearly or fully defined. There is no text or map that delineates the study area. The other restoration sites that either were not pursued or were reserved for a future phase, such as the 39 sites from the USACE 1997 report and the marsh islands, are not described or shown on a map. Similarly, the location of the restoration work by others, discussed in Section 1.5, Supporting Efforts (p. 8), is not mapped. Without a regional map showing the locations of restoration projects and other possible restoration opportunities, it is difficult to get an overall understanding of actual, planned, and potential restoration of Jamaica Bay and its environs. Maps showing the locations of alternative elements at the individual sites would improve understanding of the alternatives.
Significance – Low:
Providing additional information and maps would improve the overall regional context view and contribute to understanding the effectiveness of the project, but should not materially affect justification of the project.
Recommendation(s) for Resolution:
1. Define the overall study area and delineate it on a map. 2. Provide one or more regional maps showing the location of restoration work by others, restoration sites considered for the Jamaica Bay study, and possible restoration opportunities for the future. This would contribute to the understanding of the regional context of the eight sites in the recommended plan. 3. Provide maps of alternative elements at individual sites.

APPENDIX B

Final Charge to the Independent External Peer Review Panel
as
Submitted to USACE on July 19, 2010

on the

Jamaica Bay Feasibility Report

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Charge Guidance and Questions to the Peer Reviewers
for the
Jamaica Bay, Marine & Plumb Beach, Kings, and Queens Counties, New York Interim Feasibility Report IEPR

BACKGROUND

Jamaica Bay is a tidal waterway which lies in an urban area and is connected to the lower bay of New York Harbor. The bay is located approximately 22 miles from midtown Manhattan in New York City and lies between the city's two most populated boroughs, Brooklyn and Queens. The bay is surrounded by salt marshes, disturbed upland ecosystems, parks, landfills, residential communities, commercial and retail facilities, parkways and major roadways, and public transportation, including the John F. Kennedy International Airport.

In the 19th and 20th centuries, a series of human actions resulted in extensive habitat loss, severe degradation of much of the remaining habitats, and deterioration of the bay's chemical, physical, and biological environment. These actions included the filling of marshes and open water areas; hardening of shorelines; altering of the bathymetry of the bay bottom; and inputs from raw and treated sewage, combined sewage overflow, and landfill leachates, all of which impaired the ability of Jamaica Bay to function as an ecological system. Once an area that abounded with wildlife and was safe for fishing and other recreational uses, it is now surrounded by extensive development punctuated by sanitary waste treatment plants and landfills on one side and by one of the most heavily traveled airports in the country on the other side.

The overall purpose of the Jamaica Bay restoration project is to restore the historical productivity and diversity of Jamaica Bay. The alternatives described in the *Jamaica Bay, Marine Park & Plumb Beach, New York Environmental Restoration Project Draft Interim Feasibility Report, Kings and Queens Counties, New York* (hereinafter referred to as the Jamaica Bay Feasibility Report) include the restoration of wetland, riparian and other aquatic ecosystems as targeted habitats, but also include restoration of adjacent maritime forest and grasslands, as appropriate, to function as protective upland buffers. The acreage involved in these recommended restorations includes only a fraction of the estuarine habitat that historically existed in the area, but benefits of the restoration will be complemented first by the interactions among all the sites recommended in the Jamaica Bay Feasibility Report, and further by the other restoration efforts in Jamaica Bay.

As part of its planning and regulatory functions, the U.S. Army Corps of Engineers (USACE) evaluates activities proposed activities for wetlands and assesses the impact these activities might have on the capacity of a wetland to perform specific functions. The Evaluation of Planned Wetlands (EPW) model was developed for assessing various functions of planned wetlands and evaluating alternative plans. The EPW has been and is proposed to be used within the framework of the USACE and state permit programs for characterizing new loss and gain of habitat function associated with a planned or regulated activity. The EPW was developed as a simple rapid-assessment technique in order to meet the time and cost constraints of the permit review process and to inform decisions concerning potential requirements for compensatory mitigation. It is intended to complement applications of Habitat Evaluation Procedures (HEP) and the Wetland Evaluation Technique (WET), and is generally characterized as a tool that

facilitates comparison between existing wetland in a characteristic wetland assessment area and a planned wetland.

In accordance with procedures described in the USACE Engineer Circular *Civil Works Review Policy* (EC No. 1165-2-209) (USACE, 2010), USACE CECW-CP memorandum *Peer Review Process* (USACE, 2007), and Office of Management and Budget (OMB) bulletin *Final Information Quality Bulletin for Peer Review* (OMB, 2004), the USACE is conducting a Independent External Peer Review (IEPR) of the Jamaica Bay FS. This review will overlap the end of the technical review of the EPW model that was used for the FS, and the results of the model review will be available during the IEPR.

OBJECTIVES

The objectives of this work are to conduct an IEPR of the Jamaica Bay Feasibility Report in accordance with the USACE Water Resources Policies and Authorities' *Civil Works Review Policy* (EC 1165-2-209) dated January 31, 2010 and the OMB's *Final Information Quality Bulletin for Peer Review* released December 16, 2004. Peer review is one of the important procedures used to ensure that the quality of published information meets the standards of the scientific and technical community. Peer review typically evaluates the clarity of hypotheses, validity of the research design, quality of data collection procedures, robustness of the methods employed, appropriateness of the methods for the hypotheses being tested, extent to which the conclusions follow from the analysis, and strengths and limitations of the overall product.

This purpose of the IEPR is to assess the adequacy and acceptability of economic, engineering, and environmental methods, models, and analyses used for the Jamaica Bay Feasibility Report. The IEPR will be limited to technical review and will not involve policy review. The IEPR will be conducted by subject matter experts (i.e., IEPR panel members) with extensive experience in engineering, economics, plan formulation, ecology, and environmental issues associated with environmental restoration.

The panel members will be "charged" with responding to specific technical questions as well as providing a broad technical evaluation of the overall project. Per EC 1165-2-209, Appendix D, reviews should identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods. Review panels should be able to evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable. Reviews should focus on assumptions, data, methods, and models. The panel may offer their opinions as to whether there are sufficient analyses upon which to base a recommendation.

DOCUMENTS PROVIDED

The following is a list of documents and reference materials that will be provided for the review. **The documents and files presented in bold font are those which are to be reviewed**. All other documents are provided for reference.

1. **Jamaica Bay Vol 1: Draft Feasibility Report, Draft Environmental Assessment, and App A - Pertinent Correspondence**
2. **Jamaica Bay Vol 2: App B - Economics & IWR-PLAN results, App C - Environmental Coordination and Compliance, and App D - Real Estate Plan**
3. **Jamaica Bay Vol 3: App E - Engineering and App F - Cost Estimates**
4. Bartoldus, C.C., Garbisch, E.W., Kraus, M.L. (1994). Evaluation for Planned Wetlands: A procedure for Assessing Wetland Functions and a Guide to Functional Design. Environmental Concerns Inc. St. Michaels, Maryland.
5. Microsoft Excel Spreadsheet for Dead Horse Bay – EPW Application
6. Jamaica Bay Existing Conditions and Future Without Project Conditions" (USACE 2002)
7. EC 1165-2-209. *Civil Works Review Policy* (USACE, 2010).
8. USACE (2007). *Peer Review Process*, CECW-CP memorandum,
9. OMB (2004). *Final Information Quality Bulletin for Peer Review*, Office of Management and Budget (OMB) bulletin.
10. Draft Model Review Report developed by Battelle during the EPW model review.

SCHEDULE

Milestones and Deliverable Schedule by Task

Deliverables are noted with an asterisk (*)

TASK	ACTION	DUE DATE
Conduct Peer Review	Review documents sent to panel members	7/28/2010
	Battelle/IEPR panel kick-off meeting	7/29/2010
	USACE/Battelle/panel kick-off meeting with panel members	7/29/2010
	IEPR panel members complete their review	10/21/2010
Prepare Final Panel Comments and Final IEPR Report	Battelle provides panel members merged individual comments and talking points for panel review teleconference	10/28/2010
	Battelle convenes panel review teleconference	11/1/2010
	Battelle provides Final Panel Comments (FPC) directive to panel	11/2/2010
	Panel members provide draft FPCs to Battelle	11/9/2010
	Battelle provides feedback to panel members on draft FPCs; panel provides revised draft FPCs per Battelle feedback (iterative process)	11/9 – 11/17/2010
	FPCs finalized	11/17/2010
	Battelle provides Final IEPR report to panel for review	11/19/2010
	Panel provides comments on Final IEPR report	11/22/2010
	* Battelle submits Final IEPR Report to USACE	11/30/2010
Comment/ Response Process	Battelle inputs Final Panel Comments to DrChecks; Battelle provides Final Panel Comment response template to USACE	12/2/2010
	USACE PDT provides draft responses and clarifying questions to Battelle	12/9/2010
	Battelle provides panel members the draft Evaluator responses and clarifying questions	12/14/2010
	Panel members provide Battelle with draft BackCheck responses	12/17/2010
	Battelle convenes teleconference with panel members to discuss panel's draft BackCheck responses	12/17/2010
	Battelle convenes FPC Teleconference between IEPR team and PDT to discuss FPCs, draft responses and clarifying questions	12/20/2010
	USACE inputs final Evaluator responses in DrChecks	1/12/2011
	Battelle provides Evaluator responses to panel members	1/18/2011
	Panel members provide Battelle with BackCheck responses	1/21/2011
	Battelle inputs BackCheck responses in DrChecks	2/3/2011
	* Battelle submits pdf printout of DrChecks to USACE	2/4/2011

CHARGE FOR PEER REVIEW

Members of this peer review panel are asked to determine whether the technical approach and scientific rationale presented in the Jamaica Bay Feasibility Report are credible and whether the conclusions are valid. The reviewers are asked to determine whether the technical work is adequate, competently performed, properly documented, satisfies established quality requirements, and yields scientifically credible conclusions. The panel is being asked to provide feedback on the engineering, economics, ecological and environmental analyses, and plan formulation described in the Jamaica Bay Feasibility Report. The reviewers are not being asked whether they would have conducted the work in a similar manner.

Specific questions for the panel members (by report section or Appendix) are included in the general charge guidance, which is provided below.

General Charge Guidance

Please answer the scientific and technical questions listed below and conduct a broad overview of the Jamaica Bay Feasibility Report. Please focus on your areas of expertise and technical knowledge. Even though there are some sections with no questions associated with them, that does not mean that you cannot comment on them. Please feel free to make any relevant and appropriate comment on any of the sections and appendices you were asked to review. In addition, please note the following guidance. Note that the panel will be asked to provide an overall statement related to 2 and 3 below per USACE guidance (EC 1165-2-209; Appendix D).

1. Your response to the charge questions should not be limited to a “yes” or “no.” Please provide complete answers to fully explain your response.
2. Assess the adequacy and acceptability of the economic and environmental assumptions and projections, project evaluation data, and any biological opinions of the project study.
3. Assess the adequacy and acceptability of the economic analyses, environmental analyses, engineering analyses, formulation of alternative plans, methods for integrating risk and uncertainty, and models used in evaluation of economic or environmental impacts of the proposed project.
4. If appropriate, offer opinions as to whether there are sufficient analyses upon which to base a recommendation.
5. Identify, explain, and comment upon assumptions that underlie all the analyses, as well as evaluate the soundness of models, surveys, investigations, and methods.
6. Evaluate whether the interpretations of analysis and the conclusions based on analysis are reasonable
7. Please focus the review on assumptions, data, methods, and models.

Please **do not** make recommendations on whether a particular alternative should be implemented, or whether you would have conducted the work in a similar manner. Also please **do not** comment on or make recommendations on policy issues and decision making.

Comments should be provided based on your professional judgment, **not** the legality of the document.

1. If desired, panel members can contact one another. However, panel members **should not** contact anyone who is or was involved in the project, prepared the subject documents, or was part of the USACE Independent Technical Review.
2. Please contact the Battelle deputy project manager (Amanda Maxemchuk, MaxemchukA@battelle.org) project manager (Karen Johnson-Young, Johnson-YoungK@battelle.org) for requests or additional information.
3. In case of media contact, notify the Battelle project manager immediately.
4. Your name will appear as one of the panelists in the peer review. Your comments will be included in the Final IEPR Report, but will remain anonymous.

Please submit your comments in electronic form to Amanda Maxemchuk**, MaxemchukA@battelle.org, no later than October 21, 2010, 10 pm EDT.**

Independent External Peer Review for the
Jamaica Bay, Marine & Plumb Beach, Kings, and Queens Counties, New York
Interim Feasibility Report

CHARGE QUESTIONS

GENERAL QUESTIONS

1. To what extent has it been shown that the project is technically sound, environmentally acceptable, and economically justified?

2. Are the assumptions that underlie the economic, engineering, and environmental analyses sound?

3. Are the economic, engineering, and environmental methods, models, and analyses used adequate and acceptable?

4. In general terms, are the planning methods sound?

5. Are the interpretations of analysis and conclusions based on the analysis reasonable?

6. Which sections of the report are well written and do not require further revision?

PART 1 - INTRODUCTION

1.1 Study Authorization

No questions

1.2 Study Area Description and Location

7. Comment on whether the study area has been comprehensively described.

1.3 Historical Background: Ecological Impairments to the Bay

No questions

1.4 Restoring a System: A Comprehensive Approach

No questions

1.5 Supporting Efforts

No questions

1.6 Prior Studies and Reports

8. Have all critically important prior studies performed relative to the project and study area been described and are the descriptions adequate?

PART 2 - EXISTING CONDITIONS

9. Comment on the accuracy, comprehensiveness, and completeness of the information used to describe existing conditions for the feasibility study for each of the following sections.

2.1 Topography and Geology

No questions

2.2 Water Resources

No questions

2.3 Navigation

No questions

2.4 Economy and Income

No questions

2.5 Land

No questions

2.6 Housing

No questions

2.7 Environmental Resources

No questions

2.8 Fisheries

No questions

2.9 Rare, Threatened, Endangered and Special Concern Species

No questions

PART 3 - PROBLEM AND OPPORTUNITY IDENTIFICATION

3.1 Problem Identification

10. Comment on whether the problem list is comprehensive and complete.

3.2 Future without Project Conditions

11. Comment on the sea level rise values used in the analysis.

3.3 Goals, Objectives and Constraints

12. Comment on whether the list of goals is comprehensive and sufficiently detailed to understand the individual goals.

13. Comment on whether the list of objectives is comprehensive and sufficiently detailed to understand the individual objectives.

14. Comment on whether the list of constraints is comprehensive and sufficiently detailed to understand the individual constraints.

PART 4 - PLAN FORMULATION, EVALUATION AND, SELECTION

15. Comment on whether the information provided regarding the original site selection process is sufficiently comprehensive and complete.

4.1 Initial Screening

16. Comment on the exclusion criteria for the first phase of screening.

4.2 Second Screening

17. Comment on the inclusion criteria for the second phase of screening.

18. Comment on the appropriateness of the parallel-track approach.

19. Comment on the criteria for classification of Tier 1 Sites.

4.3 Third Screening

20. Comment on the exclusion criteria for the third phase of screening.

21. Given the selected sites, comment on the Without Project assumptions.

22. Comment on the process of determining historic and future erosion rates.

23. Comment on the application and appropriateness of the "Equilibrium Beach Profile Theory."

24. Comment on the comprehensiveness of the discussion of alternative development.

4.4 Restoration Benefits

25. Comment on the use of the Evaluation for Planned Wetlands (EPW) assessment method for characterization of the functional capacity of each of the project sites in the Jamaica Bay Feasibility Study.

26. Comment on whether the EPW assessment method is sufficiently detailed.

4.5 Restoration Costs

No questions

4.6 Restoration Alternatives

27. Comment on the extent to which the No Action and "Action" alternatives are clearly defined for each restoration project.

28. Comment on the extent to which the ecological problems, site limitations, and restoration goals are defined for each restoration project.

29. Comment on the extent to which the short- and long-term impacts associated with the alternatives have been adequately discussed and evaluated.

4.6.1 Dead Horse Bay

30. Comment on whether the description of ecological problems in Dead Horse Bay is comprehensive and complete.

31. Comment on whether the description of the restoration steps is comprehensive and complete.

32. Comment on whether the Dead Horse Bay alternatives incorporate the planning constraints.

33. Are the four Dead Horse Bay alternatives sufficiently detailed? If not, explain.

4.6.2 Paerdegat Basin

34. Comment on whether the description of ecological problems in Paerdegat Bay is comprehensive and complete.

35. Comment on whether the description of the restoration steps is comprehensive and complete.

36. Comment on whether the Paerdegat Basin alternatives incorporate the planning constraints.

37. Are the four Paerdegat Basin alternatives sufficiently detailed? If not, explain.

4.6.3 Fresh Creek

38. Comment on whether the description of ecological problems in Fresh Creek is comprehensive and complete.

39. Comment on whether the description of the restoration steps is comprehensive and complete.

40. Comment on whether the Fresh Creek alternatives incorporate the planning constraints.

41. Are the six Fresh Creek alternatives sufficiently detailed? If not, explain.

4.6.4 Spring Creek

42. Comment on whether the description of ecological problems in Spring Creek is comprehensive and complete.

43. Comment on whether the description of the restoration steps is comprehensive and complete.

44. Comment on whether the Spring Creek alternatives incorporate the planning constraints.

45. Are the four Spring Creek alternatives sufficiently detailed? If not, explain.

4.6.5 Hawtree Point

46. Comment on whether the description of ecological problems at Hawtree Point is comprehensive and complete.

47. Comment on whether the description of the restoration steps is comprehensive and complete.

48. Comment on whether the Hawtree Point alternative incorporates the planning constraints.

49. Is the Hawtree Point alternative sufficiently detailed? If not, explain.

4.6.6 Bayswater State Park

50. Comment on whether the description of ecological problems in Bayswater State Park is comprehensive and complete.

51. Comment on whether the description of the restoration steps is comprehensive and complete.

52. Comment on whether the Bayswater State Park alternatives incorporate the planning constraints.

53. Are the four Bayswater State Park alternatives sufficiently detailed? If not, explain.

4.6.7 Dubos Point

54. Comment on whether the description of ecological problems at Dubos Point is comprehensive and complete.

55. Comment on whether the description of the restoration steps is comprehensive and complete.

56. Comment on whether the Dubos Point alternatives incorporate the planning constraints.

57. Are the four Dubos Point alternatives sufficiently detailed? If not, explain.

4.6.8 Brant Point

58. Comment on whether the description of ecological problems at Brant Point is comprehensive and complete.

59. Comment on whether the description of the restoration steps is comprehensive and complete.

60. Comment on whether the Brant Point alternatives incorporate the planning constraints.

61. Are the three Brant Point alternatives sufficiently detailed? If not, explain.

4.7 Evaluation of Restoration Alternatives

62. Comment on the general approach and method for evaluating alternatives.

63. Comment on the process for deriving implementation costs.

4.8 Cost Effectiveness Analysis

64. Comment on the clarity and completeness of the cost effectiveness analysis.

4.9 Incremental Cost Analysis

65. Comment on the clarity and completeness of the incremental cost analysis.

4.10 National Ecosystem Restoration Plan or Best Buy Plan

66. Comment on the rationale and validity for moving past the IWR-PLAN model's Break Point One and not beyond Break Point Two.

4.11 Description of Recommended Plan

67. Comment on the selection process for each of the recommended plans for each site.

4.11.1 Plan Components

No questions

4.11.2 Real Estate

68. Comment on whether this section adequately addresses all real estate interests.

4.11.3 Cost Estimate

69. Comment on the use of three different rates for the calculation of interest rates, discount rates, and present value.

PART 5 - ANTICIPATED EFFECTS OF RECOMMENDED PLAN

5.1 Topography and Geology

No questions

5.2 Water Resources

70. Comment on the extent to which the role of background erosion and sea level rise has been adequately addressed.

5.3 Navigation

71. Comment on the extent to which wave action and navigation issues have been adequately addressed.

5.4 Land

No questions

5.5 Economy and Income

No questions

5.6 Housing

No questions

5.7 Environmental Resources

72. Comment on the anticipated positive effects of the restoration plan at all sites based on the alternative methods selected.

5.8 Shellfish, Finfish, and Benthic Resources

73. Comment on the beneficial effects the project is expected to have on shellfish, macroinvertebrates, and finfish in the project area.

5.9 Birds

74. Comment on the effects of a permanent change of habitat on the bird species using the project area.

5.10 Rare, Threatened, Endangered and Special Concern Species

75. Comment on the expectation that the overall improvement of the project area will benefit the rare and endangered species using the project area.

5.11 Air Quality

No questions

5.12 Cultural Resources

No questions

5.13 Recreation

76. Discuss whether the recreational cost/benefits have been adequately calculated and explained.

PART 6 - PLAN IMPLEMENTATION

6.1 General

No questions

6.2 Local Cooperation

No questions

6.3 Cost Apportionment

77. Discuss the discount rate employed and the percentages used to estimate the operation and maintenance and monitoring costs. Additionally, comment on the period of analysis used.

6.4 Pre-Construction Engineering and Design Cost Sharing

No questions

6.5 Construction Schedule

78. Comment on the reasonableness of the construction schedule and project phasing.

6.6 Financial Analysis

No questions

6.7 Views of Non-Federal Partners and Other Agencies

No questions

6.8 Major Conclusions and Findings

79. Comment on whether the finding and conclusions are supported throughout the report.

PART 7 - PUBLIC INVOLVEMENT

80. Based on your experience with similar projects, has public, stakeholder, and agency involvement been sufficient to determine all issues of interest and to ensure that the issues have been adequately addressed to the satisfaction of those interested parties? Should additional public outreach and coordination activities be conducted?

PART 8 - RECOMMENDATIONS

No questions

LIST OF APPENDICES

Volume I: Draft Environmental Assessment

Part 1. Introduction

1.1 Study Authorization

No questions

1.2 Study Location

81. Comment on whether the locations of the sites selected for the study are representative of all of Jamaica Bay.

1.3 Project Purpose and Need

82. Comment on whether the assumptions underlying the need for the restoration project are sound.

Part 2. Alternatives

2.1 Evaluation for Planned Wetlands

83. Comment on the use of the Evaluation of the Planned Wetlands (EPW) assessment method to characterize the functional capacity of the project area.

84. Comment on the rationale for developing the various alternatives at each site.

85. For each of the eight sites, comment on whether the process for evaluation and selection of the recommended plan is comprehensive and complete.

2.2 Dead Horse Bay Alternatives

86. Comment on the use of a hard structure for stabilization purposes.

2.3 Paedergat Basin Alternatives

No additional questions

2.4 Fresh Creek Alternatives

No additional questions

2.5 Spring Creek Alternatives

No additional questions

2.6 Hawtree Point Alternatives

No additional questions

2.7 Bayswater State Park Alternatives

87. Comment on the use of a hard structure for stabilization purposes.

2.8 Dubos Point Alternatives

88. Comment on the use of a hard structure for stabilization purposes.

2.9 Brant Point Alternatives

No additional questions

Part 3. Existing Conditions

3.1 General Resource Information

89. Comment on whether the description and discussion of the generally existing estuarine-wide conditions of resources is comprehensive and complete.

90. For each of the eight sites, comment on whether the description of existing conditions is comprehensive and complete.

3.2 Dead Horse Bay Existing Conditions

No additional questions

3.3 Paerdegat Basin Existing Conditions

No additional questions

3.4 Fresh Creek Existing Conditions

No additional questions

3.5 Spring Creek Existing Conditions

No additional questions

3.6 Hawtree Point Existing Conditions

No additional questions

3.7 Bayswater State Park Existing Conditions

No additional questions

3.8 Dubos Point Existing Conditions

No additional questions

3.9 Brant Point Existing Conditions

No additional questions

Part 4. Environmental Analysis of Proposed Actions

4.1 General Resource Information

91. Comment on the expectation that similar soils types and contaminant levels exist throughout the sites, so that recontouring the land will not place contaminated soils onto clean soils.

92. Comment on the expectation that excavation of fill layers from the water's edge to create tidal marsh will return the area to historic elevation and soil complex.

93. Comment on the expectation of no major impact to tidal influences by the restoration activities because of the small size of the areas affected relative to the overall size of Jamaica Bay.

94. Comment on the expectation of enhancement of the quality and quantity of marsh habitats throughout the bay by the restoration activities.

95. Comment on the expectation of minimal impact on biological resources, including rare and endangered species in the bay, by any permanent changes in the habitat areas.

4.2 Dead Horse Bay Impacts

96. Comment on the expectation of a possible negative impact on the habitats of the endangered seabeach amaranth and seabeach knotweed due to the construction of stabilization structures.

97. Comment on the plans for mitigating potential adverse effects to the cultural resources of the Dead Horse Bay project area.

98. Comment on the expected overall positive cumulative impact of restoration activities at the Dead Horse Bay site.

4.3 Paerdegat Basin Impacts

99. Comment on project plans for mitigating possible adverse effects on prehistoric and cultural resources at the Paerdegat Basin site.

100. Comment on the expected overall positive cumulative impact of restoration activities at the Paerdegat Basin site.

4.4 Fresh Creek Impacts

101. Comment on project plans for mitigating possible adverse effects on prehistoric and historic resources at the Fresh Creek site.

102. Comment on the expected overall positive cumulative impact of restoration activities at the Fresh Creek site.

4.5 Spring Creek Impacts

103. Comment on plans for mitigating possible adverse impacts to cultural, prehistoric, and historic resources at the Spring Creek site.

104. Comment on the expected overall positive cumulative impact of restoration activities at the Spring Creek site.

4.6 Hawtree Point Impacts

105. Comment on the plans for mitigating potential adverse effects to historic cultural resources in the Hawtree Point project area.

106. Comment on the expected overall positive cumulative impact of restoration activities at the Hawtree Point site.

4.7 Bayswater State Park Impacts

107. Comment on the possible negative effect of stabilizing structures on seabeach amaranth and seabeach knotweed at the Bayswater State Park site.

108. Comment on the project plans for mitigating possible adverse effects to cultural, prehistoric, and historic resources at the Bayswater State Park site.

109. Comment on the expected overall positive cumulative impact of restoration activities at the Bayswater State Park site.

4.8 Dubos Point Impacts

110. Comment on the potential negative impact of stabilization structures on seabeach amaranth and seabeach knotweed at the Dubos Point site.

111. Comment on project plans for mitigating potential adverse effects on cultural and historic resources at the Dubos Point site.

112. Comment on the expected overall positive cumulative impact of restoration activities at the Dubos Point site.

4.9 Brant Point Impacts

113. Comment on project plans for mitigating potential adverse effects to cultural resources at the Brant Point site.

114. Comment on the expected overall positive cumulative impact of restoration activities at the Brant Point site.

4.10 Cumulative Impacts

115. Comment on whether the information considered for a cumulative impact assessment is comprehensive and complete.

Part 5. Environmental Compliance

No questions

Part 6. Summary and Conclusions

116. Comment on the conclusion of No Significant Impact due to the restoration project.

Appendix A Study Correspondence

No questions.

<u>Volume II</u>

Appendix B Economics

117. Comment on the completeness of the information provided and how it supports the Feasibility Study.

Appendix C Environmental Coordination & Compliance

No questions

Appendix D Real Estate Plan

<u>Volume III</u>

Appendix E Engineering

118. Comment on the extent to which the constraints for each project site were addressed in the design criteria and major assumptions for the eight restoration projects.\

119. Comment on whether the data available to support the recommended plans for the eight restoration projects are comprehensive and complete.

120. Comment on the extent to which the analysis conducted supports the recommended plans for the eight restoration projects.

121. Comment on the extent to which the technical assumptions and preliminary analysis support the selected stabilizing structures.

122. Comment on the extent to which the rationale is clearly presented and validated for the major components of the cost estimate.

123. Comment on the extent to which the feasibility, methods, and sequence of constructing the proposed measures have been adequately addressed.

124. Comment on the assumptions used to determine the cost of operations and maintenance for the proposed project.

Appendix F Cost Estimate

125. Comment on the accuracy, comprehensiveness and completeness of the cost estimate information.

FINAL OVERVIEW QUESTION

126. What is the most important concern you have with the document or its appendices that was not covered in your answers to the questions above?