US Army Corps of Engineers®
New York District

REVISED DRAFT

Integrated Hurricane Sandy General Reevaluation Report and Environmental Impact Statement

Atlantic Coast of New York

East Rockaway Inlet to Rockaway Inlet and Jamaica Bay

Appendix G

Public Engagement

August 2018

Table of Contents

1.0 NOTICE OF INTENT

A Notice of Intent (NOI) to prepare an Environmental Impact Statement for East Rockaway Inlet to Rockaway Inlet and Jamaica Bay Reformulation Study was issued on April 2, 2015 in the Federal Register (Volume 80, Number 63). The NOI also invited public comment on the scope of the issues and alternatives to be addressed in the draft EIS. Input was received through public meetings with both oral and written comments being provided and written comments were also submitted and considered throughout the study process.

2.0 PUBLIC ENGAGEMENT MEETINGS

Two types of public engagement are required through the National Environmental Policy Act (NEPA) process. The study team must hold a NEPA Scoping meeting to obtain public input on the scope of the study and to help gather local expertise that can be woven into the study, as well a public meeting during the public review period of the Draft Integrated Report. During the public review period, the study team meets with stakeholders and members of the public to solicit comments on the *Tentatively Selected Plan* prior to the agency decision on whether or not to finalize the recommendation. The Rockaway study team held additional public meetings throughout the scoping process and the Feasibility Study. Local elected officials also facilitated a number of public meetings where they requested and obtained participation from the Rockaway study team members in order to further the public engagement on this study.

NEPA Scoping Meetings

NEPA scoping occurred between April and June 2015. Three NEPA scoping meetings were held. The first occurred on April 22, 2015 at the Knights of Columbus 333 Beach 90th Street Rockaway Beach. The second was on April 29, 2015 at Floyd Bennett t Field 50 Aviator Road (Ryan Visitor Center, Floyd Bennett t Field). The final NEPA scoping meeting was held on June 24, 2015 at Challenge Prep Charter Academy, 704 Hartman Lane, Far Rockaway.

Public Meetings

There were seven public meetings held to obtain feedback on the alternatives under consideration. Originally, five were scheduled, but two additional ones were subsequently held. The original five took place on October 1st, 5th, 13th, 20th, and 25th in 2016 and the two additional meeting took place on November 9 and 16, 2016.

The Wednesday October 5, 2016 meeting was held in Brooklyn at Kingsborough College, 2001 Oriental Blvd, Room C124, Brooklyn. 165 people attended and 23 comments were received after this meeting.

The Thursday October 13, 2016 meeting was held in Rockaway Beach, at Knights of Columbus 333 Beach 90th Street Rockaway Beach. 77 people attended and 20 comments were submitted.

The Wednesday October 19, 2016 meeting was held in Queens, at Knights of Columbus 135-45 Lefferts Blvd, South Ozone Park. Two people signed in and 5 comments were submitted.

The Thursday October 20, 2016 meeting was held in Rockaway Park, PS 114, 400 Beach 135th Street. 120 people attended this meeting and 70 comments were received.

The Tuesday October 25, 2016 meeting was held in Far Rockaway, Queens at Macedonia Baptist Church, 330 Beach 67th street, Arverne. 55 people attended and 19 comments were submitted.

Two additional meetings were held on November 16, 2016 for the Jamaica Bay Task Force and on November 9, 2016 at CB 13.

Some of the common concerns expressed during public scoping meetings included the sense of urgency to move forward to construction of a risk management feature. Some expressed concerns about the coordination among multiple agencies addressing CSRM issues. Other concerns included maintaining access to the water, preserving views, and balancing CSRM with environmental impacts. Specifically, there were some concerns on how public access would be handled in the project area. The public had concerns about Jamaica Bay flushing times (as in, how the water circulates within the bay and flushes pollutants out, as well as circulates oxygen within the bay). People were concerned about a potential 'bathtub effect' if circulation were to be limited by a storm surge barrier. Other concerns centered on sea level rise and wildlife that inhabit Jamaica Bay. There was concern about internal flooding from the sewer system in front of homes since the water table is so high in some areas and the sewer relies on gravity drainage. Additionally, the length of the construction period and when it would commence were also concerns. The type of barrier and how high the seawalls would be along the interior of Jamaica bay were identified as concerns. Lastly, the effect that this project will have on flood insurance for homeowners was a concern. Many people asked for more groins between 123 Street and 149 Street.

3.0 STAKEHOLDER GROUP LETTERS AND RESPONSES

Comment	USACE Response
"extend the public comment period on the above-referenced proposed Draft Report and Environmental Impact Statement by a minimum of thirty (30) days beyond the currently scheduled public comment deadline. The Draft outlines complex plans for a $2.6 billion-dollar long-term coastal storm management strategy for Jamaica Bay. The current 60 days does not provide adequate time for the communities and stakeholders to review the lengthy report and provide comprehensive recommendations that have the potential to strengthen the project. The ACOE is providing a potential roadmap for flood risk reduction in coastal Brooklyn and queens with the Draft and the public should play a major role in shaping the future of the project. Extending the public comment period allows the public to make better long-term decisions that will impact their communities.	Public comment period was extended in response. No additional comments received.

“formally request that the U.S. Army Corps of Engineers extend the public comment period on its Draft Integrated Hurricane Sandy General Reevaluation Report and Environmental Impact Statement for the Atlantic Coast of New York, East Rockaway Inlet to Rockaway Inlet and Jamaica Bay. Due to the scope and complexity of the proposed project, the Army Corps' recent extension of the Environmental Impact Statement's public comment period from November 2, 2016 to November 17, 2016 is inadequate to foster meaningful public comments. Specifically, we request the Army Corps to approve a 90-day extension to the draft Environmental Impact Statement's original 60-day open comment period. The purpose of the National Environmental Policy Act is to "insure that environmental information is available to public officials and citizens before decisions are made and before actions are taken." NEPA clarifies that this "information must be of high quality." and that both "[a]ccurate scientific analysis, and public scrutiny are essential...." The Environmental Impact Statement's absence of accurate scientific analysis both renders it insufficient for a draft EIS and forecloses the public's ability to properly and fully analyze its true environmental impacts. The public must not be limited to commenting on a plan's merely hypothetical and speculative impacts. Based upon these and other deficiencies, we request that the Army Corps, at the very least, provide the public with a greater extension to the Draft Environmental Impact Statement comment period. A seventy-five day public comment period does not provide the public with enough time to develop and submit helpful comments. See 33 C.F.R. 230 .19(a). The DRAFT ENVIRONMENTAL IMPACT STATEMENT The Draft Environmental Impact Statement is a lengthy 270-page document that outlines the Army Corps tentatively selected Coastal Storm Risk Management plan for the Atlantic Coast of New York. The tentatively selected plan involves a large project area that spans multiple Boroughs of	Public comment period was extended to 2 December 2016 in response. No additional comments received. Based partially on the comments received, which were considered as part of the Agency Decision Milestone, the TSP was amended to move all further consideration and evaluation of the proposed storm surge barrier to another CSRM study that is looking at regional CSRM, namely the New York and New Jersey Harbor and Tributaries Study. A Revised Draft GRR/EIS was prepared for the updated Recommended Plan and released for a second public comment period. Specific comments regarding the analysis in the Draft GRR/EIS are addressed further down in this comment and response table.

New York City (King and Queens Counties) and Nassau County. Specifically, the project area "consists of the Atlantic Coast of NYC between East Rockaway Inlet and Rockaway Inlet, the water and lands within and surrounding Jamaica Bay, New York," and "the low lying Coney Island section of Brooklyn...." This massive project is estimated to cost over $3.7-billion-dollars, result in the loss of 154 acres of natural habitat, and potentially impact the project area's "[m]ore than 850,000 residents, 48,000 residential and commercial structures, and scores of critical infrastructure features such as hospitals, nursing homes, wastewater treatment facilities, subway, railroad, and schools...." The Draft Environmental Impact Statement reveals that the tentatively selected plan has the potential to negatively affect Jamaica Bay's tidal range, water quality (e.g., dissolved oxygen, temperature, nutrient concentrations, etc.), ecological "habitat in the interior tribal tributaries and shallow areas of the Bay," as well as its neighboring coastal communities' real estate values. An initial review of the draft Environmental Impact Statement reveals numerous potential environmental issues, including but not limited to: (i) the Corps' use of outdated water quality geometric means for Fecal Coliform and Enterococci; (ii) the determination that only 240-340 million gallons of treated sewage will be discharged into Jamaica Bay per day (from WWTPs) without accounting for additional sources of discharges (e.g., CSOs, MS4s, illegal and elicit discharges, and direct discharges); (iii.) its unfounded determination that the project will not adversely affect marine mammals and sea turtles; and (iv) its complete failure to consider whether the Storm Barrier will exacerbate the Bay's already existent chlorine and heavy metal pollution, its nutrient load problems and inability to maintain Dissolved Oxygen levels at the water quality criteria threshold for fish survival; and, (v) whether the barrier will further restrict the flow of sediment into and out of	

the Bay, potentially creating new, or compound existing water quality problems (e.g., affecting the sediment's legacy contamination bioaccumulation). Indeed, the draft document does not even include a determination of exactly how the proposed gate will be constructed, admitting that additional modeling and analysis is required "to identify, quantify and conclusively address any possible impacts to water quality and fish and wildlife species and their habitats in the Bay." The funding for this massive multi-billion dollar project is not yet in place and a timeline for funding is indefinite. The draft Environmental Impact Statement may be intended to secure such funding, with the actual project not commencing until some uncertain future date. Thus, absent a true planned action, an analysis of the environmental impacts is entirely premature as it cannot possibly contemplate what conditions will exist when the project is actually constructed. CONCLUSION The potential impacts to Jamaica Bay's aquatic and terrestrial ecosystem, as well as its surrounding coastal communities, are significant. We request that the general public be provided with at least a 90-day extension to the original public comment period. If granted, this extension will enable interested parties and local residents to comprehensively review the draft Environmental Impact Statement and submit thoughtful comments. "…a minimum of 150 days is required to facilitate any meaningful public participation, it is our firm belief that the Corps' decision to merely extend the public comment period from November 2, 2016 to November 17, 2016 was clearly insufficient.	

As the elected officials for the southern Brooklyn area, we were recently made aware of the Jamaica Bay/Rockaway Draft Reformulation Plan which seeks to bring storm risk management measures into our respective communities. The scale and scope of such a project necessitates public input and we feel that the current November 17, 2016 deadline for commentary does not provide enough time for adequate review by civic groups, community stakeholders and residents. We are requesting that the deadline be extended to no earlier than December 31, 2016 so that our constituents can voice their support or concern for a project that will permanently change our communities. Thank you for your attention to this matter, and we look forward to your prompt response.	Public comment period was extended in response. No additional comments received.
The Draft Report and EIS identifies overall project features, but acknowledges that aspects of the project, including some major components, have not been finalized. These details need to be worked out in order for an EIS to thoroughly assess environmental impacts. A process for reviewing and commenting on the components of the plan that are not yet finalized must be provided prior to finalization of the plan.	Corps is separating the Atlantic Ocean Shoreline decisions--that are ripe for decision making--from the Jamaica Bay Planning Reach decisions. As a stand-alone EIS, the Atlantic Ocean Shoreline decisions do not require additional planning studies or analyses. The Jamaica Bay Planning Reach will be included in the Corps' ongoing New York and New Jersey Harbor and Tributaries CSRM Study affording the Corps in order to "*...work out the details to thoroughly assess the environmental impacts...*"
A large component of this project is constructing additional or enhancing existing hardened structures along the shoreline, e.g., groins, which are known to alter sand transport and can actually increase erosion in areas, which would degrade and destroy existing beach habitat. A-NY would like to see agreements and financial commitments in place between USACE, the NY State government, and local sponsors to monitor any habitat loss as a result of this project and then respond and address issues relating to habitat loss, in particular beach and wetland loss.	Monitoring of changes in habitat will be discussed in the Jamaica Bay Planning Reach segment of the New York and New Jersey Harbor and Tributaries CSRM Study.

This project needs to include a more thorough assessment of managed retreat from the coast. Strategies such as voluntary buyouts, converting flood zone properties into natural areas that serve as buffers during future storm events, living shorelines, and preventing further development of flood zones should be considered. Managed retreat is the only strategy that will reduce direct impacts to communities and reduce long-term economic impacts from storm damage. Studies comparing managed retreat over armoring have found managed retreat to be a better option. For example, the City of Imperial Beach in California conducted a long-term assessment of managed retreat over armoring and concluded that by 2100 the City would spend nearly five times as much on continued maintenance and new armoring compared to managed retreat.	Managed retreat was eliminated as a comprehensive measure during plan formulation. However, NYC's "Build it Back" program offered buyouts/relocation to residents with high coastal storm risk and where these buyouts were voluntarily accepted, homes were removed from the floodplain.
We feel additional evaluation on the impacts to Saltmarsh Sparrows and their preferred “high” saltmarsh habitat need to be conducted in consultation with biologists who are experienced with this species and their habitat requirements in order to adequately assess impacts to this highly at-risk species.	Monitoring of changes in habitat will be reassessed and discussed in the Jamaica Bay Planning Reach segment of the New York and New Jersey Harbor and Tributaries CSRM Study.
The Draft Report and EIS state that the impacts of the Alternatives on erosion and deposition within Jamaica Bay and, therefore, on the wetlands within the Jamaica Bay ecosystem, have not been evaluated. Those are some of the most notable habitats within the project area and not understanding how the alternatives, including the preferred alternative, will impact erosion and deposition within Jamaica Bay is a significant flaw in the project. Also, listing “0” acres impacted in Table 7.4 for wetlands is misleading, because the potential of this project to alter erosion and deposition within the bay has not been evaluated.	Monitoring of changes in habitat will be reassessed and discussed in the Jamaica Bay Planning Reach segment of the New York and New Jersey Harbor and Tributaries CSRM Study.

The proposed mitigation does not appear to compensate for the loss of beach habitat, which is estimated to be 13 acres (Tables 6.4 and 7.4).	The EIS provided a conservative approach to quantifying the effects on habitat by assuming a 15-foot right-of-way (ROW) width on both sides of the entire alignment for permanent loss of habitat. The 13 acres of beach habitat reported as permanently lost are summed from the area of this ROW intersecting beach habitat across the entire alignment. From Beach 19th Street to Beach 126th Street, the alignment would be buried seawall and composite seawall for more than eight miles in length. The Buried Seawall would be overtopped with sand, resulting in no permanent loss of beach habitat. The Buried Seawall would be overtopped for a large portion of the structure with a thin ribbon of exposed structure immediately adjacent to the existing boardwalk or surface roadway. The USACE does not consider the loss of a total of 13 acres of beach habitat--in this configuration and position in the landscape--to be a significant loss of habitat and its loss does not require mitigation.
The Draft Report and EIS states that the project would benefit federal and state listed species like the Piping Plover because it will protect vegetated areas. Piping Plovers typically nest in un-vegetated areas.	Text revised.
We commend the USACE for working with the U.S. Fish and Wildlife Service on implementing Best Management Practices (BMPs) to reduce impacts to federally listed species, but even if BMPs are implemented (e.g., restricting construction to the nonbreeding season) there will still be impacts and, therefore, A-NY would like to see mitigation to offset impacts to Piping Plovers, Red Knots, Common and Least Terns, Saltmarsh Sparrows, and other at-risk species. Mitigation for those species needs to consider the specific needs of those species, not just the general habitat that they prefer.	As a result of consultation with the Service, compensatory mitigation is not required for the species listed. Benefits to these species from enhanced or improved habitat or the implementation of BMPs during implementation are identified in the EIS.

This is a massive project that is likely to have unforeseen impacts post-construction. As such, a comprehensive monitoring program must accompany it, and the funding and commitment necessary to implement the monitoring program and respond to information gathered via the monitoring program must be secured before any iteration of this project is approved.	The Monitoring Plan will be based upon the results of the ongoing coordination with resource agencies as part of complying with environmental laws for this project.
"… supports a balanced approach to storm recovery and coastal risk reduction that includes long-term strategies that benefit the region's communities and coastal ecosystems. Our primary interest in this project is on how it impacts at-risk species like the federally threatened Piping Plover and priority coastal habitats such as beaches and salt marshes, and we believe that these and other birds will be harmed severely by the proposed changes to these areas."	An updated Biological Assessment has been prepared for the Recommended Plan and is included in Appendix D: Environmental Compliance. Impacts to federally threatened Piping Plover are discussed in the BA and area being coordinated with the US FWS, who is preparing a Draft FWCAR. The FEIS will re-examine the habitat classifications that are predicted to have changes in their habitat.
The beach habitat on the southern coast of Long Island is one of the most significant stretches of habitat to numerous priority shorebirds, including the federally and state-listed Piping Plover, Red Knot, and Roseate Tern, as well as the stated-listed Common Tern and Least Tern, and the state species of special concern Black Skimmer. It is clear from our review of the Report that this project will reduce the availability of that habitat in New York. The Report overstates the threat that overwash and breaches contribute to storm risk and damage, and the project will prevent the creation of overwash habitat, which provides optimal habitat for Piping Plovers. The Report does not outline how the project will mitigate for that. Further, the Report states that the project would benefit federal and state listed species like the Piping Plover because it will protect vegetated areas, but Piping Plovers typically nest in areas without vegetation.	As a result of ongoing consultation with the USFWS, the Service will be providing a Fish and Wildlife Coordination Act Report and has provided comment to the Corps on the effects determinations for listed species. The FEIS will reflect the status of the consultation process as well as update the basis for the effects determination for each of the listed species.

ESA Compliance section of the EIS acknowledges that the prey base for Piping Plovers will be reduced due to destruction of the wrack line, and that additional beach habitat may result in increased predator populations and increased recreational use, reducing the population of Piping Plovers. The EIS dismisses the impact on the Common Tern, Least Tern, Roseate Tern, and Black Skimmer by stating essentially that what is good for the Piping Plover will be good for other birds. The EIS not only contradicts itself, but ignores the very different nesting habits of Piping Plovers, the various terns, and Black Skimmers. Overall, the EIS downplays the impacts to shorebirds and does not fully evaluate impacts to shorebird habitat. Although we commend USACE for working with USFWS on implementing Best Management Practices to reduce impacts to federally listed species, the BMPs do not provide sufficient mitigation.	The contradiction will be addressed in the revision. In addition, as a result of ongoing consultation with the USFWS, the Service will be providing a Fish and Wildlife Coordination Act Report and has provided comment to the Corps on the effects determinations for listed species. The FEIS will reflect the status of the consultation process as well as update the basis for the effects determination for each of the listed species.
In addition to beach habitat, the project area includes impressive areas of salt marsh habitat, which supports the at-risk Salt Marsh Sparrow. The Salt Marsh Sparrow is found across the Atlantic Coast, but only breeds on a thin sliver of coastline between Maine and Virginia. The Salt Marsh Sparrow is on many state watch lists and is considered "vulnerable" on the International Union for the Conservation of Nature's (IUCN) list of threatened species. Following our review of the Rockaway Report, we concluded that additional assessment on the impacts to Saltmarsh Sparrows and their preferred, “high” saltmarsh habitat need to be conducted in consultation with biologists who are experiences with this species and their habitat requirements. At present, the impacts on erosion and deposition within Jamaica Bay and, therefore, on the wetlands within the Jamaica Bay ecosystem, have not been evaluated. In particular, it should be considered that the preferred alternative reduces overwash, but overwash provides storm protection benefits by accumulating sand and contributing to barrier island development and marsh creation	The interrelationship between the accretion and erosion processes from changes to the overwash process in the Rockaway shoreline and the potential long-term changes in high saltmarsh and wetlands habitat will be re-examined in light of potential effects to salt marsh sparrow.

A large component of this project is constructing additional or enhancing existing hardened structures along the shoreline, such as groins, which are known to alter sand transport and can actually increase erosion in areas, which would degrade and destroy existing beach habitat. The Report does not indicate that agreements, monitoring mechanisms, and financial projections between the New York State government and local sponsors are in place to monitor and address the issue of potential beach loss as a result of the project.	For Civil Works project such as this, the long-term role of the non-federal sponsor is articulated in Section 8.1 Division of Plan Responsibilities and Cost Sharing Requirements. Therein, the ninth bullet states "*For so long as the project remains authorized, operate, maintain, repair, rehabilitate, and replace the project, or functional portions of the project, including any mitigation features, at no cost to the Federal Government, in a manner compatible with the project's authorized purposes and in accordance with applicable Federal and state laws and regulations and any specific directions prescribed by the Federal Government;" and "Hold and save the U.S. free from all damages arising from the construction, operation, maintenance, repair, rehabilitation, and replacement of the project and any betterments, except for damages due to the fault or negligence of the U.S. or its contractors."*
Managed retreat from the coast needs to be considered. Strategies such as voluntary buyouts, converting flood zone properties into natural areas that serve as buffers during future storm events, living shorelines, and preventing further development of flood zones should be evaluated. Managed retreat is the only strategy that will reduce direct impacts to communities and reduce long-term economic impacts from storm damage	Managed retreat was eliminated as a comprehensive measure during plan formulation.
Finally, we strongly believe that further study is needed to consider how the storm surge gate will alter flow, water quality and habitat for fish and other wildlife. The Draft Report itself acknowledges that specific aspects of the project have not been finalized and is therefore incomplete. The proposed mitigation does not compensate for the loss of beach habitat.	Comment acknowledged.

We believe that a broad-scale structural solution is only one component of a risk reduction strategy. Even after the surge barrier, seawall/dune, and wetlands are constructed there will still be flooding and property damage due to storm events larger than the design standard or the failure of the engineered solutions. Therefore, we urge the Corps to work closely with the City of New York to implement additional local solutions to reduce flood risk. These measures include strategies such as flood proofing, raising homes, and voluntary buy-outs.	Managed retreat was eliminated as a comprehensive measure during plan formulation.
We understand that according to the EIS, the Tentatively Selected Plan (TSP) must be "engineeringly feasible, economically justified, and environmentally acceptable." To that end we urge the Corps to use Nature and Nature-Based Features (NNBF) to the greatest extent possible to create ecosystem resilience and flood protection. We also urge the Corps to value the full suite of ecosystem services that will be lost or gained with the TSP, especially in the design of compensatory mitigation for the surge barrier.	During plan formulation, the Corps did "*use Nature and Nature-Based Features (NNBF) to the greatest extent possible to create ecosystem resilience and flood protection.*"
We understand that preliminary water quality modeling on the various surge barrier alignments has been conducted using the Jamaica Bay Eutrophication Model and will be repeated again after the final design is selected. However, we urge the Corps to assess a more comprehensive suite of models at this time because it is not possible to quantify and mitigate the impacts of the surge barrier without this work. There will likely be indirect, ecosystem-level effects that result from construction and operation of a surge barrier for large storm events (and for regular operation and maintenance). Dissolved oxygen, pH, nitrogen, and fecal indicator bacteria will be influenced by changes in normal tidal fluctuations, as predicted by the hydrodynamic modeling conducted to date, even when the gates are open. When the gates are closed in large storm events, heavy rainfall will cause Combined Sewer	The need for, and appropriate use of, additional water quality modeling to identify ecosystem-level effects will be included in the Jamaica Bay Planning Reach segment of the New York and New Jersey Harbor and Tributaries CSRM Study.

Overflow events and the surge barrier could cause water quality, based on the aforementioned metrics, to drop below critical biological thresholds, with fish, diamondback terrapins, and crustaceans trapped in the Bay by the barrier. Given these potential impacts of the surge barrier, we would like to advise that the Corps ensure that sufficient ecosystem service mitigation (beyond the acreage of footprint of the surge barrier) is considered in the TSP. The current mitigation proposed for Dead Horse Bay, Elders East, and Floyd Bennett t Field Wetlands are based on the number of acres impacted by the footprint of the proposed surge barrier (Tables 5-6 and 5-7). Mitigation should also occur to offset the loss of functions and services that the wall will cause to the water quality and connectivity of aquatic organisms when the gates are shut. Salt marshes, oyster reefs, and ribbed mussel beds will provide juvenile fish and crustacean habitat and denitrification ecosystem services to the bay, helping to offset the impacts of the surge barrier.	
Low-income and vulnerable communities such as East/Far Rockaway, Edgemere, Coney Island, Broad Channel, and Bay View/Canarsie stand to be disproportionately affected by flooding, storms, and sea-level rise. These communities deserve protection from the more frequent, low-intensity storms that affect the region and cause nuisance flooding, erosion, and limit safe outdoor access. We urge the Corps to consider using NNBF to create greater resilience for these communities that will enable them to recover from future storms. Wetlands, oyster reefs, and dunes can provide wave attenuation and flood control during the storm events when the surge barrier is not operational. These NNBF should include safe public access to the greatest extent possible (e.g., fishing piers, picnic areas).	Additional evaluation of the potential disproportionate effects to low-income and vulnerable communities based on the revised Recommended Plan was performed and included in the Revised Draft EIS.

Barrier islands are transient environments that change shape and size with incoming tidal wave action and the longshore transport of sediments. The construction of groins along the Atlantic Ocean Shorefront will affect these natural depositional processes and over time the system may become sediment deficient. The permanent seawall along the Rockaway Peninsula will require costly sand renourishment and maintenance over the 50-year life cycle of the project. In the future, we urge the Corps to consider the long-term benefits of raising homes or leveraging the buyouts that occurred in Oakwood Beach, Staten Island after Hurricane Sandy.	The benefits of non-structural solutions (e.g., raising homes or buyouts) were considered, but were not economically justifiable (i.e., they are too expensive).
We understand that the Corps uses Benefit Cost Ratios to select the TSP. However, these dollar-to-dollar ratios do not account for the full suite of ecosystem functions and services that the surge barrier will impact because ecosystem services cannot always be accurately monetized.	Comment acknowledged.
We recognize and compliment the Corps on the use of functional assessments (Evaluation for Planned Wetlands and Index of Biological Integrity) to determine the current ecological value of existing ecosystems. However, these analyses did not translate to a full accounting of ecosystem functions and services affected by the TSP (Table 5-6, 5-7). There will undoubtedly be indirect effects of the surge barrier and they extend beyond the footprint of the constructed features. We urge the Corps to use ecosystem service accounting methods, such as functional assessments, and complimentary tools, such as Habitat Equivalency Analysis, to evaluate the Alternatives and use this information to complement Benefit Cost Ratio. The Nature Conservancy demonstrated the use of functional assessments and Habitat Equivalency Analysis in our Urban Coastal Resilience Report: A Case Study in Howard Beach, Queens.3 We illustrate that hybrid infrastructure strategies integrating tidal gates, salt marshes, and shellfish can provide	The appropriate use of functional assessments to inform plan formulation and will be reassessed and discussed in the Jamaica Bay Planning Reach segment of the New York and New Jersey Harbor and Tributaries CSRM Study.

sufficient, cost-effective flood protection and superior ecosystem services to gray-only alternatives.	
The TSP presents two surge barrier alignments (C-1E and C-2). The EIS states that these alignments had a lower impact to the tidal amplitude than the other option(s) given the existing hydrodynamic modeling. Although impacts to water quality are still not well understood, we believe that alternative C-2 may be preferable to C-1E, due to its lesser impact to the properties of Gateway National Recreation Area. Construction of alternative C-1E would alter the visitor experience and change the character of Fort Tilden, Jacob Riis Park, and Floyd Bennett Field. In addition, given that open space and natural areas are limited in New York City, these NPS properties provide important bird nesting habitat that would be disrupted during construction. We also encourage the Corps to include the Coney Island tie-in as part of the final flood protection solution in order to ensure that the communities of Coney Island and Sheepshead Bay do not experience additional damages from flooding.	The barrier alignment selected and the Coney Island Tie-in will be reconsidered as the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study.
The Community Risk and Resiliency Act (CRRA) signed by Governor Cuomo in September 2014 requires that permittees and funding programs demonstrate consideration of sea-level rise projections, storm surge, and flooding. There are various references to sea-level rise projections in the EIS, including references to New York City sea level (Orton et al. 2014) as well as historic and accelerated sea-level rise rates consistent with	As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, the requirements of the Community Risk and Resiliency Act (CRRA) from 2014 will be reconsidered.

current USACE guidance (EC 1165-211) but it is unclear whether they have expressly incorporated the requirements of CRRA. "…the Corps use a future projection that is higher than the 10th percentile of the ClimAid sea-level rise models, or that map onto the "Medium" or "Medium-High" estimates articulated by CRRA"	
Our concern with the Plan is not that it seeks to protect humans and human infrastructure, but that it proposes to create structures that may or may not protect human settlements from storm events while at the same time causing damage and degradation to habitat important to bird species of state and federal conservation need (e.g. Piping Plover, Red Knot, Common Tern, Black Skimmer). There will undoubtedly be damage to ecosystem function of natural areas enjoyed by both wildlife and humans. How that damage is measured, valued, and mitigated? What is acceptable?	As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, the evaluation of the anticipated effects to listed species will be coordinated with the USFWS (federal protection) and the NYSDEC (NYS-listed species).
According to the report, the overall project features have been identified as a Tentatively Selected Plan (TSP). "Specific dimensions of the plan have not been finalized." It is difficult to assess environmental impact when the details of some of the major components have not been finalized.	Because the Jamaica Bay Planning Reach segment is being integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, the dimensions of the TSP for the Jamaica Bay Planning Reach will be refined and presented within the larger CSRM Study.
"…concern is about habitat protection, including maintaining or improving water quality in the Bay. Construction or enhancement of hardened shorelines, installation or enhancement of 18 groins, installation of a 6.6 mile sea wall, and installation of one or more surge barriers at the mouth of the Bay would alter the movement of sand, constrain the movement of saltmarsh, and impact water quality in the Bay by limiting tidal flow and flushing effects. • How will these variables be measured? What will be done to restore habitat function and water quality if they are negatively impacted?	As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, evaluation of the effects of the surge barrier on tidal processes (salt wedge, tidal amplitude, etc.) and water quality (e.g., residence time, DO, salinity, etc.) will be reconsidered as part of the CSRM Study. The long-term monitoring as well as adaptive management responses in the event that unacceptable effects are identified will be discussed in the CSRM Study.

*By providing incentives for people to not build close to the shoreline, buying property in the 100-year flood zone at fair market value and converting it to natural areas, and by installing living shorelines rather than armored structures, future severe storms will be buffered by the natural environment. This approach has been used in the UK with positive results, i.e. Northey Island in Essex (flooding in 1991) and Tollesbury and Orplands (flooding in 1995). Great Wigborough in the Blackwater Estuary is one of the largest managed retreat schemes in Europe. The program was started by the RSPB - The Royal Society for the Protection of Birds. They intentionally breached the original old sea wall to allow the held-back sea to flood through to create salt marshland. The marshland reverted to its original state and has become a great site for migratory and breeding birds. • Has the alternative of 'managed retreat' been thoroughly considered and taken into account?	NYC has engaged in an extensive buyout program which has purchased and removed a number of homes from the floodplain, called "Build it Back". In fact, the Jamaica Bay communities were all approached and offered buyouts that would be fully paid for by NYC. Where this has occurred, our plan returns to floodplain, as feasible, particularly in Edgemere. The Recommended Plan also includes natural and nature-based features, or living shorelines, in the several parts of the Mid-Rockaway design. Many of the communities and residents in this area have been there their whole lives or for generations and have strong ties to the area and no desire to leave.
*The NYC Department of Environmental Protection (NYCDEP) has described impacts to water quality of Jamaica Bay as having been plagued with high nitrogen levels from combined sewer overflow, increasing population, increasing human populations, disruption of tidal circulation patterns from landfill operations. The 2016 update on NYCDEP's Jamaica Bay Watershed Protection Plan describes how shoreline hardening, channelization, dredging, loss of sediment inputs from tributaries, and accumulation of particulates have affected historic flow patterns in the Bay, "eradicated natural habitat, impacted water quality, and modified the rich ecosystem that was present prior to the extensive urban development of the watershed." They further state "Yet great progress has been made, and studies show that water quality is recorded as the cleanest it's been in the past 100 years in the New York Harbor. • How will restricting the mouth of the Bay by installing storm	The sufficiency of the existing water quality modeling will be reconsidered as the Jamaica Bay Planning Reach planning is further refined and the effects analyses for that segment are integrated into the larger New York and New Jersey Harbor and Tributaries CSRM Study.

surge gates effect water quality? Even when the gates are open, the supporting structures will extend into the inlet. We support "…that the width of the opened gates, if gates are installed, needs to be as wide as possible. The Plan suggests that the preliminary data from modelling the gates would impact water quality (p. x). Additional models need to be run, to examine the benefits from storm surge protection versus the costs to water quality, water transfer, and aquatic animal movement."	
NYC lies within the Atlantic Flyway, a migratory route especially used by shorebirds and other waterbirds. Migratory stopover sites are as critical to sustaining the population of this species as are breeding sites and wintering grounds. As sea levels rise, stopover habitat will shrink, making those existing sites become even more important. (https://www.fws.gov/northeast/redknot/). When assessing mitigation opportunities, loss of stopover habitat must be considered in addition to loss of nesting habitat.	Comment acknowledged.
The list of State Threatened bird species needs to include Common Tern.	The common tern has been added to the list of NYS-listed birds.
The Plan states that the project would only minimally impact beach-nesting shorebirds when nests occasionally would over wash (p. 72). • Nest flooding is a major cause of early egg mortality and failed nesting in American Oystercatchers as well as in Saltmarsh Sparrows. This issue requires further evaluation by trained biologists.	As a result of ongoing consultation with the USFWS, the Service will be providing a Fish and Wildlife Coordination Act Report and has provided comment to the Corps on the effects determinations for listed species. The FEIS will reflect the status of the consultation process as well as update the basis for the effects determination for each of the listed species. If the USFWS requires compensatory

• A mitigation plan that will benefit bird populations impacted during migration or breeding needs to be described. • A monitoring plan for migratory and breeding birds needs to be in place, and the funds to support that work need to be identified	mitigation and a monitoring plan for listed species, such plans will be developed.
I propose a separate EIS to elucidate more clearly as to what the Coney Island tie-in will involve. My understanding is that the New York City EDC is currently conducting a study to evaluate Coney Island coastal storm risk management features. However, the draft EIS indicates that the structure of the tie-in will utilize components drawn from the tentatively scheduled plan (TSP). For this reason, USACE should conduct the study of the Coney Island tie-in.	Comment acknowledged.
I also believe that it is vastly important that the USACE takes a stand against development in unprotected shoreline communities that will result in a higher density population. In gathering information for this study, the USACE researched and examined the impacts that Sandy left upon the community. This situates your agency uniquely in a position to caution against increasing the number of residents that live directly in the path of a potential storm surge. I would greatly appreciate the USACE's insight and support in my efforts to severely restrict development along the waterfront until a proper plan for shoreline protection is put into place	Comment acknowledged.
The analysis of impacts to surfing and other types of recreation are inadequate in the document. The “Existing Conditions” section that starts on page 17 does not consider any human uses of the project area. Page 110 discusses “Recreation Benefits” but only mentions the economic implications of beach visits, nothing about impacts to recreational users. It is commonly known and widely agreed that after beach nourishment projects in the Rockaways the surfing is	Section 2.3 Environmental and Historic Resources will be updated to include a new section describing the existing conditions relative to recreation.

significantly negatively affected. How can the effects of the proposed project on recreational use be analyzed if there is not a baseline to compare with? Page 184 similarly does not cover negative impacts from beach nourishment, or the economic impacts of reduced surfer trips to the Rockaways because of negatively affected surfing conditions.	
"…cannot support adding additional hard structures into the surf zone or on the beach. Groins are a swimming hazard both for the risk of collision and also because they increase the power of the wave and will, by the Corps own estimates, only slow down but not prevent, loss of sand from Rockaway beach. …would also like to highlight that groins are not meant to function as storm protection barriers. Many Rockaway residents claim that groins will protect against future storm surges and impacts but this is not how they function. "… cannot support placing hardened structures such as the "composite seawall" on the beach. When waves hit a seawall, the wave is reflected back towards the ocean taking beach sand with it.4 Both the beach and the surf may disappear. If unexpectedly high erosion or lack of funding allows the composite seawall to be uncovered, the structure will lead to the disappearance of the public beach in The Rockaways.5 This will severely affect the economy and culture of the community "…groin project (in NJ) along their coastline has not performed as per the site's proposal projections. In fact, plans to remove or notch the groins were introduced to improve the situation. While we do not support additional hard structures in the ocean, we are curious why there is no mention of investigating methods to increase groin permeability such as nothing, shortening and reducing offshore crest elevation, all methods that have been shown to increase the longevity of beach fill. In one study, notching postponed renourishment for up to a year.	Comment acknowledged.

"…would like to see the agreements and financial projections between NY State government and local municipalities for the continued maintenance of this project. There is a serious financial responsibility for local governments attached to this project; we would like to be certain that this project is financially and legally sound.	Section 8.1 of the main report specifies the division of plan responsibilities and cost sharing requirements. Financial responsibilities of the non-Federal sponsor are discussed therein.
"…advocates that living shoreline structures be utilized in bays and other low energy areas where such practices would be possible, including Jamaica Bay. The Corps recently released Proposed Nationwide Permit B to streamline the process of implementing living shorelines.7 It would be remiss of the Corps to overlook such an important tool for erosion control…. These methods must be considered in order to protect the valuable habitat located in Jamaica Bay.	Comment acknowledged.
Surfrider is concerned that the sea level rise (SLR) estimates used by the USACE are overly conservative. The table on page 70 shows only 5.36 feet of SLR by 2100 (in a "high" scenario), while the New York Department of Environmental Conservation estimate is 6.25 feet.9 New models by scientists that include larger Antarctic ice melting scenarios estimate that sea levels could rise as much as 6 feet by 2100.10 Due to the conservative SLR estimates, we believe that the beach fill quantities required to maintain this project need to be reconsidered. The USACE must use the best available science in estimating SLR to ensure that the millions of dollars of funds put into the proposed project are not wasted on an inadequately built project. Using realistic SLR estimates may add costs to the proposed project but they will pay off in less damage in the future. Basing this project on such conservative SLR levels, calls into question whether the projected benefits and intended protection USACE is presenting with this project will be achievable when SLR proves itself to align with the above	The approach to quantifying the effect of estimated sea level change (SLC) on plan formulation is consistent with USACE policy.

predictions provided by the New York Department of Environmental Conservation.	
Beach nourishment can negatively affect beach and ocean ecosystems in many ways. Starting offshore, important habitat areas can be negatively affected by so called “borrow” sites if they do not fill back in with sand. One study estimated that it took three years for borrow areas to fully recover, meaning that these areas could be left in a permanently decimated state with new beach nourishments scheduled every four years. Other borrow sites have filled in with mud or silt and have become anoxic areas after sand mining for beach nourishment projects has occurred. Once the sand is on the beach negative effects can occur to the beach ecology. Studies have shown that the tiny animals that live in the surf zone, which form the base of the food chain in those areas, can be severely depleted for 6---24 months after nourishment activities. This document does not adequately discuss those impacts or examine their effects to other trophic levels including commercially and recreationally important fish species that might be affected.	The sufficiency of the analyses of effects to important fish species is being coordinated with the National Marine Fishery Service (NMFS).

The type of sand can also significantly affect the beach ecosystem and the enjoyment of beach goers. If incorrect grain sizes are used they can harm beach organisms that are accustomed to a specific size. Grain size and coarseness of the deposited sand can accelerate erosion leading to steep beaches, which can result in dangerous shore breaks for beach goers.15 Steeper beaches lead to greater wave energy and a propensity for a type of breaking wave known as a "plunging wave", which is not only dangerous for recreational users but also perpetuates the erosion problem. Steep beaches and plunging waves create stronger rip currents and feeder currents and there are numerous reports of beach nourishment projects aligning with a series of serious injuries to recreational users. Additionally, if poor sand with shells, dark or foul smelling material, or rocks is used, this can affect beach goer attendance, which could lead to severe economic consequences for beach communities. Rockaway locals reported that after the beach fills following Sandy, there was a bad smell associated with the sand that was brought in and they opted to stay away from the beach until this subsided from fear of getting sick. It was also visible to residents that the most recent beach fill projects in Rockaway did not last as long as initially planned. Much of the sand was washed away with the first big storm. Surfrider is concerned that more frequent nourishments than proposed will be required, leading to further environmental degradation and negative effects to recreational use.	Comment acknowledged.
As residents and frequent visitors to Rockaway, we are aware of the efforts that are required to ensure the protection of the piping plover and other endangered species such as the red knot and humpback whale. We are concerned that a project of this scale will negatively affect these species despite assurances by the USACE. The Corps proposes seasonal and temporal limits	Effects to listed species are coordinated with the National Marine Fisheries Service as well as the US Fish and Wildlife Service (i.e., the Services) and the effects determinations will be made in consultation with the Services. Feasibility of construction and maintenance have been demonstrated in the FS.

on construction and maintenance of the proposed project to negate impacts to mating seasons of endangered species. However, this seems unfeasible given the large geographic and temporal size of the project.	
"…requests that the Corps evaluate a sand moving system as part of the proposed project, perhaps in conjunction with the composite seawall structure. There is considerable sand accretion at Breezy Point and erosion along the Rockaways and East Rockaway Inlet. Sand moved between those two points through a permanent system could be cheaper, less environmentally damaging, and result in better sand quality than large beach fill projects every four years. A similar system was proposed and implemented for Sandy Hook, New Jersey, but was destroyed by super storm Sandy before it was finalized	Alternative methods of moving sand for beach nourishment were considered in the alternatives formulation process. Finalization of design parameters and construction methods will be addressed during the Planning, Engineering, and Design (PED) phase of the project.
Managed retreat can be more economical in the long run. For example, the City of Imperial Beach in California conducted a long---term assessment of focusing on managed retreat instead of armoring. The study concluded that by 2100 the City will spend nearly five times as much on continued maintenance and new armoring compared to managed retreat. The proposed Corps plan does not include a buyback or retrofit option. We realize that the large amount of private residents in the 100---year flood zone makes these types of adaptations economically difficult. However, it would be irresponsible to not allow residents the option of having local governments buy back their property to begin the process of depopulating these low lying areas. These areas can be converted to community green spaces or gardens for the immediate future. To use super storm Sandy appropriated federal funds to solely focus on coastal armoring is a misuse of taxpayer funds.	The benefits of non-structural solutions (e.g., managed retreat including raising homes or buyouts) were considered, but were not economically justifiable (i.e., they are too expensive).

"…concerned about future use of the proposed seagate and the effects on the Jamaica Bay environment. The proposal states that the gate would only be closed for extremely high sea levels during storm events. But once it is in place, what mechanism keeps it from being closed more frequently? We envision a situation where political pressure leads to the gate being closed a few times a month or more during high tides Surfrider requests that local communities sign legal documentation stating that the seagate only be used during extreme storm events and not routine tide cycles. Jamaica Bay is a very valuable wildlife and recreational area and closing the bay off to the usual tidal cycle would have serious negative effects to the ecosystem. Many aquatic species rely on the daily tidal flushing to achieve their reproduction cycles and food location. Tidal flushing is also critical for water quality and oxygen levels. "…against placing hardened structures like the seagate into our coastal ecosystem, but in this case we believe the impacts from the seagate will be less than the impacts from hardening a significant portion of Jamaica Bay.	As the Jamaica Bay Planning Reach segment is being integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, evaluation of the effects of the surge barrier on tidal processes (residence time, salt wedge, tidal amplitude, etc.) and water quality (e.g., nutrients, DO, salinity, etc.) will be reconsidered as part of the CSRM Study.
There is little doubt that the proposed Breezy Point Risk Mitigation project to be undertaken pursuant to FEMA's HMGP was designed by the City in partnership with the BPC community specifically for coastal protection around the BPC community. The first phase (the soft costs) of the project have been approved by FEMA. The estimate for the total project is about $58 million. How could it not be considered in its entirety (or portions to be integrated into the USACE project) as a viable, cost-effective alternative for "coastal storm risk management" ("CSRM") which is the stated purpose of the USACE's project? We have provided materials on this alternative approach with this comment letter. It must be studied along with the other alternatives proposed in order for the HSGRR and EIS to be considered complete. Failing to	The design, placement, and the extent of CSRM provided to Breezy Point by the Atlantic Ocean Shoreline will be refined during analyses to be conducted prior to the Final HSGRR/EIS. At that time, the status of the Hazard Mitigation Grant Program planning for Breezy Point will be considered.

consider the adequacy, environmental impacts and cost of the FEMA project is a significant omission under NEPA requirements on the part of the USACE.	
There are other alternatives that also should be identified and evaluated as part of the HSGRR and EIS. The BPC is looking into various alternatives to complement the FEMA project. For example, raising roads has been a successful flood protection measure. It is our understanding that the USACE is considering raising roads as part of its Fire Island to Montauk Point project. Several low lying, vulnerable communities along Great South Bay, Moriches Bay and Shinnecock Bay have local roads raised to protect the communities against high frequency flooding. BPC urges the USACE to look at the alternative of raising Rockaway Point Boulevard, along with other reasonable alternatives.	Road raising was considered as a non-structural risk reduction measure as shown in Table 5-10. It will be added to Table 5-1.
The biggest difference between C-1 E and C-2, and its adverse impact on the BPC community, is critical to understand. The USACE says that a surge barrier at C-2 will impose a "severe impact to water views" on the BPC community. Maybe that is true but there is no analysis of that statement contained in the HSGRR and EIS; no view shed modeling; no simulations; no Visual Resources Assessment as required for USACE environmental reviews. The BPC believes that impact on the view shed will be mitigated by moving the surge barrier past Beach 222nd Street. This modified C-2 location should be studied in the HSGRR and EIS. Additionally, there was a location alternative C-3 which was summarily screened out because of increased construction costs due to a greater in-water footprint. The diagrams included in Chapter 5 fail to show	As the Jamaica Bay Planning Reach segment is being integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, evaluation of the effects of the surge barrier on tidal processes (residence time, salt wedge, tidal amplitude, etc.) and water quality (e.g., nutrients, DO, salinity, etc.) will be reconsidered as part of the CSRM Study.

where C-3 was located. Without more information, neither the USACE nor the public can make a fair assessment of any of the alternative locations for the surge barrier. Moreover, as further discussed below, what comes with the USACE's choice of C- 1E will have even greater adverse impacts on the BPC community	
It is extremely difficult to understand what elements of the bayside alternatives in addition to the surge barrier were identified and evaluated. There is no discussion of such elements in Chapter 5, the alternative analysis. They appear to be listed as potentially selected structures in Table 6-1 without discussion. In fact, in Section 6. 1.1 in which the proposed selected alternative is described, the USACE states that "the extent of CSRM provided to Breezy Point by the [tentatively selected plan] will be refined during analyses to be conducted prior to the Final HSGRR/EIS." This very sentence renders the HSGRR and EIS inadequate. NEPA requires that the draft EIS sufficiently inform the public so that meaningful comments may be made. Under NEPA regulations at 40 C.F.R. § 1502.9, "[i]f a draft statement is so inadequate as to preclude meaningful analysis, the agency shall prepare and circulate a revised draft ....”	As the Jamaica Bay Planning Reach segment is being integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, evaluation of the effects of the surge barrier on tidal processes (residence time, salt wedge, tidal amplitude, etc.) and water quality (e.g., nutrients, DO, salinity, etc.) will be reconsidered as part of the CSRM Study.
At the public outreach and NEPA meeting held by USA CE on October 20, 2016, which many BPC residents attended, USACE indicated, in its presentation, that the choice of C-1 E by the USACE somehow led to the conclusion that a concrete flood wall should be built on the bayside along the entire length of the BPC community. Is this because of back flooding from the surge barrier located at Cl -E? There are significant, potentially, unavoidable community and individual impacts associated with the construction of such a wall, including a plan to "take" by eminent domain or otherwise acquire a significant amount of private property in order to build the wall. This wall is also shown on Figure 8 on page xii of the executive summary yet	The final detailed design selection for how Alternative C1-E has not been chosen. There are a number of designs under consideration, as depicted in Section 5.7, Figures 5-13 through 5-16, and Table 5-18. The effects on habitat from alignment construction of Alternative C-1E are listed in Section 6.1.3.1 Summary of Environmental Impacts and also in Section 7, Environmental Consequences. Specifically, construction of sea walls in the area of Breezy Point are addressed in Section 7.6.1 Impacts Common to Both Action Alternatives.

there is absolutely no discussion of its impacts in the HSGRR and EIS.	
Of great concern to the BPC community is the loss of the Bayfront from construction of the flood wall. The beach on the bayside is very narrow. The wall will run the entire length of the BPC Bayfront thus eliminating or severely restricting all recreational activity in and by the bay including swimming, boating, kayaking, walking, and other forms of exercise as well as picnicking, family gatherings and community events. Bayfront access is not a mere amenity to the BPC community but an integral component of the lives of its residents. In addition, this mammoth structure will seriously reduce the value of BPC homeowners' property, especially with respect to every home along the Bayfront. The USACE's proposed selected alternative will tear the fabric of the historically tight-knit and vibrant BPC community. Interestingly, the executive summary of the HSGRR at page xiv states that the proposed selected alternative includes a levee along the bayside "eastward from B222nd St. to B201st St.," not a wall, conflicting with what is presented on page xii. But even the levee will have significant impacts on the BPC community. In Appendix I to the HSGRR and EIS, the Environmental Impacts Support Document, Section 5.20.2(1) says the top of the levee will be so high that it will unavoidably obstruct views of the Atlantic Ocean, Breezy Point Tip and New York Harbor. Section 10 on Unavoidable Adverse Environmental Impacts simply lists as unavoidable "[c]hanges in land use from	Comment acknowledged.

existing use to the Proposed Action Alternatives." The proposed FEMA HMGP project or other projects that will avoid the impacts of a wall or a levee must be studied as potential alternatives. Would a wall or levee even be discussed if the surge barrier were to be located past Beach 222nd Street? Again, the lack of information and analysis in the HSGRR and EIS demonstrates unequivocally the severe inadequacy of the draft EIS.	
Appendix G of the HSGRR and EIS is the Public Access Plan prepared by the DEC which discusses beach access along Rockaway Beach from Beach 19th Street to Beach 149th Street. The plan says "the scope may extend west along the beach from Beach 149th Street to Beach 193rd Street and from Beach 193rd Street to the tip of the Rockaway Peninsula." There is no further discussion or analysis of potential community impacts associated with such a public access plan and there certainly was not any outreach to discuss the plan with the various communities affected. The potential impacts of any Public Access Plan must be considered under NEPA. NEPA regulations require that the EIS include a discussion of "historic and cultural resources, and the design of the built environment" and evaluate "aesthetic, historic, cultural, economic, social, or health [impacts], whether direct, indirect or cumulative." 40 C.F.R. §§ 1502.1 6(g) and	The potential impacts to aesthetics of a storm surge barrier will be further analyzed under the NYNJHAT study as this feature is no longer part of the Recommended Plan for Rockaway. Section 7.24 Aesthetics summarizes the effects to visual resources within the project area. The Revised Draft GRR/EIS analyzes aesthetic, historic, cultural, economic, social, etc. impacts, both direct, indirect, and cumulative. Area referenced in the comment will not be impacted by the current scope of the project. Breezey Point was included as part of the Jamaica Bay barrier plan, and will be fully re-examined as part of the New York New Jersey Harbor and Tributaries CSRM.

1508.8(b). Furthermore, as DEC is a State agency, it may not ignore the principles of the State Environmental Quality Review Act, N.Y. Envtl. Conserv. Law §§8-0101 et seq. ("SEQRA"). SEQRA requires that the DEC "act and choose alternatives which, consistent with social, economic and other essential considerations, to the maximum extent practicable, minimize or avoid adverse environmental effects." N.Y. Envtl. Conserv. Law §8-0109(1). The definition of "environment" in SEQRA is broad. It includes, "physical conditions which will be affected by a proposed action, including land, air, water, minerals, flora, fauna, noise, objects of historic or aesthetic significance, existing patterns of population concentration, distribution, or growth, and existing community or neighborhood character." N.Y. Envtl. Conserv. Law §8-0105(6). Judicial decisions have denied projects on the basis of adverse impact to community character as well as visual impact. See, e.g., Wal-Mart Stores v. Planning Board of the Town of North Elba, 238 A.D.2d 93 (3d Dept. 1998). Discussion of these important land use and community impacts is either woefully inadequate or non-existent in the HSGRR and EIS.	
… we believe that a FEMA certifiable project that maximizes and employs *enhanced and expanded wetlands*, *green infrastructure strategies* and "living *shoreline*" technologies for the fullest reach of interventions is possible and best for our community. If more drastic flood mitigation measures are required to protect our community and achieve FEMA certification, then the "Six Diamonds Alignment" or "Shoreline Perimeter" options from the NYCEDC study should be considered	Comment acknowledged.

Any flood protection measures should *provide secondary benefits to our community and the natural habitat*. We hope to see *ferry service become available to our community* to enhance connectivity with other boroughs such as Manhattan, and we do not want flood protection interventions to prevent this development. Other secondary benefits such as *increased access to the waterfront*, *walking and bike paths*, and *connectivity between the parks* are desired. Further, the use of *outdoor classrooms for environmental learning2* among community members and school groups has been an excellent and regular practice here. Interventions and adaptations to the open space areas surrounding the creek should consider this key community practice and help to improve and enhance this for our community.	Comment acknowledged.
While much of the NYCEDC Coney Island Creek Resiliency Study captures community values and concerns adequately, we need to restate we are opposed to either of the far western alignment interventions. After careful study, we believe that either the "Barrage" option, or the "Calvert Vaux Alignment" option, would have drastic harmful effects on tidal flow and water quality in Coney Island Creek. It is perhaps because of continued and steady community opposition to these options that other measures were studied and included in this study. We remain highly opposed to either option.	As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, the issues associated with the Coney Island Creek Resiliency Study will be reconsidered.

Water Quality: We do not believe that there was enough attention paid to water quality issues as the NYCEDC study was conducted. That study was conducted for 2 years and then released quietly on August 18th, 2016. Community members were told that water quality testing was conducted throughout the study and helped inform flood mitigation options that were being presented to the community. However, only several weeks later, our members, through ongoing participation in a volunteer water quality testing at the creek, found out that the DEP discovered massive sewage dumping into Coney Island Creek on September 7th. 2016. The illegal and illicit discharges have been ongoing and seemingly unreported, despite the DEP's own data going back to 2014, which shows Coney Island Creek as having the highest counts of fecal coliform in any New York City body of water. How this ongoing sewage problem went undetected and unreported during the entirety of the NYCEDC study is a big question and concern for us. Further, in the Key Findings section of the report, #4 reads: An in-water barrier with a wide opening does not negatively impact tidal circulation or water quality in the Creek. Again, we challenge the assumptions this statement was made upon if the massive sewage discharges were missed during the entirety of this study.	As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, evaluation of the effects of the surge barrier on tidal processes (salt wedge, tidal amplitude, etc.) and water quality (e.g., residence time, DO, salinity, etc.) will be reconsidered as part of the CSRM Study.
How will the NYCEDC Coney Island Creek Resiliency Study be incorporated into the Army Corps study? Our members were highly active in the NYCEDC study and community engagement process. When we participated in the Army Corps presentations about the Jamaica Bay reformulation plan in October and November of 2016, there were no details or slides available about the Coney Island Tie-In. We respectfully *request that you take further time and consideration with this aspect of the Coney Island Tie-In project*, and engage our community further for input and reactions as you develop this piece further.	The barrier alignment selected and the Coney Island Tie-in will be reconsidered as the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study.

The plan describes the construction of groins and other beach stabilization structures and describes the effect on topography of these hard structures in a sand---dominated environment as minor (Section 7.1.12). These structures will have a significant unaddressed effect in halting the natural topographic forcing factors of wave--- deposited sediments and wind---induced dune formation, thereby significantly altering the patterns of sand deposition and erosion.	Comment acknowledged.
The stabilizing influences of groins, seawalls and floodgates are described as positive influences "that retain and capture littoral materials native to the beach communities and/or limit the effects of wave and storm surge erosion" (Section 7.1.1.3). However, it is well known that the effects of groins, for example, are to accumulate sediment on the up current side of the structure and to starve the down current side of sediment, creating a characteristic "cupping" structure to the beach that must be periodically remediated. Arguably letting nature distribute sediment naturally is a more adaptive way to maintain the ecological integrity of the beach and the natural processes of soil formation...It is recommended that additional study be conducted on the appropriate length, height and number of groins to minimize impacts on sediment movement.	The USACE acknowledges the concern. As stated in the Executive Summary, "*Final design and selection of the...alignment and associated tie-ins are deferred until additional analyses and design refinements can be conducted. Final...design will be made in the future based on responses from public, policy, and technical reviews of this Draft HSGRR/EIS and additional investigations conducted for that purpose".*
Beach nourishment attempts to address shoreline displacement by adding sediment to balance the sediment budget. That involves finding and transporting suitable (i.e. clean) sediment that is compatible with wave energy around the site. Because the beach/dune profile will be displaced as relative sea level rises there will be a need for greater volumes of material per unit time to maintain the beach/system in place. And, as the rate of sea---level rise increases, the need for additional sediment to maintain shoreline position will increase. Sediment will need to be secured and deposited continually so as to maintain the sediment budget balance to maintain the current shoreline. Cost is a factor in sediment	Section 5.2.1.1 Life-Cycle Cost Optimization: Beach Fill compares costs to select the feature that "...had the lowest annualized costs over the 50-year project life and the lowest renourishment costs over the project life." The evaluation did consider the effects of SLC consistent with USACE policy.

procurement because, as the more accessible material is consumed, cost per unit will increase. The plan should address more explicitly the expense and energy required to replace natural cycles of sediment movement with artificial ones.	
if beach nourishment will happen on the Rockaway beaches as part of the plan, an analysis should be given of the environmental impacts of removing sediment from elsewhere. Stipulations should be included and incorporated into the cost estimates that the sediments should not be polluted or toxic.	Information regarding the chemical characteristics of borrow materials that could be used will be added to both the Environmental and Historic Resources (Hazardous, Toxic, and Radioactive Waste (HTRW)) and the Environmental Consequences Sections (7.20 Hazardous, Toxic, and Radioactive Waste) of the report.
Exacerbating sediment starvation As the plan acknowledges (section 7.2.1.2) the bay may be sediment "starved." That is, insufficient sediments may be reaching tidal wetlands and other ecosystems already, because of anthropogenic changes to the system including beach stabilization structures and jetties, bulkheading, dredging of navigation channels and for borrow pits, and the long entrance and counter---current orientation of the Rockaway Inlet. It is possible that the tidal floodgates will exacerbate these effects by reducing sediment carried with storm surge. It is critical that these effects be better understood before deciding to implement the plan.	As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, evaluation of the effects of the surge barrier on sediment transport will be reconsidered as part of the CSRM Study.
Engineering of the barrier given the loose sediments of the two tie-in points The plan should address how the tidal floodgates will be engineered given that Floyd Bennett t Field is composed of land fill over tidal salt marshes (Black 1981) and the Rockaway Peninsula is a sandy barrier island (Sanderson 2016; Psuty 2010). The depth to bedrock in this part of the city is over 1000 feet. Both of these sediment types are subject to erosion on the edges that might influence the overall sustainability of the	As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, design of and the need for the Storm Surge Barrier alignment and associated tie-ins would be reconsidered as part of the CSRM Study.

project given storm surge and severe storms in the future. Specifically, since there is no bedrock to tie into, how will the gates be made secure against extreme forces associated with tides and storm surge?	
The plan does not address the natural disturbance and successional patterns associated with extreme flood events on aquatic and terrestrial environments. Disturbance events, which reduce ecological structure and/or biomass, and the successional sequences that follow disturbances are essential characteristic features of coastal ecosystems. These ecosystems have assembled through processes of tidal flooding and storm surge, which this plan seeks to alter. For example, as sea levels rise, extreme flooding events inundate coastal upland systems with salt water, killing sensitive plant life, and creating the opportunities for landward migration of salt marsh ecosystems. Storm surges also serve to redistribute and in some cases remove wrack and garbage from tidal marsh ecosystems, unleashing the ability of tidal marshes to recover from burial. At the same time storm surges can bring in fine and coarse sediments that otherwise would be unavailable to salt marshes. These sediments may be of particular importance in Jamaica Bay because, as described above, the system may be sediment starved. The plan will have dramatic effects on the oceanographic distribution and delivery of marine---derived sediments to near---shore and upland environments during storm surges. Section 7.1.1.2 makes reference to how seaward structures protect upland soils however the soils of the Rockaway Peninsula are derived from marine materials. On the margins of Jamaica Bay, the historic soil type (absent anthropogenic landfill) were peaty	As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, evaluation of the effects of the surge barrier on sediment transport, deposition, and the associated ecological succession in the transitional areas between aquatic and terrestrial environments will be reconsidered as part of the CSRM Study.

substrates supporting tidal marshes. These ecosystems and the soils beneath them benefit from periodic infusions of marine sediments to maintain their height in the tidal range. For the interior of Jamaica Bay, the removal of the highest tides associated with storm surge will also remove the sediment depositing effects of those storm surges, and therefore potentially interfere with the long---term natural formation processes creating tidal marsh ecosystems.	

The plan does not design for protection under scenarios of accelerated sea level rise, nor does it address the cumulative effects of development on the Rockaway Peninsula and around Jamaica Bay that have been facilitated by coastal protection measures like this one. One of the biggest uncertainties in the US coastal zone is how economic development patterns will respond to the increasing risk caused by sea level rise and coastal flooding. In other coastal urban areas, flood protection has led to a false perception of lowered risk, increasing pressure for economic development even as the rate and magnitude of projected sea level rise and coastal flooding hazards have increased (Smits et al 2006). The current expected design life of the project is ~50 years, precisely when a vast majority of the projections of sea level rise show a pronounced departure – specifically a potential acceleration – from the observed rate of sea level rise over 1993 to the present. The current choice of an intermediate sea level rise scenario amounts to tolerating the additional risk of potentially 1 – 2 feet of sea level rise by mid---century, resulting in a design elevation of approximately 18 – 19 feet. A risk---averse approach would suggest basing the design elevation on 90th percentile sea level rise projections instead of 50th percentile sea level rise projections to accommodate future risk. The expected increase in flood risk beyond the 50---year time horizon warrants consideration of how the structure can be gradually adapted or phased out in favor of more flexible pathways that support resilience in Jamaica Bay, as recognized by the New York City Panel on Climate Change and the Mayor's office (NPCC 2010, Chapter 1). Historically, development in the study area led to ecosystem degradation and habitat loss in aquatic and terrestrial environments (Black 1981; Waldman 2008; Sanderson et al.	As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, evaluation of the effects of a surge barrier on tidal processes (salt wedge, tidal amplitude, etc.) and water quality (e.g., residence time, DO, salinity, etc.) will be reconsidered as part of the CSRM Study.

2016). The environmental impacts addressed in the plan only address the direct effects of this plan and do not provide appropriate context for the cumulative effects of this plan on top of all of the previous impacts on aquatic and terrestrial environments (Cocklin et al. 1992; Lindenmayer and Laurance 2012).	
As design development is furthered for the residual risk shoreline components, further consideration should be given to alternative shoreline design strategies that include a combination of green (natural and nature---based features) and grey strategies and are responsive to local environmental conditions. In the TSP, the residual risk features are primarily grey (bulkheads, crown, I and T walls, and revetments) in areas where softer shoreline design would be preferable, given the importance of Jamaica Bay as a Special Natural Waterfront Area and the negative historical impacts of hardened shorelines on the ecology of the bay. The plan notes that increased hard structures will increase attachment areas for organisms that prefer hard substrates like rockweed and barnacles. It should be noted however that historically Jamaica Bay had very little	As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, evaluation of the effects--including cumulative effects will be reconsidered as part of the CSRM Study.

hard geological substrate. In effect increasing hard substrate in Jamaica Bay is introducing a novel ecosystem type on a large scale to the environment. These new environments should be considered in the context of the cumulative effects of seawalls and bulkheads and other forms of anthropogenic hard surfaces already in the bay.	
One of the stated study objectives (p. iv) is to "improve community resiliency." As the project advances into design development, outreach should be used as an opportunity to engage communities in resilience discussions more broadly about the environment, climate change and community resilience. Extensive outreach conducted equitably through the region and using a range of engagement strategies (in person, digital, traditional media) would give a more comprehensive understanding of community concerns to be prioritized and addressed. Discussions with affected communities about the design and construction implications of the plan, the risk reduction implications, and the flood insurance implications should be prioritized. Additionally, any outreach should consider the demographic characteristics of the neighborhood (such as language access, accessibility for elderly and disabled, etc.) to ensure broad community participation.	As stated in Section 9.1 Public Involvement Activities, "Following public release of the document, additional public meetings will provide more detailed analysis of the alternative plans, feature plans, and identification of impacts." Recommended approach to community engagement will be taken into consideration in planning and conducting further public involvement.

A major issue for the plan is how the configuration of the tidal gates and the length of their closure during a storm will affect water quality in Jamaica Bay. Four sewage treatment plants currently deliver on average 26,000 lbs. of nitrogen per day to Jamaica Bay, orders of magnitude above levels in 1900 (Misut and Voss 2007). The only way for this nitrogen to leave Jamaica Bay is through natural processes of denitrification or through export via the Rockaway Inlet to the open ocean. The high levels of nitrogen have been implicated in algal blooms, anoxic conditions, and fish die---offs in the past. On---going scientific work suggests that marsh chemistry is strong influenced by the high nitrogen loadings. The New York City Department of Environmental Protection has worked to reduce nitrogen loadings, but some of that work may be reversed depending on how the storm gates are operated. The plan should address not only the length of closure of the tidal gates to address storm surge, but also the potential for more frequent closures. Several communities around Jamaica Bay, notably parts of Howard Beach, Broad Channel and Edgemere, are likely to be flooded on monthly high tides in the future because of sea level rise. As these monthly tides begin to impinge, even more regularly than they do today, on buildings and other infrastructure, there may be pressure to close the gates more often, as a flood prevention strategy. The plan should address the full range of potential operations strategies, in the context of sea level rise scenarios, and their effects on water quality. Water quality studies should consider both nitrogen reduction strategies as well as climate---induced changes in stratification patterns that can affect the development of hypoxia as well as alter biogeochemical fluxes. These affects may be larger than any affect the project might have on water quality via changes in residence time.	The storm surge barrier will be further studied and potentially implemented under the NYNJHAT study. However, to address some of your comments, the JEM model was run to assess a potential range of impacts to water quality. The JEM is comprised of a coupled hydrodynamic model and a water quality model, which is capable of simulating eutrophication (nutrients, phytoplankton biomass and dissolved oxygen) and pathogenic bacteria. The original JEM model has undergone several revisions in recent years to improve its spatial resolution and to add functionality that allowed them to expand the capabilities of the water quality to model to forecast the impacts to the how additional biological communities that utilize nutrients in the Bay, including macroalgae (Ulva) and benthic algae. Also available for use with the JEM modeling system is a watershed or sewershed model, which relates rainfall that falls over the upland drainage basin to determine the pollutant loadings of nutrients and pathogens delivered to the Bay via combined sewer overflows (CSOs), separate sewer overflows (SWOs) and direct runoff to the Bay. The Recommended Plan acknowledges the frequent flooding that occurs in parts of Jamaica Bay and has evaluated and recommended some High Frequency Flooding Risk Reduction Features to address this frequent flooding, where feasible and justified. This would limit the closure frequency of a potential storm surge barrier as well as any associated impacts related to more frequent closure. The alternatives are indeed considered in the context of varying potential sea level rise conditions. Now that the storm surge barrier will be studied under a different study potential impacts to marshes based on any changes to tidal range would need to be assessed in that study. As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and

Further study and consideration should be given to gate configuration impacts on the movement of fish and plankton into and out of the bay during extreme storm events and the influence of those movements on fish populations. Also, section 5.2.2.1 states “Both alignments C---1E and C---2 result in a maximum tidal amplitude change of 0.2 feet, which occurs only during the highest tides of a tidal cycle.” What might the impact of the change in tidal range have on marsh loss?	Tributaries CSRM Study, evaluation of the surge barrier construction and operation on tidal processes (salt wedge, tidal amplitude, etc.) and water quality (e.g., residence time, DO, salinity, etc.) will be reconsidered as part of the CSRM Study.

Hydrodynamic models have shown that flooding will increase outside the barrier over a large region (Orton et al. 2016). Preliminary results suggest a 1.0---1.5 inch increase in the 100---year flood through the rest of NY/NJ Harbor, which is a small increase but non---negligible. The Corps should quantify this and the increased damages in their benefit---cost analysis. Also, reflection of floods will raise flood heights by 6---10 inches just outside the barrier (Manhattan Beach, Roxbury, Sheepshead Bay). If the level of protection isn't higher for those areas then those neighborhoods are at greater risk of catastrophic flooding of the type that occurred in New Orleans during Katrina – abrupt overtopping of levees into small volumes of space with a large population. This is a very serious problem if not addressed.	As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, the analyses of flood risk reduction and will be reconsidered as part of the CSRM Study.
...we request the Army Corps to approve a 90-day extension to the draft Environmental Impact Statement's original 60-day open comment period... The Environmental Impact Statement's absence of accurate scientific analysis both renders it insufficient for a Draft EIS and forecloses the public's ability to properly and fully analyze its true environmental impacts. The public must not be limited to commenting on a plan's merely hypothetical and speculative affects. Based upon these and other deficiencies, we request that the Army Corps, at the very least, provide the public with a greater extension to the draft Environmental Impact Statement comment period. A seventy-five day public comment period does not provide the public with enough time to develop and submit helpful comments. See 33 C.F.R. § 230.19(a).	The public comment period was extended to 2 December 2016, as opposed to the 45 day period required by NEPA.

Potential environmental issue: the Corps' use of outdated water quality geometric means for Fecal Coliform and Enterococci;	In order to assess the potential impact of a barrier closure on water quality within the Bay, a modeling study was conducted using the Jamaica Bay Eutrophication Modeling system, known as JEM. JEM is comprised of a coupled hydrodynamic model and a water quality model, which is capable of simulating eutrophication (nutrients, phytoplankton biomass and dissolved oxygen) and pathogenic bacteria. The original JEM model has undergone several revisions in recent years to improve its spatial resolution and to add functionality that allowed them to expand the capabilities of the water quality to model to forecast the impacts to the how additional biological communities that utilize nutrients in the Bay, including macroalgae (Ulva) and benthic algae. Also available for use with the JEM modeling system is a watershed or sewershed model, which relates rainfall that falls over the upland drainage basin to determine the pollutant loadings of nutrients and pathogens delivered to the Bay via combined sewer overflows (CSOs), separate sewer overflows (SWOs) and direct runoff to the Bay. As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, evaluation of the surge barrier construction and operation on water quality will be reconsidered as part of the CSRM Study.
Potential environmental issue: the determination that only 240-340 million gallons of treated sewage will be discharged into Jamaica Bay per day (from WWTPs) without accounting for additional sources of discharges (e.g., CS Os, MS4s, illegal and illicit discharges, 12 and direct discharges)	All available data was used for the water quality modeling, including CSO data. As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, evaluation of the surge barrier construction and operation on water quality will be reconsidered as part of the CSRM Study.

Potential environmental issue: unfounded determination that the project will not adversely affect marine mammals and sea turtles	Effects to listed species are coordinated with the National Marine Fisheries Service as well as the US Fish and Wildlife Service (i.e., the Services) and the effects determinations will be made in consultation with the Services. Please see the Revised GRR/EIS and Environmental Compliance Appendix D for detailed impact assessments of the Recommended Plan, which no longer includes the proposed storm surge barrier.
Potential environmental issue: complete failure to consider whether the Storm Barrier will exacerbate the Bay's already existent chlorine and heavy metal pollution, its nutrient load problems and inability to maintain Dissolved Oxygen levels at the water quality criteria threshold for fish survival	As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, evaluation of the surge barrier construction and operation on tidal processes and water quality (e.g., residence time, DO, salinity, etc.) will be reconsidered as part of the CSRM Study.
Potential environmental issue: whether the barrier will further restrict the flow of sediment into and out of the Bay, potentially creating new, or compound existing water quality problems (e.g., affecting the sediment's legacy contamination bioaccumulation).	As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, evaluation of the surge barrier construction and operation on tidal processes, including sediment processes, will be reconsidered as part of the CSRM Study.
...the draft document does not even include a determination of exactly how the proposed gate will be constructed, admitting that additional modeling and analysis is required "to identify, quantify and conclusively address any possible impacts to water quality and fish and wildlife species and their habitats in the Bay."	As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, evaluation of the surge barrier construction and operation on tidal processes (salt wedge, tidal amplitude, etc.) and water quality (e.g., residence time, DO, salinity, etc.) will be reconsidered as part of the CSRM Study.
The funding for this massive multi-billion dollar project is not yet in place and a timeline for funding is indefinite. The draft Environmental Impact Statement may be intended to secure such funding, with the actual project not commencing until some uncertain future date. Thus, absent a true planned action, an analysis of the environmental impacts is entirely premature as it cannot possibly contemplate what conditions will exist when the project is actually constructed.	Comment acknowledged.

The scale and scope of such a project necessitates public input and we feel that the current November 17, 2016 deadline for commentary does not provide enough time for adequate review by civic groups, community stakeholders and residents. We are requesting that the deadline be extended to no earlier than December 31, 2016 so that our constituents can voice their support or concern for a project that will permanently change our communities.	A series of public scoping meetings were held in the study area after the Alternatives Milestone meeting, but prior to the TSP Milestone Meeting. The meeting format included a presentation of the study purpose, alternatives considered and analyses of performance and cost of alternative plans. Posters highlighting pertinent analyses and findings of the study were available before and after the presentation to allow the attendees to circulate from area to area and pose questions and express concerns to technical staff.
Will project affect entrance to beach area?	A public access plan is part of the documentation package (originally published as Appendix G. Please refer to the public access plan.
Would the project block the ocean view?	A public access plan is part of the documentation package (originally published as Appendix G. Please refer to the public access plan.
Would it block the ocean breeze?	A public access plan is part of the documentation package (originally published as Appendix G. Please refer to the public access plan.
How will this affect real estate prices for lower floor apartments	Analyses of changes in real estate values is beyond the scope of the study.
Damage sustained during Sandy to our building was caused by winds but not water	Comment Noted.

Draft EIS provides no details about specific plans for Coney Island tie-in. Requesting a separate EIS for the Coney Island tie-in similar to what has been done for the Rockaway peninsula	The barrier alignment selected and the Coney Island Tie-in will be reconsidered as the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study.
Will a shorefront walkway be created above any levees or seawalls planned for this area (Manhattan Beach Esplanade, from Corbin Place to Ocean Avenue, Brooklyn)	As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, public access will be reexamined as part of the CSRM Study.
The use of natural flood barriers such as vegetated dunes and mud flats should be used wherever feasible.	Comment acknowledged. Vegetated dunes and wetland NNBFs are included in the Recommended Plan where feasible.
Changes to depth of the Sheepshead Bay Inlet should be evaluated before flood control measures are implemented	Comment acknowledged.
Interim flood protection measures should be included in the EIS. At the very minimum, vegetated dunes should be provided as interim measures for the beaches of southern Brooklyn (Manhattan Beach, Brighton Beach, Coney Island)…	Federal action can only be taken where there is existing or special authority and must follow the USACE policies and guidelines. An interim FCCE project, including a vegetated dune was built along the Atlantic Shorefront since the USACE had an existing project there, it had authority to do so. The other areas in Southern Brooklyn mentioned would need authority in order to construct CSRM measures. This authority would be granted with an approved Chief's Report which is the conclusion of a Feasibility Study.

...it appears that all of the modeling is based on a "fact" about Jamaica Bay that was proven to be incorrect: That water moves so slowly in Jamaica Bay that residence time has increased to an average of 33 days (Section 2, "Existing Conditions", page 17). In fact, water moves much, much faster through Jamaica Bay and it "flushes" roughly every 7 days. The "flushing time" of Jamaica Bay was a very contentious issue that was hotly debated at numerous meetings attended by representatives of the Army Corps, NYCDEP and the New York State Department of Environmental Conservation (NYSDEC). Therefore it is astonishing that the consultants for this project were unaware of this discrepancy. ... the modeling for the Jamaica Bay portion of the DEIS was based upon in-formation that is outdated and inaccurate and may therefore result in significant adverse impacts. This is a very serious matter that needs to be remedied. A full environmental assessment based on accurate data under the National Environmental Policy Act (NEPA) is absolutely required.	As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, the hydrodynamics of Jamaica Bay and the potential environmental consequences of risk reduction construction and operation will be reexamined as part of the CSRM Study.
The EIS mentions the numerous benefits of oyster reefs, but to date, despite substantially improved water quality and sizable efforts, reefs have not been established. Suitable substrate was provided and studies have shown that oysters will grow, thrive and even reproduce, but they are unable to establish reefs. Perhaps the spat does not settle out because tidal flow is so swift in Jamaica Bay that the spat is carried out through Rockaway Inlet. The hydraulics of Jamaica Bay were investigated in the JABERRT and need to be looked at.	As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, the hydrodynamics of Jamaica Bay and the potential environmental consequences of risk reduction construction and operation will be reexamined as part of the CSRM Study.
The Preferred Alternative includes construction of a storm surge barrier across Rockaway Inlet near Floyd Bennett Field. However tidal flow in this area is already very swift. Any construction will narrow it even further, increasing the velocity	As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, the hydrodynamics of Jamaica Bay and the potential environmental consequences of risk reduction

of water flow. This requires a thorough investigation to avoid adverse impacts.	measure construction and operation will be reexamined as part of the CSRM Study.
EIS mentions HTRW in vicinity of Floyd Bennett Field - should be investigated and remediated.	Comment acknowledged.
The US Army Corp of Engineers beach erosion and hurricane protection initiatives, and the continuous identification of Jamaica Bay as a potential site for disposal of contaminated dredged spoils into subaqueous borrow pits, have continued to use "a tidal flushing time for waters of Jamaica Bay taking 30 days for flushing channels and inlets along the periphery of the Bay". This tidal prism has been shown to be exaggerated, disproven and from a purely engineering perspective, wrong. (See attached JABERRT Research Publication) Marsh loss has been shown to be, in the majority, caused by the significant hydraulic draw and tidal flushing exchange of the Bay with Atlantic Ocean waters rapidly flowing through the Rockaway Inlet on every tidal cycle. This tidal cycle is at such a velocity, fine sediment accumulations establishing *Spartina alterniflora* marshes, cannot and have not, been able to accumulate thus contributing to the marsh losses to the interior islands of Jamaica Bay. This steep flushing cycle of Jamaica Bay waters does not allow fine particles to adhere to existing fringe marsh islands thus preventing sediments contributing to S. alternaflora germination and growth.	Comment acknowledged.

In response to several GIS investigations conducted on marsh boundary photos reviewed by NYSDEC in the mid 1990's, and an estimate established at 60 acres of marsh loss on average annually, a Blue Ribbon Panel to explore causes of marsh loss to Jamaica Bay, was established inl998 with world renowned ecologists, natural resource scientists, and coastal geomorphologists. This Blue Ribbon Panel Rep01t on Jamaica Bay, prompted the 2 year study of Jamaica Bay entitled, "The JABERRT Report", completed by the NPS for the Corps of Engineers in 2001. (copy of literature published recently on these results) The full 3 -volume JABERRT Report for Jamaica Bay has been ignored.	This report was consulted and information from it was incorporated into the water quality modeling and other analysis that was performed (see citations for the JEM write-up) in future publications of information on the Rockaway Inlet storm surge barrier. As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, the hydrodynamics of Jamaica Bay and the potential environmental consequences of risk reduction measure construction and operation will be reexamined as part of the CSRM Study.
The entire Jamaica Bay Project Proposal, part of the entire East Rockaway Inlet to Rockaway Inlet Storm Protection Management Plan is ill conceived, misinformed as to significant environmental impacts to the natural resource of the Jamaica Bay ecosystem, fails to consider and include considerable research pertinent to this proposed action, and is intolerably expensive. This proposed action, in any of its alternative forms, should be totally abandoned.	Comment noted. As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, the hydrodynamics of Jamaica Bay and the potential environmental consequences of risk reduction construction and operation will be reexamined as part of the CSRM Study.
NYCEDC Study assumptions are incorrect - flooding came from both ocean and creek but study assumes flooding is solely from creek. Focus of the study appears to be on amenities associated with floodgate/pedestrian bridge across creek rather than flood control	NYCEDC Study not within the scope of this EIS.
1) An aniline dye factory, (the Brooklyn Yarn Dye Co.) that operated on the southern shoreline of the Creek (Neptune Ave. between West 22nd & West 23rd) until the 1970's. Neighborhood residents remember seeing the water of the Creek colored with various dyes. The site is very close to the location for the proposed flood gate and the impacts from the dye factory were never remediated.	Comment acknowledged. As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, the history of contaminants within the footprint of construction for alternatives for the Jamaica Bay Planning Reach will be reexamined as part of the CSRM Study.

2) Coney Island Creek and Sheepshead Bay may still be partially connected by an old culvert. In the early twentieth century, filling of the tidal inlet between the Creek and the Bay began and a culvert was constructed to maintain a connection between them.	Comment acknowledged.
3) There is a long history of illegal dumping into the Creek. There are overturned, sunken cars, supermarket shopping carts, tires and other debris in the water at the eastern end of the Creek. Some of the cars have been in there for decades, and occasionally, bubbles of oil still rise from them.	Comment acknowledged. As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, the history of contaminants within the footprint of construction for alternatives for the Jamaica Bay Planning Reach will be reexamined as part of the CSRM Study.
4) The land portion of an old manufactured gas plant (MGP) and a small section of the Creek's adjacent shoreline was remediated. But there was no remediation of the contamination from the MGP that spread to other areas of the Creek.	As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, the history of contaminants within the footprint of construction for alternatives for the Jamaica Bay Planning Reach will be reexamined as part of the CSRM Study.
5) Several businesses that dismantled ships and barges were located along the Creek in the early to mid-twentieth century. The impacts from these activities have never been addressed.	As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, the history of contaminants within the footprint of construction for alternatives for the Jamaica Bay Planning Reach will be reexamined as part of the CSRM Study.
6) The NYCEDC study notes "There are approximately 50 permitted and unpermitted discharge pipes and outfalls throughout the Creek." The New York City Department of Environmental Protection (NYCDEP) has admitted that its mapping of these pipes may not be completed until 2020. There-fore, the modeling for NYCEDC's proposed flood gate for the Creek was done without knowing how much water is entering the Creek, whether or not it is contaminated, etc. It is essential to know what discharges into the Creek and where before any work begins.	As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, the history of contaminants within the footprint of construction for alternatives for the Jamaica Bay Planning Reach will be reexamined as part of the CSRM Study.

7) The private gated community of Sea Gate, at the western end of the Coney Island peninsula, may have combined sewer lines. Both the New York State Department of Environmental Conservation (NYSDEC) and NYCDEP have admitted that they know nothing about this private sewer system, what condition the lines are in, where they connect to or if they discharge into either the Creek or the ocean. Sea Gate was hit badly by Hurricane Sandy and their antiquated sewer lines are in very poor condition.	Comment acknowledged. As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, the history of contaminants within the footprint of construction for alternatives for the Jamaica Bay Planning Reach will be reexamined as part of the CSRM Study.
8) Several of NYCDEP's prior studies provide conflicting information about the drainage areas and outfalls that enter Coney Island Creek.	As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, the history of contaminants within the footprint of construction for alternatives for the Jamaica Bay Planning Reach will be reexamined as part of the CSRM Study.
9) Properties along the Creek include a cement plant, scrap metal business, boat yard, gas station, several auto body shops, school bus depots and various other industrial uses. Some or all of these may discharge contaminated storm water directly into the Creek.	As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, the history of contaminants within the footprint of construction for alternatives for the Jamaica Bay Planning Reach will be reexamined as part of the CSRM Study. Cleanup of contaminated sites would be outside of the scope of this study and would need to occur prior to the implementation of the Corps project.
10) The Metropolitan Transportation Authority's Coney Island Yard, the largest railyard in the world, is located on the shore of the Creek and has been in continuous use since 1926. All run off from this 75 acre property went into the Creek. Therefore, it is likely that sediments adjacent to this property are contaminated with heavy metals, PAHs and other toxins. A filtration system for the existing outfall and construction of a new outfall are planned, but there is no mention of how contaminated sediments near this property will be addressed.	As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, the history of contaminants within the footprint of construction for alternatives for the Jamaica Bay Planning Reach will be reexamined as part of the CSRM Study. Cleanup of contaminated sites would be outside of the scope of this study and would need to occur prior to the implementation of the Corps project.

A clean-up of the entire length of the Creek is badly needed. It may be so contaminated that it meets the guidelines for a Superfund site. A clean up should be done as mitigation for the future flood control project.	As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, the history of contaminants within the footprint of construction for alternatives for the Jamaica Bay Planning Reach will be reexamined as part of the CSRM Study. Clean up of contaminated sites is the mission of the Environmental Protection Agency and would need to occur prior to the implementation of a Recommended Plan.
Draft EIS omits key information to make it legally sufficient as a draft EIS - TSP is underdeveloped with no details about construction, function, or funding; conclusions are unsubstantiated; document contains contradictory information; document is incomplete and based on insufficient modeling and analysis	The Draft GRR/EIS has been revised to include more details, remove inconsistencies, and incorporate comments received on the 2016 draft. Due to the significance of the changes to the Recommended Plan (mainly the removal of the storm surge barrier from the recommendation), the Revised GRR/EIS has been released for a second public review period.
NEPA standards are not met - fails to support claims that EFH will be unaffected, fails to discuss possible exacerbation of environmental issues; water quality data used is outdated.	The sufficiency of the analyses of effects to important fish species is being coordinated with the National Marine Fishery Service (NMFS). The EFH Assessment has been revised to reflect the updates to the Recommended Plan and is included as part of the Environmental Compliance Appendix D. The latest available data was used for this analysis. If you are in possession of newer data, please provide.
Lack of information about TSP - incomplete design makes it impossible to estimate impacts of that design. Funding and real estate plans are undeveloped. Environmental impacts are therefore impossible to estimate. No discussion is included about possible consequences of closing the gate for periods of time longer than planned.	In accordance with SMART Planning, conceptual designs are further developed as the study progresses. The Revised Draft GRR/EIS includes a more detailed level of Feasibility Design. As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, barrier design and operations as well as the potential environmental consequences of barrier construction and operation will be reexamined as part of the CSRM Study.

No specific proposal as to how Sandy funding should be utilized. In effect, a plan for the use of those appropriated funds (if we assume that this figure of $500 million is generally correct) would represent the highest priority features for the Corps, the State, the City of New York and all other interested parties. Sandy funds should be first used for CSRM along Atlantic shorefront	Comment acknowledged.
Prioritize NNBF; some Sandy funds should be diverted for use to develop NNBF. We would propose that one or more coastal and/or maritime wetland forest restoration projects should be included in a near-term Plan to be funded with Sandy dollars. Allocating some Sandy dollars for this purpose is consistent with PL 113-2 Chapter 4 Department of the Army Corps of Engineers Civil Investigations provisions related to the consequences of Hurricane Sandy to this effect: "...Provided, that $2,902,000,000 of the funds provided under this heading shall be used to reduce future flood risk in ways that will support the long-term sustainability of the coastal ecosystem and communities and reduce the economic costs and risks associated with large-scale flood and storm events…." (emphasis added). This provision clearly dictates that these funds can and should be used to support coastal ecosystem sustainability. The inclusion of some coastal and marine forest NNBFs that have risk reduction features is the most effective way to comply with this statutory requirement.	Comment acknowledged. NNBFs have been developed and are part of the Recommended Plan.
Nonstructural Measures. Nonstructural measures need to be better developed for higher frequency events; plan in draft FIMP report is used as a model.	Nonstructural measures (e.g., buy outs) were considered in the analysis.

1. Please include a full analysis of the impact of combined sewer overflows and separate storm sewer discharges on the water quality of Jamaica Bay during the time the gate is closed. Please also include an analysis of these overflows and discharges given the anticipated reduced tidal exchange caused by the gates immovable infrastructure (even when open).	As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, barrier design and operations as well as the potential environmental consequences of barrier construction and operation will be reexamined as part of the CSRM Study.
2. Please include an operations plan, or anticipated use plan, describing how, when, and whether the gate will be closed. Will it be engaged only for large storms, leading to some areas continuing to be flooded during smaller storms, or will it be closed under some other circumstances? For each of the circumstances the gate will be closed, the Corps should include modeled impact assessments - across all Draft EIS issue areas (including but not limited to water quality, fisheries, oyster reef productivity, human health, access, and navigation).	As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, barrier design and operations as well as the potential environmental consequences of barrier construction and operation will be reexamined as part of the CSRM Study.
3. Please describe where, if anywhere, flooding in the action area will continue to occur, whether during small or large storms, and under a variety of sea level rise and storm surge scenarios. Please also include the Corps' modeled costs associated with recovery from such flooding events.	Please see the Revised GRR/EIS released on August 31, 2018 which describes the residual risk associated with the Recommended Plan, discusses sea level rise and sensitivity analysis of how the Recommended Plan would perform under various scenarios. The Benefits Appendix addresses recovery costs avoided as well as residual risk.
4. Please include an assessment of where water outside the barrier - in the immediate vicinity of the barrier - will travel if the barrier is closed (please provide maps).	Further development of the Jamaica Bay storm surge barrier plan has been deferred and will be fully analyzed in the New York & New Jersey Harbor and Tributaries Coastal Storm Risk Management Focus Area Study

5. Please describe in more detail the impacts of the permanent fixtures installed as part of the gate on the water exchange between the Bay and the ocean, on the ability of fisheries, marine mammals, and sea turtles to transit through the gate's permanent structure.	Further development of the Jamaica Bay storm surge barrier plan has been deferred and will be fully analyzed in the New York & New Jersey Harbor and Tributaries Coastal Storm Risk Management Focus Area Study
6. Please describe the impact of the gate on endangered sturgeon.	Further development of the Jamaica Bay storm surge barrier plan has been deferred and will be fully analyzed in the New York & New Jersey Harbor and Tributaries Coastal Storm Risk Management Focus Area Study
7. Please describe what will happen to migrating (or simply swimming) fish trapped on the inside of the gate when the barrier is shut.	Further development of the Jamaica Bay storm surge barrier plan has been deferred and will be fully analyzed in the New York & New Jersey Harbor and Tributaries Coastal Storm Risk Management Focus Area Study. However, it is not anticipated that storm surge barrier closures would exceed 48 hours and would likely be shorter in duration. The majority of the time, a proposed barrier would remain open.
8. Please describe the impact of altered hydrology on water quality, habitat, and sediment flux within the Bay. Please specifically examine impacts to restoration projects completed, planned, funded, and approved (including by the Corps) within Jamaica Bay over the past ten years - from oyster restoration pilot programs to seagrass restoration and borrow pit remediation projects.	The level of detail in the storm surge barrier design was conceptual for the Draft GRR, consistent with SMART Planning principles of only including the level of detail necessary to support a decision. It was the intention of the Corps to refine the design to full Feasibility level for the Final Report. However, the volume of comments concerning the potential impacts of the proposed storm surge barrier contributed to the agency decision to postpone the recommendation to construct the storm surge barrier until it can be studied further under another ongoing study looking at residual risk and a suite of storm surge barriers across the region. USACE has decided to recommend further study of the storm surge barrier and its potential impacts under another ongoing study, The New York and New Jersey Harbor and Tributaries Coastal Storm Risk Management Study, which is looking at a suite of storm surge barriers,

	among other measures, across the region. Please see the Revised GRR/EIS for a full impact analysis of the Recommended Plan.
No proposed size, shape, form, or use specifics for the storm barrier.	The level of detail in the storm surge barrier design was conceptual for the Draft GRR, consistent with SMART Planning principles of only including the level of detail necessary to support a decision. It was the intention of the Corps to refine the design to full Feasibility level for the Final Report. However, the volume of comments concerning the potential impacts of the proposed storm surge barrier contributed to the agency decision to postpone the recommendation to construct the storm surge barrier until it can be studied further under another ongoing study looking at residual risk and a suite of storm surge barriers across the region. USACE has decided to recommend further study of the storm surge barrier and its potential impacts under another ongoing study, The New York and New Jersey Harbor and Tributaries Coastal Storm Risk Management Study, which is looking at a suite of storm surge barriers, among other measures, across the region.

No identified engineering analysis of the barrier.	The level of detail in the storm surge barrier design was conceptual for the Draft GRR, consistent with SMART Planning principles of only including the level of detail necessary to support a decision. It was the intention of the Corps to refine the design to full Feasibility level for the Final Report. However, the volume of comments concerning the potential impacts of the proposed storm surge barrier contributed to the agency decision to postpone the recommendation to construct the storm surge barrier until it can be studied further under another ongoing study looking at residual risk and a suite of storm surge barriers across the region. USACE has decided to recommend further study of the storm surge barrier and its potential impacts under another ongoing study, The New York and New Jersey Harbor and Tributaries Coastal Storm Risk Management Study, which is looking at a suite of storm surge barriers, among other measures, across the region.
No water quality impact assessment of Jamaica Bay under closed-gate conditions.	The level of detail in the storm surge barrier design was conceptual for the Draft GRR, consistent with SMART Planning principles of only including the level of detail necessary to support a decision. It was the intention of the Corps to refine the design to full Feasibility level for the Final Report. However, the volume of comments concerning the potential impacts of the proposed storm surge barrier contributed to the agency decision to postpone the recommendation to construct the storm surge barrier until it can be studied further under another ongoing study looking at residual risk and a suite of storm surge barriers across the region. USACE has decided to recommend further study of the storm surge barrier and its potential impacts under another ongoing study, The New York and New Jersey Harbor and Tributaries Coastal Storm Risk Management Study, which is looking at a suite of storm surge barriers, among other measures, across the region.

No assessment (and only minimal identification) of endangered species, fisheries, and marine mammal impacts and issues.	Effects to listed species are coordinated with the National Marine Fisheries Service as well as the US Fish and Wildlife Service (i.e., the Services) and the final effects determinations will be made in consultation with the Services. Please see the Environmental Compliance Appendix and EIS portion of the Revised GRR/EIS released on August 31, 2018.
No review (or even cataloguing of) past, present, and pending future remediation and restoration activities within the Bay, let alone any analysis of the impacts the barrier may have (open or closed) on the hundreds of millions of dollars of work that has been leveraged by the Corps, other federal agencies, state and local government, and community organizations for the benefit of the Bay and its resilience.	The level of detail in the storm surge barrier design was conceptual for the Draft GRR, consistent with SMART Planning principles of only including the level of detail necessary to support a decision. It was the intention of the Corps to refine the design to full Feasibility level for the Final Report. However, the volume of comments concerning the potential impacts of the proposed storm surge barrier contributed to the agency decision to postpone the recommendation to construct the storm surge barrier until it can be studied further under another ongoing study looking at residual risk and a suite of storm surge barriers across the region. USACE has decided to recommend further study of the storm surge barrier and its potential impacts under another ongoing study, The New York and New Jersey Harbor and Tributaries Coastal Storm Risk Management Study, which is looking at a suite of storm surge barriers, among other measures, across the region.
No assessment of any natural or enhanced-ecosystem resilience planning alternatives.	Natural and enhanced-ecosystem resilience planning alternatives are currently being developed during the current phase of study to address high frequency flooding and are included in the Recommended Plan as presented in the Revised Draft GRR/EIS, released to the public on August 31, 2018.

We also urge the Army Corps of Engineers to expand the Natural/Nature Based Features (NNBFs) particularly as part of the residual risk projects and the perimeter plan for Jamaica Bay. Civil engineering solutions only accomplish one goal for which the structure is designed. On the other hand NNBFs accomplish multiple goals, including but not limited to water quality improvements, habitat enhancement, and public amenities. Furthermore NNBFs should be developed and implemented at the neighborhood scale (rather than larger regional scale) to ensure needs of the local communities and the local habitats are taken into consideration and in full partnership with the other public agencies such as the NYC Department of Environmental Protection, NYC Parks, and National Park Service and others. In addition there is a great deal of expertise and local knowledge within the private sector that should be tapped as a resource in developing a more robust NNBF plans.	Natural and enhanced-ecosystem resilience planning alternatives are currently being developed during the current phase of study to address high frequency flooding and are included in the Recommended Plan as presented in the Revised Draft GRR/EIS, released to the public on August 31, 2018.
We urge the Army Corps of Engineers to provide more opportunities for the public to review and comment on every phase of this project. In fact there are models for effective public outreach and engagement, such as the New York Rising Citizens Advisory Committee and the EPA's Superfund Community Advisory Groups.	As stated in Section 9.1 Public Involvement Activities, "*Following public release of the document, additional public meetings will provide more detailed analysis of the alternative plans, feature plans, and identification of impacts.*"
Finally given the projections on sea level rise and frequency of severe weather events, we must give coastal retreat and buy-out as serious and viable alternatives. New York State has already implemented a buy-out program in Staten Island. Such non-capital (i.e., programmatic) solutions may not exactly align with the Army Corps of Engineers' expertise but with appropriate partnerships this type of programmatic solutions can be further developed and might be the most prudent action in some areas.	Managed retreat allows natural shoreline erosion to occur and incrementally removing or relocating shoreline structures and infrastructure as they eventually become unsafe for intended use. This measure (also referred to as floodplain buy-out) was not carried forward as a measure which would be implemented on a large scale due to anticipated economic inefficiency.
Our first choice would be Plan B, utilizing only natural and nature-based features (NNBF). However, we understand that	Noted

that alternative would not fully mitigate future storm damage, is economically unfeasible and is not a current option	
We are vehemently opposed to Plan D. Building 44 miles of 18-foot seawalls all the way around the bay would destroy access to the shore for recreational boats and destroy land-based access to the bay. The 20 storm gates would significantly affect recreational navigation in every corner of the bay, including Paerdegat, Mill Basin, Gerritsen Inlet, Spring Creek and all the parks in Far Rockaway and Arverne. The seawalls would uproot sensitive shorelines with their protective vegetation and destroy the majority of nesting grounds for fish and turtles. The whole plan does nothing to protect the community of Broad Channel and does nothing to protect the cordgrass marshes that filter the water and protect the shorelines against storm surges, the same marshes that USACE and the American Littoral Society have been rebuilding for the past two years. This plan would destroy the historic and continuous relationship between shorefront communities and the water that is the reason they exist. This is an ill-conceived, heavy-handed approach that destroys what it is intended to protect.	Interior Plan D was not selected as an element of the recommended plan.
We strongly prefer Plan C-2 over Plan C-1E. The problem with Plan C-1E is that placing a storm surge barrier inside the Marine Parkway Bridge would require 6.6 miles of 18-foot seawalls across Floyd Bennett t and Marine Park, along Flatbush Avenue and the Belt Parkway, and across the shoreline of Roxbury, as well as sea gates at Gerritsen Inlet and elsewhere. Dead Horse Bay, Plumb Beach and Gateway Marina would remain exposed to storm surges. Plan C-2 saves all these miles of shoreline destruction at the expense of a 600-foot longer storm barrier (Table 5-5). The C-1E seawalls would cut off a significant portion of natural shoreline from the land, significantly reduce land access for recreational boating and destroy the natural interaction between local residents and the waterfront they cherish. The community of Roxbury is dead-set against Plan C-	Comment acknowledged.

1E for these reasons. On land, Plan C-2 impacts half the acreage of Plan C-1E (Table 5-6). You prefer C-1E over C-2 solely because of the possibility of seafloor cables in the C-2 area and the potential expense of relocating the pipes leading from the Coney Island WWTP to the diffuser. However, Section 7.18.1 points out that C-1E also impacts these effluent lines. Since the storm surge barrier is estimated to cost over $2 billion, dealing with those two potential issues could not possibly be an economic deal-breaker for Plan C-2 which has many clear environmental, cultural and engineering advantages over Plan C-1E.	
The Army Corps of Engineers recently released the "Draft Integrated Hurricane Sandy General Reevaluation Report and Environmental Impact Statement" (Draft HSGRR/EIS) and General Conformity (GC) Determination for the Atlantic Coast of New York, East Rockaway Inlet to Rockaway Inlet, and Jamaica Bay Reformulation Study for review and submission of comments. As recognized, the Rockaway peninsula was one of the most heavily impacted areas by and during Hurricane Sandy. The draft studies have been reviewed and the following feedback/comments are made to be fully considered during the final preparation of the final EIS: 1. The recommendations throughout the various studies are based on reduction of risk from two sources of storm damage: inundation, wave attack with overtopping along the Atlantic Ocean shorefront of the rockaway peninsula and flood waters amassing within Jamaica Bay via the Rockaway Inlet. In addressing "coastal resiliency" and "long term resiliency" a number of factors have not been stated and considered to identify best solutions to prepare for, and reduce or eliminate vulnerability to storm damage. 2. In reference to #1 above, the principle water factors stated in the	In developing the comprehensive plan, "wave attack, wave run-up, overtopping, and erosion" included consideration of (a) wind, tides, and precipitation; (b) interior flooding from rainfall or backflow from sewers; (c) and predicted sea level change from all factors. As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, barrier design or other solutions will be reexamined as part of the CSRM Study. The approach to addressing climate change and sea level rise is consistent with Corps policy.

studies were wave attack, wave run up, overtopping and erosion. It is also noted the bay shoreline retaining wall (Beach 149th Street to Beach 109th Street) has a top elevation of approximately 3 to 4 feet above grade (roughly +10 ft. NAVD). 3. In reference to #2 above, no mention is made that water rises from storm sewers (backflow) into the streets, basements and garages during small storms. This large amount of water (possibly over a foot+ high at several street points) is not from wave attack, wave run up, overtopping and erosion. 4. In reference to #3 above, for the purpose of the Reformulation Study, the year of reconstruction is assumed to be 2020, with a design life of 50 years. Also, Projected flood heights at Howard Beach will increase by 2.9 feet from 1983-2001 to the 2050's. 6. In reference to #5 above, a number of Sandy Storm factors were not mentioned nor facts shown in the studies, i.e., Duration of storm, Rainfall Rate (# of inches), Horizontal Rain, Full Moon, Full Moon Closeness to the Earth Effects, Wind Velocity, Wind Gusts Velocity, and Wind Direction. These factors, in combination to "sea level rise, high tide, Northeaster, colliding with a second storm (blast of arctic air from the North)" require further study and possibly new recommendations. 7. In reference to #6 above, factors that attribute to sea level rise in the future is the installation of an underwater 26 inch diameter gas pipeline by Williams Co. that equates to submerging a 10 story building with a 4,000 square foot footprint. 8. In reference to #7 above, what is the underwater footprint of the possible installation of a Montauk 90 MW facility project planned in the ocean that can contribute to sea level rise? Relate this calculation to a building size. 10. In reference to #8 &#9 above, include the effect of all the windmill's underwater electric cable runs (in the ocean) that can contribute to sea level rise. 11. With the protections proposed, it would appear that a bathtub effect can or may occur. The Rate of Rainfall, Duration of the Storm, Wind	

Velocity, etc. will contribute to water entering the bathtub without a manner for the captured water's exit. Thus, it's important that these factors be stated and included to the study for furthering the analysis. It's believed with the above factors considered for additional study, a number of recommendations may be changed, such as the Bay Wall Height (Beach 149th Street to Beach 109th Street), Height of Flood Gates, Sea Level Rise, etc. In addition, for the purpose of the Reformulation Study, the stated year of reconstruction being assumed to be 2020, with a design life of 50 years doesn't appear realistic.	
1. The recommendations throughout the various studies are based on reduction of risk from two sources of storm damage: inundation, wave attack with overtopping along the Atlantic Ocean shorefront of the Rockaway peninsula and flood waters amassing within Jamaica Bay via the Rockaway Inlet. In addressing "coastal resiliency" and "long term sustainability" a number of factors have not been stated and considered to identify best solutions to prepare for, and reduce or eliminate vulnerability to storm damage.	Comment Noted.
2. In reference to #1 above, the principle water factors stated in the studies were wave attack, wave run up, overtopping and erosion. It is also noted the bay shoreline retaining wall (Beach 149th Street to Beach 109th Street) has a top elevation of approximately 3 to 4 feet above grade (roughly +10 ft. NAVD).	Comment Noted.
3. In reference to #2 above, no mention is made that water rises from storm sewers (backflow) into the streets, basements and garages during small storms. This large amount of water (possibly over a foot+ high at several street points) is not from wave attack, wave run up, overtopping and erosion.	Comment Noted.
4. In reference to #3 above, projected future climate changes are expected to exacerbate existing problems. Projected future climate changes, including sea level rise, precipitation increase, temperature increases, and changes in extreme weather	Comment Noted.

events' frequency and/or intensity will increase coastal storm flooding, erosion and wetland loss.	
5. In reference to #4 above, for the purpose of the Reformulation Study, the year of reconstruction is assumed to be 2020, with a design life of 50 years. Also, Projected flood heights at Howard Beach will increase by 2.9 feet from 1983-2001 to the 2050's.	Comment Noted.
6. In reference to #5 above, a number of Sandy Storm factors were not mentioned nor facts shown in the studies ,i.e., Duration of storm, Rainfall Rate (# of Inches), Horizontal Rain, Full Moon, Full Moon Closeness to the Earth effects, Wind Velocity, Wind Gusts Velocity, and Wind Direction. These factors, in combination to "sea level rise, high tide, Northeaster, colliding with a second storm (blast of artic air from the North)" require further study and possibly new recommendations.	Comment Noted.
7. In reference to #6 above, factors that attribute to sea level rise in the future is the installation of an underwater 26 inch diameter gas pipeline by Williams Co. that equates to submerging a 10 story building with a 4,000 square foot footprint.	Comment Noted.
8. In reference to #7 above, what is the underwater footprint of the possible installation of approximately 200 windmill towers and substation(s) that can contribute to sea level rise? Relate this calculation to a building size.	Comment Noted.

9. In reference to #8 above, what is the underwater footprint of the possible installation of a Montauk 90 MW facility project planned in the ocean that can contribute to sea level rise? Relate this calculation to a building size.	Comment Noted.
10. In reference to #8 & #9 above, include the effect of all the windmill's underwater electric cable runs (in the ocean) that can contribute to sea level rise.	Comment Noted.
11. With the protections proposed, it would appear that a bathtub effect can or may occur. The Rate of Rainfall, Duration of the Storm, Wind Velocity, etc. will contribute to water entering the bathtub without a manner for the captured water's exit. Thus, it's important that these factors be stated and included to the study for furthering the analysis.	Comment Noted.
12. With reference to the above September letter, Comment #8, factors that attribute to sea level rise in the future is the proposed Multi-Purpose Levees (MPL) installation along a portion of Southern Manhattan's East River waterfront. This high and wide standard river embankment roughly comprises a 1.3 mile long section of Southern Manhattan. The proposed 500' land reclamation will require structural fill inbound of the proposed perimeter structures. Therefore, what is the complete underwater footprint planned in the East River that can contribute to sea level rise (approximate Depth, Length and Width)? Relate this calculation to a building size.	Comment Noted.

13. In reference to Sea Level Rise and associated effects by the other factors, project the future installation of structures in the Ocean and Rivers elsewhere that can elevate these waters. These man-made structures should be factored into the drafted designs proposed for safeguarding the Rockaway peninsula.	Comment Noted.
14. The Bay Wall's height from Beach 149th Street to Beach 109th Street should be increased by approximately "more than 2 feet" to significantly reduce water overtopping caused by many factors stated in comment #6 and potential overflowing.	Comment Noted.
MAINTENANCE: A floodgate barrier used only in rare emergency situations will wind up at the bottom of the City's list for upkeep. How often would it be tested and inspected? Coney Island's infrastructure has persistent problems with vandalism and scavenging. Unless there is a constant security presence, the structure would be extremely vulnerable to damage.	Comment Noted.
SHOALING AND CLOGGING: The floodgate illustration shown in the Resiliency Study has multiple support columns and gates rather than one wide gate. These supports would stop normal flushing action, allowing silt and floatables from storm sewer runoff to block the gates and slow tidal action. Floating marine debris from Gravesend Bay, including large broken pilings and tree trunks, would also create a hazardous condition and interfere with operation of the gates. Past experience shows that the City is not quick to remove this sort of debris from the creek.	Comment Noted.
ICE FLOWS: In winter the gates could be jammed by ice flows. Coney Island Creek freezes over in winter. If the gates were clogged with ice, it could dam the creek, and then melting snow runoff from the streets would backflow through the storm sewers into surrounding neighborhoods.	Comment Noted.

PLASTIC FLOATABLES: DEP skimmers would be unable to access the creek to collect the refuse that's now removed from the floating barrier at Cropsey Avenue. Plastic and other debris are a constant hazard. How often would the gates be cleaned? My guess is "not often enough."	Comment Noted.
BACKDOOR FLOODING: Hurricanes and nor'easters can dump as much as 14 inches of rain in a short period of time. Three thousand acres of runoff would be trapped in the creek without an outlet. If the gates were closed in anticipation of a storm, the creek would back up through the storm sewers and flood the surrounding neighborhood. There are no tide gates on storm sewers to prevent backflow.	Comment Noted.
LIABILITY: If the barrier includes a public access bridge, it will become a diving board for young people and a platform for anglers to set illegal fishing nets at the gates. If anyone is swimming around the structure during an incoming tide or if the gates are clogged with debris, current could cause them to be pinned underwater, resulting in deaths by drowning. Many young people have drowned in Coney Island Creek over the years, and the proposed dam would prove to be an irresistible attraction for kids to explore. This structure would be a liability problem for the City.	Comment Noted.
EMERGENCY OPERATION: How would a floodgate be powered? Power outages accompany hurricanes. Will there be generators? Is it possible to manually operate such a large structure?	Comment Noted.
WATER QUALITY AND POLLUTION: Coney Island Creek is an estuary that has a history of contamination from manufacturing, coal gasification facilities, illegal dumping and filling with material of unknown origin, auto junkyards, petroleum contamination, auto repair shops, scrap metal recycling, illegal shipbreaking, sunken vessels, underground and aboveground storage tanks, metals, and spills of hazardous materials.	Comment Noted.

There is an error in the EDC's Resiliency Study. The KeySpan mitigation of the former coal gasification site at Shell Road did not extend to Stillwell Avenue as claimed in the study. The creek was only cleaned to the gas site's property line at the MTA Bridge at West 12 Street. The creek west of the bridge has never been mitigated, and "black mayonnaise" toxic sediment was never removed or capped and has most likely migrated to the western site of the creek. Any construction along the creek's banks will require a massive cleanup. Heavy industry once lined the creek's shoreline and most sites have never been mitigated.	Comment Noted.
THREATS TO WILDLIFE: A floodgate that traps sewage spills or other toxic materials would seriously degrade quality of life in the neighborhood much more than the occasional flooding that now occurs.	Comment Noted.
RECOMMENDATION: Use living shorelines, reefs, gabions, wetlands, raised habitat-enhanced bulkheads constructed along private property. Use a passive system instead of a mechanical one.	Comment Noted.
1. I do not believe the main storm gate planned parallel to the Gil Hodges Memorial Bridge, from Flatbush Ave. Brooklyn to the Rockaways, is sufficiently wide in the "open" position to allow adequate water flow through Jamaica Bay. According to page 94 of the plan, the total width of the gates is 1100 feet. The width of the current opening is about 3800 feet. Therefore, the opening will be decreased to 30% of the existing opening. The water quality in Jamaica Bay is adversely affected by sewage outflow, fertilizer runoff, industrial pollution, and other human activities. If the amount of water flushing the bay is significantly decreased, what will happen when this pollution accumulates? What will happen to the oxygen levels, to the organisms that live in the bay, and to the birds and other wildlife that feed on fish and other marine organisms?	Comment Noted.

2. There are also planned “sector gates” to Sheepshead Bay, Gerritsen Inlet, and Coney island Creek. These last two affect natural areas with wetlands. Are these gates of an adequate size to have no negative impact on these natural areas?	Comment Noted.
3. There are miles of other features: Reinforced dunes, beach berms, levees, concrete floodwalls, elevated promenades. Will these negatively impact beach-nesting birds? 4. What will happen to the areas outside (west) of the main storm gate: Plumb Beach, southwest Barren Island, and the bay side of the Rockaway Peninsula from Roxbury to Breezy Point? Will the “bathtub effect” of waves bouncing off the main storm gate and sector gates, even when open, cause an increase in erosion? And during a storm when the gates are closed, won’t this effect be even more pronounced?	Comment Noted.
Surge barrier needs to be funded - Surge barrier needs to incorporate lazy open - modelling needs to be more complete	Additional engineering and modeling will be undertaken during design phase as funding is available
Island of Broad Channel is... the most at risk community in the study area and one that sees the most instances of periodic tidal flooding from events that do not rise to the level of major storm instances and the one where RRM's would see the greatest benefit.	Comment acknowledged.
Include Waver Break Oyster Reef-to be constructed off west side of Broad Channel on the shallow mud flat that exists. This would reduce wave force energy approaching the homes and infrastructure on the west side of the island. (noted in the governors NY rising plan as a goal for storm protection)	Comment acknowledged.
(No comments written)	Comment missing from transmittal.
We need groins in Neponsit.	Groins have worked in the past Groins and "jetties" are only deemed cost effective if the amount of sand they save in future renourishments exceeds the initial cost of groin

	construction. They are only recommended for construction in areas where this is the case.

4.0 AGENCY LETTERS AND RESPONSES

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

Planning Division

July 19, 2018

United States Environmental Protection Agency
Region 2
290 Broadway
New York, NY 10007-1866

Attn: Ms. Judy-Ann Mitchell, Chief
Sustainability and Multimedia Programs Branch
Clean Air and Sustainability Division

Dear Ms. Mitchell:

The U.S. Army Corps of Engineers (USACE), New York District (District) is in receipt of your letter, dated 17 November 2016, submitting comments on the East Rockaway Inlet to Rockaway Inlet and Jamaica Bay Draft Integrated Hurricane Sandy General Reevaluation Report and Environmental Impact Statement (HSGRR/EIS).

As a result of the significance (extent and content) of agency and public comments received on the proposed project, as well as the feedback to the District resulting from the concurrent policy and technical review that was conducted by USACE Headquarters (HQUSACE), the District has determined that sufficient revision to the draft report is required in order to proceed to a final decision document. This development has prompted the decision to include, within the current schedule to finalize the report (August 2018), another 45 day public review period so as to ensure proper agency and public notification and input prior to finalizing the report and rendering a decision.

The District will be issuing a revised Notice of Availability when the Revised Draft Report is available for review. The revised draft HSGRR/EIS will reflect revisions and updates based upon some comments submitted by you, as well as other agencies, stakeholders and interested parties.

The District thanks you for your continued assistance, guidance and input to this process so as to advance the execution of this regionally-significant project. If you have any questions or concerns, please do not hesitate to contact Daria Mazey of my staff at 917-790-8726 or myself at 917-790-8634.

Sincerely,

Clifford S. Jones III
Chief, Planning Division

Enclosure

Pertinent Text and Responses to Comment Letter

EPA believes that the proposed project, on the whole, will add value by reducing future flood risk and costs associated with large-scale flood events and support the long-term sustainability of the coastal ecosystem. There are a number of ways in which the HSGRR/EIS can be enhanced as an analytical document so is to more thoroughly evaluate and communicate the potential impacts associated with the project; and ways in which the project itself can be enhanced to create more naturally resilient coastal ecosystem which are discussed below.

Financial Estimate

The document includes a number of tables including two in the Executive Summary (Without-Project Conditions Annual Damages, p. v and Alternative Plan Comparison, p. xi) which are simplified to the point at which they provide little insight into the financial impacts without the project or of the various alternatives. Further, Appendix C - Cost Estimating, is not completed. As the proposed alternatives are not finalized, it is understandable that specific costs are not known at this point, however, ball park estimates allow the public to more effectively evaluate the merits of the alternatives put forth in the document. The "Without-Project Conditions Annual Damages" should be known with more certainty, however. Providing a more detailed explanation of anticipated damages without the project, allows for a more informed assessment of the proposed alternatives. EPA believes this information should be provided in the FEIS with greater detail.

> Response: Comment Noted. Additional tables that provide more detail on the Without Project Conditions damages are available in the Economics Appendix and were not included in the main report because the study team is directed to limit the level of detail to that required for decision-making. Presentation of additional without project conditions damages detail in the main report will be reconsidered for the next draft of the HSGRR/EIS. The level of detail for the cost estimate will be more extensive in the revised Draft HSGRR/EIS being released in late August as the Recommended Plan has been further refined post the Agency Decision Milestone.

Green House Gas Emissions and Climate Change

The HSGRR/EIS references the Council on Environmental Quality's 2014 Revised Draft Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews (GHG Guidance). CEQ finalized the GHG Guidance on August 1, 2016. The Final GHG Guidance eliminates the reference point of 25,000 metric tons of C02-e annually for determining whether quantification of a project's GHG emissions is warranted. This reference point is used throughout the GHG and climate change analyses in the HSGRR/EIS.

To ensure appropriate consideration of GHG emissions and climate change in the NEPA analysis and decision-making process, we recommend removing reference to the 2014 Draft GHG Guidance and discussing the 2016 Final GHG Guidance in the FElS. Further, we recommend revising the GHG and climate change analyses to remove the 25,000 metric tons of C02-e reference point and ensure overall consistency with the 2016 Final GHG Guidance.

While the HSGRR/EIS includes estimates of GHG emissions for the preferred alternative, no estimates were given for other alternatives. NEPA requires rigorous and objective evaluation of

all alternatives, and this approach is supported for GHG emissions by the CEQ Guidance. We recommend including GHG estimates resulting from each alternative and mitigation measures in the FEIS.

> Response: The Council on Environmental Quality (CEQ) has withdrawn its final guidance for federal agencies on how to consider greenhouse gas emissions and the effects of climate change in National Environmental Policy Act (NEPA) reviews, a Notice of Availability for which was published on August 5, 2016 (81 FR 51866). As explained in the Notice of Availability, the withdrawn guidance was not a regulation. Pursuant to Executive Order 13783, "Promoting Energy Independence and Economic Growth," of March 28, 2017, the guidance has been withdrawn for further consideration.

Endangered Species and Essential Fish Habitat

The HSGRR/EIS does not effectively communicate whether or not consultation has been initiated with the U.S. Fish and Wildlife Service (USFWS) for this project. The HSGRR/EIS states on page 141 that, "Submittal of this Draft HSGRR/EIS to USFWS and the National Marine Fisheries Service (NMFS) initiates USACE's requested Section 7 consultation for the TSP." However, consultation is generally initiated with the Service(s) with an effects determination, as opposed to communication of a Biological Assessment via a NEPA document. The same is true for the Marine Mammal Protection Act. If, in this instance, alternative arrangements have been made for the initiation of consultation that should be communicated in the document. Further, it is stated on page 141 that "USACE is currently conducting informal consultation with NMFS to determine the appropriate formal consultation (i.e., Biological Assessment or Not Likely to Adversely Affect Determination)." This sentence confounds multiple aspects of consultation that should be clarified with the Services. This inconsistency with Endangered Species Act terminology can also be found in the last paragraph of page 180.

Lastly, page 141 states that coordination will occur with NMFS for ap. Essential Fish Habitat assessment. However, page 167 states that "Because adverse effects to essential fish habitat would be minor, the essential fish habitat requirements of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations would be satisfied." This inconsistency should be clarified in the FEIS.

> Response: Terminology used on p. 141, 167, and 180 will be revised to reflect the process and status of compliance with each of the Services under Section 7 of the ESA, the Marine Mammal Protection Act, and the Magnuson-Stevens Fishery Conservation Management Act for the Revised Draft EIS.

Water Quality

The document highlights the numerous stressors on water quality in the Bay, including combined sewer overflow (CSO), runoff from roads and the airport, leachate from landfills, windblown trash and other sources. The HSGRR/EIS cites one reference stating that as much as 240-340 million gallons per day of treated sewage effluent flow into the Bay from four wastewater treatment plants. In light of the water quality impairments in the Bay, a more detailed and refined assessment of the impacts resulting from the tidal gate on the hydrology and water quality of the Bay should have been included in the HSGRR/EIS. The impacts of alternative configurations of

the tidal gate should have also been evaluated to assess whether varying layouts could have differing impacts on the hydrology and sedimentation of the Bay.

> Response: The storm surge barrier feature (Jamaica Bay component) is now being evaluated under the New York and New Jersey Harbor and Tributaries Study (NYNJHATS) as a potential CSRM measure for the Jamaica Bay area. This includes all features previously selected for Jamaica Bay, including the Jamaica Bay shoreline CSRM components and tie-ins to the barrier along Jamaica Bay.
>
> Additional water quality modeling has been conducted to analyze a range of potential impacts up to the worst case scenario for water quality impacts of a barrier in Jamaica Bay. The NYNJHATS will describe the Jamaica Bay Eutrophication Model (JEM) that was used to analyze potential water quality impacts (JEM documentation has been revised in recent months).

EPA does not feel that the HSGRR/EIS appropriately or sufficiently communicated the range of potential impacts, either qualitatively or quantitatively, that can result from this project. Page 147 states, "A detailed discussion of each type of impact and the degree that each barrier option would have on the Jamaica Bay environment is beyond the scope given the level of the present design detail." This approach can be seen in various sections throughout the HSGRR/EIS. As detailed in the Council on Environmental Quality's Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act, 40 CFR Parts 1500-1508, inherent to all EISs is the discussion of environmental consequences. It states:

> The discussion will include the environmental impacts of the alternatives including the proposed action, any adverse environmental effects which cannot be avoided should the proposal be implemented, the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and any irreversible or irretrievable commitments of resources which would be involved in the proposal should it be implemented.

This document did not meet this standard. Delaying this discussion until the release of the Final EIS is not consistent with the intended implementation of the requirements of the National Environmental Policy Act.

> Response: The storm surge barrier feature (Jamaica Bay component) is now being evaluated under the New York and New Jersey Harbor and Tributaries Study (NYNJHATS) as a potential CSRM measure for the Jamaica Bay area. The remaining components are moving forward under the East Rockaway Inlet to Rockaway Inlet and Jamaica Bay study. A detailed discussion of each type of impact and the degree that each barrier option would have on the Jamaica Bay environment will be addressed in the NHNJHATS.

Use of Natural Features

One of the stated goals of this effort is "to identify solutions that will reduce Atlantic Ocean Shoreline and Jamaica Bay vulnerability to storm damage over time, in a way that is sustainable over the long-term, both for the natural coastal ecosystem and for communities." To that end, EPA does not feel that the HSGRR/EIS sufficiently evaluated potential alternatives that could achieve this goal utilizing a more natural approach. Techniques and approaches such as

breakwaters, oyster reefs, or narrowing the inlet should be considered and discussed as possible alternatives. If there are specific reasons why these and other natural approaches weren't considered, that should be discussed in the FEIS.

> Response: The revised Draft HSGRR/EIS will include four nature-based features, i.e. living shorelines, as part of the recommended CSRM plan to address the high frequency flooding in the Back-Bay. Due to the potential positive benefit these will have on native habitats in providing intertidal wetlands that are valuable nursery habitats for many fish, the plan for these nature-based features is assumed at this time to be self-mitigating (serving to balance the needs of the community with protection of the environment). This assumption has been evaluated based upon EPW field studies, and is addressed quantitatively in the revised Draft HSGRR/EIS.

Flood Gates Impacts

In assessing the potential impacts of the tidal flood gate, it would be useful to see a schematic of what the gate would look like and how it would impact viewsheds from around the bay. There was a paucity of information regarding the operation of a flood gate including how long the gate would be opened/closed, if it would be adjusted in preparation of a storm or only during the actual event, who is responsible for decision making and manually adjusting the gate, whether it retracts within itself, etc. These details should be included in the FEIS.

> Response: The NYNJHAT Study team is performing an independent NEPA analysis. During the recent scoping meetings held for the NYNJHAT Study, photographs of some of the many types of storm surge barrier designs were presented and discussed. During analysis of the Recommended Plan, a rendering of the storm surge barrier and its potential gate type will be included in the NYNJHAT study, as well as additional photographs of other existing storm surge barriers around the world. As information becomes available within the NYNJHATS, the future analysis will also provide a discussion of operating parameters of the storm surge barrier, including closure timing (i.e., for specific anticipated storm frequencies), anticipated durations of closures, and identification of decision-makers who would initiate a storm surge barrier closure.

Hazardous, Toxic, and Radioactive Waste

EPA notes the useful inclusion of sites that may be impacted by storms with the general status of each site. However, EPA believes it is necessary for the USACE to perform a more complete analysis of the potential public health and environmental issues related to properties and storm events and should, therefore, consider the following points:

- An analysis should be performed to determine the potential chemical, radiological and biological exposures related to storm-impacted sites, properties, and nearby humans, ecosystems and the environment and how they would vary with each alternative and the no action alternative. This should include sensitive populations such as children, expecting mothers, the immunocompromised, the elderly, the impoverished, the infirmed, and any others that could be identified. Potential exposure pathways and detrimental effects should be determined. For example, contaminants may wash into surface waters, groundwater or become airborne, resulting in impacts to humans through recreational

exposure in the ocean, consumption of contaminated water or fish, inhalation of contaminants outside or via vapor intrusion in homes. Potential contamination issues and exposure pathways should also be evaluated for ecosystems and intervention strategies for these should be determined.

Response: This comment is addressed in the bullet below.

- Any additional sites of concern should be inventoried and evaluated for potential problems that could be caused by storms. Sites may include, but are not limited to, gas stations, chemical companies, tank farms, facilities with fuel tanks, sources of chemical or infectious waste (e.g., hospitals or animal farms) or those with combined sewer/storm-water systems, septic tanks or cesspools that may fail or become overloaded during extreme flooding.

  Response: The processes involved in contaminant mobilization during extreme flooding are understood, and do not need to be quantified on a location specific basis in order to demonstrate the environmental benefit of coastal storm risk reduction. General impacts will be discussed within the revised Draft HSGRR/EIS.

- If not already completed, the USACE should contact agencies that were involved in the relief work that was completed after past storms to identify problems relating to hazardous, toxic and radioactive waste that were created by past storms and how they were addressed. This information should be used to help identify precautions during the construction phase, and potential design elements, that can be integrated into the TSP to help prevent potential problems that may occur in the future.

  Response: Section 7.20.4 of the HSGRR/EIS states:

  Following Hurricane Sandy, New York DEP undertook a study to understand the impact of the storm on sites that store hazardous substances, in accordance with Local Law 26 of 1988, more commonly known as the NYC Right-to-Know Law. Of 367 facilities that had filed reports under Local Law 26, 46 facilities were severely affected by Sandy, but reported no spills and showed no evidence of spills. Only 11 facilities reported spills related to Hurricane Sandy, but the spills had been cleaned up by the facility prior to DEP inspection or spills were completely washed out by the storm. The DEP study concluded that though the lack of evidence of contamination may indicate that the impacted businesses had secured these chemicals sufficiently prior to Sandy or adequately remediated their sites post-storm, it also may reflect the particular reality of Sandy, as the high volume of water may have diluted and washed away any spills that occurred.

  As noted in the EPA-letter full paragraph above, HTRW sites for the Atlantic Shoreline and Jamaica Bay components are identified and mapped in Section 4.15 of the Environmental Appendix. Impacts on legacy HTRW sites in the Jamaica Bay portion of the study area relative to the Jamaica Bay storm surge barrier will be evaluated as part of NYNJHATS. Any impacts relative to the high frequency flooding risk reduction features

being developed as part of the TSP will be evaluated in the revised Draft HSGRR/EIS. Regarding HTRW sites located within the Atlantic Shorefront portion of the study area, project alignments will specifically avoid impinging on those sites as plans are drafted in the planning, engineering, and construction phase.

Environmental Justice

Page 145 of the document states:

> Based on a demographic analysis of the study area (presented in section 7: Environmental Consequences) and based on findings of an environmental justice review, the TSP would not have a disproportionately high and adverse impact on any low-income or minority population. USACE has determined that the TSP will provide short- and long-term benefits to disappropriated populations by protecting infrastructure resources (e.g. housing, transportation, and commercial/retail/recreational facilities) from damage caused by coastal storms.

EPA conducted an evaluation of the area using EJSCREEN, a screening tool that uses a nationally consistent dataset to identify areas of potential EJ concern. The report generated from the tool indicated that there are several potential EJ concerns within the project area. In reviewing EJ Indices at or above the 80th percentile, which likely warrant further review/investigation, EPA found that the indices for PM 2.5, Ozone, NATA Respiratory Hazard Index, Traffic Proximity and Volume, Superfund Proximity, and Water Discharger Proximity were all 80% or higher, indicating potential areas of concern.

The FEIS should include greater detail on the demographics data, the environmental data and the sources of the data that were used in reaching the determination that there will be no disproportionately high adverse impacts on any low-income or minority populations. Information should also be included concerning the geographic scope of the EJ analysis so the public can have a better idea of what is being considered in the EJ assessment. This information will allow for a more thorough evaluation of potential EJ impacts.

> Response: The revised Draft HSGRR/EIS will update Section 2.3.16 Socioeconomic Considerations to include the use of the EJSCREEN tool to identify the issues and areas of potential concern as part of the existing conditions. In addition, analyses to clarify the geographic scope of the EJ analysis, citations for the environmental data, and identification of the sources of the data that were used in reaching the determination will be added to Section 7.23 Socioeconomics and Environmental Justice in the revised Draft HSGRR/EIS.

Children's Health

EPA would like to emphasize that Executive Order 13045 on Children's Health and Safety directs each federal agency, to the extent permitted by law and appropriate, to make it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children, and to ensure that its policies, programs, activities, and standards address these risks. Analysis and disclosure of these potential effects under NEP A is necessary because some physiological and behavioral traits of children render them more susceptible and vulnerable than adults to environmental health and safety risks. Children may have higher exposure levels to contaminants (through pathways such as degraded water quality or contaminants exposed during

construction) because they generally eat more food, drink more water, and have higher inhalation rates relative to their body size. Also, children's normal activities, such as putting their hands in their mouths or playing on the ground, can result in higher exposures to contaminants as compared with adults. In addition, a child's neurological, immunological, digestive, and other bodily systems are also potentially more susceptible to exposure-related health effects. It has been well established that lower levels of exposure can have negative toxicological effects in children as compared to adults, and childhood exposure to contaminants can have long-term negative health effects. The DEIS did not include a dedicated section addressing Children's Health, and only stated that "it has been determined that children in the project areas would not likely experience any adverse effects from the TSP." EPA does not question the validity of this statement, however, further detail is required. It is unclear whether the evaluation that was completed included the construction phase of this project, or evaluated aspects such as the potential for degraded water quality as a result of impacts from the proposed floodgate. A dedicated Children's Health section should be included in the FEIS and the evaluation included should be of greater scope and detail than what was included in the HSGRR/EIS.

Response: The revised HSGRR/EIS will include a dedicated section addressing the impact of TSP implementation on children's health. For example, schools and playgrounds in the vicinity of construction rights of way and lay-down areas will be identified, and avoided. The preferred alternative should not result in any adverse environmental or health impacts to children. Health and safety concerns would be primarily related to construction activities. Construction of most new facilities; however, would occur in areas where no children reside or would be present. Furthermore, appropriate barriers would be constructed and signage installed to prevent accidental incursion of children into dangerous work sites. Assuming the project as proposed meets the required federal, state and local permitting requirements outlined in the EIS, required mitigation measures should minimized the amount of criteria pollutants emitted to the environment, thereby reducing the potential for sensitive populations, such as children, to be exposed to unhealthy levels of environmental contaminants.

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Planning Division

July 20, 2018

Mr. Louis A. Chiarella
United States Department of Commerce
National Oceanic and Atmospheric Administration
National Marine Fisheries Service
55 Great Republic Drive
Gloucester, Massachusetts 01930-2276

Subject: Responses to Comments on the Draft General Reevaluation Report / Environmental Impact Statement (GRR/EIS) for the East Rockaway Inlet to Rockaway Inlet Hurricane Sandy Reformulation Study

Dear Mr. Chiarella:

The U.S. Army Corps of Engineers (USACE), New York District (District) is in receipt of your letter, dated 1 December 2016, submitting comments on the East Rockaway Inlet to Rockaway Inlet and Jamaica Bay Draft Integrated Hurricane Sandy General Reevaluation Report and Environmental Impact Statement (HSGRR/EIS).

As a result of the significance (extent and content) of partner, agency and public comments received on the proposed project, as well as the feedback to the District resulting from the concurrent policy and technical review that was conducted by USACE Headquarters (HQUSACE), the District, in coordination with New York State Department of Environmental Conservation (NYSDEC) as our non-federal Sponsor, has determined a revised draft HSGRR/EIS is required to document the changes and USACE response to these extensive comments before proceeding to a final decision document.

The Agency Decision Milestone (ADM) resulted in the decision to move all further evaluation of the proposed storm surge barrier measure within Jamaica Bay, a significant component of the Tentatively Selected Plan (TSP), to the ongoing New York and New Jersey Harbor and Tributaries (NYNJHATs) Feasibility Study (NYSDEC and NJDEP are the non-federal sponsors, with the partnership of New York City). The NYNJHATs Study was initiated in the Summer of 2016 around the same time as the release of the Rockaway Reformulation Draft GRR/EIS. The NYNJHATs Study is evaluating large-scale regional coastal storm risk management (CSRM) strategies for the New York/New Jersey metropolitan area (which includes Jamaica Bay) extending upstream of the Hudson River to the federal lock and dam at Troy, New York, the Passaic River to the Dundee Dam, and the Hackensack River to the Oradell Dam. The NYNJHATs study is evaluating a suite of storm surge barriers, including one alignment from Breezy Point to Sandy Hook that would obviate the need for the proposed Jamaica

Bay barrier. Therefore, from a plan formulation perspective, it makes sense to evaluate the storm surge barrier, previously a component of the Rockaway Reformulation, in this newer regional study instead.

Moving the barrier component to the NYNJHATs Study has other strategic advantages as well. Namely, that more analysis is needed and that the required analysis should not delay construction of the more readily implementable Atlantic Shorefront and 'Residual Risk' measures in Jamaica Bay. Part of why more environmental analysis was deemed necessary for the barrier component is that the level of detail available to date was still largely conceptual.

The Project Delivery Team has been working with to further refine and develop the 'Residual Risk' measures in the Back-Bay, now termed *high frequency flooding risk reduction features* (HFFRRFs), in order to bring them up to full feasibility level of design and environmental analysis, and to include natural and nature-based features, as well as areas outside of New York City in Nassau County.

Thank you for the continued assistance and input to this process which helps to advance the execution of this regionally-significant project. Points of contact for the study are Planner and Biologist, Daria Mazey, at 917-790-8726 or the Project Manager, Dan Falt, at 917-790-8614.

Sincerely,

Clifford S. Jones III
Chief, Planning Division

Enclosure

cc: Marrone; NMFS
Greene; NMFS

Pertinent Text and Responses to Comment Letter

We have reviewed the integrated Draft Hurricane Sandy General Reevaluation Report and Draft Environmental Impact Statement (DHSGRR/DEIS) and the Essential Fish Habitat (EFH) assessment , both dated August 2016, for the East Rockaway Inlet to Rockaway Inlet and Jamaica Bay Reformulation Study. The project area consists of the Atlantic coast of New York City between East Rockaway Inlet and Rockaway Inlet, and the water and lands within and surrounding Jamaica Bay, including the Coney Island section of Brooklyn.

The Tentatively Selected Plan (TSP) described in the DHSGRR/DEIS includes reinforced dune and berm construction, in conjunction with new groins and the modification of existing groins, in select locations along the Atlantic Ocean shoreline; a line of protection along Jamaica Bay and Rockaway Inlet with a storm surge barrier at one of two identified potential alignments; flood gates at Sheepshead Bay and Gerritsen Inlet; and residual risk features in locations surrounding Jamaica Bay, of which five of the identified 26 locations currently have available detail. The beach nourishment portion of the project will require approximately 804,000 cy of material for the initial placement, with a four year renourishment cycle of approximately 1,012,000 cy. The material will be dredged from an 1,830 acre offshore borrow area, two miles south of Long Island, NY and six miles east of Rockaway Inlet.

> Response: It should be noted that the storm surge barrier feature (Jamaica Bay component) is now being evaluated under the New York and New Jersey Harbor and Tributaries Study (NYNJHATS) as a potential CSRM measure for the Jamaica Bay area. This includes all features previously selected for Jamaica Bay, including the line of protection along Jamaica Bay, the storm surge barrier, and flood gates at Sheepshead Bay and Gerritsen Inlet. The remaining Atlantic shoreline components are moving forward under the East Rockaway Inlet to Rockaway Inlet and Jamaica Bay Hurricane Sandy General Reevalution Report.

The Fish and Wildlife Coordination Act (FWCA) and the Magnuson-Stevens Fishery Conservation and Management Act (MSA) require federal agencies to consult with us on projects such as this that may adversely affect EFH and other aquatic resources. This process is guided by the requirements of our EFH regulation at 50 CFR 600.905, which mandates the preparation of EFH assessments, lists the required contents of EFH assessments, and generally outlines each agency's obligations in this consultation procedure.

Aquatic Resources

Fish and Wildlife Coordination Act

Rockaway Inlet provides access to Jamaica Bay and its tributaries for many aquatic species including both state and federally managed species and their forage, such as American lobster (*Homarus americanus*), Atlantic butterfish (*Peprilus triacanthus*), Atlantic croaker (*Micropogonias undulatus*), Atlantic menhaden (*Brevoortia tyrannus*), Atlantic sea herring (*Clupea harengus*), Atlantic silverside (*Menidia menidia*), bay anchovy (*Anchoa mitchilli*), black sea bass (*Centropristis striata*), bluefish (*Pomatomus saltatrix*), killifish (*Fundulus spp*.), little skate (*Leucoraja erinacea*), red hake (*Urophycis chuss*), scup (*Stenotomus chrysops*), spot (*Leiostomus xanthurus*), striped bass (*Marone saxatilis*), summer flounder (*Paralichthys*

dentatus), tautog (*Tautoga onitis*), weakfish (*Cyanoscion regalis*), windowpane flounder (*Scophthalmus aquosus*), winter flounder (*Pseudopleuronectes americanus*), winter skate (*Leucoraja ocellata*), and other assorted baitfishes and shrimps (e.g., *Neomysis americana, Mysidopsis bigelowi*).

Diadromous Fishes

Anadromous species such as alewife (*Alosapseudoharengus*), blueback herring (*Alosa aestivalis*), American shad (*Alosa sapidissima*), and striped bass transit the inlet of the project area to reach spawning and nursery habitat in the freshwater portions of the system. Alewife and blueback herring, collectively known as river herring, spend most of their adult life at sea, but return to freshwater areas to spawn in the spring. Both species are believed to be repeat spawners, generally returning to their natal rivers (Collette and Klein-MacPhee 2002). In the Mid-Atlantic, landings have declined dramatically since the mid-1960s and have remained very low in recent years (ASMFC 2007). Because landing statistics and the number of fish observed on annual spawning runs indicate a drastic decline in alewife and blueback herring populations throughout much of their range since the mid-l960s, river herring have been designated as a Species of Concern by NOAA. Species of Concern are those species about which we have concerns regarding status and threats, but for which insufficient information is available to indicate a need to list the species under the Endangered Species Act. We wish to draw proactive attention and conservation action to these species.

Catadromous American eel (*Anguilla rostrata*) spawn in the Sargasso Sea, transit inlets as elvers and move into estuarine and freshwater habitats within coastal embayments. They inhabit these areas until they return to the sea through those inlets as adults. According to the 2012 benchmark stock assessment, the American eel population is depleted in U.S. waters. The stock is at or near historically low levels due to a combination of historical overfishing, habitat loss, food web alterations, predation, turbine mortality, environmental changes, toxins and contaminants, and disease (ASMFC 2012).

Shellfish

Shellfish occur in the nearshore portion of the project area such as hard clam (*Mercenaria mercenaria*), soft shell clam (*Mya arenaria*), blue mussel (*Mytilus edulis*), oyster (*Crassostrea virginica*), blue crab (*Callinectes sapidus*), and horseshoe crab (*Limulus polyphemus*). Surf clam (*Spisula solidissima*), razor clam (*Ensis directus*), and tellin (*Tellina agillis*) occur in the vicinity of the offshore borrow area. However, surveys conducted by the USACE in 2003 and by the NYSDEC in 2012 indicate that the borrow area itself contains very small, to no, localized populations of surf clam. It is the intent of the USACE to conduct another survey in the borrow area prior to the utilization of the borrow area and to notify NMFS prior to commencement of each dredging event, prior to the solicitation of bids, to ensure that our EFH conservation recommendations remain valid and that impacts to surf clams are minimized.

Coen and Grizzle (2007) discuss the ecological value of shellfish habitat to a variety of managed species (e.g. American lobster, American eel, and winter flounder) and have suggested its designation as EFH for federally managed species. Clams are a prey species for a number of federally managed fish including skates, bluefish, summer flounder and windowpane; siphons of hard clams provide a food source for winter flounder and scup (Steimle et al. 2000). Infaunal species such as clams filter significant volumes of water,

effectively retaining organic nutrients from the water column (Nakamura and Kerciku 2000; Forster and Zettler 2004).

Blue mussels and oysters are found along shorelines attached to hard substrates, are an important food resource for fish and birds, and as filter feeders improve water quality (Bain et al. 2007, Waldman 2008). Reef forming species such as blue mussels and oysters support an increased diversity of finfish and invertebrates, cycle material between the water column and substrate and have the potential to enhance water quality (Dewey 2000; Nakamura and Kerciku 2000; Coen and Grizzle 2007; McDermott et. al. 2008). Further, blue mussels are an important prey item for many animals in the Mid-Atlantic region (Newell 1989). Steimle et al (2000) reported that blue mussel spat were components of the diets of winter flounder, scup, black sea bass and tautog.

Although no known oyster reefs exist in the project area presently, scattered live oysters can be found in certain areas, indicating the presence of isolated populations. New York City Department of Environmental Protection, in collaboration with Cornell University's Cooperative Extension Service, constructed pilot oyster reef sites in Jamaica Bay in late 2010 by establishing a spat-on shell reef at Dubos Point and placing spat-covered reef balls in Gerritsen Creek. Both sites were monitored through 2012 and exhibited healthy oyster growth and survival, as well as a high degree of utilization by natant macrofauna (USACE 2016).

Jamaica Bay and Rockaway Inlet provide spawning, nursery, foraging, and overwintering habitat for blue crabs, which are commonly found in subtidal bottom and oyster reef habitats and are important food resources for predatory fish and birds (Bain et al. 2007, Waldman 2008). The blue crab winter dredge fishery in New York is concentrated in the lower portion of New York Harbor, including Rockaway Inlet (Briggs 1998). Horseshoe crabs use multiple habitats along the shoreline of the project area, including subtidal bottoms, intertidal mudflats, and sandy beaches. They are a key food resource for a variety of estuarine organisms, and their eggs provide food for migrating red knots, a federally endangered bird (Botton et al. 2006).

Magnuson Stevens Fisheries Management and Conservation Act (MSA)

The project area has been designated as EFH for a number of federally managed species including Atlantic butterfish, Atlantic salmon (*Salmo salar*), Atlantic sea herring, black sea bass, bluefish, cobia (*Rachycentron canadum*), king mackerel (*Scomberomorus cavalla*), little skate, long-finned squid (*Loligo pealei*), monkfish (*Lophius americanus*), pollock *(Pollachius virens*), red hake, scup, Spanish mackerel (*Scomberomorus maculates*), summer flounder, whiting (*Merluccius bilinearis*), windowpane flounder, winter flounder (*Pseudopleuronectes americanus*), and winter skate.

The project area is also EFH for several highly migratory species including blue shark (*Prionace glauca*), dusky shark (*Carcharhinus obscurus*), sandbar shark (*Carcharhinusplumbeus*), and sand tiger shark (*Odontaspis taurus*). Sand tiger and dusky sharks have also been listed as Species of Concern by NOAA.

The MSA requires federal agencies to consult us on projects such as this that may affect EFH adversely. This process is guided by the requirements of our EFH regulation at 50 CFR 600.905, which mandates the preparation of EFH assessments, lists the required contents of EFH assessments, and generally outlines each agency's obligations in this consultation

procedure.

The EFH final rule published in the Federal Register on January 17, 2002, defines an adverse effect as: "any impact which reduces the quality and/or quantity of EFH." The rule further states that:

> An *adverse effect may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat and other ecosystems components, if such modifications reduce the quality and/or quantity of EFH Adverse effects to EFH may result from action occurring within EFH or outside EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.*

The EFH assessment included in the HSGRR/DEIS does not evaluate adequately all of the potential impacts to EFH that could result from implementation of the TSP. EFH for coastal locations was provided, but the assessment should be revised to include EFH for the Hudson River/Raritan Bay/Sandy Hook Bay estuary complex, such as EFH designations for larval Atlantic herring and spawning adult winter flounder and windowpane flounder.

> Response: The revised HSGRR/DEIS will consider the cumulative effects to EFH resources across the geographic range of hurricane storm risk reduction projects that includes the Hudson River/Raritan Bay/Sandy Hook Bay estuary complex.

The assessment HSGGR/DEIS lacks any discussion of the specific details of the project components including impacts to the hydrology and ecology of Jamaica Bay, Sheepshead Bay, Gerritson Creek, Mill Creek and Shellbank Creek as a result of the installation of the storm surge barrier and storm gates, and impacts to EFH from these structures and the other components of the proposed line of protection. The assessment also does not describe the areal extent of sand placement below the high tide line and the amount and extent of dredging within the inlet associated with the beach renourishment component of the project. The absence of these details prevents a full evaluation of the direct, indirect, individual and cumulative effects of all of the actions proposed.

> Response: The storm surge barrier feature (Jamaica Bay component) is now being evaluated under the New York and New Jersey Harbor and Tributaries Study (NYNJHATS) as a potential CSRM measure for the Jamaica Bay area. This includes all features previously selected for Jamaica Bay, including the Jamaica Bay shoreline CSRM components and tie-ins to the barrier along Jamaica Bay.
>
> Additional water quality modeling has been conducted to analyze a range of potential impacts up to the worst case scenario for water quality impacts of a barrier in Jamaica Bay. The NYNJHATS will describe the Jamaica Bay Eutrophication Model (JEM) that was used to analyze potential water quality impacts (JEM documentation has been revised in recent months).
>
> The revised EFH analysis will describe the areal extent of sand placement below the high tide line associated with the beach renourishment component of the project.

As a result, we must consider the assessment to be incomplete. In addition, based upon the scope of the project, including the storm surge barrier and the significant impacts to EFH and

other aquatic resources that will result from its construction, an expanded EFH consultation as described in 50 CFR 600.920 (f) is warranted. An expanded consultation process allows the maximum opportunity for us to work together to review the action's impacts on EFH, and to develop EFH consultation recommendations. Under the expanded consultation procedures, we are allowed 60 calendar days to review, comment, and respond to the information that has been provided to us.

To initiate the expanded EFH consultation, a full and complete evaluation of the direct, indirect, individual and cumulative effects of the construction and operation of all of the project components on EFH should be provided. The required components of the EFH assessment include a description of the action; an analysis of the potential adverse effects of the action on EFH and the managed species; the federal agency's conclusions regarding the effects of the action on EFH; and proposed mitigation, if applicable. As part of the expanded consultation, the assessment should also include additional information such as results of on-site inspections, views of recognized experts, a review of pertinent literature, an analysis of alternatives and any other relevant information should be included.

Response:

The District anticipates that there may be a variety of impacts to Essential Fish Habitat (EFH) as a result of the implementation of the revised TSP; some may be temporary and related to construction activities and some may be permanent due to changes in habitat types.

As project plans are further developed in the Pre-Engineering and Design Phase, the District will coordinate with NOAA Fisheries and undertake project specific EFH consultation so that the effects of the individual actions can be evaluated and site-specific EFH conservation recommendations can be developed. The District requests your review and confirmation of concurrence with this overall assessment and path forward.

Potential Project Impacts

Storm Surge Barrier and Storm Gates

Impacts to Hydrology

Rockaway Inlet provides a hydrologic connection between the Atlantic Ocean and the Jamaica Bay estuary. Tidal flushing regulates local salinity regimes, facilitates nutrient and sediment transport, and ameliorates hypoxic and anoxic conditions. Due to heavy urbanization of the Jamaica Bay watershed, industrial effluent, sewage discharges, chemical and oil spills, and storm water runoff impact water quality within the estuary. While nitrogen and phosphorus are typically limiting nutrients in estuarine ecosystems, their concentration in Jamaica Bay is exacerbated by large volumes of effluent from four wastewater treatment plants (NPS 2013); these high nutrient levels contribute to low dissolved oxygen in the estuary. A decrease in frequency or volume of tidal flushing would likely adversely impact an already fragile ecosystem.

The 3,970 ft storm surge barrier proposed in the TSP across Rockaway Inlet will have a 1,100 ft gate opening, seven 100 ft wide vertical lift gates, and two 200 ft wide sector gates. According to the DHGSRR/DEIS, preliminary modeling has been conducted on the impact of the storm surge barrier on hydrology within the Jamaica Bay system, resulting in two

alternatives for the inlet gate structure. Construction of the gate using either alternative will have both short- and long-term impacts on the inlet and estuary.

Short-term adverse effects will result from construction, while long-term impacts will include habitat loss within the footprint of the barrier, as well as changes in flow velocities, tidal amplitude and flow, sediment transport, and deposition. More detailed hydrologic modeling should be conducted to provide additional information on impacts to the system in terms of changes in tidal regime, flow velocity, scour, sedimentation rates, and current patterns, as well as the effects of the storm barrier on the ecology and water quality of Jamaica Bay.

Little information is provided on the proposed storm gates across Sheepshead Bay and Gerritson Inlet. As with the proposed storm barrier across Rockaway Inlet, the effects of the storm gates proposed for Sheepshead Bay and Gerritson Inlet on EFH and the other aquatic resources and habitat of Sheepshead Bay and Gerritson, Mill and Shellbank Creek should also be evaluated and similar modeling should be undertaken.

> Response: The storm surge barrier feature (Jamaica Bay component) is now being evaluated under the New York and New Jersey Harbor and Tributaries Study (NYNJHATS) as a potential CSRM measure for the Jamaica Bay area. This includes all features previously selected for Jamaica Bay, including the line of protection along Jamaica Bay.
>
> Additional water quality modeling has been conducted to analyze a range of potential impacts up to the worst case scenario for water quality impacts of a barrier in Jamaica Bay. The NYNJHATS will describe the Jamaica Bay Eutrophication Model (JEM) that was used to analyze potential water quality impacts.

Impacts on Fishes and EFH

Rockaway Inlet serves as the conduit for planktonic exchange and related movements ·of diadromous species, estuary dependent fishes, and invertebrates between the ocean and the estuary and its tributaries. Both temporary in-water work and permanent structures within the inlet can impede the movement of fish into and out of the estuary. A permanent structure such as a storm surge barrier can constrict flow into and out of the system and affect the circulation within the system.

Summer flounder may be impacted adversely by the in-water work and hard structure proposed for Rockaway Inlet. In a study of larval movements at Indian River Inlet, Delaware, Targett and Rhodes (2008) found that ingress of summer flounder larvae peaked bimodally in December and mid-January with collections continuing through April. Movement into the estuary may involve intermittent settling to take advantage of tidal stream transport before permanent settlement once metamorphosis is complete (Able and Fahay 1998). Residual bottom inflow, a result of more dense oceanic water intruding beneath more buoyant outflow, provides some fishes with a mechanism of ingress (Weinstein et al., 1980 in Rhodes 2008). Miller et al. (1984) proposed that to gain entry into North Carolina inlets, spot (Leiostomus xanthurus), Atlantic croaker, summer flounder, and southern flounder (Para/ichthys lethostigma) remain near the bottom (Rhodes 2008). The placement of the storm surge barrier across Rockaway Inlet will restrict fish ingress and egress through the inlet to the vertical lift and sector gates. Benthic migrations through the open gates will be further impeded by the

bottom structure of the storm surge barrier.

Winter flounder also transit inlets to reach spawning areas within mid-Atlantic estuaries when water temperatures begin to decline in the fall. Tagging studies show that most return repeatedly to the same spawning grounds (Lobell 1939, Saila 1961, Grove 1982 in Collette and Klein- MacPhee 2002). Winter flounder typically spawn in the winter and early spring, although the exact timing is temperature dependent and thus varies with latitude (Able and Fahay 1998), however movement into these spawning areas may occur earlier, generally from mid- to latei November through December (B. Phelan, personal communication 2014). Winter flounder have demersal eggs that sink and remain on the bottom until they hatch. After hatching, the larvae are initially planktonic, but following metamorphosis they assume an epibenthic existence. Winter flounder larvae are negatively buoyant (Pereira et al. 1999), and are typically more abundant near the bottom (Able and Fahay 1998). These life stages are less mobile and thus more likely to be adversely affected adversely by any impact to benthic habitat. The placement of the storm surge barrier across Rockaway Inlet will result in the permanent loss of winter flounder EFH associated with the footprint of the structure, as well as a reduction in access to the spawning areas in Jamaica Bay.

Seasonal in-water work restrictions may be necessary to protect EFH and other NOAA trust resources, particularly if a storm surge barrier is constructed. This includes a seasonal in-water work restriction from January 15 to May 31 for construction activities within EFH for winter flounder early life stages. In addition, construction activities that generate noise or turbidity may impede the migration of diadromous fishes to their upstream spawning and nursery grounds. In- water work should be avoided from March 1 to June 30 of each year to minimize adverse effects to migrating diadromous fishes. Any in-water work undertaken at other times of the year should be designed to allow movement of fish past the work site.

Further study should consider whether any solution to reduce the risk to communities and infrastructure from storms may impact species access and movements, and how such effects can be avoided or minimized. Access does not only include the ability to enter the estuary but also movements within the estuary and its tributaries.

> Response: The storm surge barrier feature (Jamaica Bay component) is now being evaluated under the New York and New Jersey Harbor and Tributaries Study (NYNJHATS) as a potential CSRM measure for the Jamaica Bay area. This includes all features previously selected for Jamaica Bay, including the line of protection along Jamaica Bay.

Wetlands

Tidal wetlands are essential for healthy fisheries, coastlines, and communities, and are an integral part of our economy and culture. Wetlands also provide essential food, refuge, and nursery habitat for federally managed and NOAA Trust species, including striped bass, alewife and blueback herring. Salt marshes provide habitat for fiddler crabs and other intertidal benthic species, and provide foraging grounds for wading birds, shorebirds, waterfowl, estuarine fishes, and blue crabs. Estuarine marsh grasses provide many ecological functions to the wetland and the adjacent waters, including a source of organic nutrients, stability of the sediments, and absorption of contaminants. The shallows provide nursery habitat for many species of fish including winter flounder and summer flounder.

Summer flounder larvae migrate inshore into estuarine nursery areas, settling to the bottom of marsh creeks to transform to their juvenile stage. These juveniles will then make extensive use of the creeks, preying on creek fauna such as Atlantic silversides and mummichogs. Juvenile summer flounder may also be found in salt marsh cord grass habitat during flood tides. Juveniles use the marsh edges for shelter, burying themselves in the muddy substrates. Keefe and Able (1992 in Packer et al. 1999) found that summer flounder juveniles that inhabit marsh creeks exhibit the fastest growth.

The primary production in wetlands forms the base of the food web that supports invertebrates and forage fish that are then prey species for larger fish such as bluefish. Surface water retention and detention and ground water recharge provides flood control services to the surrounding community. Wetlands may help to moderate global climate change through carbon storage in wetland plant communities and soil.

Jamaica Bay is regionally significant for shellfish and marine, estuarine, and anadromous fishes, as well as for its significant migratory and wintering waterfowl concentrations. The wetlands and uplands in the bay are important as fish nursery areas and foraging areas for shorebirds and waterbirds. Wetlands in the project area perform many important ecological functions including water storage, nutrient cycling and primary production, sediment retention, water filtration or purification, and groundwater recharge.

Although no wetland loss was proposed in the TSP, long-term impacts on wetlands in the Jamaica Bay estuary due to the storm surge barrier have not been identified. The estuary is subject to severe anthropogenic impacts, and has incurred a loss of 63% of wetlands between 1951 and 2003. During this time period, the rate of marsh loss increased from 17 acres lost per year during 1951 - 1974 to 33 acres lost per year during 1989 -2003 (NPS 2007). Marsh islands were lost at a rate of 47 acres per year from 1994 to 1999 (USACE 2016). The loss of wetlands as a result of this project could therefore adversely affect resources of concern to NMFS species through the loss of nursery, forage, and refuge habitat, the reduction of prey species and primary production, as well as water quality degradation from the reduction in sediment retention and pollution filtration. Vegetated wetlands are also considered to be special aquatic sites under the Clean Water Act. Because of their ecological value, impacts on these special aquatic sites should be avoided and minimized.

> Response: The storm surge barrier feature (Jamaica Bay component) is now being evaluated under the New York and New Jersey Harbor and Tributaries Study (NYNJHATS) as a potential CSRM measure for the Jamaica Bay area. This includes all features previously selected for Jamaica Bay, including the line of protection along Jamaica Bay.

Beach Nourishment and Dredging

The dredging of sand for beach nourishment has the potential to impact both the EFH of a particular species as well as the organisms themselves in a variety of ways. Dredging can result in the impingement of eggs and larvae in the dredge plant and create undesirable suspended sediment levels in the water column. Increased suspended sediment levels can reduce dissolved oxygen, mask pheromones used by migratory fishes, and smother immobile benthic organisms and newly-settled juvenile demersal fish (Auld and Schubel 1978; Breitburg 1988; Newcombe

and MacDonald 1991; Burton 1993; Nelson and Wheeler 1997). Sustained water column turbulence can reduce the feeding success of sight-feeding fish such as winter flounder and summer flounder.

Dredging can remove the substrate used by federally managed species as spawning, refuge, and forage habitat. Benthic organisms that are food sources for federally managed species may so be removed during dredging. These impacts may be temporary if the substrate returns to preconstruction condition and the benthic community recovers with the same or similar organisms. The impacts may be permanent if the substrate is altered in a way that reduces suitability as habitat, and' if the benthic community is altered in a way that reduces its suitability as forage.

As part of the borrow site screening process, the Corps has proposed to avoid dredging in sections of the borrow area identified as prominent shoal habitats such as the "Seaside Lumps" and "Fish Havens" areas. Overall, the dredging and placement of sand along the coastline will have some adverse effects on EFH and federally managed species due to the entrainment of early life stages in the dredge, alteration or loss of benthic habitat and forage species, and altered forage patterns and success due to increased, noise, turbidity and sedimentation. We agree that some effects will be temporary and others can be minimized using some of the management practices mentioned in the EFH assessment, such as dredging in the fall to avoid sensitive life stages of certain species, not dredging deep holes and leaving similar substrate in place to allow for recruitment.

Dredging in the borrow area can also affect EFH adversely through impacts to prey species. The EFH final rule states that the loss of prey may be an adverse effect on EFH and managed species because the presence of prey makes waters and substrate function as feeding habitat; the definition of EFH includes waters and substrate necessary to fish for feeding. Steimle et al. (2000) reported that winter flounder diets include the siphons of surf clams (*Spisula solidissima*). As a result, activities that adversely affect surf clams can adversely affect the EFH for winter flounder by reducing the availability of prey items. Therefore, actions that reduce the availability of prey species, either through direct harm or capture, or through adverse impacts to the prey species' habitat, may also be considered adverse effects on EFH.

According to the DHSGRR/DEIS, the offshore borrow area provides habitat for surf clams, however surveys conducted by the USACE in 2003 and by the NYSDEC in 2012 indicate that the borrow area itself contains very low to no localized populations of surf clams. Another survey is proposed prior to the use of the borrow area. It is unclear whether the intent is to survey just once prior to implementation of the entire project or before each dredging cycle. To ensure that impacts to surf clams are minimized, the borrow areas should be surveyed prior to each dredging cycle and areas of high densities should be avoided. Copies of the shellfish survey results should also be provided to us prior to any dredging in the borrow area.

> Response: The revised DHSGRR/DEIS will include a definitive survey schedule that will be used throughout project construction for each dredging cycle. After the completion of surveys, copies of the results will be provided to NMFS.

The Mid-Atlantic Fisheries Management Council (MAFMC) has developed a policy statement on beach nourishment activities that may affect federally managed species under their purview including summer flounder, scup, black sea bass, monkfish and butterfish. These policies are intended to articulate the MAFMC's position on various development activities and facilitate

the protection and restoration of fisheries habitat and ecosystem function. The MAFMC's policies on beach nourishment are:

1. Avoid sand mining in areas containing sensitive fish habitats (e.g., spawning and feeding sites, hard bottom, cobble/gravel substrate, shellfish beds).
2. Avoid mining sand from sandy ridges, lumps, shoals, and rises that are named on maps. The naming of these is often the result of the area being an important fishing ground.
3. Existing sand borrow sites should be used to the extent possible. Mining sand from new areas introduces additional impacts.
4. Conduct beach nourishment during the winter and early spring, when productivity for benthic infauna is at a minimum.
5. Seasonal restrictions and spatial buffers on sand mining should be used to limit negative impacts during fish spawning, egg development, young-of-year development, and migration periods, and to avoid secondary impacts to sensitive habitat areas such as SAV.
6. Preserve, enhance, or create beach dune and native dune vegetation in order to provide natural beach habitat and reduce the need for nourishment.
7. Each beach nourishment activity should be treated as a new activity (i.e., subject to review and comment), including those identified under a programmatic environmental assessment or environmental impact statement.
8. Bathymetric and biological monitoring should be conducted before and after beach nourishment to assess recovery in beach borrow and nourishment areas.
9. The effect of noise from mining operations on the feeding, reproduction, and migratory behavior of marine mammals and finfish should be assessed.
10. The cost effectiveness and efficacy of investments in traditional beach nourishment projects should be evaluated and consider alternative investments such as non-structural response and relocation of vulnerable infrastructure given projections of sea level rise and extreme weather events.

The MAMFC's policies should be incorporated in the final design of this project and its long-term management plan.

Response: The MAMFC's policies listed above will be incorporated in the final design and long- term management plan to the maximum extent practicable

Mitigation

Two mitigation projects, previously identified as high priority restoration projects by the Hudson-Raritan Estuary Comprehensive Restoration Plan, are tentatively proposed to offset a loss of 154 acres of fish and wildlife habitats. The two proposed projects are the Floyd Bennett Field Wetlands Habitat Creation project and the Elders Island Project. According to the information in the DHSGRR/DEIS, these two projects would provide 247 acres of habitat to mitigate for the impacts of the TSP. The Evaluation of Planned Wetlands (EPW) and the Benthic Index of Biological Integrity (B-IBI) were used to determine that these two projects would offset the loss of ecological services resulting from the implementation of the TSP. NMFS staff were not included as part of the EPW team and the results of the EPW and B-IBI

have not been provided to us. In addition, the full extent of the potential impacts of the TSP on EFH and details of the proposed mitigation are not described fully in the DHSGRR/DEIS. As a result, it is not possible determine if the proposed mitigation will offset the adverse effects of the project on aquatic resources and EFH.

As part of the expanded EFH consultation, additional information should be provided the specific element of the proposed mitigation plans. Also, any compensatory mitigation proposed should offset any loss or degradation of EFH and other impacted aquatic resources resulting from the implementation of the TSP. The Corps should coordinate with us to develop a detailed compensatory mitigation plan in accordance with the 2008 federal mitigation rules, and provide it to us for review prior to implementation. The plan should include success criteria and a long- term management plan. The site protection mechanism and long-term land steward should also be identified.

Response:

The District anticipates that there may be a variety of impacts to Essential Fish Habitat (EFH) as a result of the implementation of the revised TSP; some may be temporary and related to construction activities and some may be permanent due to changes in habitat types.

As project plans are further developed in the Pre-Engineering and Design Phase, the District will coordinate with NOAA Fisheries and undertake project specific EFH consultation so that the effects of the individual actions can be evaluated and site-specific EFH conservation recommendations can be developed. The District requests your review and confirmation of concurrence with this overall.

Endangered Species Act

Federally listed species including the threatened loggerhead (*Coretta caretta*), and the endangered Kemp's ridley (*Lepidochelys kempi*), green (*Chelonia mydas*) and leatherback (*Dermochelys coriacea*) sea turtles and Atlantic sturgeon (*Acipenser oxyrhynchus*) may be present in the project area. Consultation, pursuant to Section 7 of the Endangered Species Act (ESA) of 1973, may be necessary. Our Protected Resources Division will be commenting on the DHSGRR/DEIS separately. Questions regarding the status of their review should be directed to Daniel Marrone at (978) 282-8465 or daniel.marrone@noaa.gov.

We look forward to our continued coordination with your office on this project as it moves forward. As stated above, because the EFH assessment provided lacks sufficient detail on each action proposed as part of the TSP, we cannot consider it to be complete. A comprehensive evaluation of the direct, indirect, individual and cumulative effects of all of the project components on EFH should be provided to us as part of an expanded EFH consultation. We are available to discuss the information needed in order to undertake this consultation. If you have any questions or need additional information, please do not hesitate to contact Ursula Howson at ursula.howson@noaa.gov or (732) 872-3116.

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT
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Planning Division

July 20, 2018

Ms. Jennifer T. Nersesian
United States Department of the Interior
National Park Service, Gateway National Recreation Area
210 New York Ave
Staten Island, New York 10305

Subject: Responses to Comments on the Draft General Reevaluation Report / Environmental Impact Statement (GRR/EIS) for the East Rockaway Inlet to Rockaway Inlet Hurricane Sandy Reformulation Study

Dear Ms. Nersesian:

The U.S. Army Corps of Engineers (USACE), New York District (District) is in receipt of your letter, dated 19 January 2017, submitting comments on the East Rockaway Inlet to Rockaway Inlet and Jamaica Bay Draft Integrated Hurricane Sandy General Reevaluation Report and Environmental Impact Statement (HSGRR/EIS).

As a result of the significance (extent and content) of partner, agency and public comments received on the proposed project, as well as the feedback to the District resulting from the concurrent policy and technical review that was conducted by USACE Headquarters (HQUSACE), the District, in coordination with New York State Department of Environmental Conservation (NYSDEC) as our non-federal Sponsor, has determined that sufficient revision to the draft report is required in order to proceed to a final decision document.

The Agency Decision Milestone (ADM) resulted in the decision to move all further evaluation of the proposed storm surge barrier measure within Jamaica Bay, a significant component of the Tentatively Selected Plan (TSP), to the ongoing New York and New Jersey Harbor and Tributaries (NYNJHATs) Feasibility Study (NYSDEC and NJDEP are the non-federal sponsors, with the partnership of New York City). The NYNJHATs Study was initiated in the Summer of 2016 around the same time as the release of the Rockaway Reformulation Draft GRR/EIS. The NYNJHATs Study is evaluating large-scale regional coastal storm risk management (CSRM) strategies for the New York/New Jersey metropolitan area (which includes Jamaica Bay) extending upstream of the Hudson River to the federal lock and dam at Troy, New York, the Passaic River to the Dundee Dam, and the Hackensack River to the Oradell Dam. The NYNJHATs study is evaluating a suite of storm surge barriers, including one alignment from Breezy Point to Sandy Hook that would obviate the need for the proposed Jamaica Bay barrier. Therefore, from a plan formulation perspective, it makes sense to evaluate

the storm surge barrier, previously a component of the Rockaway Reformulation, in this newer regional study instead.

Moving the barrier component to the NYNJHATs Study has other strategic advantages as well. Namely, that more analysis is needed and that the required analysis should not delay construction of the more readily implementable Atlantic Shorefront and 'Residual Risk' measures in Jamaica Bay. Part of why more environmental analysis was deemed necessary for the barrier component is that the level of detail available to date was still largely conceptual.

The Project Delivery Team has been working with to further refine and develop the 'Residual Risk' measures in the Back-Bay, now termed *high frequency flooding risk reduction features* (HFFRRFs), in order to bring them up to full feasibility level of design and environmental analysis, and to include natural and nature-based features, as well as areas outside of New York City in Nassau County.

Thank you for the continued assistance and input to this process which helps to advance the execution of this regionally-significant project. Points of contact for the study are Planner and Biologist, Daria Mazey, at 917-790-8726 or the Project Manager, Dan Falt, at 917-790-8614.

Sincerely,

Clifford S. Jones III
Chief, Planning Division

Enclosure

cc: Raddant-DOI

Pertinent Text and Responses to Comment Letter

Mutually Acceptable Plan

NPS appreciates that the Draft HSGRR/EIS explicitly cites future coordination with the NPS to identify a plan that is mutually acceptable. A mutually acceptable plan must be one that meets USACE project objectives, minimize adverse impacts to NPS cultural, natural and recreational resources within Gateway National Recreational Area (GATE or "park"), and mitigates for all unavoidable adverse impacts to NPS resources. Under the fundamental principles that guide the National Park Service, a mutually acceptable plan cannot result in impairment of NPS resources. In addition, the plan must be consistent with the park's enabling legislation which states "That the Secretary shall administer and protect the islands and waters within the Jamaica Bay Unit with the primary aim of conserving the natural resources, fish, and wildlife located therein and shall permit no development or use of this area which is incompatible with this purpose." The alternatives analyzed in the Draft HSGRR/EIS may have significant, persistent and irreversible adverse impacts to GATE natural, cultural and recreational resources. Potential impacts from the Tentatively Selected Plan (TSP) include the loss of coastal natural resources, alteration of natural coastal functions, alteration of the setting, feeling and association of six Historic Districts within GATE, and alteration of park visitor experiences and opportunities.

> Response: Future analyses of adverse impacts to GATE are the subject of current and ongoing coordination between the USACE and NPS. It is important to note the Jamaica Bay storm surge barrier component of the original plan presented in the Draft HSGRR/EIS is now within the scope of the NY / NJ Harbor and Tributaries Study (NYNJHATS) for further evaluation and potential recommendation. Adverse impacts cited above by NPS will be assessed within the scope of the NYNJHATS.

None of the alternatives analyzed in the plan include mitigation measures that avoid and minimize adverse impacts to NPS resources. Given the magnitude and permanence of the preferred alternative or alternative tie-in locations and the absence of identified mitigation measures, and without a full analysis of the potential impacts, the NPS can only conclude that the project as currently described in the HSGRR/EIS would result in the impairment of park resources. We consider this a starting point that can and should be rectified within the draft HSGRR/EIS, and will work with you to achieve this goal.

> Response: Planning for the avoidance and mitigation of impacts to GATE will be the subject of future coordination between the USACE and NPS. As stated above, the Jamaica Bay storm surge component of the original plan presented in the Draft HSGRR/EIS is now within the scope of the NY / NJ Harbor and Tributaries Study (NYNJHATS) for further evaluation and potential recommendation.

The draft HSGRR/EIS identifies that potential alternate tie-in alignments may be developed as part of the optimization of storm surge barrier alignment C-1E to provide flexibility for the final design to minimize effects to NPS resources and to provide for a plan that is mutually acceptable to the Secretaries of the Army and Interior. We anticipate that analysis may show that some of these alternatives, such as running the line of protection

perpendicular to the eastern edge of Riis Beach, would greatly decrease the scope and degree of impacts to park resources by avoiding the Atlantic shoreline along Riis Beach, Fort Tilden and the tip of Breezy Point. We strongly encourage you to consider these alternative alignments and analyze their relative impacts. In doing so, we would also request that there is coordination between the HSGRR/EIS and the Breezy Point and Roxbury communities' plans for protection to make sure those populations are not left vulnerable.

While we anticipate that some of the alternatives contemplated could greatly reduce impacts to park resources, we cannot formally make that determination in the absence of data and analysis. We note that alternate alignments BZ, 149, FB, and 149 & FB (listed in Table 5-18 and shown in Figures 5-13 through 5-16) were not evaluated in the Draft HSGRR/EIS. NPS will require full analysis of impacts for a mutually acceptable plan.

> Response: Alternative alignments for potential tie-in alignments for the Jamaica Bay storm surge barrier will be reassessed as part of the NYNJHATS.

It is our agency's goal to work collaboratively with USACE to arrive at a mutually acceptable plan and to implement a project that will reduce storm damage risks for NYC residents and communities; however, NPS lacks sufficient capacity to participate in the multi-year planning, design and implementation phases to the level necessary for successful development of this project. Full participation by NPS to maintain the engagement and collaboration necessary for this project will require funding for staff and technical resources that are currently not available within the NPS budget.

Impacts to Park Resources

The NPS's authority to conserve and manage park resources is derived from the Organic Act of 1916, which states that "the fundamental purpose of the said parks ...is to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." The NPS has discretion to allow impacts on park resources and values when necessary and appropriate to fulfill the purposes of a park (NPS 2006 sec. 1.4.3). However, the NPS cannot allow an adverse impact that would constitute impairment of the affected resources and values (NPS 2006 sec 1.4.3). An action constitutes an impairment when its impacts “harm the integrity of Park resources or values, including the opportunities that otherwise would be present for the enjoyment of those resources or values” (NPS 2006 sec 1.4.5). To determine impairment, the NPS must evaluate “the particular resources and values that would be affected; the severity, duration, and timing of the impact; the direct and indirect effects of the impact; and the cumulative effects of the impact in question and other impacts” (NPS 2006 sec 1.4.5). The Draft HSGRR/EIS impact analysis is not currently sufficient to meet NPS policy requirements to determine if the project would impair NPS resources. In order to be mutually acceptable, the document will need to include this analysis to demonstrate that the proposed actions do not constitute impairment.

Specific areas in need of analysis are included in the sections below, and the NPS will work with the USACE to further define these needs as necessary. Overall, there is a concern that the Tentatively Selected Plan (TSP) could have significant, persistent and irreversible adverse impacts to GATE natural, cultural and recreational resources. Buried seawalls along the Atlantic coast within sections of GATE could constitute permanent, irreversible adverse ecological impacts to fundamental natural resources; an adverse effect on several aspects of integrity of

fundamental cultural resources, including association, feeling, setting, etc.; and irreversible change for the visitor experience. As an analysis of these impacts is developed and we get a better sense of the severity, duration and timing of these impacts, we can collectively work on strategies to eliminate, minimize and/or mitigate those impacts and have those changes reflected in the final analysis in the document.

Impacts to any Fundamental Resources outlined in the park's General Management Plan are of particular concern. *Fundamental resources and values are the park's attributes-its features, systems, processes, experiences, stories, scenes, sounds, smells, opportunities for visitor enjoyment, or others-that are critical to achieving the park's purpose and to maintaining its significance* (NPS 2014). The resource values of the estuary, beaches, wetlands and maritime uplands of Jamaica Bay within the proposed plan are fundamental to GATE. *These resources provide unique and surprising opportunities for experiencing the wildness of the natural world while within the city's limits, and a model for studying, managing, and restoring urban ecosystems* (NPS 2014). The habitats that compose the Jamaica Bay ecosystems are rare in such highly developed areas and support a rich biota that includes migratory birds, marine finfish and shellfish, plant communities, and rare, threatened, and endangered species. These features provide opportunities to restore, study, enhance, and experience coastal habitats and ecosystem processes. The Draft HSGRR/EIS does not provide sufficient information and analysis to fully assess the impacts of the project on these resources.

The cultural resources of the park represent tangible manifestations of humans interacting with their environment and with each other throughout time. The history of the park's defensive military fortifications and weaponry is manifested in some of the most notable cultural resources in the park. Within the project area, the history of Fort Tilden as part of the national defense network designed to protect the New York Harbor is a fundamental value. Battery Harris, Battery Kessler, Construction Battery 220 and the Nike Missile Launch Site are fundamental park resources. The civil and military aviation history resources at Floyd Bennett Field, historic landscape at Jacob Riis Park, including the beaches, boardwalk, and bathhouse; and pre-contact archeological sites, historic archeological sites related to domestic and Military occupations of park lands, and submerged resources have been identified as important park resources and values. In addition to the National Register-listed Fort Tilden, Floyd Bennett Field and Jacob Riis Park Historic Districts, the Silver Gull Beach Club, the Breezy Point Surf Club, and the Far Rockaway Coast Guard Station have been determined eligible for the National Register by the New York State Historic Preservation Office (NPS 2014). The impact analysis must describe both physical impacts and impacts on other aspects of resource integrity such as association, feeling, setting, etc. The Draft HSGRR/EIS does not adequately characterize the national and local significance of the NPS cultural resources within the project area nor evaluate the impacts of the projects on those resources.

Response: The breadth of the effects to NPS resources at GATE are acknowledged, and will be reassessed as part of the NYNJHATS. Effects to NPS resources associated with the Atlantic Shorefront portion of the project will be reexamined in coordination with the NPS and NYSHPO. However, the Corps does not agree that "*Buried seawalls along the Atlantic coast within sections of GATE could constitute permanent, irreversible adverse ecological impacts to fundamental natural resources; an adverse effect on several aspects of integrity of fundamental cultural resources, including association, feeling, setting, etc.; and irreversible change for the visitor experie*nce." The buried seawall will be a component of "Layers of protection+ - beach + dune + structure). There will be temporary construction related impacts related the seawall, but once buried it is to remain buried and the impacted area will function as before.

Agency Decision Milestone (ADM)

The Draft HSGRRIEIS identifies that a final decision for the TSP will be made at the Agency Decision Milestone (ADM) and that the TSP may be modified particularly with regard to the alignment of the Storm Surge Barrier and risk residual features. The ADM will select a plan for feasibility-level design and recommendation for implementation. NPS will require significant additional information regarding the impacts of project in general and the alternative alignments in particular to support agency agreement on a final plan. USACE has indicated that additional modeling and analysis will occur during the design and development phase of the project that could result in further refinement of the Jamaica Bay and Rockaway Inlet components of the TSP. NPS will require results of that modeling and analysis to fully evaluate the impacts of the project on NPS resources. As explained above, it is not reasonable to expect that a mutually acceptable plan can be identified without full evaluation of impacts on NPS resources. In these comments, NPS has identified some additional analysis and revisions that will be required for the Atlantic Shorefront Component of the plan. Substantial information needs and analysis is required to fully assess the impacts of the Jamaica Bay Component and residual risk measures on NPS resources. Therefore, NPS recommends that USACE develop a Supplemental EIS (SEIS) for the Jamaica Bay Component of the HGRRJEIS and that the SEIS will provide a mutually acceptable plan for the Jamaica Bay Component at the ADM milestone of the SEIS.

Response: The USACE concurs with the recommendation to separate the Jamaica Bay storm surge barrier component from the Atlantic Shoreline component of the TSP. In lieu of preparing an SEIS, as recommended by NPS, the Jamaica Bay storm surge component will be subsumed into the NYNJHATS.

Atlantic Ocean Shorefront

The Atlantic Ocean Shorefront component of the HSGRRJEIS would extend in length 5 existing groins and construct 13 new groins. The terminal groin at Beach 149th Street has and will continue to interrupt natural littoral transport mechanisms to the beach face at Jacob Riis. Expansion of the Rockaway groin field may further disrupt sediment transport processes. The sediment starved Riis beach provides protection for the Jacob Riis Park Historic District. The loss of the beach also threatens the integrity of the cultural landscape including character defining elements such as the large scale of the beach space. Loss of sand and narrowing of these beaches has also reduced the quantity and quality of habitat available for wildlife such as the

federally threatened piping plover (Charadrius melodus) and is likely to increase the risk of human-wildlife conflicts. Lastly, the loss of sand compromises the recreational experience of the hundreds of thousands of visitors that frequent the beach every summer. Interagency Agreement Number Pl4PG00287 between the NPS and USACE provided the placement of approximately 200,000 yd^3 in 2014 to restore fundamental and other important resources and values associated with recreation, cultural landscapes, and coastal habitats for wildlife at Jacob Riis Park as an interim measure until the HSGRRJEIS was completed. The Draft HSGRR/EIS does not provide for any beach nourishment at Riis Beach (reach 2) to mitigate for the impacts of the groin field on sediment transport process west of the terminal groin at Beach 149th Street. We request that this be included as a part of the plan.

> Response: Coastal Storm Risk Management (CSRM) features for Atlantic Shorefront reaches 1 and 2 (which include Riis Beach) did not pass initial screening due to the small number of structures (0 residential, 7 non-residential – Depreciated Replacement Value $19,342,000). Preliminary analyses showed that the benefits of providing CSRM features would not exceed the costs of providing CSRM features, and not be economically justified. However, concur that the Recommended Plan cannot adversely affect NPS property, so sand placement and groin rehabilitation are proposed as a taper tie-in at the western end of the project past the terminal groin at Beach 149th Street. USACE is performing sediment transport modeling and will refine the western taper design in coordination with NPS during the Pre-Construction Engineering and Design Phase.

Storm Surge Barrier

The Draft HSGRRJEIS lacks sufficient information to evaluate the impacts of the storm surge barrier across the Rockaway Inlet from near Jacob Riis Park to Floyd Bennett Field (TSP Cl -E alignment) on NPS resources. The 3,970-foot barrier will directly impact Jacob Riis Park and Floyd Bennett Field Historic Districts and will be within the viewshed of other Districts managed by NPS. The open barrier will substantially reduce the area for water exchange and will impact the hydrology and hydrodynamics of the bay. Hydrologic changes may alter the sediment budget, sediment distribution, mobilization of contaminated sediments, as well as the area, distribution and long-term resilience of bay intertidal and subtidal habitats and the organisms associated with those habitats. Closing the barrier may have additional impacts, particularly with regard to water quality and sediment budget. The Draft HSGRR/EIS indicates that preliminary modeling identifies minimal impacts and that additional modeling will be conducted during the design and engineering phase of the project. NPS cannot evaluate whether it will be possible to achieve a mutually acceptable plan until the impacts of the storm surge barrier are fully evaluated and measures to reduce adverse impacts have been included to the greatest extent possible, and mitigation has been identified for adverse impacts that cannot be avoided. In addition, NPS recommends that USACE develop an external peer advisory team to provide expert input into the development of models and other tools to evaluate the impacts of the storm surge barrier on Jamaica Bay physical and ecological resources. NPS requests that scientists from the Science and Resilience Institute at Jamaica Bay and the United States Geological Survey are represented on that team.

> Response: Additional water quality modeling has been conducted to analyze a range of potential impacts up to the worst case scenario for water quality impacts

of a barrier in Jamaica Bay. The NYNJHATS will describe the Jamaica Bay Eutrophication Model (JEM) that was used to analyze potential water quality impacts (JEM documentation has been revised in recent months). Independent External Peer Review is part of the Corps planning process, and will take place under the NYNJHATS for the Jamaica Bay storm surge barrier.

Storm Surge Barrier Tie-In - Rockaway Peninsula

The current TSP alignment would maximize adverse impacts on NPS cultural, natural and historic resources. The alignment will directly impact 4 historic districts and, depending upon the alignment, may directly impact contributing resources within those districts such as Shore Road and Batteries Kessler and Construction 220. The highly modified urban setting in which GATE is situated does not negate the NPS requirement to preserve the physical and biological resources. When "a truly natural system is no longer attainable," NPS policies require management to achieve the best approximation of natural conditions, to minimize impacts, to mitigate for impacts, and, when possible, to restore natural conditions.

Construction of a reinforced dune and concrete floodwall through NPS property would constitute a permanent management decision to eliminate naturally dynamic features that are formed and shaped by coastal processes and artificially fix the location of the dune and berm system. Construction and long-term maintenance of a reinforced dune would result in a permanent loss of natural conditions at Breezy Point and Fort Tilden and alteration of shoreline processes that will adversely impact the flora and fauna associated with these coastal habitats as well as recreational opportunities and experiences for park visitors. It would also result in a loss of the visitor's sense of connection with the sea and the natural environment. Breezy Point and Fort Tilden are among the only remaining natural beach and dune systems on the Rockaway Peninsula. The concrete floodwall on the north side of the Rockaway Peninsula will alter sediment transport processes and may impact the Breezy Point marsh and other bayside coastal habitats within NPS.

NPS has previously discussed with USACE alternate alignments that could reduce impacts on NPS resources. These alternate alignments were identified in the Draft HSGRR/EIS; however, no impact analysis was provided. Again, we request the consideration and analysis of these alternative alignments that would reduce or eliminate many of these impacts to park resources. In analyzing these alternative alignments, we also recommend consideration be given to the Breezy Point Marsh, particularly to understand whether this is a point of vulnerability for the adjacent road (the only means of egress for the community), and if so, what appropriate measures would be to address that situation (for instance, ecological restoration and/or sand placement).

Response: The Jamaica Bay storm surge barrier tie-ins on Rockaway Inlet presented in the Draft HSGRR/EIS is now within the scope of the NYNJHATS for further evaluation and potential recommendation. The NPS comments listed above will be addressed within the scope of NYNJHATS decision making.

Storm Surge Barrier Tie-In - Brooklyn

NPS resources will also be adversely impacted by the north-shore (Brooklyn) storm surge barrier tie-in identified in the TSP. The concrete floodwall running north along Flatbush Avenue toward the Belt Parkway will impact the Floyd Bennett Field National Historic District and may impact visitor opportunities and experiences. In addition, this alignment is expected to increase vulnerability of NPS property west of the floodwall during storm events due to reflection of

storm surge energy from the barrier and tie-in onto Dead Horse Bay, Gateway Marina and the mini-golf course. NPS property west of Flatbush Avenue was formerly a landfill and the nature and extent of sediment contamination is not known; however, significant contamination could be present. Increased erosion, due to reflection of storm surge energy from the barrier and tie-in, may result in the scouring of this material and an accompanying release of contaminants. It is essential that this is accounted for within the HSGRR/EIS.

Construction of a berm-faced elevated promenade along the waterside of the Belt Parkway, a concrete floodwall at Gerritsen Inlet, and sector gates at Gerritsen Inlet will adversely impact park resources. Reflection of storm surge energy form these barriers may increase vulnerability to NPS property, including critical habitats south of the barriers. This may result in the loss and/or degradation of horseshoe crab spawning habitat and salt marsh at Plumb Beach and changes in flora and fauna which will have adverse biological and recreational (nature watching) impacts. In addition, the elevated promenades will alter the recreational experiences and opportunities.

> Response: The Jamaica Bay storm surge barrier tie-ins on Rockaway Inlet presented in the Draft HSGRR/EIS is now within the scope of the NYNJHATS for further evaluation and potential recommendation. The NPS comments listed above will be addressed within the scope of NYNJHATS decision making.

Residual Risk Measures

The Draft HSGRR/EIS does not currently identify construction of residual risk features on NPS property or within NPS boundaries. Shoreline modifications, including the construction of 1-walls and bulkheads may alter sediment transport processes within the Bay and/or result in localized erosion that may adversely impact NPS resources. Changes in sediment transport processes that result in mobilization of sediments due to scouring adjacent to shoreline structures may also mobilize contaminated sediments. Impacts of residual risk measures on NPS resources, sediment transport processes and bio-availability of contaminants have not been analyzed in the TSP.

> Response: The environmental impact analysis of the High Frequency Flooding Risk Reduction Features (HFFRRFs – which are residual risk measures) is underway and will be included in the revised Draft Final GRR/EIS. Coordination with NPS on this issue has been undertaken and HFFRRFs are not sited within NPS property.

Nature Based Features

The restoration of over 150 acres of salt marsh island habitat within Jamaica Bay is an example of Natural and Nature Based Features (NNBF) that has been realized through the collaborative effort of USACE, NPS and other partners. Enhancement of NNBFs is one of the five planning objectives of the HSGRRJEIS. With plan components including composite seawalls, beach nourishment and groin construction, the TSP does not include any NNBFs. Softening hardened shorelines and marsh restoration in Jamaica Bay are good examples of NNBFs that can buffer storm surge and improve ecosystem resilience. The NPS encourages the evaluation and integration of more NNBFs to meet the project objectives. These may also offer alternatives that serve to avoid or minimize impacts to NPS resources as compared to the current plan components.

Jamaica Bay has experienced a long-term negative sediment budget due to the reduction of sediment input from the ocean due to westward extension of the Atlantic Ocean Shoreline, reduced sediment inputs from the watershed, and historical removal of large volumes of sediment from dredging of the bay (NPS, 2014). This has diminished the natural resilience of Jamaica Bay's marshes. The HSGRR/EIS does not evaluate how changes in tidal range, circulation, sediment budget and sediment transport under storm surge barrier open and closed conditions may impact extant and restored marsh habitat within the Bay.

Response: Where feasible, the Corps has and will continue to include green infrastructure interior drainage instead of pumps and natural and nature-based features instead of gray infrastructure. All separable elements must be incrementally justified using CSRM benefits alone and drainage infrastructure improvements are subject to Corps planning policy and guidance.

Additional water quality modeling has been conducted to analyze a range of potential impacts up to the worst case scenario for water quality impacts of a barrier in Jamaica Bay. The NYNJHATS will describe the Jamaica Bay Eutrophication Model (JEM) that was used to analyze potential water quality impacts (JEM documentation has been revised in recent months). Independent External Peer Review is part of the Corps planning process, and will take place under the NYNJHATS for the Jamaica Bay storm surge barrier.

Science and Technical Information

NPS has identified a number of information gaps that should be addressed in the Final HSGRR/EIS and/or supplemental EIS. These data and analysis are needed to assess project impacts on NPS resources, identify opportunities to minimize impacts, evaluate mitigation alternatives, and facilitate development of a mutually acceptable plan. Additional data and modeling are required to understand changes in availability and distribution of sediment within the Jamaica Bay component of the plan including: changes in flux through the Rockaway Inlet; sedimentation patterns within the bay; distribution of benthic communities, salt marsh and beaches; and, the depth and temporal development of scour along the storm surge barrier and submerged and emergent tie-in features under storm and non-storm conditions and the key parameters that determine the scour type. Additional data and modeling must also be developed to evaluate changes to hydrodynamics of the bay such as: perigean spring tides, tidal amplitude, current velocities (including peak currents), stratification and residence time within the Bay; and, tidal range outside the barrier when closed (including head of tide amplification for surrounding creeks and Dead Horse Bay). Data, model simulations and sensitivity analysis are also needed to understand how the system will perform under climate change (sea level rise, rising water tables, increased frequency/intensity of precipitation events, etc.). Hydrodynamic modeling must integrate storm surge and sea level rise. The plan also needs to provide further analysis of how surface water (precipitation) will be managed during storm barrier closed conditions. Assessment of ecological impacts will also require additional data and modeling to understand impacts of changes in hydrology and hydrodynamics on species composition, abundance and distribution in the Bay.

Response: The Jamaica Bay storm surge barrier tie-ins on Rockaway Inlet presented in the Draft HSGRR/EIS is now within the scope of the NYNJHATS for further evaluation and potential recommendation. The NPS comments listed

above will be addressed within the scope of NYNJHATS decision making.

Mitigation

The Draft HSGRR/EIS identifies that the TSP will result in permanent and temporary adverse habitat impacts of 104.5 acres and 115.7 acres, respectively. The plan does not indicate how much of that acreage is on NPS property or within NPS boundaries. On NPS property, mitigation requirements are generally greater than 2: 1. The Draft HSGRR/EIS does not discuss mitigation for adverse impacts to recreational experiences and opportunities. Mitigation for cultural resource impacts will be developed through a programmatic agreement among NY SHPO, USACE and NPS.

NPS will work with USACE to identify appropriate mitigation actions for unavoidable adverse impacts to NPS natural, cultural and recreational resources. HSGRR/EIS project costs should include support for analysis to estimate human use and ecological losses in monetary terms using established approaches applied in regulatory and natural resource damage assessment. External technical support will be needed to conduct a benefit transfer analysis to estimate the value of recreational experiences and the likely reduction associated with the plan. Habitat Equivalency Analysis or similar methodology should be used to quantify ecological losses. Impacts should be summed over time and space to identify the mitigation requirements sufficient to offset estimated losses. The mitigation should be included as a part of the impact analysis in the HSGRR/EIS, and factored appropriately into the project cost up-front.

Response: The Jamaica Bay storm surge barrier tie-ins on Rockaway Inlet presented in the Draft HSGRR/EIS is now within the scope of the NYNJHATS for further evaluation and potential recommendation. The NPS comments listed above regarding mitigation will be addressed within the scope of NYNJHATS decision making.

Impacts and Economic Benefits of Closing the Storm Surge Barrier

The Draft HSGRR/EIS does not identify a design elevation for protection for the Jamaica Bay planning reaches. Figure 3-5 illustrates the 1% annual chance (100-year return period) flood hazard; however the draft plan specifically states that no design elevation has been determined. The impacts of closing the storm surge barrier cannot be fully determined and evaluated if the frequency of closures cannot be projected based upon a design elevation for protection. It is also unclear how the economic benefits and cost-benefit ratios were calculated without a design elevation for protection. Furthermore, it is important to provide public transparency regarding the storm level for which the storm surge barrier would be closed and flood risks that will not be managed by closure of the storm surge barrier. The HSGRR/EIS must identify the level of protection and identify an approach for developing a decision matrix/closure criteria for the barrier.

Response: Economic benefits and cost-benefit ratios can be developed using risk management features designed to mitigate against a 100-year return period flood. Specific aspects of the design and operation (including timing of closings) of the Jamaica Bay storm surge component would be developed as part of the Planning, Engineering, and Design (PED) phase of the project. As stated above, the Jamaica Bay storm surge component of the original plan presented in the Draft HSGRR/EIS is now within the scope of the NY / NJ Harbor and Tributaries

Study (NYNJHATS) for further evaluation and potential recommendation.

NPS Consulting Party Status

In a July 2016 letter addressed to Mr. Clifford Jones, NPS Northeast Regional Director Michael A. Caldwell accepted the USACE New York District invitation to be a cooperating agency in the National Environmental Policy Act (NEPA) process for the HSGRR/EIS and requested consulting party status under Section 106 of the National Historic Preservation Act. The Draft HSGRR/DEIS identifies New York City as a Section 106 consulting party. The HSGRR/DEIS should also identify that NPS is a consulting party. In addition, throughout the document, references to NPS with regard to our role in the NEPA and Section 106 processes are inconsistent. One example of this is provided on page 93 where NPS is identified as an interested party for the Programmatic Agreement when NPS is actually a Section 106 consulting party and cultural resource manager. The HSGRR may have an adverse effect on NPS cultural resources and NPS must be an integral part of consultations with NYSHPO, Native American Tribes and other interested parties.

Response: The HSGRR/EIS will be corrected to state that the NPS is a Section 106 consulting party, and the Corps will include NPS in consultations with NYSHPO, Native American Tribes and other interested parties. It should be noted, however, that future consultations would occur within the scope of the NYNJHATS.

Draft HSGRR/EIS Planning Constraints - GATE 2014 General Management Plan and other GATE planning documents

The Draft HSGRR/EIS identifies that this plan will "*not negatively impact ongoing recovery, ecosystem restoration and risk management by others*". NPS has completed recovery plans for several areas in GATE that were damaged during Hurricane Sandy. The NPS is currently implementing projects at Riis Beach, Fort Tilden, West Pond and Floyd Bennett Field, all of which fall within the TSP project area. NPS recovery has emphasized increased resilience through restoration of natural processes, enhanced building resilience, and strategic retreat for cultural resources and infrastructure that cannot reasonably be made resilient.

In addition, the 2014 Gateway National Recreation Area General Management Plan (GMP) provides for the long term management of park resources that fall within the TSP project area. The GMP established most of Jamaica Bay as a natural zone with the objective of natural wetland and coastal habitat restoration in the greater Jamaica Bay area. "*Natural resource protection and restoration efforts in the Jamaica Bay Unit would focus on softening hardened coastal edges, restoring wetland and coastal habitats, and creating additional freshwater wetlands. Increased use would be balanced with additional monitoring and management of wildlife and habitats. Natural Zone Habitats would be managed to improve resilience and healthy environments as part of the larger Jamaica Bay system. The restoration of freshwater and saltwater wetland habitat would be explored in portions of the North Forty natural area and along the shoreline. The shoreline would return to natural (soft) conditions through the removal of bulkheads and other hardened structures and allow natural sediment transportation processes to occur. The Habitats would be managed to improve resilience and healthy environments as part of the larger Jamaica Bay system.*" The TSP should strive to support these goals to the extent possible and consider the specific impacts and related mitigation strategies with them in mind.

Response: The Jamaica Bay storm surge barrier tie-ins on Rockaway Inlet presented in the Draft HSGRR/EIS is now within the scope of the NYNJHATS for further evaluation and potential recommendation. The NPS comments listed above will be addressed within the scope of NYNJHATS decision making.

Draft HSGRR/EIS Planning Constraints - Endangered Species

A planning constraint identified in the Draft HSGRR/EIS is that this plan will "*not negatively affect plants, animals, or critical habitat of species that are listed under the Federal Endangered Species Act or a New York State Endangered Species Act*". GATE habitat that would be impacted by this project supports the federally listed piping plover (*Charadrius melodus* - threatened), red knot (*Calidris canutus rufa* -threatened), roseate tern (*Sterna dougallii* - endangered), and seabeach amaranth (*Amaranthuspumilus* -threatened). A quantitative analysis of the project impacts on these species within NPS boundaries is not provided. NPS requests access to the US Fish and Wildlife Service Draft Fish and Wildlife Coordination Act Report and participation in Section 7 consultation.

Response: The Corps will provide NPS with the US Fish and Wildlife Service Draft Fish and Wildlife Coordination Act Report and will engage the NPS for participation in Section 7 consultation.

Scientific Review and Documentation

NPS encourages USACE to complete a robust external technical review of the Draft HSGRR/EIS and to update and revise the science and citations supporting the plan. A key issue that has been raised during public meetings is residency time in the Bay. Citation in the Draft HSGRR/EIS for residence time is a 1997 USFWS publication. Over the past decade, significant hydrodynamic modeling has been conducted by NYC Department of Environmental Protection, researcher s affiliated with the Science and Resilience Institute at Jamaica Bay, and USGS to understand the hydrology, water quality and other physical parameters of the Bay. The Draft HSGRR/EIS must include the most recent and relevant science. In addition, citations in the document should reference the primary literature rather than summary reports or agency reports that referenced the primary literature.

Response: Additional water quality modeling has been conducted to analyze a range of potential impacts up to the worst case scenario for water quality impacts of a barrier in Jamaica Bay. The NYNJHATS will describe the Jamaica Bay Eutrophication Model (JEM) that was used to analyze potential water quality impacts (JEM documentation has been revised in recent months). Independent External Peer Review is part of the Corps planning process, and will take place under the NYNJHATS for the Jamaica Bay storm surge barrier.

Cultural Resources - Section 2.3.15

NPS defines cultural resources as historic structures, cultural landscapes, ethnographic resources, archaeological resources and museum collections. The discussion of cultural resources within the project area and impacts to those resources must be inclusive of the NPS defined cultural resources to ensure that the document is sufficient for NPS adoption. The description of the Historic Districts that occur within the project area lacks sufficient detail to fully analyze impacts to the historic context. At minimum this should include a description of the resources and the criteria under which the district was listed. Impact analysis must be broader than direct impact to

historic structures and include other aspects of integrity. The Draft HSGRRIEIS identifies that "*The on-land portion of this element overlaps the southern boundaries of the historic districts at Jacob Riis Park, Fort Tilden, Silver Gull Beach Club, and the Breezy Point Surf Club..... Construction of elements along the beach has the potential to adversely affect the historic districts.*" NPS considers the construction of an 18' buried seawall along the ocean in front of these 4 historic districts to be an adverse effect on several aspects of integrity including association, feeling, setting, etc. In addition, this section references "landmark" structures. Those resources should be identified by name as well as if the structures are NYC landmark structures or Nfil structures.

> Response: The Corps believes that the descriptions of potential impacts to cultural resources impacts documented in the HSGRR/EIS are sufficient. However, any changes to the analyses as a result of the NPS comments above will be coordinated with the NYSHPO as a part of the NYNJHATS.

Real Estate Considerations - Section 6.3.

The TSP requires extensive construction on NPS lands. As stated previously, we seek to reduce impacts to NPS resources; however, if the final alignment requires construction on NPS lands, we suggest the following process, similar to what is being considered on NPS lands for the South Shore of Staten Island Line of Protection.

6.3.3. The NPS will grant the City an easement that allows them to construct a municipal facility on lands owned by the United States. The United States will retain fee ownership of the underlying land and will retain the right to access the areas by means such as a boardwalk or other pedestrian and bicycling facilities along the top of the structure which may be needed for park purposes. The City would accept responsibility for the ownership, maintenance, and liability associated with the HSGRR; and

6.3.4. Assuming all parties agree that the type of legal instrument is sufficient to authorize the proposed use and to authorize the construction of the HSGRR, the City, the USACE, and the NPS will enter into an Agreement identifying the parties' roles and responsibilities. The Agreement will contain the terms and conditions which must be met before NPS can issue a construction permit to build the TSP. The permit will also contain conditions addressing the time, place, and manner of the construction, mitigation requirements for impacts to NPS resources, and may contain conditions for other components of the construction as necessary.

> Response: Comment noted. This information will be useful as the Jamaica Bay storm surge component is analyzed as part of the NYNJHATS implementation phase.

Operations and Maintenance - Section 6.4

The terms and conditions of the easement will specifically address the City's obligations and responsibilities for the operation, maintenance, and repair of the municipal facility, as well as liability obligations, in perpetuity. The City will be required to address corresponding funding considerations accordingly.

Jamaica Bay Sediment Budget - Section 6.7.1.7

Although a detailed sediment budget analysis has been conducted for the Atlantic Ocean Shorefront Planning Reach, a sediment budget for Jamaica Bay Planning Reach has not been

developed. Impacts to the sediment budget, sediment distribution, flux to and between emergent and submerged habitats, and mobilization of contaminated sediments have not been analyzed. Impact analysis must include open barrier condition as well as impacts of having the barrier closed during storm events.

> Response: The Jamaica Bay storm surge barrier tie-ins on Rockaway Inlet presented in the Draft HSGRR/EIS is now within the scope of the NYNJHATS for further evaluation and potential recommendation. The NPS comments listed above regarding sediment budget will be addressed within the scope of NYNJHATS decision making.

Topography - Section 7.1.1.2

Impacts of floodwalls and seawalls on Rockaway Peninsula topography associated with aeolian and flood-induced transport of sediments is not evaluated.

> Response: The Jamaica Bay storm surge barrier floodwalls and seawalls on Rockaway Inlet presented in the Draft HSGRR/EIS are now within the scope of the NYNJHATS for further evaluation and potential recommendation. The NPS comments listed above regarding aeolian and flood-induced transport of sediments will be addressed within the scope of NYNJHATS decision making.

Sediments - 7.2.1.2

The existing Rockaway groin field has not had a beneficial impact on sediment transport to Riis Beach. Expansion of the groin field, as proposed in the Draft HSGRR/EIS, is expected to further exacerbate sediment deficits at Riis Beach. In addition to the existing long-term average sediment budget, event scale erosion rates, impact of structures on sediment budget, and contribution of overwash to dune development should be analyzed.

> Response: Please see description of Seven-Cell Sediment Budget in the Engineering Appendix. The sediment budget shows that Reaches 2, 3, and 5 (Riis Beach is located within Reach 2) have been relatively stable and have about the same net longshore sediment transport entering and leaving the cells.

Cultural Resources - Section 7.22

The Draft HSGRR/EIS states that "*A Programmatic Agreement will be executed to provide a process for continuing to identify historic properties and address effects to these historic properties caused by project elements as they are developed*." A Programmatic Agreement (PA) will outline the path forward for Section 106; however the PA does not substitute for the analysis of impacts necessary to fulfill the requirements of NEPA. The Draft HSGRR/EIS considers direct physical impact to historic structures but does not evaluate impacts to other aspects of integrity such as association, feeling, setting, etc. All aspects of integrity should be evaluated for each Historic District within the project area. View sheds are noted; however, no detailed analysis of impacts on viewsheds is provided.

> Response: Agree that a rendering of the proposed barrier would need to be included to further assess the barrier's aesthetic impacts to a site-specific level to assess aspects such as association, feeling, setting, etc. The Jamaica Bay storm surge barrier is no longer part of the Recommended Plan for this study and will be further evaluated under the NYNJHATS study.

Impacts Common to Both Action Alternatives - Section 7.12.1

The Draft HSGRR/EIS concludes that "Beneficial short- and long-term direct impacts on special management areas...include: NPS Gateway National Recreation Area (Portions of Fort Tilden and Jacob Riis Park, Breezy Point, Plumb Beach). NPS finds that overall the impact analysis is insufficient to support that conclusion.

> Response: The statement regarding beneficial short- and long-term impacts to Jacob Riis Park and Breezy point will be re-evaluated as part of the current study. The determination of beneficial short- and long-term direct impacts to the GATE and Plumb Beach will be evaluated as part of the NYNJHATS.

Proposed Action Impacts - Section 7.12.2

The Draft HSGRR/DEIS concludes that "Beneficial short- and long-term direct impacts on special management areas are anticipated from implementation of the unique elements of the Proposed Action. Additional special management areas protected by the unique elements of the Proposed Action include: NPS Gateway National Recreation Area (Floyd Bennett Field)". NPS finds that overall the impact analysis is insufficient to support that conclusion.

> Response: The determination of beneficial short- and long-term direct impacts to the GATE and Floyd Bennett Field will be evaluated as part of the NYNJHATS.

Impacts Common to Both Action Alternatives - Section 7.15.1

The Draft HSGRR/EIS concludes that "Beneficial long-term direct impacts on recreation would be realized by implementation of the common project elements. Long term benefits to recreational resources described in Section 2.3.15 Cultural Resources generally result from: Protection of parks (NPS, NYC, NYSDEC) throughout the study area." NPS finds that overall the impact analysis is insufficient to support that conclusion.

> Response: The reference to cultural resources in HSGRR/EIS Section 7.15.1 is incorrect. The statement will be revised to read: Long-term benefits to recreational resources generally result from: Protection of parks (NPS, NYC, NYSDEC) throughout the study area.

Proposed Action Impacts - Section 7.15.2

The Draft HSGRR/EIS concludes that "Additional beneficial short- and long-term direct impacts on recreation would be realized from implementation of the additional shore protection actions unique to the Proposed Action. In particular, the portions of Gateway National Recreation Area on Floyd Bennett Field would be protected by the Storm Surge Barrier alternative, but not protected by implementation of the Action Alternative." NPS finds that overall the impact analysis is insufficient to support that conclusion.

> Response: The determination of beneficial short- and long-term direct impacts to recreation associated with the GATE and Floyd Bennett Field will be evaluated as part of the NYNJHATS.

Hazardous, Toxic, and Radioactive Waste - Section 7.20

Impacts on legacy hazardous, toxic and radioactive wastes within the project area have not been sufficiently evaluated. Construction of project elements may contribute to accelerated erosion of legacy landfills in areas such as Dead Horse Bay and/or bay bottom due to changes in

hydrodynamics and/or reflection of storm surge. A thorough analysis of potential impacts needs to be included in the plan.

Furthermore, NPS will need to be released from contamination liability incurred as a result of ground-disturbing activities associated with project construction, as well as long-term impacts of the project on the nature, exposure or effects of resident contaminants.

> Response: HTRW sites for the Atlantic Shoreline and Jamaica Bay components are identified and mapped in Section 4.15 of the Environmental Appendix. Impacts on legacy HTRW sites in the Jamaica Bay portion of the study area relative to the Jamaica Bay storm surge barrier will be evaluated as part of NYNJHATS. Any impacts relative to the high frequency flooding risk reduction features being developed as part of the TSP will be evaluated in the revised Draft HSGRR/EIS. Regarding HTRW sites located within the Atlantic Shorefront portion of the study area, project alignments will specifically avoid impinging on those sites as plans are drafted in the planning, engineering, and construction phase. As stated in Section 8.1 of the HSGRR/EIS, the non-federal sponsor shall be considered the operator of the project for the purpose of CERCLA liability, and to the maximum extent practicable, operate, maintain, repair, rehabilitate, and replace the project in a manner that will not cause liability to arise under CERCLA.

Landfills - Section 7.21

Impacts of the project on the Dead Horse Bay, a former New York City landfill, have not been evaluated. Location of the line of protection east of this landfill may increase erosion during storm events, resulting in the potential exposure of wastes or leaching of waste material into the environment.

> Response: The project alignment adjacent to Dead Horse Bay is part of the Jamaica Bay storm surge barrier, which has been removed from the recommended plan. Impacts to the former landfill will be evaluated as part of the NYNJHATS.

Aesthetics - Section 7.24

The Draft HSGRR/EIS concludes that "Beneficial long-term direct impacts on aesthetics would be realized by implementation of the common project elements." NPS does not find this conclusion consistent with the "Long-term direct impacts would include viewshed disruption for some key observation points, which would be impacted by the presence of lift gates, sector gates, floodwalls and berms" as well as impacts to Historic Districts and recreational opportunities that have not been evaluated in the plan.

> Response: A rendering of the proposed barrier would need to be included in the analysis to further assess the barrier's aesthetic impacts to a site-specific level. However, the storm surge barrier is no longer part of the Recommended Plan. The potential impacts to aesthetics will be analyzed and discussed for the features of the recommended plan in the revised draft final GRR/EIS.

Cumulative Impacts - Section 7.25

Cumulative impacts section does not include any of the on-going or planned NPS Jamaica Bay Unit Sandy Recovery projects or the Breezy Point Federal Emergency Management funded storm damage risk reduction project.

Response: Cumulative effects of the on-going or planned NPS Jamaica Bay Unit Sandy Recovery projects or the Breezy Point Federal Emergency Management funded storm damage risk reduction project are no longer part of the HSGRR/EIS, as the Jamaica Bay storm surge barrier has been moved to the NYNJHATS. Those cumulative effects listed in the NPS comment will be included in the cumulative effects discussion of the NYNJHATS.

DEPARTMENT OF THE ARMY
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Planning Division

July 20, 2018

Mr. Andrew L Raddant
United States Department of the Interior
Office of Environmental Policy and Compliance
15 State Street, Suite 400
Boston, Massachusetts 02109-3572

Subject: Responses to Comments on the Draft General Reevaluation Report / Environmental Impact Statement (GRR/EIS) for the East Rockaway Inlet to Rockaway Inlet Hurricane Sandy Reformulation Study

Dear Mr. Raddant:

The U.S. Army Corps of Engineers (USACE), New York District (District) is in receipt of your letter, dated 1 December 2016, submitting comments on the East Rockaway Inlet to Rockaway Inlet and Jamaica Bay Draft Integrated Hurricane Sandy General Reevaluation Report and Environmental Impact Statement (HSGRR/EIS).

As a result of the significance (extent and content) of partner, agency and public comments received on the proposed project, as well as the feedback to the District resulting from the concurrent policy and technical review that was conducted by USACE Headquarters (HQUSACE), the District, in coordination with New York State Department of Environmental Conservation (NYSDEC) as our non-federal Sponsor, has determined that sufficient revision to the draft report is required in order to proceed to a final decision document.

The Agency Decision Milestone (ADM) resulted in the decision to move all further evaluation of the proposed storm surge barrier measure within Jamaica Bay, a significant component of the Tentatively Selected Plan (TSP), to the ongoing New York and New Jersey Harbor and Tributaries (NYNJHATs) Feasibility Study (NYSDEC and NJDEP are the non-federal sponsors, with the partnership of New York City). The NYNJHATs Study was initiated in the Summer of 2016 around the same time as the release of the Rockaway Reformulation Draft GRR/EIS. The NYNJHATs Study is evaluating large-scale regional coastal storm risk management (CSRM) strategies for the New York/New Jersey metropolitan area (which includes Jamaica Bay) extending upstream of the Hudson River to the federal lock and dam at Troy, New York, the Passaic River to the Dundee Dam, and the Hackensack River to the Oradell Dam. The NYNJHATs study is evaluating a suite of storm surge barriers, including one alignment from Breezy Point to Sandy Hook that would obviate the need for the proposed Jamaica Bay barrier. Therefore, from a plan formulation perspective, it makes sense to evaluate

the storm surge barrier, previously a component of the Rockaway Reformulation, in this newer regional study instead.

Moving the barrier component to the NYNJHATs Study has other strategic advantages as well. Namely, that more analysis is needed and that the required analysis should not delay construction of the more readily implementable Atlantic Shorefront and 'Residual Risk' measures in Jamaica Bay. Part of why more environmental analysis was deemed necessary for the barrier component is that the level of detail available to date was still largely conceptual.

The Project Delivery Team has been working with to further refine and develop the 'Residual Risk' measures in the Back-Bay, now termed *high frequency flooding risk reduction features* (HFFRRFs), in order to bring them up to full feasibility level of design and environmental analysis, and to include natural and nature-based features, as well as areas outside of New York City in Nassau County.

Thank you for the continued assistance and input to this process which helps to advance the execution of this regionally-significant project. Points of contact for the study are Planner and Biologist, Daria Mazey, at 917-790-8726 or the Project Manager, Dan Falt, at 917-790-8614.

Sincerely,

Clifford S. Jones III
Chief, Planning Division

Enclosure

cc: Stilwell; USFWS-NYFO
Sinkevich; USFWS-LIFO
Nersesian; NPS-GATE

Pertinent Text and Responses to Comment Letter

Lack of Best Available Information for Existing Conditions/Resources
Aquatic and Terrestrial Habitats

The GRR/EIS provides a description of twelve habitat types that have been identified and mapped within the project site. These habitat types are discussed generally with little or no discussion of the functionality, prevalence or distribution of these habitats.

> Response: Section 2.3.7 Biological Communities in the Study Area identify and describe 10 different distinct aquatic and terrestrial habitats in the study area. Additional content will be added to the Revised Draft EIS to provide data indicating the extent and general locations of the habitat types within the landscape to provide the reader context to understand the extent and relative importance of the respective habitat types within the project area. In addition, Section 7.6, Environmental Consequences to the Aquatic and Terrestrial Environments erroneously referred to Section 2.3.8 Aquatic and Terrestrial Habitats, which does not exist in the DEIS. For the Revised Draft HSGRR/EIS, Section 7.6 will appropriately refer to Section 2.3.7 within the discussion of the effects to the different habitat types.

Avian

The Corps provides a description of the avian species that are known or are likely to occur within the project area within Chapter 2 and Appendix I. The information provided by the Corps is general, and to some extent incomplete and/or outdated. The Corps relied on U.S. Army Corps of Engineers 1998, 2003 and U.S. Fish and Wildlife Service 1992 to describe common species found within the project area. A table (Table 4.8-2, page 4-59 of Appendix I) is provided identifying migratory bird species of conservation concern that may be found breeding, foraging or migrating through the project area. Site specific information is available from New York City Urban Park Rangers, Breezy Point Co-Op/U.S. Fish and Wildlife Service, National Park Service, and New York City Audubon regarding breeding shorebirds and wading birds and was provided to the Corps in the Service's PAL.

In terms of specific information the Corps provided regarding breeding birds, data is limited to piping plover. The Corps provided data from 1998 to 2000 within Appendix I and from 2014 within the GRR/EIS. The piping plover is not the only breeding bird within the project area. Surveys conducted in 2016 documented least tern, common tern, American oystercatcher and black skimmers breeding along the Atlantic Coast of Rockaway Peninsula. In addition to being outdated, the information provided by the Corps is limited to the eastern portion (Sub-reaches 3-6 of the Atlantic Ocean Shorefront Planning Reach) of the peninsula and does not provide breeding data for the Breezy Point Co-Op or the National Park Service (sub-reaches 1 and 2) nor does it address recent changes to the nesting distribution of black skimmers, a New York State Species of Special Concern.

Surveys conducted by New York City Audubon, documented numerous breeding bird species within Jamaica Bay, including: black-crowned night heron (*Nycticorax nycticorax*), great egret (*Ardea alba*), snowy egret (*Egretta thula*), glossy ibis (*Plegadis falcinellus*), little blue heron (*Egretta caerulea*), and tricolored heron (*Egretta tricolor*) (Winston 2015).

> Response: As part of the existing conditions that will be updated for the Revised Draft HSGRR/EIS, the District will reference use the more recent data provided in the

Service's Planning Aid Letter and the forthcoming Draft Fish and Wildlife Coordination Act Report is to assure equal consideration and coordination of fish and wildlife resources.

Inter-jurisdictional Fish

The Corps provides a general list of finfish species which may be present within the project area with a citation for Woodhead (1992). Additional references used to describe finfish include USFWS 1989, 1995, 1997, Waldman 2008 and USACE 1995, 2009 but are not provided within the References list. While information provided by documents/reports dated from 1997 and earlier may still be relevant, the list of species generated from this reference is at least 19 years old and should not be used solely to describe the finfish present within the project area. Additionally, information regarding the seasonal distribution and abundance for these species is not provided.

Response: Content of the Revised Draft HSGRR/EIS will be updated to provide the cited primary references as the source used to characterize the finfish species within the project area. A general discussion of the seasonal patterns of species utilization of the project area will also be included.

Threatened and Endangered Species

Within the GRR, the Corps provided a description of the Federal and State listed species which may occur within the project area. Comments regarding federally-listed species will be addressed in a separate correspondence in response to the Corps' Biological Assessment in Appendix J.

Response: The District will be revising the Biological Assessment to reflect the changed project conditions within the Revised Draft HSGRR/EIS. Species to be consulted on include the red knot, seabeach amaranth and the piping plover.

Additional Terrestrial and Aquatic Species

Information regarding species like the diamondback terrapin and horseshoe crab are discussed generally with the exception of a discussion on page 4-91 and 4-92 of Appendix I regarding the abandonment of Plumb Beach as a horseshoe crab spawning site. The Corps states: "Unfortunately, horse crab populations are becoming severely threatened throughout the region. A move in the early 1990s to replenish sand to Plumb Beach severely disrupted the habitat conditions for the horseshoe crabs, and they abandoned use of the beach." Although the Environmental Appendix of the Draft GRR/EIS states that horseshoe crabs no longer spawn at Plum Beach, spawning has been documented in the eastern limits of Plumb Beach, from just west of the comfort station to the eastern limit of the beach as the shoreline turns into Plumb Beach Channel as recently as 2013, the most recent data available (Sclafani et al. 2014). Distribution of spawning data collected since 2010 indicates that Plum Beach had a total crabs/square meter value of 6 in 2011 (peak on May 30), 5 in 2012 (peak on May 20), and 7 in 2013 (peak on May 10) (Sclafani et al. 2014).

Response: Discussion of the horseshoe crab utilization of Plumb Beach for spawning will be updated with the cited information and the Sclafani et al. (2014) cite will be added to the list of references.

ENVIRONMENTAL CONSEQUENCES (Chapter 7)
Lack of Best Available Information

As discussed above, the Service finds that the GRR/EIS lacks best available information to describe the existing conditions of terrestrial and aquatic habitats and fish and wildlife resources. This information is needed in order to adequately evaluate the environmental impacts of the proposed alternatives. Additionally, the Corps' impact analysis and conclusions are not supported by the best available information. The Service recommends that the Corps conduct a comprehensive evaluation of the with/without project impacts based on current, quantitative data regarding the existing conditions.

> Response: The District will reference and use the more recent data provided in the Service's Planning Aid Letter and the forthcoming Draft Fish and Wildlife Coordination Act Report is to assure equal consideration and coordination of fish and wildlife resources.

Project Impact Analysis

Table 6-4 of the GRR (page 130 of GRR/EIS) lists the permanent and temporary habitat impacts of the TSP (Tentatively Selected Plan), the totals (129.7 acres of temporary and 128.9 acres of permanent) of which do not match with the 154 acre loss of habitat described in the text on the same page. The Service requests clarification of the total loss of habitat forecasted to result from the TSP.

The GRR references ecological modeling (page 139 of GRR/EIS) without providing a description of each of the models and how results are derived. The Service requests a description of the Benthic Index of Biotic Integrity and Evaluation of Planned Wetlands ecological modeling.

As discussed below, under the heading *Additional Concerns and Comments on the GRR/EIS,* the Service has identified numerous occasions where the Corps states that they will complete additional studies or modeling in order to determine potential impacts.

> Response: The acreage totals for the areas of impact will be reviewed and revised to ensure consistency (129.7 acres of temporary and 128.9 acres of permanent vs 154 acre loss reported elsewhere). The text of the Revised Draft HSGRR/EIS on pg. 139 will be revised to reference where the "description of each of the models and how results are derived" is addressed in the appendices. In addition, the Corps will identify all of the "additional studies or modeling" described in the EIS and include them in the Adaptive Management Plan.

MITIGATION

The Service requests detailed descriptions/plans/conceptual drawings of the four mitigation projects, Dead Horse Bay, Duck Point, Floyd Bennett Field and Elders Island, referenced in GRR (page 101). No description was provided for these projects. Additionally, if these projects were authorized and/or funded from sources other than this project (such as the Hudson Raritan Estuary Program) and are currently or planned to be implemented independent of this project, the Service questions the validity of attempting to claim credit for the benefits of these projects as
part of the ERIRIJB.

Response: The mitigation projects referenced above were considered as potential mitigation sites and if they were to be constructed as mitigation would be removed from the Hudson Raritan Estuary Ecosystem Restoration Study. The section on mitigation needs has been updated in the Revised Draft HSGRR/EIS to reflect the revised proposed action. The appropriate functional assessment methodologies have been used to evaluate and determine any required mitigation resulting from the Recommended Plan. Since the *high frequency flooding risk reduction features* (HFFRRFs) in the Back-Bay include four areas with natural and nature-based features (NNBFs), the plan is currently assumed to be self-mitigating. The NNBFs for the Back-Bay include creation/restoration of intertidal wetlands, maritime forest, and intertidal rocky habitat with oyster and ribbed mussel incorporation. The shorefront plan includes a vegetated dune with a seawall core that will remain buried, and periodic beach renourishment, as well as some groin rehabilitation and construction.

ADDITIONAL CONCERNS AND COMMENTS ON THE GRR/EIS
Coastal Processes

The Corps stresses throughout the GRR the significance of overtopping of the Rockaway peninsula and Coney Island as a source of flooding into Jamaica Bay. The Service requests a clarification/justification/data to support this position.

Response: Clarification will be provided in the revision by the addition of historic data on the relative contribution of overtopping flooding from the Rockaway Peninsula and Coney Island into Jamaica Bay.

Lack of Clarity on Project Description

Throughout the GRR/EIS the Corps refers to the project as a whole or refers to the two reaches: Jamaica Bay Planning Reach and the Atlantic Ocean Shoreline. The majority of references are made to sub-reaches 3 - 6 of the Atlantic Ocean Shoreline Reach and do not include sub-reaches 1 and 2. This was observed throughout the document including the description of the existing conditions.

Response: The completeness of the discussion of each of the six Atlantic Ocean Planning Reaches will be addressed comprehensively as a result of the splitting of the Jamaica Bay Planning Reach from the Atlantic Ocean Shoreline Reach in the subsequent EISs. The storm surge barrier feature (Jamaica Bay component) is now being studied under the New York and New Jersey Harbor and Tributaries Study (NYNJHATS). The remaining components are moving forward under the East Rockaway Inlet to Rockaway Inlet and Jamaica Bay subject line study.

The Corps discusses separable elements in chapter 6.1.2, which are defined as “any part of a project which has separately assigned benefits and costs, and which can be implemented as a separate action (at a later date or as a separate project). The Corps identified two separable elements: the Coastal Storm Risk Management (CSRM) plan for the Atlantic Ocean Shoreline and the CSRM for the residual risk features. As such, the Corps states that they may consider a phased NEPA decision process. The Service assumes that some omission of reaches 1 and 2 is a result of the separable elements discussed in Chapter 6. However, the Service recommends that the Corps clearly identify what the proposed project is in its entirety and provide a comprehensive discussion of the existing conditions and resources found within the

project area. The Service also recommends that the Corps provide the Service with a description of how this would work from a procedural standpoint and to ensure that segmentation does not occur.

> Response: The completeness of the discussion of each of the six Atlantic Ocean Planning Reaches will be addressed comprehensively as a result of the splitting of the Jamaica Bay Planning Reach from the Atlantic Ocean Shoreline Reach. The Jamaica Bay Planning Reach will be included in the Corps' ongoing New York and New Jersey harbor and tributaries CSRM study with each of these project areas evaluated in separate EISs. Taking this approach will allow the Corps to separate the Atlantic Ocean Shoreline decisions that are ripe for decision making from the Jamaica Bay Planning Reach decisions.

Future Studies

The Corps has identified a number of studies that need to be completed before the Final GRR/EIS or during PED. The Service is concerned that the Final GRR/EIS will include a large amount of information/data and project design details that the public and regulatory agencies will not have the opportunity to comment on and assess. We request that the public and regulatory agencies be given the opportunity to review and assess the “Final” GRR/EIS prior to it being actually finalized. Additionally, the Service requests coordination meetings to allow Service input as the project design is further developed which will also assist the Service in better understanding what is being proposed.

> Response: To reflect the revised TSP, the District is preparing a revised Draft HSGRR/EIS which will be available for Service review and comment. Coordination on such has been initiated.

DEPARTMENT OF THE ARMY
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Planning Division

March 30, 2018

Mr. Matt Chlebus
New York State Department of
Environmental Conservation
Bureau of Flood Protection and Dam Safety
Coastal Erosion Management
625 Broadway
Albany, New York 12233-3504

Subject: Responses to New York State (NYS) and New York City (NYC) Comments on the Draft General Reevaluation Report / Environmental Impact Statement (GRR/EIS) for the East Rockaway Inlet to Rockaway Inlet Hurricane Sandy Reformulation Study

Dear Mr. Chlebus:

The U.S. Army Corps of Engineers (USACE), New York District (District) is in receipt of your letter, dated 14 December 2016, submitting comments on the East Rockaway Inlet to Rockaway Inlet and Jamaica Bay Draft Integrated Hurricane Sandy General Reevaluation Report and Environmental Impact Statement (HSGRR/EIS).

As a result of the significance (extent and content) of partner, agency and public comments received on the proposed project, as well as the feedback to the District resulting from the concurrent policy and technical review that was conducted by USACE Headquarters (HQUSACE), the District, in coordination with New York State Department of Environmental Conservation (NYSDEC) as our non-federal Sponsor, has determined that sufficient revision to the draft report is required in order to proceed to a final decision document.

As NYSDEC is aware, the Agency Decision Milestone (ADM) resulted in the decision to move all further evaluation of the proposed storm surge barrier measure within Jamaica Bay, a significant component of the Tentatively Selected Plan (TSP), to the ongoing New York and New Jersey Harbor and Tributaries (NYNJHATs) Feasibility Study (NYSDEC is also the non-federal sponsor, with the partnership of New York City). The NYNJ HATs Study was initiated in the Summer of 2016 around the same time as the release of the Rockaway Reformulation Draft GRR/EIS. The NYNJHATs Study is evaluating large-scale regional coastal storm risk management (CSRM) strategies for the New York metropolitan area (which included Jamaica Bay) extending upstream of the Hudson River to the federal lock and dam at Troy, New York, the Passaic River to the Dundee Dam, and the Hackensack River to the Oradell Dam. The NYNJHATs study is evaluating a suite of storm surge barriers, including one alignment from Breezy

Point to Sandy Hook that would obviate the need for the proposed Jamaica Bay barrier. Therefore, from a plan formulation perspective, it makes sense to evaluate the storm surge barrier, previously a component of the Rockaway Reformulation, in this newer regional study instead.

Moving the barrier component to the NYNJHATs Study also addresses concerns that more analysis is needed and that the required analysis should not delay construction of the more readily implementable Atlantic Shorefront and 'Residual Risk' measures in Jamaica Bay. Part of why more environmental analysis was deemed necessary for the barrier component is that the level of detail available to date was still largely conceptual.

To be responsive to NYS and NYC comments and concerns, the District has agreed to expedite the construction schedule of the least complicated elements of the Recommended Plan by initiating the development of plans and specifications (P&S) early, in conjunction with the end of the Feasibility Study.

Finally, the Project Delivery Team has been working with your agency, NYC, and the National Parks Service (as Cooperating Agency), to further refine and develop the 'Residual Risk' measures in the Back-Bay, now termed *high frequency flooding risk reduction features* (HFFRRFs), in order to bring them up to full feasibility level of design and environmental analysis, and to include natural and nature-based features, as well as areas outside of NYC in Nassau County.

Thank you for the continued partnership, assistance, and input to this process which helps to advance the execution of this regionally-significant project. Points of contact for the study are Planner and Biologist, Daria Mazey, at 917-790-8726 or the Project Manager, Dan Falt, at 917-790-8614.

Sincerely,

Cliff Jones
Chief, Planning Division

Enclosure

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

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New York State Department of Environmental Conservation Comments on the Draft East Rockaway Inlet to Rockaway Inlet and Jamaica Bay HSGRR, EIS, and associated appendices, dated August 2016

General Comments

The Rockaway Project can be viewed as three separate components, all in different stages of development. The Atlantic Shoreline component, the Jamaica Bay component, and the Residual Risk component. In general, the Department supports the Atlantic Shoreline and Residual Risk components, however additional modeling and analysis are required to further refine the Jamaica Bay component. While the Corps has committed to conducting this additional water quality and engineering modeling/analysis prior to construction, the Department believes that there needs to be flexibility in the final selection of an alternative/alignment for the Jamaica Bay component. This analysis should be conducted in a manner that does not preclude the Atlantic Shoreline portion of the Project from moving forward.

The Department does not believe that the information in the Report provides sufficient detail or analysis for the selection of a final storm surge barrier alignment. In addition to barrier alignments C1-E and C-2, the Department asks that the Corps also evaluate other potential alignments, as far west as possible, that could eliminate the need for some of the tie-in features. Impacts to water quality, fish and wildlife species and their habitats in Jamaica Bay resulting from the installation and operation of the storm surge barrier proposed in the Report will continue to be an area of concern for the Department. Modeling and analysis to adequately identify, quantify and conclusively address any possible impacts needs to be conducted.

The Department supports splitting off the Atlantic Shoreline and Residual Risk components of the Project as soon as possible and moving them forward to construction in an expeditious fashion, and therefore suggests that the Corps include language in the Report clarifying that the final surge barrier alignment and associated tie-in features will be finalized during the Pre-construction Engineering and Design Phase (PED), and after additional analysis and modeling has been completed.

If a surge barrier alignment must be identified prior to the Report being finalized, the Department recommends that language be included in the final report to allow for flexibility in the final alignment based on the results of additional analysis during PED.

Response: Concur. This has been done and will be presented in a revised Draft General Reevaluation Report (GRR)/Environmental Impact Statement (EIS). The storm surge barrier feature (Jamaica Bay component) is now being evaluated under the New York and New Jersey Harbor and Tributaries Study (NYNJHATS) as a potential CSRM measure for the Jamaica Bay area. The remaining components are moving forward under the East Rockaway Inlet to Rockaway Inlet and Jamaica Bay subject line study.

During the alternatives screening process the alignments west of C-2 were screened out because they were found to be less cost effective than the other alignments (i.e. not the NED plan). Alignment C-1W was screened out because it would have produced too much scour on the Gil Hodges Bridge, by the PDT's estimations. Further screening was done to differentiate between C-1E and C-2. The Corps believes that alignment C-1E is the NED alignment not only because it provides the greatest net benefits compared to other alignments and the perimeter plan (granted C-2 alignment is close to C-1E in terms of net benefits), but also due to the following factors:

- The costs for C-1E include far less uncertainty that the costs for C-2. There is no need for submerged cable and sewer line relocations for alignment C-1E. Relocating submerged utilities is a risky and uncertain endeavor and costs can quickly balloon if there is a puncture to the utility lines or unknown materials are found during excavation, such as unexploded ordinances, additional unknown utilities, submerged sea wrecks previously unknown, etc. Furthermore there is a risk of puncturing sewer lines during transfer and impacts to water quality during construction, especially if there is a spill.
- Although the real estate costs for alignment C-2 are lower than real estate costs for C-1E (Table 11), real estate costs do not account for the severe impact to water views that are imposed on a Breezy Point neighborhood by alignment C-2 (Figure 5-11), which are likely to increase real estate cost estimates at a later stage in the project were C-2 to be pursued. Many Breezy Point residents have expressed strong opposition to any impairment of their view which increases the risk of real estate costs increasing for alignment C-2. The Storm Surge Barrier Plan alignment C-1E is nearly one-half mile away from residential structures on the Rockaway peninsula and does not carry this same risk.
- Alignment C-1E provides flexibility in the determination of whether to include and to what extent to include Breezy Point and Jacob Riis Park into the project. The Rockaway peninsula terminus of alignment C-2 cannot be removed from Breezy Point in a cost effective manner. In other words, alignment C-2 requires the inclusion of and impacts to Breezy Point. The Rockaway terminus of alignment C-1E is approximately one-half mile from Breezy Point. There are numerous potential configurations of the Rockaway Bayside and the Rockaway Shorefront CSRM units that can provide alternative levels of CSRM at Breezy Point.

The evaluation and comparison of Jamaica Bay storm surge barrier alignments will be described in more detail in the revised Draft Final GRR/EIS. However, any additional modeling and analysis pertaining to the proposed Jamaica Bay storm surge barrier will be considered under the NYNJHATS study.

The Department also recommends that the Corps use the ADM as an opportunity to determine how the Atlantic Shoreline and Residual Risk components can be split from the Jamaica Bay and associated tie-in components to ensure that there are no delays to the Atlantic Shoreline component while the necessary analysis associated with the surge barrier and its tie-ins is conducted.

Response: As a result of the ADM, the barrier will be considered for further evaluation and potential recommendation under the NYNJHATS study, an option that NY DEC supported.

Impacts to water quality, fish and wildlife species and their habitats in Jamaica Bay as a result of the installation and operation of the storm surge barrier with a design as presented in this Draft HSGRR/EIS, will continue to be an area of concern with the NYS DEC, NYC ORR, NYC DEP and the NYS DOS. Modeling and analysis to adequately identify, quantify and conclusively

address any possible impacts will need to be conducted prior to the release of the Final HSGRR/EIS and/or prior to the final design of the storm surge barrier. The results of this modeling and analysis effort should be included in the Final HSGRR/EIS to better inform the public of any potential impacts to the Bay.

Response: Substantial water quality modeling has been done to analyze a range of potential impacts up to the worst case scenario for water quality impacts of a barrier in Jamaica Bay. Many of the specific comments and concerns regarding the perceived shortcomings of this modeling have been addressed in both the comment responses to NYS DOS, as well as a revised write-up describing the Jamaica Bay Eutrophication Model (JEM) that was used to analyze potential water quality impacts. The revised write-up is more detailed and explains how most of what was requested for modeling was already performed using the JEM model.

Any additional analyses pertaining to the storm surge barrier, inclusive of impacts to fish, wildlife and their habitats, will be considered under the NYNJHATS study, and is subject to that study's authorization and appropriation.

A section view, image, or artistic rendering of the vertical lift gates to illustrate the water view impacts from the storm surge barrier should be included in the Final HSGRR/EIS. A rendition showing a person on the ground and the approx. height of the gates (~50 feet) in the open position would provide the public with more of an illustration on how the proposed storm surge barrier alignments (both C-1E and C-2) would impact water views.

Response: Any rendering of the storm surge barrier and vertical lift gates will be included in the NYNJHATS study, as well as photographs of other existing storm surge barriers around the world.

Discussion of the current scarping and dune erosion issues in the in the Belle Harbor/Neponsit area should be addressed and included in the main report of the Final HSGRR/EIS and/or Appendix A1 – Rockaway, Atlantic Ocean Shoreline Engineering Appendix. Discussion of whether a re-evaluation of groin placement, number and/or size and the significance of the erosion to the overall sediment budget (Chapter 6 of Engineering Appendix) should be included.

Response: Groin field design will be confirmed and optimized during the PED phase via modeling with the two-dimensional USACE certified CMS model, which will be used to simulate the downdrift shoreline morphological response to the new proposed groin structures. Optimization adjustments may include modifications to the spacing and length of groins, tapering additional groins, or extending tapered groins westward, if modeling indicates this is warranted.

The Rockaway peninsula east of Beach 9th Street contains one of the most densely populated concentrations in the study area and serves as a vital transportation and evacuation corridor. The 8-square-block section east of Beach 9th St. is home to over 2,000 people, including a significant number of seniors. High-rise apartments line East Rockaway Inlet between Beach 9th and Beach 6th Streets, protected from the ocean by only a small, aging bulkhead. During Superstorm Sandy, apartment lobbies experienced 10 feet of surge, knocking out mechanicals, electricity, water pumps and elevators, which resulted in residents being stranded on high floors for nearly two weeks. Flood waters also entered the area from the north and east via Bridge Creek and Bannister Bay, leaving Seagirt Boulevard and the Nassau Expressway (NYS Route 878), the Rockaway's single land-based evacuation route, impassable. Emergency access was

severely restricted. Street lighting along Rte. 878 was ruined and repair began only last week (November 2016). The low-lying residential area north of Seagirt Blvd. was also flooded for up to a half-mile inland. The Report should explore addressing shoreline protection from the proposed tie-in east to Beach 1st Street.

Response: Thank you for this information and description. It is valuable background and will be used to investigate whether federal action is feasible and economically justified under the Nassau County Back Bay Study, which is poised to better address the flood risk experienced by residents in this stretch. The proposed tie-in concept for the eastern end of the Atlantic Shorefront component of the Rockaway Reformulation Recommended Plan ends at Beach 9th Street (the blue line in below figure).

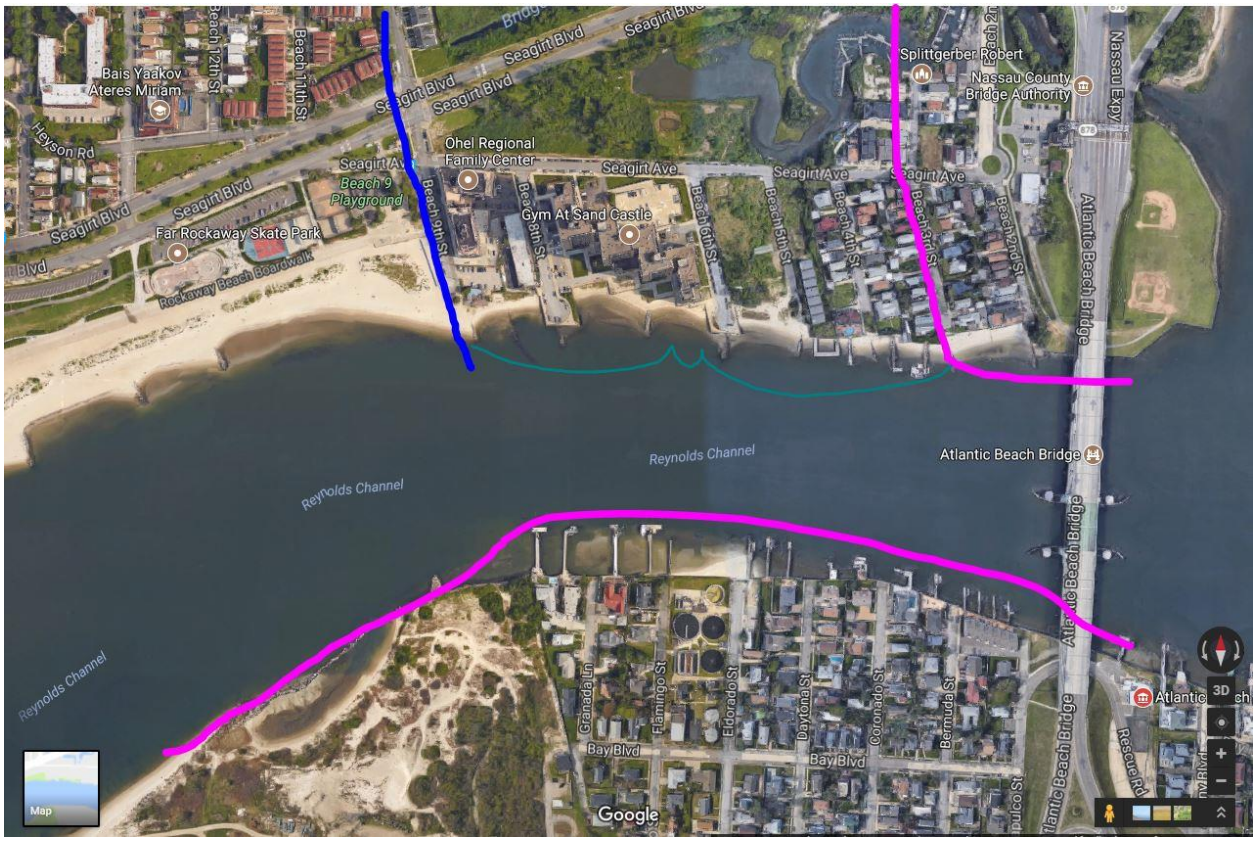

Figure 1. Rockaway Project Boundary and Tie-in*. The proposed project tie-in would end at Beach 9th (blue line) and the Nassau County Back-Bay (NCBB) study area goes to the pink line, but the .3 mile (1,585 feet) area between the projects (teal bracket) would be best addressed as a tie-in to the NCBB Study*

The .3 mile (roughly 1,585 linear feet) stretch between Beach 9th and Beach 3rd where the Nassau County Back-Bay (NCBB) focus area CSRM study begins (see pink lines in Figure 1). The NCBB study is analyzing, among other things, a potential storm surge barrier at or near the Atlantic Beach Bridge, just east of Beach 2nd Street at the inlet. Therefore, the gap area between Beach 9th and Beach 3rd would be considered under NCBB for a tie-in to the storm surge barrier, or would be protected by another proposed alignment for a storm surge barrier, which would be west of Beach 9th Street. The section between Beach 9th and 3rd gets really complex and is subject to flooding from both sides. Therefore, even if the Rockaway project were to tie-in all the way to Beach 3rd, the residents there would still be subject flooding from behind, north of their homes. Thus, this area is more appropriately addressed in the NCBB,

which is looking at the area north of this stretch as well. Additionally, from an engineering standpoint, the tie-in for Rockaway might be more appropriate north of here to high ground.

In order to proactively address the concerns of residents and businesses in this area, the planned public engagement for Rockaway will include discussion of this area and how it will be studied by NCBB, as well as include outreach to the elected representatives for this area in order to preemptively answer any questions and concerns. The team will coordinate with the NCBB study on this public outreach as well.

The Department supports the inclusion of the JEM modeling report as an Appendix to the HSGRR. It is the understanding of the Department that edits to the JEM model report based on USACE and Department comment are being undertaken by the City. These edits should be completed prior to the inclusion of the JEM Model Report in the HSGRR.

Response: Concur, edits to the JEM modeling report have been made. The report will be included in the revised Draft Final GRR/EIS as supporting information.

Mitigation

DEC considers the desktop ecosystem evaluation and EPW studies as preliminary and looks forwarding to reviewing a more detailed analysis based on actual site conditions and an evaluation of ecosystem services, types and functions.

Response: Concur, evaluation of mitigation requirements will be revised in the Draft Final integrated report for the features we are recommending for construction. Mitigation requirements will be based upon impacts to regulated habitats (i.e., water, wetlands), and utilize EPW field studies to further analyze impacts to wetland habitats in terms of ecosystem functions (i.e., functional habitat units). EPW-based analysis will be founded on field collected data, and existing site conditions. The Corps looks forward to sharing our functional habitat assessment of the Recommended Plan features with DEC.

DEC requests that the errors in the base FCU calculations be corrected and all tables, comparisons and conclusions be updated accordingly throughout the report.

Response: Concur, evaluation of mitigation requirements will be revised in the draft final integrated report as discussed above.

Jamaica Bay

More information based on the proposed location and design of the surge barrier is necessary before DEC can concur with the Corps' statements that the NED Plan will have only minor environmental impacts.

- Detailed environmental impact study showing effects by habitat type, elevation and geographic location is requested;

  Response: Concur, this analysis will be provided in the revised Draft Final GRR/EIS for the recommended plan. However, it is important to note the storm surge barrier component of this plan is being considered under the NYNJHATS study for further evaluation and potential recommendation.

- Further hydrology and hydrodynamic and water quality modeling is essential to assess

the impacts of the surge barrier and the tie-ins.

Response: Please see previous response regarding water quality modeling. Any future modeling for the storm surge barrier will be considered under the NYNJHATS study and is subject to the funding constraints of that study.

See comment for Appendix I, *Chapter 3: Summary Description of Analyzed Actions,* below for more detail on what the Department would like to see.

Residual Risk Features

Coordination with the Corps' and other agencies' proposed and in-process projects is advisable.

Response: The Corps, in close coordination with DEC and NYC, has begun coordinating with NYC DEP, DOT, and Parks, as well as NYS DOT.

Re-examination of proposed projects for opportunities to use green infrastructure rather than proposed hardened structures is requested.

Response: Where feasible, the Corps has and will continue to include green infrastructure interior drainage instead of pumps and natural and nature based features instead of gray infrastructure. All separable elements must be incrementally justified using CSRM benefits alone and drainage infrastructure improvements are subject to Corps planning policy and guidance.

Design based on current site conditions rather than historical wetland maps is requested to avoid and minimize impacts.

Concur. The alternative development will be evaluated in order to avoid or minimize impacts in that area. The Corps will continue to work closely with DEC on alignment considerations.

See comment for Appendix A3 Part 3 Rockaway Residual Risk plates, and Appendix S, Rockaway Freshwater Wetlands, for more detail.

Comments on the Rockaway Draft Integrated HSGRR and EIS

Page 55; Section 2.3.10 Water Quality, 1st paragraph: Paragraph indicates fecal coliform and E-coli data are from 1999 for the Atlantic Shorefront Reach. Is there any more recent data that can be used? Is it reasonable to assume and state that WQ is good when the geometric mean densities from 1989 through 1998 and reports from the NYC and Nassau Co. Public Health Departments from 1999 are referenced?

Response: Concur, more recent data on coliform and E-coli for the interior of Jamaica Bay is available and will be added to the Water Quality section of the report. Data covering 1997-2006 that was collected by the USEPA off Long Island will be incorporated into the analysis. The PDT will also be following up on data collected by the NYCDEP Harbor Survey. As necessary, the more recent data will be included in the revised Draft Final GRR/EIS.

Page 90; Section 5.2.1.3 Atlantic Ocean Reach Optimization: Paragraph between Table 5-5: Recommended Seawall Design Alternatives, and Figure 5-5: Dune and Berm Screening. The paragraph incorrectly references Figure 5-4 as the table that compares the costs and benefits of the beach restoration and dune alternatives. The correct figure should be Figure 5-5.

Response: Thank you, this will be corrected.

Page 101; Section 5.3.1 Habitat Impacts and Mitigation Requirements: First paragraph under Table 5-6 states that "Two mitigation projects, which have previously been identified as high priority restoration projects by the Hudson-Raritan Estuary Comprehensive Restoration Plan (HRECRP) have been selected as mitigation projects for the alternative CSRM plans." However, the text only refers to the Dead Horse Bay project. What other mitigation project is identified?

Response: Evaluation of mitigation requirements will be revised in the Draft Final GRR/EIS for the Recommended Plan. Mitigation requirements will be based upon impacts to regulated habitats (i.e., water, wetlands), and utilize EPW field studies to further analyze impacts to wetland habitats in terms of ecosystem functions (i.e., functional habitat units). EPW-based analysis will be founded on field collected data, and existing site conditions. It is important to note that the surge barrier will be further evaluated under the NYNJHATS study. In addition, the revised Draft Final GRR/EIS will include four nature-based features, i.e. living shorelines, as part of the recommended CSRM plan to address the high frequency flooding in the Back-Bay. Due to the positive benefit these will have on native habitats in providing intertidal wetlands that are valuable nursery habitats for many fish, the plan for these nature-based features is assumed at this time to be self-mitigating. This assumption will be further evaluated based upon EPW field studies, and addressed quantitatively in the Draft Final GRR/EIS for the Recommended Plan.

Page 106; Section 5.3.4 Alternative Plan Costs: In the paragraph after Table 5-10, the text states the "Mitigation costs were previously discussed in section 5.3.1 Habitat Impacts and Mitigation Requirements." However, there is no discussion of mitigation costs in section 5.3.1. The habitat impacted and the mitigation requirements for each Alternative were the only items discussed in Section 5.3.1. A discussion concerning mitigation costs should be included in Section 5.3.1 or the text in this paragraph should be changed to reflect this omission.

Response: Evaluation of mitigation requirements will be revised in the Draft GRR/EIS for the recommended plan. Mitigation requirements will be based upon impacts to regulated habitats (i.e., water, wetlands), and utilize EPW field studies to further analyze impacts to wetland habitats in terms of ecosystem functions (i.e., functional habitat units). As necessary, the Draft GRR/EIS will include a discussion of mitigation costs and referenced appropriately.

Page 110-111; Section 5.4.3 Recreation Benefits: The last paragraph on page 110 and the first paragraph on page 111 as written, make it difficult for the public to understand the methodology in computing the NED recreation benefits. One, the total number of beach visits should be discussed (7,738,500) and two, there should be more of an explanation on how the visits, corresponding costs and the final NED benefits were calculated so the public can get a better understanding.

Response: The discussion of how recreation benefits are incorporated into the evaluation will be revised for clearer understanding. It will incorporate more of the discussion from the Benefit Appendix and specifically reference the Recreation Analysis sub-Appendix.

Page 133; Section 6.3.2; 2nd paragraph: The second paragraph discusses the TSP (C- 1E) and the two large effluent sewer lines for the Coney Island WWTP. It states, "One barrier alignment crosses two large effluent sewer lines spanning between the Coney Island Wastewater Treatment Plant and the diffuser located in Rockaway Inlet." That one barrier alignment is C-2; which should be stated in the text.

Response: Concur, this change has been made. Thank you.

Page 138; Section 6.7.1.8; 2nd paragraph: The second paragraph incorrectly identifies the level of protection afforded by the residual risk features as .2% (500 year). This should be changed to 20% (5 year).

Response: Concur, this change has been made. Thank you.

Page 140; Section 6.8 Consistency with State and Federal Laws: The title of the section is Consistency with State and Federal Laws. However, the section discusses only applicable Federal laws. The section should discuss applicable New York State Environmental Laws or change the section title to, “Consistency with Federal Laws.”

Response: Concur. Section title will be revised to “Consistency with Federal Laws.”

Page 204; Section 7.25.3.1 Rockaway Boardwalk Reconstruction Project; Later in the 2nd paragraph the text states, "Between Beach 126th and Beach 149th Streets, the project includes providing structured access to the beach with stairs and ramps across the new dunes currently being constructed as part of the USACE beach renourishment project." However, the dunes and the renourishment project were completed in 2014. The last sentence states, “In addition, the project would maintain the five existing at-grade crossings through the existing dunes between Beach 9th and Beach 20th Streets.” However, the proposed project ends at Beach 19th street. This section should be updated with more accurate information and coordination with NYC Parks Department.

Response: Concur, this entire section will be updated to reflect the correct project descriptions and to indicate the timing that the boardwalk and FCCE dunes were completed.

Page 209; Section 7.25.6 Long-Term Combined Sewer Overflow (CSO) Projects; The second sentence states, “Water treatment plants are affected by heavy rain and snow storms when combined sewers receive higher than normal flows.” The word “Water” should be changed to Wastewater as a reference to wastewater treatment plants to avoid confusion with “drinking water” treatment plants.

Response: Concur, change has been made.

Page 226; Section 9.1 Public Involvement Activities: Paragraph three, second sentence states, “A Public Agency Council convened regularly to address Jamaica Bay issues of flooding, environmental quality and sustainability, and USACE.” Seems like something is missing in the sentence in the reference to USACE. Sentence should be re-written to clarify intent of the information.

Response: Thanks, this will be corrected to read: “The Public Agency Committee of the Science and Resilience Institute of Jamaica Bay convened quarterly meetings to address Jamaica Bay issues of flooding, environmental quality and sustainability, as well as to coordinate efforts between agencies. The purpose of the Public Agency Committee is to ensure all agencies are aware of each other's activities so as to not duplicate efforts, to share data and discuss priorities between agencies.”

Appendix A1 - Rockaway, Atlantic Ocean Shoreline Engineering Appendix

Chapter 6.0: Sediment Budget – See comment under General Comments regarding the current scarping and dune erosion on Rockaway Beach in Belle Harbor (Reach 3 of Sediment Budget).

See above response.

Appendix A2 - Rockaway, Jamaica Bay Planning Reach Engineering Appendix

Regarding the Coney Island Tie-in measures; on page 86 of the Jamaica Bay Engineering Appendix, the text states, "The alignment is assumed to extend west from Corbin Place with reinforced dunes along Coney Island Beach to West 37th Street and continuing the dunes as the alignment wraps around Sea Gate. Hybrid levees and floodwalls are envisioned to be integrated into Kaiser Park and Six Diamonds Park, with an in-water, non-navigable floodgate recommended near West 21st Street. Floodwalls would then follow the Belt Parkway towards high ground, which is found at Bensonhurst Park." "Preliminary costs for these CSRM measures total $410 million, accounting for CSRM measures along the entire alignment."

- Based on the proposed alignment, was there consideration given to the aesthetic value (e.g., impact on view shed) and socio-economic impacts to Coney Island Beach? What is the design height of the proposed reinforced dune?

- How will the final constructed Sea Gate project affect the proposed measures?

- These proposed measures should be shown on representative figures in the Final HSGRR/EIS for public understanding.

- Table 36: Comparison of CSRM Alternatives, (pages 89-92) does not reflect the same construction and annual O&M costs compared to Table 5-17 (page 113) of the main report. Which table and corresponding costs are correct? Why is there such a large discrepancy between the two?

Response: The Coney Island tie-in is part of the proposed barrier feature which is no longer being studied or recommended as a part of this study. The details on the Coney Island tie-in will be removed from the revised GRR/EIS. These comments will be shared with the NYNJHATS project delivery team, which is now responsible for evaluating the proposed Jamaica Bay barrier and tie-ins.

Appendix A3 Part 1 Atlantic Ocean Reach Plates and Sections

The groin field plates do not reflect a tapered design as previously proposed. DEC requests that western groins be shortened and lowered to avoid destruction of the beach leeward of the final proposed groin, currently at Beach 121st St. as well as to reduce environmental impacts.

Response: As shown in the plates, the westernmost groin is shortened, providing a minimal taper. This taper design will be optimized during the PED phase via modeling with the two-dimensional USACE certified CMS model, which will be used to simulate the downdrift shoreline morphological response to the new proposed groin field. Optimization adjustments may include tapering additional groins, or extending tapered groins westward, if modeling indicates this is warranted.

The plans do not indicate how the sheetpile and rock revetment will allow access through the corrals. It appears that the proposed wall and revetment will cut off access to the beach via the corrals. The baffle walls and corrals should be indicated on the plan cross sections.

Response: The existing Baffle wall is indicated on the cross-sections (Sheet CS301). Details with respect to access ramps and stairs (size and support configuration) that cross-over the dune and provide access to the beach will be further finalized in PED. Discussion of public access will be included.

Additional analysis should be undertaken to determine the necessity of extending the composite seawall from its current eastern end point to B 1st Street.

Response: Please see previous response pertaining to east end taper of the Atlantic Shorefront.

Appendix A3 Part 3 Rockaway Residual Risk Plates

DEC understands that the residual risk projects are in the preliminary planning stage. Looking forward, it is essential that the reformulation study:

- Coordinate with other planned initiatives in the area, such as USACE-sponsored restoration projects. Coordination is essential to avoid conflicting or duplicative projects and to optimize design effectiveness;

  Response: Concur, we have been and will continue to coordinate on this.

- conduct a detailed assessment of proposed features for effectiveness, e.g., Project #9 as presented would be flanked by routine storm tide waters;

  Response: Each proposed alignment and how it would perform under various flood events will be analyzed.

- conduct an environmental impacts analysis;

  Response: Concur, the environmental impact analysis of the High Frequency Flooding Risk Reduction Features (HFFRRFs) is underway and will be included in the revised Draft Final GRR/EIS.

- evaluate relocating or redesigning features where the proposed location of structures would have significant impacts on existing wetland features, e.g., for Project #8, moving the I-wall landward of the road;

  Response: The HFFRRF alignments are being pulled back as much as possible from existing wetlands. The features need to have enough space to site the necessary drainage, as well as space to construct and operate the features. Wherever possible, publically owned land, DOT right-aways and other real estate opportunities to move alignments away from the shore and onto City-owned lands are being pursued, as requested by NYC.

- calculate the mitigation required to account for the destruction of existing vegetated

wetland and high marsh areas and suggest appropriate mitigation projects;

Response: As part of the impact analysis, evaluation of mitigation requirements will be revised in the Draft GRR/EIS. Mitigation requirements will be based upon impacts to regulated habitats (i.e., water, wetlands), and utilize EPW field studies to further analyze impacts to wetland habitats in terms of ecosystem functions (i.e., functional habitat units). EPW-based analysis will be founded on field collected data, and existing site conditions. Due to the inclusion of natural and nature-based features, the restored or enhanced acreage of native habitats is expected to far exceed any permanent impacts to existing habitats. As discussed recently with Region 2 staff, the Corps expects the project to be self-mitigating.

- review all designs for opportunities to replace proposed hardened structures with green infrastructure;

  Response: Concur, in designing and siting our HFFRRFs, the team considered the existing shoreline condition and where natural shorelines existed and CSRM measures were warranted, the team considered NNBFs for CSRM. Other considerations for siting NNBFs included the lateral space and bathymetry, the existing habitat, and wave conditions, etc. For drainage, green infrastructure is also being considered where space allows.

- consider the long-term value of some projects, e.g., NYC DDC and NYC HPD are offering buyouts in the Edgemere area and homeowners have accepted offers, which reduces the number of people and amount and value of property protected by proposed bulkhead and berm;

  Response: The study team is coordinating with NYC HPD and has obtained parcel data maps on Edgemere buyouts in order to adjust the alignments there to better marry with the City's local plans for the area.

- review other projects requested by and supported by local communities that would achieve similar goals, and if appropriate, substitute those projects.

  Response: The study team is currently evaluating the plan for Broad Channel that was submitted by the Broad Channel Civic Association as a HFFRRF to be analyzed.

See also DEC's comment on Appendix S and use of 1974 tidal wetland maps for preliminary design purposes. It is essential that current conditions be delineated for planning purposes and to assess impacts.

Please see response for the fuller comment.

Appendix B - Rockaway, Borrow Area Engineering Appendix

Note: the dredge plan will be reviewed in detail by the R2 DEC dredge team and permits staffs when a permit application is submitted.

Noted.

Appendix B2 - Rockaway, Borrow Area Environmental

Note: the dredge plan will be reviewed in detail by the R2 DEC dredge team and permits staff when a permit application is submitted.

Noted.

Appendix I - Rockaway, Environmental Impacts Support Document

Chapter 3: Summary Description of Analyzed Actions
See comments elsewhere re: required tapering of groin field, extending study area to Beach 1st St., and need for a technical analysis of erosion and sediment transport in the Belle Harbor/Neponsit area of the Atlantic shoreline.

Please see responses to those comments.

Page 3-3: for the Tier 2 studies, in addition to further water quality studies, DEC would like to see, at a minimum, the following data:

- Quantification of acreage lost or gained by wetland type, e.g., mudflats, high marsh, intertidal marsh;

  Response: Concur, this information will be provided in the revised Draft Final GRR/EIS for the Recommended Plan. Mitigation requirements will be based upon impacts to regulated habitats (i.e., water, wetlands), as well as restoration of similar habitats associated with the four HFFRRFs. Wetland habitat to be impacted and restored can be presented in terms of wetland type as requested. In addition, mitigation requirements will utilize EPW field studies to further analyze impacts to wetland habitats in terms of ecosystem functions (i.e., functional habitat units). EPW-based analysis will be founded on field collected data, and existing site conditions.

- Determination of impacts on keystone species, e.g., horseshoe crabs, wading birds, shore birds;

  Response: Concur, this information will be provided in the revised Draft Final GRR/EIS for the Recommended Plan. Environmental impacts to noted species will be addressed, and consistent with format provided in Section 5.0 Environmental Impacts.

- Recalculation of mitigation requirements, assuming a DEC mitigation requirement of 2:1 (non-vegetated) or 3:1 (vegetated), and the confirmation or revision of assessment scoring and available acreage in report;

  Response: As noted above, the mitigation requirements will be recalculated and presented in the revised GRR/EIS for the Recommended Plan. However, the Recommended Plan is expected to be self-mitigating, with the inclusion of NNBFs at four sites. The Corps will further coordinate with DEC regarding mitigation ratios as

needed.

- Conversion of vertical data to horizontal measurements, using LIDAR and aerial change analysis, to precisely quantify habitat type changes;

  Response: Through the EPW modeling, site visits were performed at all areas to be impacted within the Back Bay. Habitat maps are based upon field mapping of vegetated communities, as well as existing habitat mapping and aerial interpretation. The Corps does not believe that additional LiDAR or aerial change analysis is warranted at this time.

- Identification of habitat types affected, e.g., plant communities;

  Response: As noted above, mitigation requirements will be based upon impacts to regulated habitats (i.e., water, wetlands, adjacent buffer areas), as well as accounting for restoration of similar habitats associated with the four HFFRRFs. Wetland habitats to be impacted and restored can be presented in terms of differing plant communities (i.e., low marsh, high marsh, mud-flat). The existing Environmental Impacts had a thorough discussion of mapped and impacted habitat types, and which will be refined as needed in the revised GRR/EIS.

- Identification of biotic communities affected, e.g., avians, horseshoe crabs, finfish, shellfish, sessile biota;

  Response: These biotic communities were addressed in Section 4 and 5 of the Environmental Impacts Support Document, and will be incorporated in the larger revised GRR/EIS.

- Determination of species impacts by changes in WQ inputs and tidal range, location, and time of year;

  Response: This comment pertains to the storm surge barrier which is no longer being evaluated as part of the Recommended Plan. As discussed above, these impacts will be evaluated within the NY/NJ HATS study.

- Summary of ecosystem impacts to enable reviewers to readily assess species viability, i.e., who are the winners and who are the losers;

  Response: The mitigation requirements will be revised as discussed above for the Recommended Plan. EPW will be utilized for wetland habitats to address functional impacts or gains. As requested, a discussion will be included relative to vegetative communities that will be impacted or restored within the revised project area.

- Calculation of Jamaica Bay–specific concerns such as the expansion of *phragmites* as the result of a decrease in tidal range and the exacerbation of *ulva* growth as a result of the changes in water quality.

  Response: This comment pertains to the storm surge barrier which is no longer

being evaluated as part of the Recommended Plan. As discussed above, these impacts will be evaluated within the NY/NJ HATS study.

Chapter 4: Affected Environment

Overall Comment: This is a thorough analysis of subject area sourcing both recent and historical studies. Distinguishing between Atlantic Oceanfront and Jamaica Bay APIs was very helpful. The distinction wasn't made in a few sections, noted below. Also, how
- or if - the Sheepshead Bay/Coney Island component was assigned wasn't always clear,

Response: Noted.

- also noted below.

- Page 4-6, Section 4.1.2.1: There is a reference to a "park," which isn't clear. "Soils found on the eolian and marine deposits within these portions of the park include Hooksan and Jamaica."

  Response: Concur. Reference will be addressed in revised GRR/EIS. The original text referred to the Gateway National Recreation Area.

- Page 4-11, Section 4.1.2.1; "Prime Farmland": There is a key word missing in the following sentence: "While the Sudsbury sandy loam and Riverhead loamy coarse sand soils at […] are classified as prime farmland…."

  Response: Concur. Text will be addressed in revised GRR/EIS.

- Page 4-16, Section 4.1.3.1, "Rockaway": For the sentence reading "From 1927- 2007, the shoreline of the Rockaways has been stable." Is it accurate to extend period to present, i.e., 2016?

  Response: FEMA 2013 is cited for this paragraph, which is where it comes from. The timeline will be edited to note from 1927-2013. Recent shoreline analysis completed since 2013 that is now available will also be added and referenced.

- Page 4-19, last paragraph: please explain the value of showing conditions in absence of an existing and just repaired retaining wall.

  Response: Text will be added to provide further clarification as part of revised GRR/EIS.

- Page 4-19: as noted elsewhere, DEC requests that the Corps and consultants conduct a technical assessment of sediment transport and erosion in this area.

  Response: GENESIS Modeling indicated that shoreline fronting Belle Harbor/Neponsit should remain relatively stable. Shoreline response to the groin field as shown in the TSP will be revisited for optimization during the PED phase via modeling with the two-dimensional USACE certified CMS model, which will be used to simulate the downdrift shoreline morphological response to the new proposed groin field. Optimization adjustments may include tapering additional groins, or extending tapered groins

westward, if modeling indicates this is warranted.

The shorefront Engineering and Design Appendix includes an evaluation of the performance of prior projects, historic erosion rates and volumetric losses. In addition it includes a sediment budget study. The reviewer is referred to Shorefront Engineering and design appendix.

- Page 4-20, 2nd paragraph; the relevance of statement about surfing beaches is not clear without there being comparative or complementary information of other types of recreational uses.

  Response: Concur, broader recreational uses will be added to the discussion either reach by reach or as a whole. This note was put in this reach to highlight a significant recreational resource.

- Page 4-21, Reach 5: first paragraph: second and fourth sentences are repetitive.

  Response: Concur, the second sentence has been deleted to remove repetition

- Page 4-22: as noted elsewhere, DEC requests that the study area be extended to Beach 1st St.

  Please see previous response.

- Page 4-31, Section 4.2.1, Bathymetry: will there be a corresponding discussion for the Atlantic Ocean shore? If it's in this section, suggest adding a cross- reference.

  Response: Concur, text will be revised to address refined project area.

- Page 4-33: cross-reference SLC.

  Response: Concur, cross reference will be added

- Page 4-36, section 4.3.2, "Tidal Currents": The intermediate SLC predictions are lower than that used by the project local sponsors (NYS CRRA; NYC CCP). Suggest adding a discussion noting and explaining the differences, if not here, somewhere in the DEIS, with a cross-reference.

  Response: Concur, a graph with the three USACE curves and local sponsor curves will be included along with a description of SLR considerations and how they relate to the various curves. Section 4.3 of the shorefront E&D appendix discusses SLR.

- Page 4-36, 5th paragraph: please verify that calculations and projections based on all three SLC scenarios will be included in the final EIS.

  Response: The design will be based on the intermediate USACE SLR curve, as noted in the Draft Report, however a sensitivity analysis will be performed to show how the project would perform under all three USACE SLR curves, as well as one additional curve which approximates the NYS/NYC curve (a mean between the USACE high and medium

curves). This has been coordinated and agreed upon between NYS DEC, NYC ORR, and USACE.

- Page 4-37, Section 4.3.2, “Tidal Currents”: Please clarify if summary of tidal currents in Rockaway applies to Coney Island as well. If not, please provide that data.

  Response: The barrier and its tie-ins will be evaluated under the NYNJHATS study. Coney Island is no longer part of the current study area.

- Page 4-37 and 4-38: a wind rose showing month, speed and direction would be helpful for this discussion.

  Response: Noted. The Corps will evaluate the potential to include a wind rose as part of the revised GRR/EIS

- Page 4-42; Section 4.6.2.1, Contaminated Groundwater: If text is not quoting EPA directly, suggest adding continued use of septic systems in communities surrounding Jamaica Bay in Queens is a source of groundwater contamination.

  Response: While the text is included based upon reference from EPA, additional text relative to potential septic systems will be included in the revised GRR/EIS.

- Page 4-53; please see comment in MRF #8 regarding the error in calculating B- IBI.

  Noted.

- Page 4-57; Section 4.8.1, Invertebrate and Benthic Resources: commend action of surveying pre-dredging at borrow pit.

  Thank you.

- Page 4-64; Section 4.9.4, State Species of Concern: black skimmers are included in the table as a NYS species of concern. Suggest adding to narrative as they are nesting in habitat adjacent to plovers in Breezy and Arverne beaches.

  Response: Revised GRR/EIS will include discussion of black skimmers.

- Page 4-86; Section 4.12.1.1, Rockaway Beach and Boardwalk: expect that final report will contain updated visitation figures; there was a marked year-over-year decrease in visitors to the Rockaway beaches in 2016 despite the recently renourished beaches and re-opened boardwalk.

  Response: Additional visitation data will be included in the Report.

- Page 4-91, Section 4.12.2.2 Plumb Beach: text contains incorrect information: 1) dunes at Plumb Beach protect the Belt Parkway only - surge can readily move up Plumb Beach Channel and Shell Bank Creek; 2) Restoration of Plumb Beach was under way pre-Sandy; sand had been added before the storm.

  Response: Text will be revised accordingly.

- Page 4-97, Incorrect text Beach Channel Drive is on the northern side of the peninsula; Shore Front Parkway is on the southern side.

  Response: This will be corrected. Thank you.

Chapter 5: Environmental Impacts

Page 5-2, Section 5.0, Environmental Impacts: As indicated elsewhere in our comments, DEC requires further modeling and study before the Department can endorse the Corps' statement that no significant adverse impacts were identified.

Response: The revised Draft Final GRR/EIS which will address all the questions remaining to make this statement.

Page 5-5, Section 5.2.1, Bathymetry: down-current side effects of groins are classified as minor and long-term. The length of the terminal groin at approx. B. 121 St. has not been established but in some drawings it appears as 375 feet, approximately the same length as the groin presently at B.149th St. Based on historic conditions at B.149th St., and continual need for intervention at Beach 149th St., those long-term effects should be classified as major.

Response: Groin field design will be confirmed and optimized during final the PED phase via modeling with the two-dimensional USACE certified CMS model, which will be used to simulate the downdrift shoreline morphological response to the new proposed groin structures. Optimization adjustments may include modifications to the spacing and length of groins, tapering additional groins, or extending tapered groins westward, if modeling indicates this is warranted.

Page 5-6, Section 5.2.2, Bathymetry, and throughout section: as previously stated, detailed DEC comments will be provided pending further modeling. However, modeling so far shows that from construction of the barrier alone, and in the open position, tidal amplitude will change a maximum of 0.2 feet (2.4 inches) in Jamaica Bay. Given the limited amount of intertidal and high marsh and the limits of retreat, this is not an insignificant figure. Were the impacts of this change explored in depth?

Response: The impacts would have been explored more extensively once the barrier measure was further refined. However, the storm surge barrier is no longer part of the Recommended Plan for Rockaway. Any further analysis pertaining to the barrier will be considered under the NYNJHATS study.

Page 5-9; Section 5.3.1, Tidal currents: Rip tides resulting from the construction of groins are not mentioned as a long-term adverse impact in this section. If they are not anticipated, please give a reason for opinion.

Response: Rip tides adjacent to groins have not been examined specifically as a potential long-term adverse impact for this project. It is noted that Rockaway beaches do experience rip currents adjacent to existing groins as well as in areas without groins. It is anticipated that rip tides for the new structures will be similar to conditions created by existing structures along the project. The USACE will work with local responsible parties to educate beach users of the dangers of rip currents and how to deal with them.

Page 5-15, Aquatic and Terrestrial Environments, please see DEC comment about MRF #8 and request for recalculation and update of related text throughout the report.

Response: Noted.

Page 5-17, 5.6.2, states that the proposed action would protect shorelines and marsh islands from future erosion. However, current research indicates that significant erosion is the result of persistent, lower-energy storms, events for which the barrier would not be closed. Please substantiate the report statement.

Response: Noted. It would be helpful if you could provide citations for the current research to this effect which we can use to bolster our statement on the need for the proposed NNBFs in the HFFRRF measures. Thank you. This section is being re-worked due to the removal of the barrier from the recommended plan but discussion on erosion will be edited to reflect the nuance.

Page 5-19, Section 5.7.1, Impacts Common to Both Action Alternatives, states that oysters would flourish on the newly constructed groins. As there are no oysters growing on the existing groins, why does the Corps anticipate oyster recruitment and growth on the extended groin field?

Response: The Corps referred to recent oyster research that was occurring with the NY/NJ Harbor region. The Corps will evaluate this comment further, and address in the revised GRR/EIS. Since the Draft Report was released, the NYC DEP has undertaken an effort to establish oysters in Jamaica Bay and the USACE will monitor their progress for potential lessons learned. To date, oysters have not successfully propagated on their own, though they persist when placed in the Bay.

Page 5-22, Section 5.8.1, Fin Fish. Appendix K, EFH Assessment (pp. 16-19), lists potential impacts to finfish and recommends dredge windows. This is not consistent with statements in this section; please align findings.

Response: The revised GRR/EIS will align findings with the EFH assessment.

Page 5-32; Section 5.10.2: Suggest giving examples of barrier construction activities to help reviewers assess the impact of construction, e.g., trestles, fill, geotubes, boat docks, concrete load conveyor.

Response: The storm surge barrier is no longer part of the Recommended Plan for Rockaway. Any further analysis pertaining to the barrier will be considered under the NYNJHATS study.

Page 5-34, Section 5.11.1, Protected Species. The construction of the barrier could have potential acoustic impacts on marine mammals and finfish. Recent marine engineering advances include sound muffling technologies. Has there been an evaluation for the need for such technologies in the New York Bight area?

Response: The storm surge barrier is no longer part of the Recommended Plan for Rockaway. Any further analysis pertaining to the barrier will be considered under the NYNJHATS study.

Page 5-38, Section 5.13, Recreation. Long-term recreational impacts should include potential for riptides.

Response: Rip tides adjacent to groins have not been examined specifically as a potential long-term adverse impact for this project. It is noted that Rockaway beaches do experience rip currents adjacent to existing groins as well as in areas without groins. It is anticipated that rip tides for the new structures will be similar to conditions created by existing structures along the project. The USACE will work with local responsible parties to educate beach users of the dangers of rip currents and how to deal with them.

Chapter 6: Cumulative Impacts

Page 6-9, Section 6.4, Summary of Cumulative Impacts. As noted elsewhere, the storm surge barrier as presented in this report would not afford protection to the interior of Jamaica Bay for frequent, smaller-scale disturbance. Therefore, the stated advantage is misleading.

Response: The storm surge barrier is no longer part of the Recommended Plan for Rockaway. Any further analysis pertaining to the barrier will need to be considered under the NYNJHATS study. This section will be revised accordingly.

Page 6-11, Section 6.4.5, construction of bulkheads and seawalls has known detrimental impacts on wetland vegetation and induces scour. Please note the use of mitigation for these events.

Response: The revised back-bay features have included NNBF wetland habitats where possible and as coordinated with Region 2, are expected to be self-mitigating. The Corps recognizes these impacts due to scouring, and expect these impacts to be addressed as part of NNBF designs.

Page 6-13, Section 6.3.8, Benthic Communities. Recent research in California shows long-term impacts to polychaetes from grin construction. Please cite source of statement that impacts will be temporary.

Response: Noted. Research as referenced will be evaluated, and text revised as necessary.

Chapter 7: Summary of Potential Impacts

Page 7-1, table 6-1. As noted elsewhere, DEC would like to see detailed environmental, hydrodynamic and water quality assessments for Jamaica Bay over the long term before it can judiciously evaluate the report's quantification of impacts.

Response: The write-up on the JEM water quality modeling has been updated to better explain what went into it. Any further analysis will be considered under the NYNJHATS study and is subject to funding constraints of that study. NEPA analysis will be tiered for HATS in order to account for the development of project detail over the course of the Feasibility Study and into the Pre-Construction Engineering and Design Phase.

Chapter 8: Irreversible and Irretrievable Commitment of Resources

Page 8-1. As noted elsewhere, DEC would like to see a more refined environmental assessment that examines the proposed bayside structures over the long term before it can endorse the claim that the proposed action is sustainable over the long term "both for the natural coastal ecosystem and the communities protected."

Response: More refined environmental analysis is going into the revised Draft Final GRR/EIS for the Recommended Plan.

Chapter 9: Short- and Long-Term Productivity of the Environment

Page 9-1, Section 9, 4th para. As noted elsewhere, DEC would like to see a more refined environmental assessment that examines the proposed bayside structures over the long term before it can endorse the claim that the proposed action would "reduce vulnerability to major storms in a way that is sustainable over the long term…for the natural coastal ecosystem.…"

Response: More refined environmental analysis is going into the revised Draft Final GRR/EIS for the Recommended Plan.

Page 9-1, Section 9, last sentence: Does this assessment of long-term benefits outweighing short-term impacts extend beyond "project construction" and include operation? Please cite survey or literature review conducted of similar barrier projects that examined potential long-term, unforeseen impacts.

Response: The storm surge barrier is no longer part of the Recommended Plan for Rockaway. Any further analysis pertaining to the barrier will need to be considered under the NYNJHATS study.

Chapter 10: Unavoidable Adverse Environmental Impacts

Page 10-1; Section 10.0, Unavoidable Adverse Environmental Impacts:

- Bullet list: noise discussion should be a separate bullet
- Bullet list: 4th bullet should include dredging activities (or create separate bullet)
- Bullet list: 4th bullet: it's not clear if this describes impacts of Atlantic and Jamaica Bay actions. Does "structures" refer to groins and barrier? Please clarify.
- Bullet list, fifth bullet: suggest replacing "and loss" with "some mortality"
- Bullet list, final bullet, last sentence: long-term change to the visual landscape is outside the "construction period" stated in the lead-in sentence to the bullets.

Response: All of the above changes will be made.

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The study combined all 5 functions retained in the EPW portion of the study, but contrary to normal EPW protocols, they were all summed and averaged, giving each equal weight, instead of independent evaluations of each. While this approach might suffice for this preliminary screening study, a more robust analysis should be performed for future phases, to make sure that all important ecosystem functions are being replaced.

Response: A revised mitigation evaluation will be developed as described above for the

Recommended Plan.

The study is based upon desktop analysis, and the authors assume that future phases will incorporate site-specific data collection. This should definitely occur during the next phase.

Response: Site specific data has been collected and will continue to be incorporated in the evaluation of mitigation requirements for the Recommended Plan.

The study defines the Functional Capacity Unit (FCU) as the product of the Functional Capacity Index (FCI) and the impact acreage, and it states repeatedly: "FCUs are calculated by multiplying the acreage of the assessment area by the FCI score." The results of these calculations are presented in Table 6 of MFR8. However, this table is fraught with math errors, in particular for the IBI function.

Response: A revised mitigation evaluation will be developed as described above for the Recommended Plan. FCU's based only on EPW analysis will be presented for the revised project area. For reference on EPW, calculations include:

1) Multiply the FCI values for each restoration alternative by the total number of acres restored to calculate the number of FCUs gained for each of the seven wetland functions (i.e., shoreline bank erosion control, sediment stabilization, water quality, wildlife, fish, uniqueness/heritage).

2) Multiply the FCI values for the each wetland (Estuarine and Palustrine) by the number of acres of estuarine and palustrine wetlands lost in the conversion to each restoration alternative to determine the number of FCUs lost for each of the seven wetland functions, for each restoration alternatives.

3) Subtract the number of FCUs lost from the number of FCUs gained for each restoration alternative to obtain the net gain in FCUs due to restoration for each of the six wetland functions.

4) Add the FCUs for all six wetland functions together to obtain the cumulative number of FCUs produced by each restoration alternative.

While most of the calculations for the Wetland and Upland functions are off by a small amount, most of the IBI calculations seem to inflate the scores by a factor of 5, and even then the numbers are slightly off. For example, the first row of Table 6, the FCUs for the IBI, Wetland, and Upland functions are calculated at 37.50, 5.50, and 10.07 respectively. However, multiplying the FCIs by the areas of impact yields the following numbers: 7.50, 5.50, and 10.13. In row 3 (row 2 has no IBI factor), the numbers calculated are 36.67, 1.43, and 100.44. Multiplying the FCI by the acreage, however, yields: 7.33, 1.42, and 100.44. Assuming, for some reason that doesn't seem to be explained, that the IBI number is supposed to be further multiplied by 5, that would yield 36.65, not 36.67.

Response: A revised mitigation evaluation will be developed as described above. FCU's based only on EPW analysis will be presented for the revised project area. Evaluation in terms of IBI scores will not be further evaluated. See above.

The methodology states that the IBI index number was calculated by combining all 5 IBI component scores and averaging them. However, it seems as though after combining and dividing by 5 to get the composite score, the Table 6 calculations then eliminates the average

and uses the total score of the 5 IBI elements, prior to averaging, to calculate the FCU. The methodology also states that all 3 habitat types are assumed to be functionally equivalent, and are given equal weight. However, the way Table 6 calculates the FCU scores, it seems as though the IBI habitat FCU score is being weighted (approximately) 5 times that of the other habitat types. The Corps should explain why the IBI calculation is consistently increased (approximately) by a factor of 5 in all cases, and why in most cases the calculations are slightly off.

Response: A revised mitigation evaluation will be developed as described above. FCU's based only on EPW analysis will be presented for the revised project area. Evaluation in terms of IBI scores will not be further evaluated.

The tables in Appendix C calculate the Habitat Adjusted Total DSAY's, which is understood to be the product of the Total DSAYs and the Habitat Equivalency Factor. However, the calculations seem to be slightly off in most cases, even when the multiplier is 1. For example, in Table C-1, row 1 correctly multiplies 0.7 by 0.0 and yields 0.0., but row 2 multiplies 79.6 by 1.0 and gets 76.2. While this is a slight increase over the product of the Total DSAYs and the HEF, row 3 multiplies 112.5 by 0.9 and gets 103.6, not the actual product, which is 101.25, or a slight increase. The Corps should explain why these calculations seem to be in error.

Response: A revised mitigation evaluation will be developed as described above. FCU's based only on EPW analysis will be presented for the revised project area. Evaluation in terms of DSAYs will not be further evaluated.

Since the evaluation of both proposed impacts and mitigation are based upon the above calculations, it is impossible to evaluate the results and recommendations until the apparent errors cited above are either corrected or explained.

Response: Noted.

Both reports state that detailed calculations are provided in a flash drive (Attachment A); however no flash drive was provided. This should be provided.

Response: A revised mitigation evaluation will be developed as described above. FCU's based only on EPW analysis will be presented for the revised project area. EPW modeling will be available as part of the revised GRR/EIS.

Section 6.4 of MFR 8 states that, with respect to Alternative C-1E, the Spring Creek restoration site will satisfy the mitigation requirement. It then goes on to state that it is assumed that this alternative would also require a comparable level of excess mitigation to at least that proposed for Alternative D. The Corps should provide the basis for this statement.

Response: A revised mitigation evaluation will be developed as described above. FCU's based only on EPW analysis will be presented for the revised project area.

Appendix J - Rockaway, Endangered Species Act Compliance

The construction plan and schedule will be reviewed in detail by the R2 DEC fish and wildlife and permits staffs when a permit application is submitted. We expect that the final EIS will include data from 2016 surveys performed by NYCDPR.

Response: Noted.

Appendix K - Rockaway, Essential Fish Habitat

The approach to EFH assessment is consistent with Federal guidelines and appears thorough, with the following comments:

Page 2, 3rd paragraph: Authors of this EFH assessment specify that it addresses only the Atlantic Ocean, or Tier 1, phase of the TSP, and that an equivalent assessment for the interior of Jamaica Bay, Tier 2, will follow pending further analysis of the options by the COE. Given the designation of the interior of Jamaica Bay by New York State as Significant Coastal Fish Habitat, and noting that the alignments of the two barrier options are proximal to one another, DEC requests a draft EFH analysis before preliminary construction designs for the barrier are published.

Response: The storm surge barrier is no longer part of the Recommended Plan for Rockaway. The revised EFH will include the Atlantic Ocean, as well as four NNBFs within the interior of Jamaica Bay.

Page 7, paragraph above table 3: Comments re: minimal hydrodynamic impacts of barriers are premature, pending water quality modeling. Text should indicate uncertainty of impacts of with-project conditions. Also as noted by DEC elsewhere, a change in tidal amplitude of 0.2 feet is not insignificant. Detailed studies showing the horizontal impacts of this change from current conditions is necessary to assess impacts, especially to mud flats and shoals and to the upper and lower limits of intertidal marsh.

Response: The storm surge barrier is no longer part of the Recommended Plan for Rockaway. See above.

- Section 2.1: see comments for main report, especially: 1) To provide protection to the entire Rockaway peninsula, the study area should extend to the eastern edge of the peninsula at Beach 1st St.; and 2) it is important to note in Table 1 that the beachfill and renourishment amounts are calculated based on historic conditions and do not include sea level change.

  Response: Please see previous responses in terms of extension to eastern edge of the peninsula.

- Page 12; Section 3: The text following Table 5 on page 11 is not consistent with the table in cross-referencing “South Atlantic Species” (#s 30-32), “Coastal Migratory Pelagic Species” (#s 33-37) and “Highly Migratory Species” (#s 20-23).

  Response: Noted. This paragraph will be corrected.

- Page 19; last paragraph, refers to the “borrow site screening process.” It would be helpful to the reader to provide a cross-reference to the section or appendix in the EIS where this process is discussed.

  Response: Concur. Appropriate cross-reference and supporting text will be included relative to the borrow-site screening process.

- While the Introduction to Section 4 notes the possibility of temporary impacts from groin

construction, and Table 6 frequently notes a temporary disruption of benthic food prey organisms, the discussion doesn't address the long-term impacts of the structures. An assessment of the effects of groins on benthic food prey would be helpful.

Appendix L Rockaway, Cultural Resources

Note: the cultural resources plan will be reviewed in detail by the R2 DEC permits staff when a permit application is submitted. Expectation is that application will meet conditions of the East Rockaway permit. Noted.

Appendix M - Rockaway, Historic Resources

Appendix is blank in this draft; DEC will review the material in final draft.

Response: This appendix will be deleted from the revised report. It was used as a placeholder. Any information on historic properties, including any correspondence, Programmatic Agreement, Areas of Potential Effect (APE), etc., will be included in Appendix L.

Appendix N - Rockaway, Coastal Zone Management

Policy 1 states that the project will not adversely affect adjacent and upland views. Since drawings and schematics of the surge barrier have not been published, it is premature to make this statement. DEC will review any schematics of view shed when they are available and make an assessment as to impacts.

Policy 7 (3) - until further water quality and hydrodynamic modeling for the surge barrier has been done, it is premature to make this statement.

Policy 7 (4) – please expand this section to include shorebirds.

Policy 13 - it would be helpful to provide sea level change scenarios used for calculation of 50-year protection

Policy 14 –While prior presentations have referred to the groins as "tapered," the lengths given in this report of 326, 376, and 351 feet do not support that characterization. The 326-foot groin planned for Beach 121st St. will severely impact the beach on the leeward (west) side of the groin.

Policy 15 states that the "Project will also result in minor seafloor disturbance within Rockaway Inlet during piling construction of the Hurricane Barrier." The final location of the barrier has not been selected and plans have not been published. Without this information, as well as means and methods of construction, it is impossible to assess this statement. Please add qualifying language.

Policy 17 does not address the residual risk features, where there is opportunity to use non-structural means to achieve project goals.

Policy 19 references a decrease in access to and use of recreational areas "that is predicted to occur." Please cross-reference the study where this prediction is made.

Policy 22 – See comment about view shed, above (Policy 1). Policy 25 -

See comment about view shed, above (Policy 1).

Policy 44 states that the project will improve degraded tidal ecosystems and habitat for fish and wildlife. Until further water quality and hydrodynamic modeling and a detailed environmental impacts assessment for the surge barrier has been done, it is premature to make this statement.

Response: The Appendices for the new TSP will be updated to reflect the updated plans, and to incorporate or address your comments, as applicable.

Appendix O - Rockaway, Fish and Wildlife Coordination

This appendix reprints a letter from USFWS; no comment necessary other than to say that DEC has no objections to the USFWS comments.

Response: Noted.

Appendix P - Rockaway, Emissions Estimates

Note: These are draft calculations; DEC R2 air resources staff will review when barrier design is selected.

Response: Noted.

Appendix Q - Rockaway, Environmental Compliance

6.8.2, "Clean Water Act": A separate, written request to DEC is required, at which point DEC will assess the validity of the statements in this section, in particular that the alignments of the "proposed CSRM, barrier and borrow area have been located to minimize and avoid impacts to Jamaica Bay and the Atlantic Ocean."

Response: Concur.

6.8.3, 6.8.4, 6.8.5, 6.8.13, 6.8.14: deferring to USFWS, NMFS, NYS DOS, NPS, and USFWS, respectively.

Response: Noted.

6.8.11 : Please provide a basis for the determination that the "USACE has determined that the TSP does not induce direct or indirect floodplain development within the base floodplain." The conclusion is contrary to coastal real estate practices. If that justification exists elsewhere in the Draft EIS, please provide a cross-reference.

Response: The eight step assessment, presented in the Environmental Impacts section of the Environmental Appendix, concludes that all practicable alternatives have been considered in developing the TSP, and that the main federal objective of reducing coastal flood risk cannot be achieved by alternatives outside the floodplain. This will be reevaluated for the next Draft HSGRR/EIS.

6.8.12 : It is not clear how the TSP will protect wetlands from damage caused by coastal storms as the surge barrier would not close for ordinary nor-easters or coastal storms, and it is these

storms that inflict the most damage on existing wetlands. Also, the Residual Risk features have not been subjected to the requisite scrutiny to avoid, minimize or mitigate wetland impacts. (See DEC comments for Appendix A3, Part 3, "Rockaway Residual Risk Plates.")

Response: Please see earlier response.

6.8.14: EJ impacts can also be measured by exclusion, and if the study area does not extend to Beach 1st Street, and encompass a 916-unit, 2000-resident housing complex and at least two senior-citizen residences, this statement does not appear to be correct.

Response: please see earlier responses pertaining to this issue.

6.8.16: See comment about exclusion, above.

Response: Please see earlier response.

Appendix R - Rockaway, 404b1 compliance

Page 3, Project Description, b., "General Description": It is premature to conclude that "no significant adverse impacts from construction or operation of the TSP on environmental resources in the study area have been identified in the EIS." Once the alignment and design of the surge barrier is finalized, hydrology and hydrodynamic and water quality modeling will be required before DEC can make an endorsement of this statement. See general comments.

Page 4, Factual Determinations, a., "Physical Substrate Determinations, (1)": DEC looks forward to coordinating with the Corps on identifying and prioritizing additional residual risk features. For residual risk projects included in this draft EIS, see DEC comments for Appendix A3, Part 3, "Rockaway Residual Risk Plates."

Pages 8-9, (a2-a6) through (h) and "Findings of Compliance or Noncompliance: It is not clear if these assessments apply to the Atlantic Oceanside only or to the entire TSP. If the latter, the conclusions stated are premature and not substantiated by the available ecological assessment data.

Response: The Appendices for the new TSP will be updated to reflect the updated plans, and to incorporate or address your comments, as applicable.

Appendix S - Rockaway, Mapped Freshwater Wetlands

The title of the report is incorrect; the appendix shows DEC's mapped *tidal* wetlands, not freshwater wetlands.

Response: Correction will be made.

It is important to note that the tidal wetland boundaries and types may have changed since the 1974 maps and that actual drawings, plans and designs must be based on current delineated conditions.

Response: Corrections will be made based upon recent site evaluations, as well as current elevational data.

For further DEC comments on the residual risk features, please see DEC comments for Appendix A3 Part 3, “Rockaway Residual Risk Plates.”

Response: OK.

New York State Department of State Comments:

Draft HSGRR and EIS for USACE Rockaway/Jamaica Bay Project

Based on the information available to DOS at this point in project development, we have identified a number of coastal policy-based concerns, which are reflected in the following series of questions and comments:

General

- A separate section on land management and local responsibility for risk management, akin to the FIMP report Appendix H (Land and Development Management), would be a valuable addition to this report. Language noting that state and local governments are responsible for utilizing their available programs and authorities to manage risk should be included. The study area is densely populated and therefore measures to reduce the risk of flood damages is necessary. A structural solution for an area of this size and for the number of people it will help protect from damages is justifiable. However, a structural solution to protect existing property and uses should not justify more development in the study area. A structural solution is not a long-term solution, and there is always residual risk should the barrier be overtopped. Language that urges the City to consider smart land use decisions to manage risk should be included. The following (or similar) could be inserted into an appendix document to set the context for a discussion on land use and risk management recommendations:

  "*State and local governments have authorities and responsibilities for managing risk that should be utilized in coordination with federal storm risk management efforts. The Atlantic Coast of New York East Rockaway Inlet to Rockaway Inlet and Jamaica Bay project will not eliminate all flood risks so additional measures by other public sector and private interests are necessary to help achieve resilience. Mechanisms available to local interests to better understand and reduce risk include comprehensive land use plans, New York City's Waterfront revitalization Program (WRP), and local Hazard Mitigation Plans, to name a few."*

  Response: Concur that a structural solution is justifiable and that there will always be residual risk. This is why the Corps has changed our language to be one of 'risk management' not 'flood control'. The revised report will discuss the City's land use planning efforts in Edgemere. The team will also work with DOS, DEC, and NYC to include language about ongoing and potential future avenues for additional resiliency and the available mechanisms for achieving it.

Main report (Draft Integrated HSGRR and EIS)

- Executive Summary, p. iv- One of the five planning objectives listed in the report is enhancing natural storm surge buffers, also known as NNBFs, and improving coastal resilience. However, the report and selected alternative provide little detail in their discussion of these features and buffers. Most of the reference to buffers in this report relates to wetlands and maritime forest. It would appear that achieving this planning objective would require some restoration of these habitats. There is also no clear definition of living shorelines in the report, and while it is understood that living shorelines span a continuum of designs, living shorelines with a structural core would not be able to function

as natural shorelines. According to table 5-10, CSRM Structures and Associated Quantities, no living shorelines are proposed in the selected alternative (surge barrier). It appears as if this planning objective, which DOS is highly supportive of, was not met.

Response: Concur that the draft report which included the objective to include natural and nature-based features (NNBFs) did not cite potential areas for wetland and maritime forest NNBFs. However, the composite seawall/vegetated dune with rock core does meet the objective of a 'nature-based' solution. Though it does not function the same way a sand-only dune would, it is a viable and fitting solution given the restricted berm width along much of the Atlantic Shorefront reaches of the project. The minimum berm width in the TSP design is 60 feet, which would require beachfill and periodic renourishment to achieve. The study area is mostly very developed up to the coastal edge and this has limited the natural resiliency options by taking up space that could otherwise support a more natural multiple dune system. The design takes all of this into account and the rock core adds resiliency because it is not erodible and were back to back storms to hit and the first one to overtop the dune, the remaining seawall would still manage risk until the dune could be repaired.

As far as including other forms of NNBFs in the recommended plan, the team has since developed and included up to four sites where wetland/berm hybrid NNBFs are justified to help manage risk from high frequency flooding in the Back-Bay. These sites are not considered 'restoration' but integral parts of the design for managing coastal storm risk. The team is very pleased to have included them and thanks you for your involvement in the process.

Section 1

- Section 1- Please define "long-term sustainability" and how it is being achieved in the proposed project

Response: There is no single accepted definition of 'sustainability.' However, this project aims to help manage coastal flood risk for the communities in the flood area such that damages are reduced and/or prevented from future storms up to the design event, so that residents, businesses, educational institutions, public infrastructure, natural communities, etc., can continue to persist and thrive.

The recommended plan is only part of an overall system solution. The proposed storm surge barrier which will now be further studied under NYNJHATS, and will not be authorized from this study, is a key part of the system and residents in the area will remain at high risk from large storms without a storm surge barrier. Further, as DOS noted elsewhere, land use decisions and adaptive management strategies for addressing sea level rise as it occurs if it exceeds design assumptions will need to be revisited in the future. This will be discussed in the revised report.

- Section 1.5- The introduction suggests that the Corps recommended project will eliminate storm damage and understates the significant need for additional risk management actions by others as part of a comprehensive approach to risk reduction. We recommend the following observations be added to alert

readers to the fact that risk management is a broader need and involves everyone.

- The emphasis on risk management versus storm damage reduction or elimination should be more explicit.
- In accordance with effective risk management, the introduction should emphasize the need for a robust approach including additional actions by others. The project will only address a portion of storm risks and it is not guaranteed against all possible events. Similar to an investment prospectus, project reports should illuminate risks that go along with the proposed project and advocate a diversity of actions by others:
  - The project alternatives do not completely eliminate flood risks, leaving substantial continuing risk even with implementation.
  - A storm could occur that exceeds project design and overwhelms project measures.
  - There are multiple, complex components in the project and the failure of any one component could compromise the protective system.
  - The project design is predicated on certain sea level and storm behavior assumptions which may prove unreliable in the future. Project measures will not reduce sea level rise or tidal flooding.
  - The project depends on future funding and maintenance, which cannot be guaranteed with absolute certainty.

Response: Concur with all of the above recommendations.

- The reports should emphasize the use of transformative land use measures to reduce risk and maintenance of flood insurance to help address residual risk.

Response: The team will work with the City/State to include local land use measures, as agreed to by our partners.

- The reports should emphasize that continuing adaptation in surrounding communities is needed to reduce hazard impacts, even if the recommended measures are completed.

Response: Concur, especially as it pertains to Broad Channel.

Section 3

- Section 3.6 (and 6.7.2)- Sea Level Change- The low estimates of 1.3 feet from a 1992 base year to 2070 are no longer reasonable. There is near universal scientific agreement that rates have accelerated and will continue to accelerate for the foreseeable future and beyond the project life. Current research indicates that SLR effects are expected to be higher in our region than global averages, due to gravitational effects and to slowing of offshore currents. That in turn will affect the relative elevation of the peninsula, estimates of sand stability, renourishment periods, nearshore depth and wave height, and the extent of the inland flood plain. It should also affect information presented in the reports – localities need to be alerted that flood plains will get larger, flood depths will increase and storm surges

will be higher in the future since they will be on top of higher water levels. To address these issues:

- USACE project reports should emphasize that SLR is escalating and will continue to escalate well beyond the project life. Development will need to adapt to address this effect.
- Project SLR estimates should be increased to the High-Medium projection currently available through 6NYCRR Part 490 (publicly reviewed recommendation currently waiting final approval) for:
    - Areas hosting critical facilities,
    - Areas in or adjacent to FEMA-NFIP "V" zones,
    - Areas where evacuation routes are constructed (such as the Rockaway peninsula), and
    - Areas where existing land elevation is less than two feet (NY State building construction freeboard standard) above the projected water level under the 6NYCRR Part 490 High-Medium Projection.
- Actions by others including local government and property owners will be needed to address risks and impacts. Assistance from state and federal sources should be in support of local resilience initiatives.
- Avoid conveying the impression that federal flood control projects will completely and permanently manage risks. Emphasize that the federal project can only accomplish limited protective levels on a short term basis and encourage other partners to act responsibly given the known and expected mid-term and long term risks.

  Response: If you have citations of studies DOS would like included, please provide. The team can certainly include recent data and studies showing the low curve to be unlikely or surpassed in the discussion of sea level rise and climate adaptability. Nonetheless the PDT is required to show the expected performance given a continuation of historic trends. Residual risk will be discussed as well as local resilience initiatives.

Section 6

- Section 6.1.1- Please describe in greater detail the analysis used to determine to residual risk features for each of the 5 locations. All of the selected features are structural solutions- were other NNBF or non-structural features evaluated? (See comment from Appendix A2-H).

    a. It would be helpful to include upfront the storm recurrence interval that was used in the analysis for determine these 5 locations.

    Response: The plan formulation write-up in the revised GRR/EIS will include more information on this, but to summarize: the barrier was identified as the TSP over the perimeter plan shortly prior to the publication of the Draft EIS/GRR. Residual risk measure were included at a conceptual level and were taken from NYC's Raised Shorelines Report which was formulated for a current 3-year event to address SLR. These were also limited to NYC. As part of the refinement of this concept, the Residual Risk measures were further developed into the

High Frequency Flooding Risk Reduction Features (HFFRRFs).

HFFRRFs were analyzed in the whole project area, into Nassau County, and three different additional flood extents (current 5, 10, and 20 year return period events) were mapped in order to identify the appropriate "tipping point" at which a potential barrier would be likely to be operated.

Finally, a harder look was given to where NNBFs could be included since the Raised Shorelines Report did not consider NNBFs.

- Section 6.7.5- p. 140 states that "Environmental impacts from Storm Surge Barrier realignment and non-structural residual risk measures will need to be fully evaluated prior to the Final Draft HSGRR/EIS." What are these non- structural residual risk measures? There is no mention of them anywhere else in this report. This is a significant information gap.

  Response: in addition to the HFFRRF development described above, the team is looking at the potential inclusion of non-structural measures for Broad Channel, to include floodproofing and house raising. The findings of the ongoing analysis will be shared with the team (including DOS) and will be captured in the revised GRR/EIS. Discussion of how non-structural was considered elsewhere will also be included.

Section 7- Environmental Consequences

- Throughout this section, reference is made to the benefits from living shorelines under the Action Alternative. However, because it is not clear what the Corps is referring to when reference is made to living shorelines, it is difficult to assess whether the benefits will be realized. Please define the living shoreline project components.

  Response: The revised GRR/EIS will include four NNBFs to address high frequency events. The discussion of these features will be included, and will specifically address a project specific definition of living shoreline.

- Section 7.14.1- Proposed action impacts from seawalls, groins, and floodwalls will not permanently stabilize the coast. They will aid in risk reduction in the short to mid-term, increasing sediment containment on the landward and updrift side of the features (seawall and groins, respectively). However, in the longer term, these features will disconnect the barrier spit from natural coastal process functioning and formation and contribute to passive erosion in front of and downdrift from the features (parallel and perpendicular beach structures, respectively). These impacts to coastal processes were not adequately addressed, nor was an adaptive management mechanism discussed for evaluating/mitigating impacts to these processes over the life of the project.

  Response: Adaptive Management will be described in the revised Draft Final GRR/EIS. The storm surge barrier is no longer part of the Recommended Plan for this study and will be further evaluated under the NYNJHATS study.

- Section 7.14.2- A potential long-term adverse impact from this project could be increased development in hazardous areas as a result of the perceived risk reduction potential of the proposed alternative. In addition, this section refers to future land use policies, but does not discuss them as potential drivers of change in the no-action alternative impact section (7.14.4)

  Response: NYC is engaged in land use planning to prohibit further development in hazardous areas, especially at Edgemere on the Back-Bay side of the Rockaway Peninsula. Future development along the peninsula, however is already planned with or without our project and is part of the future without project condition. Some of the new developments that have been built since Sandy prior to authorization to construct for our project have raised elevations and incorporated other non-structural measures to reduce risk. The report will stress that any new development in this area should implement non-structural measures such as raised elevations, elevated utilities, etc. to any new developments to reduce risk.

- Section 7.24- More detail on visual/aesthetic impacts from the proposed alternative is needed, particularly for the Jamaica Bay barrier. This section only discusses beneficial impacts, but hardened structures are not as aesthetically pleasing as natural or nature-based features. In addition, a rendering or alternative means of displaying the visual impact is necessary for state and local government entities, as well as the general public, to fully understand how this feature will impact their viewshed and the scenic quality of Jamaica Bay.

  Response: Agree that a rendering of the proposed barrier would need to be included to further assess the barrier's aesthetic impacts to a site-specific level. However, the storm surge barrier is no longer part of the Recommended Plan. The potential impacts to aesthetics will be analyzed and discussed for the features of the recommended plan in the revised draft final GRR/EIS.

- 7.24.4- It would be incorrect to assume that a natural shoreline, such as in the no-action alternative, would present an adverse significant long-term impact. Natural shorelines are able to adapt to changes from storms. For example, beaches are able to rebuild after a storm. Structures that interrupt these natural processes would limit the ability of a natural system to adapt and recover.

  Response: Much of the shoreline in the project area is already hardened and many of these hardened features, such as bulkheads, revetments, etc., are crumbling and undermined and do not currently function as intended. The assumption is that the lack of maintenance and disrepair would continue in the no-action alternative for these hardened elements.

  Response: This lack of maintenance would have a direct effect on the aesthetics of the shoreline in certain regions. The authors comment is noted and will be further addressed with additional clarifying text. However, it should also be noted that the extent of hardened shoreline throughout this urban estuary also has a direct effect on the resilience of these natural shorelines in the inner bay.

SCFWH – Significant Coastal Fish and Wildlife Habitat – Jamaica Bay – This is a state-

designation and it is tied directly to New York State coastal management program Policy No. 7. The Corps has not evaluated the proposed measures and outcomes within the context of protecting (first avoiding and then minimizing impairments to) the functions and values of the Jamaica Bay SCFWH. This should be included as a significant discussion within the EIS as well as, ultimately, the Corps' policy analysis to the Department of State when submitting materials for a federal consistency review.

Response: Concur, this policy will be evaluated in the revised Draft Final GRR/EIS and Environmental Appendix.

Special Natural Waterfront Area (SNWA) – Jamaica Bay & Rockaway Peninsula –The focus of this New York City Local Waterfront Revitalization Program (WRP) designation is to acknowledge and protect the integrity and benefits of coastal ecosystems and their important characteristics and features, including wetlands, habitats, and buffer areas. Again, there is no discussion of the project in the context of the SNWA and its attendant values.

Response: The Corps requests that the City add in information about this program to the writeup on local efforts that was provided for inclusion in the revised report.

Redirected Storm Impacts or Collateral Damages of the Project? – No discussion or modelling is included regarding the deflection and redirection of storm surge due to presence of the closed barrier during a major storm event. It should be determined where the water & energy will actually be directed during various events and closure scenarios, who is impacted, and how risk is changed for those who may be impacted. Residual risk measures should include actions to mitigate such risks outside of the project area. In the event that real events do bear out damages to others resulting from the barrier closure, who is liable?

Response: The storm surge barrier is no longer part of the Recommended Plan. The report will be updated to reflect this. Any further analysis will be considered under the NYNJHATS study which is now looking at the Jamaica Bay barrier in a regional context.

Residual Risk Measures – A more comprehensive description and review of the residual risk measures is necessary. Through what process and analyses did the Corps arrive at the five measures included in the TSP? How will residual risk measures be funded? Is any land acquisition required? What are the consequences if measures cannot be implemented due to funding or real estate constraints? Are the five measures presented the only ones that will be considered going forward or will other measures be developed as the project progresses.

Response: The Residual Risk measures have been expanded upon and further refined in this next stage of the study. Please see earlier response to similar comment on this.

Best Available Data – PFIRMs – Sec. 2.3.3 and other places within the document should acknowledge and reflect the PFIRM data/ maps rather than prior FEMA maps.

Response: The effort, time and cost to redo the modeling based on the updated maps is not warranted and would not change the results of the screening. A discussion of how the maps relate to one another can be included. PFRIM data is recognized in the shorefront engineering appendix, Section 4.2.

Real Estate – This section is not sufficiently developed. It should be detailed as to which properties will be affected, both private and public, and how conflicts will be handled. What properties are affected? How have/ will property owners be notified? Will eminent domain be considered? Will there be government buy-outs? Will lands be acquired for permanent open space, etc.?

Response: The Real Estate Plan is being developed as the project detail is refined and will be included in the revised Draft Final GRR/EIS.

Mitigation Elements, (6.1.3.2); Environmental Operating Principles (8.5.2) – What will final mitigation elements be? There is no detail provided. Appendix O – USFWS – also references a need for this information – ecological modelling used to determine impacts to habitat, including acreage and quantity of each habitat impacted, and descriptions and engineered drawings of proposed mitigations. In addition to direct disturbance impacts, both temporary and permanent, investigations and development of mitigation elements should integrate those impacts to species, biodiversity, and habitats that may result from effects on water quality and circulation.

Response: Evaluation of mitigation requirements will be revised in the Draft Final integrated report for the Recommended Plan. Mitigation requirements will be based upon impacts to regulated habitats (i.e., water, wetlands), and utilize EPW field studies to further analyze impacts to wetland habitats in terms of ecosystem functions (i.e., functional habitat units). EPW-based analysis will be founded on field collected data, and existing site conditions.

TSP – preferred barrier alignment – The analysis of the barrier alignments resulting in the TSP of C1E should be expanded and reevaluated. The report indicates that C3 was found to have the lowest environmental impact and would likely protect more people and property and require less of a structural footprint elsewhere. Additionally, the economic costs are said to be comparable in light of the latter consideration. It is not clear why the USACE selected C1E as the TSP except for the need to make modifications to locations of utility lines. What were the deciding factors?

Response: Please see earlier response on this comment.

Analysis of social and economic impacts – NFIP impacts should be discussed. Would there be changes to requirements for flood insurance? Would the mapped flood risk areas be altered?

Response: The PDT does not anticipate that the project, as designed, would change flood insurance requirements.

Water Quality – Potential water quality impacts (and consequent impacts on the ecology of Jamaica Bay) of the proposed storm surge barrier remain one of the major concerns with the Jamaica Bay part of the project. Modelling has been minimal and voluntary on the part of the City's environmental agency. Selection of the most appropriate (least impact) alternative should necessarily follow more thorough and detailed modelling efforts under a wider scope of circumstances – storms, period of closure, upland influences, etc. Modelling should also include an analysis of impacts on water quality at inlets, bays, and mouths of tidal creeks, etc. in order to make an intelligent assessment.

Response: The JEM modeling that was done to assess potential water quality impacts was detailed and aimed to assess a worst case scenario. USACE has provided an updated more detailed write-up describing what was done as well as responses to DOS detailed comments about the water quality modeling, most of which were addressed in the existing modeling which is now better explained. Any further analysis would be considered under the NYNJHATS study. Furthermore, SMART Planning, the Corps' new planning paradigm, directs the team to only develop a level of detailed analysis sufficient to make the decision at hand. If alternatives can be screened out in early phases, limiting the modeling and analysis needed for the full feasibility design and impact analysis, then the team is directed to do so. This is intended to reduce cost and duration of Corps studies, something that many non-federal partners have advocated for.

Ecosystem and Bay Health Effects – Detail is needed as to how the Corps intends to approach evaluating effects of implementing the TSP on the functions, restoration, and sustainability of Jamaica Bay's wetland systems and the critical habitats they support, on the hydrology including tidal creek systems, bay circulation and tidal flushing of pollutants. This evaluation should be discussed in the context of both the near term effects and the long term sustainability of living and non-living resources and natural processes including changing climate and sea level.

Response: First, it is important to note the storm surge barrier component of this plan has been moved to the NYNJHATS study for further evaluation and potential recommendation. Second, the mitigation evaluation will be revised based upon the revised project area and approach described above.

Wetlands/ Marsh Islands – The report (p. 76) discusses environmental degradation and historic loss of wetlands as a problem and presents the opportunity of restoration of natural coastal features including wetlands, reefs, beaches, dunes, and transitional upland features. Section 3.3 projects a future net loss of Jamaica Bay wetlands (and ocean beaches) in the FWOP condition. The USACE does not present how the project is anticipated to offset this historic trend of wetland loss and fails to acknowledge that losses will not be overcome by the future "with project" condition, i.e. there will still be a net loss with the project in place unless restoration measures are sufficient to overcome it and/ or wetlands are provided room to migrate landward. The USACE also fails to acknowledge that there may be benefits to wetlands and water quality through storms and storm surge events that would be impeded by the presence of surge barriers. The Corps should greatly expand the background discussion and scientific analysis pertaining to wetlands and potential impacts of this project on wetland resources for each planning reach. There should also be a discussion focused on current projects which are attempting to restore Jamaica Bay wetlands and how the project may affect (positively or negatively) the success of these and future efforts to improve bay health. It should be further considered, as an integral part of the TSP, to include such measures.

Response: This section will be revised to address the revised project area that is inclusive of four NNBFs designed for high frequency storm events, and the exclusion of the storm surge barrier. The revised text will take into consideration these considerations as it relates historic and project loss of wetlands in Jamaica Bay. The storm surge barrier is no longer part of the Recommended Plan.

CRBS – Designated CBRA areas – Sec. 2.3.5.5 -- All of Jamaica Bay and the western portion of the Rockaway Peninsula are CBRA areas. The purpose of the CBRA is to conserve coastal barrier resources through dis-incentivizing federal expenditures and

financial assistance that encourage development in these areas. P. 34 of the HSGRR/EIS states, without qualification, "The project area meets with the exemptions identified below …" and then lists the CBRA exemptions or circumstances under which federal investment is not contrary to the CBRA. The report fails to establish and sufficiently demonstrate, applying the purpose and legislative intent of the CBRA and its language, that the project actually meets CBRA exemption criteria.

Response: The CBRA area associated with the Jamaica Bay and the Rockaway Peninsula is NY60P which is per CBRA an "otherwise protected area" which the only restriction is not allowing the purchase of flood insurance by entities. The Draft HSGRR/EIS will be revised to reflect this determination.

7.26 – *Any Adverse Environmental Impacts that cannot be avoided* – "Permanent impacts will be fully mitigated by the creation of 247 acres of natural habitat. No other long-term environmental impacts are expected to occur as a result of the TSP." – see table 6-2.

Response: The mitigation evaluation will be revised as noted above and included as part of the revised GRR/EIS.

Regarding these sections and the associated tables presenting habitat impacts, there is no distinction or indication of which impacts are attributed to implementation of the surge barrier versus implementation of the Atlantic Ocean shoreline measures. There is also no background on what analysis led to the data presented in the tables and thus no way to verify or qualify anything presented.

Response: The mitigation evaluation will be revised as noted above and included as part of the revised GRR/EIS. Any identified impacts will be related to Atlantic Ocean shoreline measures in revised GRR/EIS, or the four NNBFs.

10.1 *Recommendations, Overview* - States "environmental resource concerns were addressed early in the study process to assure that adverse impacts were avoided to the maximum extent practicable". While there has been dialogue among agencies, important environmental resource concerns expressed by DOS in commentary provided in January 2016 and by other agencies including the DEC and NYC DEP involving water quality, long term ecological health of the bay, and impacts to bay wetlands have not been comprehensively addressed within the HSGRR/EIS to a point where the conclusion that "adverse impacts were avoided to the maximum extent practicable" is a reasonable one.

Response: The mitigation evaluation will be revised as noted above and included as part of the revised GRR/EIS.

Re: Decommissioning – This topic is missing from the report. Please discuss economic costs associated with decommissioning and removing the surge barriers in the future. Discuss when and under what circumstances and conditions the surge barrier would become ineffective and/ or non-operational to perform its intended functions.

Response: the storm surge barrier is no longer part of the Recommended Plan.

Re: Plan Recommendation - TSP – C1-E – May be refined or altered at the Agency Decision Milestone (ADM) based on public, policy, tech. reviews of draft HSGRR/EIS – Specifically for the alignment of the SSB, NPS land features, and residual risk features.

Response: Noted. The storm surge barrier is no longer part of the Recommended Plan for this study as a result of the ADM.

Re: Alternatives Development – Alternatives analysis appears to have been done as an assessment of alternative proposed alignments of the SSB – resulting in selection of C1E. Where is there reference to prior analyses of full array of alternatives including the No action alternative, evaluation of AO measures with and without the SSB, and the various alternatives including the Jamaica Bay perimeter plan? How were these evaluated and compared with the TSP.

Response: The plan formulation to date will be revised in the revised Draft Final GRR/EIS in an attempt to better explain the process and screening. The storm surge barrier is no longer part of the Recommended Plan.

Re: Modelling/ Tributaries – Modelling of potential impacts at individual tributary gates should be conducted before the preferred plan is authorized in order to protect bay health and ecology.

Response: The tributary gates were part of the Perimeter Plan, which was not the TSP, except for the measures proposed in Sheepshead Bay, Gerritsen Inlet, and Coney Island. These features are considered to be part of the proposed storm surge barrier tie-in plan and will be further evaluated under the NYNJHATS study. Since they have been screened out, no further analysis will be conducted on tributary gates.

Re: Post-project monitoring/ reporting – The Corps should include an outline of its plan to monitor and report on post-project recovery of ecological communities to pre-project levels or better – e.g. beach infauna, shorebird presence and foraging, and recovery of benthic communities in the borrow areas.

Response: The District and NYSDEC presently engaged in multiple coastal storm risk management projects to protect communities along the South Shore of Long Island (including New York City). Concern about ecological impacts due to these dredging and placement operations has been focused on potential detrimental effects on infaunal benthos, a major source of forage for commercially important coastal fish and invertebrate species. Previous studies of beach nourishment (e.g., Nelson 1993, Burlas, M., Ray. G. L. & Clarke, D. 2001) concluded that, in most cases, impacts from beach nourishment are minor. Impacts such as short-term reductions in standing stock biomass (an indicator of secondary production) are outweighed by benefits (e.g., medium- to long-term increases in flood protection and recreation), making such projects clearly in the public interest. However, because most previous studies were constructed in beach environments geographically distant from New York (e.g., New Jersey and southeastern U.S., questions have been raised as to the applicability of results reported elsewhere. As a result, the District has been sampling affected borrow areas the last 2 years sharing the results with Bureau of Marine Habitat (East Setauket). Findings from this study shall be intended not only to assess impacts associated with the immediate dredging and filling operations, but also to confirm the potential for impacts from subsequent renourishment operations and similar projects in the New York-New Jersey area.

Environmental impacts from beach nourishment are typically confined to the immediate

borrow (dredge) and beach (fill) areas and include reduced abundance of infauna, altered infaunal community structure, altered feeding habits among fish, crabs, and other commercially important species (due to changes in the availability of prey items), and increased turbidity. The overall objective of monitoring applicable to the South Shore of Long Island program is to determine if these impacts are severe and long-term and allow for resource managers to make better informed decisions on future projects.

There are no standard sampling programs for collecting this type of information; however, Cochran (1963), Morrisey et al. (1992), and Nelson (1993) provide useful guidelines, Saila et al. (1976), Cohen (1988), and Underwood (1992) provide specific advice for applying these principles to environmental impact studies. Each borrow area will have one year of pre sampling and three years of post-sampling events.

Detection of changes in benthos at both the borrow areas is the major focus of the monitoring program. Although the Program addresses general concerns associated with beach nourishment, certain aspects were tailored to fill specific gaps in knowledge relevant to the specific project area.

Purpose of monitoring program is to assess the potential impacts of offshore dredging activities and to identify ways in which dredging operations can be conducted so as to minimize or preclude long-term adverse biological and physical impacts to the environment. The primary study elements are: 1) characterize benthic ecological conditions, using existing data sets and data collected from field work, in and around the proposed sand borrow sites; 2) evaluate benthic infauna present in the proposed sand resource areas, and assess the potential effects of offshore sand dredging on these organisms; 3) develop a schedule of best and worst times for offshore sand dredging in relation to transitory pelagic species; 4) evaluate the potential impact of offshore dredging and consequent beach replenishment on sediment transport patterns, sedimentary environments, and impacts to local shoreline processes.

Re: Real Estate considerations –p.132

What is the plan if the non-federal sponsors cannot acquire, furnish, fund or otherwise provide the lands, easements, rights-of-way, and utility relocations necessary to implement the project? Is the federally funded project going to move forward ahead of all of these things being secured?

Response: If the required lands, easements, rights-of-way, and utility relocations necessary to implement the project cannot be provided, then the separable portions pertaining to that real estate will not be built. The project can move forward into the Pre-construction, Engineering, and Design (PED) Phase as the non-federal sponsors work to secure real estate. However, necessary real estate instruments, such as rights of entry for surveys and boring work, may be required during PED Phase. Construction Phase will begin once Real Estate is acquired and not prior.

Re: Navigation – 7.16 – Concludes that “no adverse impact on navigation is anticipated from the closed barrier as navigation during a storm is unlikely” –

The report fails to address problems related to the barrier closure during a large event, potential for debris, vessels, and sediment deposition in and around the structure which may have impacts for navigation in coming weeks following a major event.

The report should address, in narrative form, the types and sizes of vessels currently

using and anticipated to continue using this passage. [See also infrastructure, as the channel itself can be considered "navigational infrastructure" and its capacity should be considered in this report.] Does the restricted channel due to the structure narrowing the passage, have any impact on these vessels/ uses? What sort of guidance will be available for navigators in "being more careful regarding safe passage"?

Response: the storm surge barrier is no longer part of the Recommended Plan. The report will be revised to reflect this and the EIS will discuss navigation impacts for the Recommended Plan and the No Action plan. Discussion of above would need to be addressed in the NYNJHATS study which is currently analyzing the proposed Jamaica Bay storm surge barrier in a tiered NEPA approach.

Appendix A-2H – Residual Risk for Jamaica Bay

- P. 1 states that site specific factors will dictate the choice of inundation protection measures, but that it was not practical to account for all of the local, site-specific conditions to determine which measure was most appropriate at each location. Therefore, generic measures were selected. The recognition that these protection measures should consider local and site-specific factors is accurate, and we believe that more analysis could have been done, exploring an array of different measures beyond just structural or retrofit solutions. Please explain why there is no discussion of NNBF or non-structural solutions, if or if not they were considered at all, and if they were, why were they eliminated? We could not find any alternatives analysis for these features in the other reports. We believe that these residual risk features present a great opportunity to explore alternative options, such as NNBF. As it relates to the Corps planning objectives, this would be an opportunity to achieve the project objective of enhancing buffers and implementing NNBF.

  Response: Concur. Please see previous response about the development of the Residual Risk measures and subsequent and ongoing refinement into the HFFRRFs, which include up to four NNBFs and are examining potential non-structural measures for Broad Channel, based on the site specific conditions.

- If the 5-year return interval was chosen for analysis of low-lying, "at-risk" shorelines, does that mean that the surge barrier will be closed for any event that is larger than a 5-year level? Please clarify if there is any residual risk that was not addressed due to discrepancies between the level at which the gate would close and the interior residual risk factors that were discussed.

  Response: At the time the Draft Integrated Report was published, the Residual Risk measures and closure triggering event were still conceptual and uncertain. During subsequent analysis, the team has mapped three additional 'high frequency' flooding events in order to identify an appropriate closure trigger. This event is what the HFFRRFs are designed to. The flood extents for the current 3, 5, 10, and 20 year events were all mapped. It became clear with the mapping that once you went to a 20 year event the inundation was widespread and that in order to manage flood risk from such an event you would basically need something more akin to the Perimeter Plan. Since the Perimeter Plan was already deemed less economically

efficient and more environmentally impactful than the proposed storm surge barrier, the team decided to design the HFFRRFs to a current 10 year, future 5 year flood event level (using the USACE Intermediate SLR curve). This operational parameter would minimize wear and tear and maintenance for the proposed storm surge barrier, as well as any impacts to navigation or the environment from closures of the barrier.

Since HFFRRFs were not economically justified in all of the areas where flooding is frequently experienced, the Recommended Plan still has residual risk for residents from both smaller and larger events, but would substantially reduce the frequency that residents in the areas of the HFFRRFs would experience flooding. Residual risk will be discussed in the report, similar to many of DOS' previous comments.

Appendix D - Economic Benefits

General comments:

1. Subdivision of Project Area: Two planning reaches are subject to distinct risk mechanisms (p. *i*) so evaluation of with and without project damages requires a different model. Appendix D-2 Jamaica Bay Planning Reach Benefits is identified on p. 2, but no copy of that document was provided for review.

   Response: Appendix D-2 is part of Appendix D (available on the CENAN website), and begins on PDF page 132 of 155.

   a. Specific information in 131 of 155 pages of the appendix relates only to the Atlantic Shoreline Planning Reach which is at risk from erosion, wave attack and inundation. Are we able to rely on the benefits estimate for the Atlantic shore components if the bay and inlet components don't advance?

Response: Yes, the benefits estimate for the Atlantic shore components are independent of the bay and inlet components. As such, the benefits estimate for the Atlantic shore components remain viable without the bay and inlet components going forward as part of the recommended plan.

   b. If the proposed surge barrier doesn't advance, can an alternative plan be extracted for the bay communities that would provide Corps program eligible measures to be coordinated with actions by other federal, state, local and private concerns?

   Response: The barrier has been moved to a different study and we have developed HFFRRFs as eligible measures to try and provide some protection for Back-Bay communities that could be stand-alone yet also complement a potential future storm surge barrier. These measures are being coordinated with other state and local efforts.

2. Risk definition and ecosystem health: The "risks" described are natural events for

which the ecological community is well adapted. Changes in landforms associated with these events are necessary for the health of the ecological community. As a result, we recommend emphasizing that the "risks" are potential negative effects to development and human uses, rather than environmental forces, ie., the "risks" are not waves, surge and erosion, but negative effects to development. This is an important distinction because many, if not all of the management measures proposed by the USACE will have detrimental risks for the natural community, which will have to be addressed elsewhere.

Response: Discussion of risk in the context of a coastal storm risk management (CSRM) study centers around risk to human life and safety, as well as to development, infrastructure and human uses, as assessed in NED benefits. Flood risk, though adapted to the ecological community, poses risk to human life and development and communicating that risk is a key part of a successful CSRM planning effort. Especially since our plan, as DOS points out, will still leave residual risk and we need people to understand this as it impacts their decisions regarding development, evacuation during storms, etc. Therefore it is appropriate to talk about the key elements of flooding (waves, surge, and erosion) as risks in the context of a CSRM study.

3. Non-standard Benefits and Recreation Benefits: We commend the Corps for estimating recreation values. The inclusion of these non-standard benefits is valuable for understanding uses and opportunities in the region. However, several issues with respect to how the project is understood by decision makers and the public are raised that should be addressed. Lack of examination of the full spectrum of existing and potential recreation opportunities weakens the objectivity of the report and undermines the ability of state and local interests to fully consider the effect of recommended measures. It's important that the best estimates of potential non-standard costs and benefits be presented for a comprehensive and realistic description of regional conditions and the effects of the project.
   a. Other recreation effects – The economic analysis used only represents current visitation practices under an assumption existing beach uses will continue with the project. Construction of project features may foreclose other recreation benefits.

      Response: This is referring to the storm surge barrier which is no longer part of the Recommended Plan.

   b. Residual Risks – The economic analysis does not describe the scale and frequency of damages to infrastructure and development that may accompany the proposed project, for example:
      i. The project does not eliminate inundation in low lying areas due to sea level rise;
      ii. Some storms may occur that exceed project design level of protection;
      iii. The project may not function as intended during a storm event;
      iv. The project may not be maintained to perform adequately;

v. There could be flaws in project construction materials or installation;
vi. Sea level rise may exceed the amount used as a basis for estimating benefits, which would reduce project benefits and/or project features could be compromised by accelerated sea level rise.

Response: Annualized residual damages are included in the tables which present with-project damages, which by definition includes events that exceed the design level of protection. The PDT is not aware of any specific methodologies that account for flaws in design, construction or operation of flood protection structures when analyzing benefits.

c. Potential losses are not described or quantified - The list of benefits estimated does not include the benefit gained by a variety of reduced losses, such as lost business operations, school closings, increased travel time, reduced need for temporary shelter, reduced debris disposal, etc. While these types of costs are difficult to estimate and may not be part of standard Corps procedures, they are important factors to consider and should be included in regional strategic management plans.
    i. If possible, a list of these costs should be included somewhere with an indication of how others might address them.
    ii. If included, guidance should point to the importance of estimating changes in these costs over time due to changes in development patterns and recommended project actions. The effects of storms, erosion and natural processes on community values, including project-related investments, should be addressed in a comprehensive review of alternatives.
    iii. NYC should be apprised of the costs the city will bear under alternative management strategies.

Response: The text can be revised to include a list of potential benefits not evaluated for this study, and could include a brief discussion of their likely impact / their expected magnitude compared to the benefits that have been evaluated, based on previous studies.

4. Characterization of project area: In general, there is insufficient information on the natural features and processes in the project area. As a result, it is difficult to determine how compatible proposed actions are with the landscape and regional hydrological and sediment processes, and whether impairments due to human actions in the study area or adjacent areas are having detrimental effects that could be addressed to help manage risks. Addressing the following general points would greatly facilitate project evaluation and efforts by others:
    a. Wind, waves, storms, surges and erosion are natural processes and can be expected to occur during the project life and foreseeable future. Land uses should be compatible with these events. To the extent that land uses are incompatible, information on which areas are most at risk and the reasons for those risks (what is in jeopardy and what environmental events would cause damage) would be helpful.

Response: Noted.

b. The nature of the landforms, barrier peninsula, inlets, marshes and floodplains should be described. How did these forms originate, how would they tend to evolve over time absent human intervention, and what human activities have taken place to modify these landforms?

Response: This should be addressed in the 'affected environment' section, the geological existing conditions, and the future without project section. Those sections will be revised to include this discussion where it is missing.

c. If sea level rise accelerates to high levels estimated by the Corps or New York City, what are the expected effects on landforms in the project area, and what development will be at risk? It would be helpful to identify areas that could be inundated during the project life, and areas that could be inundated 100 years from the start of the project, using highest estimated sea level rise projections.

Response: A sensitivity analysis describing what would happen and potential adaptive responses were the high levels of SLR to occur will be included in the revised report.

Specific Comments:

1. Physical Setting, p. 5 and Description of the Problem, p. 13: Rates of erosion and building exposure are well described, but the nature of the peninsula as a natural feature is insufficiently discussed. We suggest at least one paragraph be added that describes the rates at which the peninsula accumulated over time, the elevation of the peninsula and particularly developed areas relative to MHHW, the general patterns and rate of sand movement characteristic of the peninsula, the height and distribution of natural dune features, and how the peninsula might be expected to evolve under environmental conditions over time absent human intervention. This information is essential to effective regional land use planning and risk management efforts. Comparable information should be provided for the bay interior shoreline and floodplain areas.

   Response: Noted. These additional facts will be considered. The team will need to rely on existing information to include them. If DOS has any resources they can cite, that would be helpful. The PDT will see if information about land use and physical changes over time can be included in the revised report.

5. Description of the Problem, p. 13: The occurrence of storms and natural sediment movement processes is not the root cause of damages because absent at-risk development these damages would not occur. It is the placement of vulnerable development in locations subject to these forces leads to risk. This should be emphasized so that land use planners and other risk managers in the region are fully aware of the consequences of their decisions. To the extent that development is placed in locations where floods, storm surges and erosion are prone to occur,

defensive measures will be permanently required, risks will increase in the future, and the likelihood of damages is increased relative to inland areas. We suggest emphasizing these points in sections describing risks and natural processes.

Response: Concur, that developing in high risk areas is unadvisable and interrupts natural processes and the natural resiliency of an undeveloped shoreline. The revised report can emphasize this more. However, this area is highly developed already and has been identified by NYC as an area for further in-fill development irrespective of a federal CSRM project, in order to meet the unmet housing needs of NYC.

If there is any way to differentiate geographic areas or neighborhoods on the basis of different levels of risk, or different natural processes that could cause damages, it would be helpful to planners to know that. Are certain areas more susceptible to flooding, surge or erosion that others? Where is erosion significantly elevated in comparison to average rates elsewhere in the project area?

Response: The flood extent mapping that was done in the Back-Bay for the HFFRRFs will be a useful tool for this. The shorefront engineering appendix includes an evaluation of shoreline erosion rates along the Atlantic shorefront. Additionally, the FEMA flood risk maps (FIRM and PFIRM), as well as the CEHA maps are useful sources of information/tools to address the reviewer's questions.

The report can be revised to show in broad detail which shorefront reaches currently have greater or lesser background erosion rates, based on inputs to the Beach-fx model. Other than that the published flood mapping for the shorefront could be discussed, which would define areas vulnerable to wave action.

2. Without Project Future Conditions, p. 18: Rates of expected erosion are provided but there should also be an explanation of why the peninsula accumulated sand over the course of the 19th and early 20th century, but is eroding now. What is the reason sediment inputs to the peninsula are not maintaining continuing the historic growth of the peninsula? This may be largely due to construction of the jetty at East Rockaway Inlet, other intervening structures, dredging practices, or other factors changing sediment supplies. A general description of the reasons the peninsula accumulated and why it is eroding now should be provided. A project designed to counteract natural processes cannot be properly designed without comprehending the causes of the problem, nor can other regional managers make informed decisions. This information would be greatly helpful.

   Response: Please see the Shorefront Engineering and Design Appendix A-1 which documents shoreline changes and human activities in Section 2.2 Shoreline History and Section 2.3 Engineering Activities.

3. Paragraph 54, p. 20, beginning "In order to evaluate damages…". A sentence later in the paragraph states: "The alternative plans offer full protection up to the easternmost project limit at Beach 19th Street." We interpret this to be a Corps guarantee that no flood damages will occur during the project life with the recommended measures. If that is not the case, please revise the sentence to explain what is and is not provided

by the proposed measures.

Response: Sentence will be revised.

4. Economic Benefits Appendix, Jamaica Bay Planning Reach p. 2 (136/155): The shape of the project study area does not seem to relate to any geo-political or floodplain boundary. Please provide some explanation of how the project area was determined.

   Response: Figure 1 of the Jamaica Bay Planning Reach discussion referred to in the comment is based on the 500-year water surface elevation of +15 feet NAVD88, which includes the high estimate of sea level rise expected by 2070. Figure 1 of Appendix D also shows in the main document as Figure 1-1. Comparison of these figures to Figure 1-5 of the main document verifies the general boundaries shown on Figure 1 of Appendix D (part 2) follow the +15 feet NAVD88 contour. Figure 1 does not specifically follow the contours of the +15 feet NAVD88 contour, as the study area boundary shown in Figure 1 Appendix D (part 2) were drawn up-gradient to the nearest road. Clarifying text will be added to the revised document.

5. Structure Values, p. 24: The text states "All calculated values were adjusted for location using RS Means location factors and for depreciation using standard depreciation factors as applied in previous flood risk management projects for USACE-NYD." A better explanation of depreciated values is needed. Could some example depreciated value be inserted to help readers understand the estimating procedure? What is the construction cost estimate and what depreciated values are used in the model going forward in time? Do depreciated values reach a minimum as time goes forward, and if so what is that value? Readers do not know and should not be expected to know how the Corps applied depreciation in other projects.

   Response: The text will be revised to clarify the methodology by which depreciation factors are applied to structure values for the purposes of the benefit analysis, and to include a brief discussion of the rationale for use of depreciated values in studies of this nature.

   a. Does the model estimate depreciated replacement cost for future events? Some explanation of how the economic model accrues damages for modeled storm events over time is needed.

   Response: The report will be edited to explain how the economic model accrues damages for modeled storm events. The HEC-FDA model has the capacity to include a future year where the hydrologic engineering and/or economic data would have changed from the base year. Within the model the expected annual damage is assumed to be constant beyond the most likely future condition. The expected annual damage for each year in the period of analysis is computed, discounted back to present value at the beginning of the base year and then annualized to get the equivalent value over the analysis period.

6. SBEACH modeling, p. 37: The description of modelling indicates post-storm conditions

are reported for various features. It is routine for beaches to recover sediment naturally following storms. Do the models account for this recovery, or do the models assume continuous consumption of beach features over time, absent beach construction?

Response: SBEACH models the beach profile response to storms and does not include beach profile recovery. However, Beach-fx does account for beach recovery. Typically a berm width recovery factor of 90% to 95% is applied in Beach-fx. So if the berm erodes 100 feet during a storm event, 90 to 95 feet of berm width is recovered in the weeks/months after the storm event.

7. Non-shore Reaches, p. 37: Flood stage/frequency curves are used to estimate damages. Are the stage/frequency curves adjusted upward over the life of the project to account for sea level rise? The maximum estimated sea level rise damages should be reported, with and without recommended measures. How much continuing damages occur with recommended measures, and where are those damages expected to occur?

   Response: Stage frequency curves are adjusted upward to reflect future sea level conditions and average annual damages are calculated at different points in time to reflect changes in risks. Detailed tables of annual damage in current and future years will be updated in the Report Appendix and will quantify damages in each project reach.

   a. Estimates of effects without the surge barrier should be provided, in case the ocean front portion of the project goes forward separately. The surge barrier concept could be modified, replaced or abandoned in the future, and the state and local interests should know what those effects could be.

      Response: Since the barrier is no longer part of the recommended plan, the estimated effects without the barrier will be discussed in the revised report.

   b. A projection of damages 100 years in the future, with high estimate sea level rise, would be valuable for planning. The locations affected should be identified, and effects with and without project measures should be estimated.

      Response: Please see earlier response.

OFFICE OF THE MAYOR

253 Broadway - 14th Floor New York, New York 10007 www.nyc.gov/resiliency

Date: December 2, 2016

Subject: ***USACE East Rockaway Inlet to Rockaway Inlet and Jamaica Bay Draft Integrated Hurricane Sandy General Reevaluation Report (Report) and Environmental Impact Statement (DEIS) – New York City Comments***

I. Top-Level Comments:

- The proposed buried seawall along the Atlantic shoreline in the Rockaways (section 6.1 and elsewhere) will protect New York City (City) communities that were among the most devastated during Sandy. The United States Army Corps of Engineers (USACE or Corps) should move expeditiously to construct this separable element of the project with funds appropriated in the wake of Hurricane Sandy while continuing to pursue additional funds to realize the full project.

  Response: The Corps has agreed to initiate P&S concurrently with the final stages of the Feasibility Study in order to address this concern/comment. The storm surge barrier, will be further studied under the NJHATS study.

- The Corps identifies a preferred alignment for Rockaway Inlet tide barrier in proximity of the Gil Hodges Bridge over two more westerly alignments (C-1E over C-2 and C-3) due to potential impacts to underwater cables and higher costs, respectively.

  The City prefers a more westerly alignment that avoids additional in-water construction and associated environmental impacts at Sheepshead Bay and Gerritsen Inlet and minimizes visual and environmental impacts of upland coastal defenses. Before moving forward with an alignment that will necessitate additional tide barriers in Sheepshead Bay and Gerritsen Inlet, such as C1-E, the Corps should produce more detailed analysis of the costs and environmental impacts associated with C-1E and C-1W compared with C-2 or an alignment west of C-2.

  Response: C-1W was screened out because it would have produced too much scour on the Gil Hodges Bridge, by the PDT's estimations. Please see earlier response on why C-1E was chosen as the TSP alignment. Not only does it maximize net benefits compared to C-2 and the perimeter plan, but there is less risk for costs to balloon during utility relocation, which is not required for C-1E. Any other alignments further west than C-2 were screened out as less cost effective alignments (i.e. not the NED plan).

- The USACE must ensure that the City is able to coordinate and comment on any forthcoming Corps EIS documents and plans as detailed designs are further developed. In order to fulfill its own environmental review obligations pursuant the New York State Environmental Quality Review Act, set forth in the New York State Environmental Conservation Law Sections

3- 0301(1)(b), 3-0301(2)(m) and 8-0113, additional detail regarding Corps actions, affected properties, and necessary local actions are necessary. Therefore, the Corps should conduct site- specific environmental review of project components that sets forth additional specificity and should issue draft versions of such documents for public comment. The City should be notified as the Corps develops a timeline that sets forth milestones for future design, analysis, and construction as well as projected dates for the release of related environmental review, design, and planning documents for public comment.

Response: Noted/concur. The Corps will continue to involve NYC in the regular PDT meetings of the study team. A member from ORR and NYC Parks regularly participate and meeting agendas and minutes are sent out every two weeks to a larger distribution list of NYC team members, which should help them to identify when added participation may be warranted. The Corps relies on the NYC representative/liaison to involve additional technical experts at the City at the appropriate times and works with the City to facilitate this.

General Comments:

- The Corps should recognize the City's successful appeal to the Federal Emergency Management Agency (FEMA) to revise the flood risk calculations and corresponding flood maps when discussing the 2013 preliminary Flood Insurance Rate Maps (PFIRMs) (in Section 2.3.3 and elsewhere) and provide context on the process for establishing new flood maps.

  Response: Concur, this should be noted. Could the City please provide a write-up on the context for inclusion? Thank you.

- This project will include significant operation and maintenance (O&M) obligations for the City.
  - As design progresses, the USACE should coordinate with the City and its operational agencies on any decisions that may impact O&M costs.

    Response: Concur. This is underway.

  - USACEs should make clear what reporting requirements will be imposed on the City.

    Response: Noted.

  - USACE should identify any training, support, and guidance that will be provided to the City in order to meet these O&M and reporting requirements.

    Response: Noted

- Assumptions for future sea level rise projections vary within the Report and DEIS. For example on page v the projection is 1 foot, and on page 71 the projection ranges from 1 to 5.4 feet. Sea level rise projections should be consistent throughout.

  Response: Concur, the report will be checked and revised for consistency.

- The final design of any engineered structures that may impact New York City Department of Parks and Recreation (NYCDPR) parklands should be completed in coordination with NYCDPR. In addition, the USACE should coordinate potential betterment projects with NYCDPR to ensure that funds are

used efficiently to provide New York City residents with the greatest benefits to open space and natural resources.

Response: USACE is fully coordinating with NYCDPR.

- Many of the proposed elements have the potential to impact existing sewer and water infrastructure in the project area. USACE should work in close coordination with the New York City Department of Environmental Protection (NYCDEP) to ensure that impacts are minimized and City sewer and water infrastructure is not compromised.

  Response: USACE is fully coordinating with NYCDEP.

- Specifically:
  - Any portion of the Tentatively Selected Plan (TSP) crossing existing water and sewer infrastructures should either (1) span or bridge over NYCDEP infrastructure so there will be no additional loading to the existing infrastructure or (2) USACE must demonstrate that the system foundation will not undermine existing water and sewer infrastructure.

  - USACE should demonstrate that the existing water and sewer infrastructure can withstand the additional soil fills.

  - TSP structures should not impede access and maintenance of existing DEP water and sewer infrastructure.

  - Effects on the effluent discharge capacity of the Coney Island WWTP (which is within the protected area but has an outfall outside the barrier) must be evaluated in coordination with NYCDEP.

  Response: Noted. USACE will continue to coordinate with the DEP.

- Many of the proposed elements have the potential to impact existing roadway infrastructure and traffic patterns in the project area. USACE should work in close coordination with NYCDOT to ensure that impacts are minimized and City roadway infrastructure and traffic patterns are not compromised. Specifically:

  - Raising of roads will require full-depth reconstruction of roadways and sidewalks; as part of reconstruction, traffic signals and lighting and all associated conduits need to be removed, redesigned, and reinstalled. Impacts to and redesign of this infrastructure should be coordinated with NYCDOT and other appropriate entities. City standard details and specifications should be used for the roadway design.

    Response: Concur. The team will continue to coordinate with NYCDOT.

  - Please identify whether USACE or NYCDOT will be responsible for the design and/or construction of street geometry changes.

    Response: USACE will be the responsible party, in partnership with and NYC. However, USACE can take lead on design and construction, in coordination with DOT.

- There should be a section that illustrates how storm surge barriers may affect current study streets (i.e., Flatbush Avenue and its gas pipelines) and provides related quantitative traffic/pedestrian/parking analyses.

  Response: Response: the storm surge barrier never reached the level of design to assess this. The storm surge barrier will now studied under the NYNJHATS study and any traffic impact analysis will considered as part of that study.

- As design plans are developed USACE should provide travel demand assumptions on construction workers, trucks, and relevant Maintenance and Protection of Traffic (MPT) plans during construction period.

  Response: Please see above.

- The TSP will have significant impacts on the Jamaica Bay Greenway, a 28-mile network of bike and pedestrian paths that will form a loop around Jamaica Bay when complete (10 miles have been completed to date). USACE should coordinate with NYCDOT on the project design to ensure adequate replacement of Greenway facilities and to minimize impediments to future Greenway construction. During construction, impacts to Greenway access should be avoided or mitigated with alternate routes. See appendix II for a list of areas where USACE TSP overlaps with the Jamaica Bay Greenway.

  Response: Thank you for providing this list. Our team will review to see if there are any unaccounted for intersections with our Recommended Plan. We have already begun incorporating boardwalk as-builts into our design. Now that the barrier is out and the HFFRRFs have changed, we will look again to see if there are overlaps and reach out to NYCDOT for as-builts or design plans in order to consider them in our designs. Thanks.

II. **Project Features:**

Rockaway Atlantic Side

- USACE should work with NYCDPR and NYCDOT to ensure appropriate in-kind replacement for existing recreation infrastructure, including but not limited to the Jamaica Bay Greenway, shoreline and boardwalk features impacted by construction.

  Response: Concur.

- USACE should work with NYCDPR to determine the design of the recreational access over the buried seawall, and address features including but not limited to:
  - The number, location, and design of all access points over the buried seawall, including access for maintenance vehicles and pedestrian access
  - The selection of surface material and finishes
  - The siting of construction staging areas
  - The alignment of permanent access over the new composite seawall to the beach at Belle Harbor and Neponsit that will maintain its current ADA accessibility

  Response: Concur.

- Removal of recently built ramps and stairs on the Rockaway boardwalk necessary to build the

stone revetment discussed in section 5.2.1 of the Report has the potential to significantly impact the project's costs. The USACE should provide additional information regarding:

- Whether the estimated cost for the reinforced dune factors in the removal of the king piles and reinstallation afterwards

Response: Costs for removal and reconstruction of ramps or stairs associated with the boardwalk was not accounted for in the original cost estimate. These costs will be included in the updated cost estimate for the project. The USACE will include additional narrative regarding any major work items and construction sequencing that relate to modifications of existing stairs and ramps to accommodate the new buried seawall design.

- Because the ramps will have to rest on top of the stone revetment once reinstalled, Whether there has been consideration to the weight of the ramps on the stone revetment and whether the pile configuration will be changed

Response: Details with respect to access ramps and stairs (size and support configuration) that cross-over the dune and provide access to the beach will be further finalized in the PED phase.

- Whether the stone revetment will have any impact on the stairs which were built down to the scour line

Response: Details with respect to access ramps and stairs (size and support configuration) that cross-over the dune and provide access to the beach will be further finalized in the PED phase.

- At the community meeting held on 10/13/October 13, 2016, the community responded very positively to the extension of the current groin field west to Beach 121st Street and many community members requested the groins be extended even farther west. Has the Corps considered adding groins in Belle Harbor / Neponsit where the City has experienced significant erosion following Hurricane Sandy?

  Response: GENESIS Modeling indicates that shoreline fronting Belle Harbor/Neponsit is relatively stable and may not need an extension of the groin field westward. The Tentatively Selected Plan groin field east of Belle Harbor will allow sediment transport westward to those communities from the new groins. A planned two-dimensional USACE certified CMS model will be used to simulate the downdrift shoreline morphological response to the new proposed groin field during the PED phase. Further extension of the taper groin field westward will be considered if modeling results warrant.

- USACE should set forth expectations for maintenance for the new reinforced dune and groins

  Response: Agreed. General maintenance expectations will be established and discussed during Feasibility, particularly regarding the proposed pump stations and road closure gates, which the team is currently seeing if those features can be replaced by less-maintenance intensive measures such as ponding and road ramps. If those are not possible given the space limitations, USACE will work closely with NYC and DEC to determine whether the proposed plan with the

maintenance involved is acceptable or not. The Operations & Maintenance Manual is prepared during subsequent to the Feasibility Study as the design is finalized.

- Does "suitable beach fill material" meet the New York State Department of Environmental Conservation's (NYSDEC) recommended soil clean up objectives for publicly accessible land? Any feature of the proposed project that will incorporate public access should be evaluated for contaminated materials at a later date to ensure there would be no significant hazardous materials impacts.

  Response: USACE does not consider soil clean up objectives when screened. Suitable sediment-sand with a grain size equivalent to or slightly coarser than sand found naturally on the beach-must be used (U.S. Army Corps of Engineers 2002[1]). In this study, beaches throughout the U.S. were examined to determine both natural grain size distributions and the sediment size that is stable under natural conditions. Sand within proposed borrow areas off the coast of Rockaway (i.e. out to 60 ft water depth) were sampled to determine their natural conditions. No assessment for Hazardous, Toxic, Radioactive Waste (HTRW) was required, since the borrow areas were not a concern of the U.S. EPA or NY State, nor are they part of the National Priority List under, Comprehensive Environmental Response, Compensation, Liability Act (CERCLA) or Resource Conservation and Recovery Act (RCRA). Sand from the borrow areas is predominantly quartzose sand (>90%), which lacks the affinity for binding of contaminants. In addition, the extremely low organic carbon and clay content of the borrow area sediments makes the presence of contaminants highly unlikely other than at trace levels. (USEPA/USACE, 1991[2]).

Rockaway Inlet Tide Barrier

Response: The storm surge barrier is no longer part of the Recommended Plan and will be further studied under the NYNJHATS study.

- What level of risk is acceptable for water quality degradation, habitat, and tidal range effects in Jamaica Bay and other water-bodies that may be impacted by construction of the TSP (i.e. Gerritsen Inlet and Sheepshead Bay)? Is this accounted for in the mitigation requirements?
- Additional water quality modelling will need to be completed to evaluate impacts of a Rockaway Inlet tide barrier. Any modeling and analysis performed by USACE should be in consultation with DEP. Additional modeling should also be conducted on barriers across the Gerritsen Inlet and Sheepsehead Bay.
- The DEIS analysis indicates that the Storm Surge Barrier Plan results in a tidal amplitude change of 0.2 feet during the tide cycle. The Corps should evaluate the impact of this tidal pattern change on existing DEP outfalls in Jamaica Bay.
- The effects of tidal fluctuation on wetland restoration projects in Jamaica Bay should be

[1] U.S. Army Corps of Engineers (2002). Chapter 4: Beach Fill Design. In Coastal Engineering Manual-Part V. Vicksburg, Mississippi. 113 p.

[2] U.S. Environmental Protection Agency/U.S. Army Corps of Engineers. 1991. Evaluation of Dredged Material Proposed for Ocean Disposal - Testing Manual. EPA-503/8-91/001. February 1991. USEPA, Office of Water/Department of the Army, USACE.

investigated.

- The wetlands at the greatest distance from the barrier and those with small inlets due to past modifications would experience reduced flushing. A 10% to 20% reduction for a 6 foot tidal range during average tides would result in a .06 to 1.2 foot difference, which could be significant.
- If storm surge barriers cross waterways that DEP vessels traverse (as depicted in Figures 5-12 and 6-2), DEP will need to be included as stakeholders during discussions of design so DEP vessel dimensions can be calculated into the design.

Roadway Floodgates

- The type of floodgate should be specified (swing, roller, etc.) and specifications should be provided for all materials, machines, and equipment, including overall quantities, costs per unit, and operation specifications.
- It is important that the City understands the resources required for deployment and operation of proposed road gates before gate designs are finalized.

  Response: During Feasibility, the design is developed to a roughly 50% level, enough to reasonably calculate costs and impacts. Detailed design will be done during the Pre-Construction Engineering and Design (PED) Phase. The Corps will work with DEP to fully define the resources required.

- Many proposed flood gates cross important evacuation routes. The USACE will need to coordinate with the City and its emergency services providers, New York City Emergency Management and NYCDOT, on alignment and an operational plan for street closures. A note in the design drawings should reference this forthcoming coordination.

  Response: Concur.

- The information pertaining to "Operations and Maintenance" in section 6.4 of the Report should provide specific details pertaining to the proposed roadway flood gates. These details should include a schedule and operating procedure for when gates will be deployed in the case of an anticipated event.

  Response: Operations and Maintenance details for roadway flood gates for any HFFRRFs will be developed during the PED phase concurrent with detailed design of the gates.

Residual Risk Projects

- The Corps should set forth the level of protection the residual risk features are designed to provide, how the Corps selected this level of protection, and how sea level rise will impact this level of protection?

  Response: Concur, this will be included in the revised Draft Final GRR/EIS.

- The Corps should set forth why the five initial measures included in the TSP were prioritized, how the remaining seventeen measures will be advanced, and the implications that a measure's inclusion or exclusion will have on its funding and implementation.

  Response: please see previous response on the development of HFFRRFs.

- Many of the residual risk projects overlap with planned City capital projects, including some coastal resilience projects with similar goals. The City and Corps should coordinate to ensure projects are not duplicative as planning progresses.

  Response: Concur, coordination is underway.

- The USACE's plan to raise Brookville Boulevard will continue to restrict natural tidal flows to the adjacent wetland. Phase I of the City's Raised Shorelines Citywide project also identified the raising of Brookville Boulevard as a high benefit project and evaluated alternatives that could enhance inter-tidal wetland exchange while also increasing the Boulevard's resiliency. The USACE should consider a design that improves tidal exchange as the passage of these waters is important for the protection and nourishment of the wetlands and for the function of the wetlands as a water retaining body. The Idlewild Watershed Communities Reconstruction Plan, produced by the Governor's Office of Storm Recovery (GOSR) through its New York Rising program, also identifies the elevation of Brookville Boulevard as a featured project.

  Response: Brookville Boulevard is landward of the floodprone structures in the Rosedale area, it was screened out because it would not provide any significant flood risk reduction benefits.

  

  Above image shows the houses which experience frequent flooding west of Brookville Boulevard, which would not receive significant flood risk reduction benefits were it to be raised.

- The raising of Brookeville Boulevard would likely exacerbate negative impacts to water quality in Idlewild marsh due to CSO discharges. This could potentially cause marsh loss and erosion in an already degraded habitat area. The USACE should analyze these impacts, which were not included in the DEIS, before finalizing any designs.

  Response: please see above.

- Impacts to coastal areas caused by the construction of residual risk features such as walls and

berms include loss of habitat, erosion, loss of public access, and general condition of the shoreline areas. In particular, construction of seawalls at the shoreline often accelerates erosion. These impacts must analyzed and mitigated.

Response: Potential impacts from the HFFRRFs will be analyzed in the EIS. The HFFRRFs now include four NNBF areas and the plan as a whole is expected to be self-mitigating because of this.

III. Report Sections:

Section 2 - Existing Conditions

- Section 2.3.3.7
    - Fauna are omitted from description of biological communities; some connection to the broad class of animals listed in section 2.3.8 should be made in this section.

Response: Will be revised to include appropriate references.

- Section 2.3.5.2
    - The U.S. Department of Commerce approved the revisions to New York City Waterfront Revitalization Program on June 9, 2016. The revised policies, available at www.nyc.gov/wrp, should be used for the review of consistency of this project.

Response: Team will review and update as needed. Thank you.

    - There is also a revised Coastal Zone Boundary available online that should be used to update Figure 2-11.

Response: Will be revised to include the most recent Coastal Zone Boundary.

- Section 2.3.75
    - The high marsh areas noted as invaded by common reed in paragraph 2 are undervalued because the full range of function of these areas is not assessed. Very little high marsh remains within parkland – most has been converted to low marsh. These remaining high marsh areas serve multiple purposes: they are the only areas available for low marsh migration and they are extremely valuable habitat for obligate salt marsh nesting ground birds. These functions should be considered highly valuable and factor into the analysis, which focuses solely on the value of habitat services and functions of this area, and not its use for marsh migration.

      Response: While the mitigation evaluation will be revised, the project team recognizes the high value of native high marsh habitats; especially within Jamaica Bay. The text will be evaluated and revised as necessary to ensure the value of high marsh habitats is not understated.

    - The Report does not comment of the causes of the invasion of phragmites into high marsh areas. It should be noted that this largely occurs on the fringes of marshland where there has been fill introduced in to the high marsh, and thus elevations are increased in adjacent areas, and at the freshwater interface of wetlands, where there are likely high nutrient sources.

Response: Due to the highly urbanized nature of Jamaica Bay, phragmites has invaded the majority of high marsh habitats and even at sites where fill has not been introduced. However, it's recognized that it most frequently the result of some form of anthropogenic disturbance. The text will be revised to address this comment.

- There is no mention of the biota/fauna that are dependent on the high marsh areas within the section titled "Biological Communities."

Response: Appropriate link to species that utilize high marsh areas will be included.

Section 3 - Future Without Project

- NYCDEP's 26th Ward, Coney Island, and Jamaica waste water treatment plants (WWTPs) should be shown on Figure 3.3 Map of Critical infrastructure (which appears to only indicate Rockaway WWTP).

  Response: Thank you. These wastewater treatment plants will be added.

Section 4 – Formulation and Evaluation of Alternative Plans

- USACE should incorporate an assessment of all impacts and benefits of the TSP on NYCDEP infrastructure into the more detailed cost estimate that will be developed.

  Response: It is beyond the scope of the study to provide that quantitative analysis. However, USACE will continue to coordinate with NYCDEP to help with common understanding of what would be required of NYCDEP and what USACE can construct in terms of interior drainage improvement.

Section 7 - Environmental Impact Statement

Additional environmental analysis is necessary as the design of the project progresses or as separable elements of the project progress.

Response: The environmental analysis will be revised based upon the new project area.

- Additional environmental review must also identify any actions that the City, its agencies, and non-City stakeholders must take to facilitate the completion of this project.

  Response: the team is actively coordinating with the City on this during regular PDT meetings, bi-weekly higher level coordination meetings, and other meetings, as needed. The Project Partnership Agreement (PPA) clearly lays out all of this and is signed prior to construction.

- Though the DEIS is necessarily generic due to the conceptual nature of the current plan, USACE should consider adding discussion that further explains the anticipated framework for additional review that the Corps will conduct, especially for the Rockaway Inlet barrier, including a description of the additional studies that are expected and at what point in the process those details will be presented publicly.

  Response: The barrier is no longer part of the Recommended Plan but is being evaluated under the NYNJHATS study. The NYNJHATS study will use a tiered NEPA strategy and will lay out what types of analyses are planned and when in the process they will occur.

- The City and its agencies, as well as non-City stakeholders, must be provided an opportunity to comment on forthcoming environmental analysis undertaken as design progresses on the project or separable elements of the project, and the Corps should set forth the process for facilitating such comments.

  Response: Noted.

- The literature review is based primarily on only one study Fugro, 2016)[1] which is inadequate for a project of this magnitude. The USACE should review additional sources, including Pater (2012) [2], which was referenced in the Fugro study.

  Response: Additional references were included in Appendix I. However, the GRR/EIS will be revised to include a more thorough discussion of these impacts and draw upon a diversity of literature sources.

- The USACE should provide a noise analysis for the construction period.

  Response: Noted. Noise will be discussed in the revised Draft Final EIS.

- 7.4 Air Quality: For Air Quality Construction analysis, projects lasting more than two years are not considered temporary. Discrete stages of construction should be described and potentially analyzed in further detail.

  Response: A General Conformity analysis and Determination was completed for the project and a Statement of Conformity was signed. The project will be in full compliance with the Clean Air Act and Amendments. In so far as the project is a construction project with a specific duration (start-finish) and not the establishment of a permanent facility, the potential for impacts would be temporary, i.e. to occur only during the construction of the project, and not be sustained beyond that duration.

- 7.7 Invertebrate and Benthic Resources, 7.8 Finfish, 7.9 Reptiles and Amphibians, 7.10 Birds, 7.11 Mammals: The no action analysis assumes a greater level of damage to coastal ecological habitat by high energy storms than the City has observed in past weather events. The USACE should consider additional analysis to validate these claims.

  Response: The GRR/EIS will be revised to specifically address high frequency storms and includes four NNBFs.

- 7.13 Protected Species: “USACE is engaged with the USFWS to ensure the latest reasonable and prudent measures for piping plovers and standard BMPs are incorporated into the projects’ Plans and Specifications detailing specific conservation measures to be undertaken to minimize potential adverse effects to protected species under their jurisdiction.” Please describe or provide example of these types of measures.

  Response: The Conservation Measures would consist of, but not be limited to:

1) The USACE will conduct surveys during the spring/summer, and prior to construction activities, to identify nesting plover in the Project Area and to document all known locations of plover. In addition, the USACE will document any other Federal or state-listed wildlife species observed in the Project Area during survey and will initiate consultation with appropriate state and Federal agencies.

2) Symbolic fence and signs will be placed around all plover nests and brood rearing areas located in the construction area to deter use of the area and to protect sites from incidental disturbance from construction activities.

3) The USACE will conduct construction activities near active plover nesting areas from September 2 through April 14 to avoid the key shorebird nesting period.

4) Construction activities will avoid all delineated locations of the species during the breeding season and will undertake all practicable measures to avoid incidental taking of the species.

5) The USACE will reinitiate consultation with the USFWS to identify acceptable alternatives should any plover nest sites be identified within the direct construction footprint.

6) The USACE will monitor the Project Area before, during and after construction.

7) The USACE will educate residents, landowners, beach visitors and beach managers on piping plover.

8) The USACE will encourage local agencies to place time restrictions on beach use by vehicles to avoid key nesting and fledging periods.

9) The USACE will conduct follow-up surveys of plover habitat within the Project Area. Surveys will be conducted for three consecutive nesting seasons post-construction and a summary report regarding habitat use and nesting will be provided annually to the USFWS.

- 7.15 Recreation: The USACE should provide additional justification for the conclusion that "negligible short-term direct impacts are anticipated from disruption of access to recreation resources during project construction (e.g., beaches, parks, historic sites)" and a description of recreation facilities that will be displaced.

  Response: The GRR/EIS will be revised to further detail rationale that led to this determination.

- 7.24 Aesthetics: the USACE should provide more specific detail regarding viewsheds (including renderings or cross-sections if possible) to justify its claim that, despite viewshed disruption, "beneficial long-term direct impacts on aesthetics would be realized by implementation of the common project elements."

  Response: please see previous response regarding viewshed/aesthetic impacts of proposed

storm surge barrier which is no longer part of the Recommended Plan.

[1] Fugro. (2016) Lafayette River Tidal Protection Alternatives Evaluation, City of Norfolk, City-wide Coastal Flooding Project, Work Order No. 7, January 2016.
[2] Pater, P.D. (2012) Effect of the Removal of the Oosterschelde Storm Surge Barrier, Delft University of Technology, June 2012.

Appendix F – Real Estate Plan

- The City would not be able to complete a ULURP and environmental review findings to prepare real estate with the real estate plan provided. A more detailed real estate plan that specifies blocks/lots and roads to be acquired, eased, or otherwise affected by construction or drainage should be prepared in future reports. The Corps should provide more detailed environmental review to accompany future real estate plans should environmental review and provided to stakeholders for public comment.

  Response: A complete Real Estate Plan will be included in the revised Draft Final GRR/EIS. This plan will be released for a second 45-day review period.

Appendix G – Public Access Plan

- Plan should address the preservation of existing Greenway uses for both bicycle users and pedestrians during construction as well as in the built design.

  Response: The Public Access Plan is prepared by the Non-Federal Sponsors. This comment will be passed to the points of contact at DEC and NYC Parks, respectively.

Appendix M – Historic Resources

- In order for the New York City Landmarks Preservation Commission (LPC) to complete its review of historic resources, the USACE should provide the following information:
  - A figure consisting of a map of the cultural resources in the Area of Potential Effect (APE), including all listed and eligible resources. The map should include street names and a key containing districts and addresses of individually listed or eligible properties.

    Response: A map as described above will be included in the revised report.

  - The bibliography of previous reports/surveys used to complete the Cultural Resources section and Programmatic Agreement (PA) should be provided.

    Response: The references section of the main report includes citations of the reports, websites, etc., used to prepare the cultural resources section. It will be to ensure all citations used in the Cultural Resources section are included. The Programmatic Agreement will have an appendix that includes any reference material used in its preparation.

  - The USACE should provide information regarding the location of archaeology surveys referenced in Appendix I.

    Response: In the references section of Appendix I, each cultural resources citation will identify the location of the archaeological surveys used – which may be the location of the report (ex. New York District) or web address if found online.

  - A copy of the SHPO comments should be included in the DEIS.

    Response: Concur. Some of the correspondence was located in the Pertinent Correspondence appendix. For the revised report, the chronology of SHPO, NYCLPC and

other coordination will be included in Appendix L.

Appendix N –Rockaway Coastal Zone Management

- There is a new Consistency Assessment Form available at www.nyc.gov/wrp that should be filled out. The analysis of consistency should refer to the updated policies also available on that site.

Response: Concur. The new form will be used in the next draft.

- The new policy 6.2 requires analysis of how the project is designed to consider future sea level rise projections. This analysis should refer to the New York City Panel on Climate Change's sea level rise scenarios and projections for future 100-year storm events and future high tides. Please see attached draft guidelines.

Response: the Corps has coordinated with NYS and NYC on this and agreed that a sensitivity analysis will be done using the Corps' low and high level SLR curves, as well as a mid-point between the Corps' medium and high curves. Comparisons between the Corps' projections and the NYS and NYC projections, taken from the Corps' sea level change curve calculator (2017.55) show that, though these aren't perfect fits by any measure, if we aim to approximate NYS's medium projections under CRRA Part 490 and the 50th percentile under NYCC, we'll meet the state's and city's objectives. The mean of the Corps' medium and high curves appears to do so and will provide the City and State the added information requested to help in long-term planning and understanding how the project would perform under varying SLR curve projections.

Appendix I – Planned NYCDOT Capital Projects in Study Area:

Reconstruction of Beach Channel Dr – Phase B

- Phase: Pre-Scoping
- Construction Registration: FY 20

Beach 108th Streetscape Improvements

- Phase: Design Procurement
- Construction Registration: FY 20

Beach 84th St Reconstruction

- Phase: Pre-Scoping
- Construction Registration: FY 22

Somerville Area – Phase II

- Phase: Design Procurement
- Construction Registration: FY 20

Westbourne – Norton

- Phase: Preliminary Design
- Construction Registration: FY 18

Gerristen Beach – Street Reconstruction

- Phase: Final Design
- Construction Registration: FY 16

Reconstruction of Bergen Avenue Area, Bklyn

- Phase: Final Design
- Construction Registration: None

Jamaica Bay Greenway – Canarsie Pier Connector

- Phase: Planning/Scope Development
- Construction Registration: FY 20

South Brooklyn Crosstown SBS

- Phase: Planning/Scope Development
- Construction Registration: FY 20

Woodhaven Blvd SBS, Segment A

- Phase: Planning/Scope Development
- Construction Registration: FY 18

Broad Channel Bulkheads – Phase II

- Phase: Final Design
- Construction Registration: FY 18

Median Reconstruction on Cross Bay Blvd

- Phase: Pre-Scoping
- Construction Registration: FY 20

Downtown Far Rockaway Urban Design and Streetscape Reconstruction Project

- Phase: Final Design
- Construction Registration: FY 17

Brookville Edgewood

- Phase: Final Design
- Construction Registration: FY 17

Southeast Queens (Merrick or Guy Brewer) SBS

- Phase: Null
- Construction Registration: FY 20

Springfield Gardens Phase 5

- Phase: Design Procurement
- Construction Registration: FY 15

Appendix II – Jamaica Bay Greenway overlaps with USACE TSP:

Plumb Beach Network Link

- Currently, this segment of the Jamaica Bay Greenway, beginning at the intersection of Brigham St. and Emmons Ave in Sheepshead Bay, exists as a separated two-way path located on the southern side of the Belt Pkwy/Shore Pkwy right-of-way.
- The HSGRR&EIS proposes in the Tentatively Selected Plan (TSP) at this location an elevated promenade (partially vertical-faced, partially berm-faced).

Flatbush Ave/Floyd Bennett Field

- The existing Greenway facility at this location (Flatbush Ave from Shore Pkwy exit ramp to the

Marine Pkwy Bridge) includes a separated two-way path on the East side of Flatbush Ave. At the southern end of this segment, at Aviation Rd, Greenway users are routed across Flatbush Ave to the East side of the street before continuing south through the toll plaza and over the Marine Pkwy Bridge to the Rockaway Peninsula.

- The HSGRR&EIS proposes in the Tentatively Selected Plan (TSP) at this location a concrete floodwall (land).

Marine Parkway Esplanade (Jacob Riis Park / Beach Channel Drive)

- This segment of the Greenway extends approximately 0.9 miles from the Marine Pkwy Bridge towards the east, along the north shore of Rockaway Peninsula. The two-way Greenway path is located approximately midway between Beach Channel Drive and Jamaica Bay, in a 90'-wide strip of parkland.
- The HSGRR&EIS proposes in the Tentatively Selected Plan (TSP) at this location a concrete floodwall (bulkhead).

Riis Boardwalk

- The Greenway path connects Beach 169th St to Rockaway Beach Blvd, following the Jacob Riis Park Promenade path on the south (Atlantic Ocean-facing) beach of the Rockaway peninsula.
- The HSGRR&EIS proposes in the Tentatively Selected Plan (TSP) at this location beach restoration and an 18-foot reinforced dune-composite seawall.

Shorefront Parkway

- This segment of the Greenway extends approximately 1.6 miles on Shorefront Pkwy from Beach 108th St. to Beach 73rd St. The facilities for this portion of the Greenway include on- street bicycle lanes.
- The HSGRR&EIS proposes in the Tentatively Selected Plan (TSP) at this location beach restoration and an 18-foot reinforced dune-composite seawall. Though not directly overlapping, the Greenway facilities are immediately adjacent to the planned seawall and as such must be considered in the development of its design.

Rockaway Beach Boardwalk

- The Rockaway Beach Boardwalk is a multi-use path, providing facilities for both pedestrians and cyclists alike. The Jamaica Bay Greenway includes the Boardwalk as part of its route for 5.5 miles, from Beach 126th St to Beach 9th St/Seagirt Avenue in Far Rockaway.
- The HSGRR&EIS proposes in the Tentatively Selected Plan (TSP) at this location beach restoration and an 18-foot reinforced dune-composite seawall.

5.0 PUBLIC COMMENTS

Comment	Response
Flooding comes from underneath our homes (groundwater?). Hard structures will cause water to be retained behind them. The water will flood both sides of the gate and cause Roxbury to be flooded first. Recommend building "some sort of moveable structures that could direct the current depending on which way is needed".	Comment Noted.
TLDR: The communities know the risks and want to stay anyway. Utilize buyouts instead of building for the people that want to leave I believe much of your extremely costly proposals will change much of the current beauty and opportunities the communities presently enjoy. Ecosystems will be changed forever as will the quality of life. Just now when Jamaica Bay waters have improved tremendously your intended project will change that for the worse. Undoubtedly or eventually the cost of maintenance will filter down to homeowners and renters perhaps even forcing them to relocate. The problem of living in flood prone areas in not unique to our area. Up and down the east coast and adjacent to inland rivers people choose to live in such locations knowing the risks. Time and again people rebuild their homes knowing that their area is prone to hurricanes and flooding, yet they remain. I propose that the monies allocated to these projects be better spent in purchasing the homes of those who choose to relocate and then reselling to those who will take the risk of flooding for a chance to live near the shore as millions of others have chosen to do in our country. This could be a cost neutral proposal, a profit	NYC's *Build it Back* program, which did extensive outreach in the project area, included a buyout program to move people out of the floodplain, and raise homes where people did not want to leave. A USACE program to further this goal is unlikely to have good participation rates since it would require more cost-sharing on the part of homeowners in many cases, whereas the recently offered City program was 100% paid for.

making one, or at the very least save an enormous amount of money for the taxpayers involved. I realize that this idea is not part of what your department does and that there are other concerns such as the cost of flood insurance and FEMA's involvement in the aftermath of a major storm, but I feel strongly that your current proposals would be extremely disruptive to our present way of life.	
18ft walls are excessively high. No hard structures - expand the beach to accommodate a dune, repair existing groins and jetties, add groins, nourish the beach, build bulkheads, elevate homes, build mini floodwalls for each home.	Comment Noted.
TLDR: How will project affect horseshoe crabs? interested in your research as to the structures beings built i.e. gates and how will this affect the Atlantic Limulus Polyphemus in that it is one of their mating areas.	Please see the Revised Draft EIS and Appendix D for analysis of potential impacts to horseshoe crabs from the Recommended Plan.
With regard to the proposed floodgate to be built into a new/renovated Marine Parkway - Gil Hodges Memorial Bridge, I have some concerns. How much flow will be affected, even in an open position? The Jamaica Bay estuary, spotlighted by the Jamaica Bay Wildlife Refuge, is a world famous site for birds in all seasons, most notably shorebirds during the southbound fall migration. They currently use the East Pond for feeding, but much activity takes	The water quality modeling that was performed for the Draft GRR/EIS did not show a significant affect to salinity from the storm surge barrier in the open or closed position, even for the worst case scenario extended closure that was modeled. Regarding overwash, the storm surge barrier would need tie-in structures to tie-into high ground and ensure that the barrier is not flanked, inducing flooding on either end.

place all over the bay along the periphery and on the numerous internal islands. Will salinity be negatively affected by the placement of this device? There is only the one small outlet from the bay, and many fish and marine arthropods, such as horseshoe crabs, exist as they do because the current environment suits their needs. Do we know what changes may affect them, and the upstream impacts in the food chain on the birds? Also, isn't there the real threat, with a monster storm, of a total wash-over at Riis Park right behind the gate? There is no elevation there.	Further analysis pertaining to potential impacts from the storm surge barrier will be conducted under the NYNJHAT study which is now studying this feature for potential implementation.
I want to discuss the rock jetty on beach 149 street to repair the jetty make it bigger and stronger is left out and the community wants to know why	Comment Noted.
Summary: generally support. C2 is probably an easier alternative to execute than C1E. Models are inaccurate based on my personal observations while living in the area. West of Beach 124-125 sees more erosion until 130-131. 131 to mid-130s sees worse erosion. Extend the groins further west to mitigate erosion	Comment Noted.
TLDR: seawall should be higher than the boardwalk. Has USACE included the existing dips in the boardwalk in their design? My understanding is the proposed beach protection includes adding a sea wall and rocks covered with sand against the boardwalk. Currently the boardwalk dips at the concession stands which forms a gully and would funnel the ocean water if the	Comment Noted.

ocean breaches the current dunes. I believe the proposed sea wall protection should not follow the height of the boardwalk, the sea wall should be higher. If the sea wall follows the height of the boardwalk the same funneling of ocean water will exist. Creating a sea wall higher than the boardwalk will remove the funneling affects if the ocean breaches the sea wall. Has/Is the army Corps of Engineers including the dips in the boardwalk when designing the Sea wall and rock protection?	
Summary: nature should dictate how you construct; any project will be a failure if it does not take natural forces into account. Wildlife and nature must not be harmed for the benefit of humans.	The team has considered the existing natural conditions in our designs and the Recommended Plan includes nature-based features. The team has also, in compliance with NEPA, sought to avoid, minimize and mitigate for any impacts to the environment.
TLDR: My community has preserved our beaches - you're going to destroy our dunes. Based upon my readings and the discussions I've had with other residents of Cherry Grove, the opinions are varied; however, the conclusion that I have drawn is that I am adamantly against the plans to dredge/remove sand from our community beach front area only to be relocated to other areas along this barrier beach. Doing so, will destroy our dunes! The members of this community have assiduously maintained our dunes for the past forty some odd years by yearly planting beach grass and have supervised the installation of snow fences along the entire length of the Grove. We have preserved our dunes! Dredging and relocating sand from our area will undo what we have done!!! Though my property is located mid-island, I support every and all efforts made by my friends and neighbors in their stated objections to your current and continuing FIMI and FIMP plans.	This comment appears to be for a different project. Please direct your comment to the FIMP and FIMI teams.
Around the world cities are now using inflatable/deflatable barriers to protect their harbors and coastlines. Have you	The storm surge barrier component of the TSP will be further analyzed and potentially implemented under a separate study,

investigated these inflatable/deflatable barriers in the Rockaway Inlet?	the NYNJHAT study. The NYNJHATs team is considering inflatable barriers.
Which of the following are more effective lift gates, sector gates and swing gates? Also what are the cost of each?	Please refer to Appendix A2 for discussion of cost and purpose of selected gate alternatives. The NYNJHAT team is investigating the pros and cons of various gate types.
Storm gate. Call on me	Comment Noted.
Question regarding eminent domain concerning buildings along baywall. I own bungalow Bay on Bay 92 St	Since the perimeter plan was not selected as the TSP, no real estate issues are expected at this location of Jamaica Bay.
Could you please explain about co-payment city and state money? What are the phases of construction? Jetties first? Or sheet piling?	Sandy funded elements of this plan are 100% federally funded. Phasing of construction will be determined during design phase.
What will happen to the residential piers in Historic Arverne? What will the bulkheads in Historic Arverne look like? What is the schedule for new storm sewer infrastructure to prevent sewer seepage/backflow during storms? When will work start in Historic Arverne? I request clarification/details for proposed work in Historic Arverne coast. I request a US Army Corps of Engineers planning meeting for the Historic Arverne community. I request emergency mitigation to the flooding areas in Historic Arverne.	While no work in this area has been identified as a primary alternative, this area may be the target for High Frequency Flood Risk Measures.
Surfrider Foundation is a group of beach lovers, so we are very interested in this plan.	Comment Noted.
What was the cost of this study to date	Approximately $6M
ALL	Comment Noted.
(No comments written)	Comment missing from transmittal.

Five years ago after Hurricane Irene the Rockaway community had a demonstration by Beach 91st street on the boardwalk with Senator Schumer and looked down and saw water not on a sandy beach. Fast forward to today, after the boardwalk, berm and sand replenishment was done that area has a beach. The Belle Harbor and Neponsit community is losing its sand at an alarming rate. Question: Has the USACE reviewed/revised their models to better understand why this is happening?	Erosion is occurring at rates confirmed by historic research and computer modeling. While the current TSP recommends erosion control measures, the location of Rockaway Beach and the location of existing infrastructure will still require additional renourishment activities to maintain the existing shoreline.
ARC was committed to the big build hard solution from the start. Why should we believe this just happened to turn out the "best" solution?	Please refer the HSGRREIS and Appendix 2 to understand the USACE planning process.
Question timing of these projects.	Comment Noted.
Can you please consider constructing a storm surge gate from Breezy Point Rockaway to Sandy Hook NJ? It seem simpler in terms of purchasing private property and it would protect all of NY Harbor + NJ, Raritan Bay+ Staten Island etc. Thank you	This is currently being studied under the NYNJHATS, which is underway.
Water movement	This comment is incomplete.
I live in Canarsie, I would like to know if you will hold a public session in Canarsie, if so when?	Public sessions were held with within the study area during the comment period associated with the release of the Revised Draft HSGRR/EIS.
Does the Army Corp do assessment if City of NY can operate barrier?	Any barrier that is built will be operated and maintained by the State of NY, in partnership with the City. They will need to demonstrate their capability to do so as part of the requirements for signing the Project Partnership Agreement at the outset of preconstruction engineering and design, as well as the construction phase.

How does your project compare to the New Orleans wall? How will it protect Brighton Beach and how tall will it be? Can you build on sand and make it high enough?	Please refer to Appendix 2. Further analysis of the storm surge barrier is being conducted by the NYNJHAT study.
1. No models of Dutch water abatement presented. 2. Sheepshead Bay not addressed nor the Brighton Beach area. 3. Are you still using Katrina style levees? (they did not work in New Orleans.) 4. What is a Project Biologist?	Please refer to the subject report.
Has the possibility of an artificial barrier island extending from Breezy Point Northwest, an area of natural accretion, been considered? Recycled materials and pumped sand should be inexpensive and simple to construct. A gate system could be built in to allow total surge and vessel traffic.	This kind of alternative is under consideration by the NYNJHATS, which is underway
If construction starts in 2019. How long will it take to complete construction for the protective wall with flood gates?	Construction of the Atlantic Shoreline portions of the TSP are anticipated to begin in 2020 and will be complete by 2023
Where has there been done in Brighton Beach since Sandy?	Brighton Beach area was renourished immediately after Sandy as part of the FCCE emergency sand placement
Where would be if Hurricane Matthew did not turn East out the ocean - We have no protection since hurricane Sandy destroyed us four years ago.	FCCE emergency project was implemented. Combined with the NYC funded dune betterment, Rockaway Beach has a greater level of protection than has ever existed.
What percentage of people have to vote this plan down so it's not constructed?	Public acceptability is one of the evaluation accounts that the USACE uses to evaluate plans. Due to the significant amount of comments received raising concerns about the proposed storm surge barrier, this feature will be further evaluated under a separate study before it can be recommended for construction.
If money runs out, the walls that are built will stop water from running in, but the water will then rush into the community where barriers are missing!	Any plan recommended for construction will need to tie-in to high ground at each end to avoid the scenario you lay out. This is part of our tentatively selected plan.

What is the 1st phase of construction on the ocean side? Would the groins (jetties) come before the dune reinforcement?	Construction phasing will be determined in the design phase of this project.
The recent storm surge from Hurricane Matthew has washed away our beach. There is currently a three foot drop from the mats to the sand. These mats are more in the water at high tide. How can you solve this problem?	The Recommended Plan for this project includes beachfill and periodic renourishment. Without knowing which stretch of beach you are referring to, please review the Revised GRR/EIS for details on what is included in the recommendation for your area.
Why is NPS being permitted to not participate in this project? The lack of protective measures on NPS property seriously compromises and jeopardizes the safety and resiliency of the surrounding communities of Breezy Point, Neponsit and Belle Harbor as well as the property and facilities of Gateway Recreation Area. The plan must include protection against breach of State Rd. due to the continued erosion of the Cove area at Beach 193rd street.	NPS is a cooperating agency on this study and we are in regular communication and coordination with them. Much of the TSP would occur on or near their property and we must achieve mutual acceptability before any project can be constructed for this study.
I do not want to lose my home to eminent domain.	Comment Noted. No eminent domain to occupied homes is included in the Recommended Plan.
Please explain how the topography of the ocean bottom affects beach erosion.	Please refer to the Appendix A1 for a discussion of ocean topography and wave energy.
For maintenance - what funding guarantees would Corps require from City and State	The non-federal partners enter into a binding contract with the federal government.
Why not use the same program as Venice, Italy and build a retractable concrete wall from tip of Breezy Point to Coney Island	The TSP identified the gate option with the best benefit to cost ratio. Other potential alternatives, like the Venice gates were considered and ruled out. Please refer to Appendix A2.
This is a bad idea	Comment Noted.

Please provide a timeline for the planning process and implementation	Please refer to subject document.
Is this formulation proposal fully funded?	No, the storm surge barrier and associated tie-ins do not have funding and would need future appropriations in order to build them.
Once reefs are in place what is the cost of maintenance?	Reefs are not a component of the TSP.
Quite simply: Residents want groins, reinforced dunes, reefs and sand replenishment. Without additional protection, the dollars spent of sand replenishment are wasted because storms remove sand. Try to get it right and take action beyond the 40+ years of study that I have been hearing about. Again the experience of Sandy, wouldn't it be were to eliminate most of the barriers that have to be overcome before any works begins - 2017 npt acceptable. Already 4 years - only a draft. FOR SHAME	Comment Noted. The Recommended Plan includes groins, reinforced dunes, beachfill (sand replenishment), nature-based features on the bayside and low floodwalls, bulkheads and revetments on the bayside. The study team is working on an expedited schedule to recommend and implement a plan that would reduce coastal storm flood risk while complying with USACE policies and meeting our review and environmental compliance requirements. A study of this scope and scale has higher scrutiny for required reviews, public engagement, and complexity for the design, all of which add to the timeline for execution. Nonetheless, the team is working hard to serve the needs of the community in the interest of the nation. The Chief of Engineers has agreed to allow the concurrent and early start of Plans and Specifications and negotiate the terms of the Pre-Construction Engineering and Design Phase early to facilitate a seamless and quick transition once a Recommended Plan is approved for implementation. This is all aimed at being able to start construction as soon as possible without adding delays of ramp up time, etc.
Is Rockaway really protected? - Jetties are not in place - Sand dunes are not reinforced with steel bulkheads - Seawalls have shallow foundations - Riis Park has no dunes on ocean or bayside - Ft Tilden and area west of Ft Tilden are exposed the same way Riis Park is	There is significant coastal storm flood risk in the area which this Feasibility study aims to manage. The FCCE project that was built by the USACE after Hurricane Sandy for portions of the Atlantic shorefront included a dune and extended the beach. In these areas the communities behind this FCCE project have reduced

	risk, however the Recommended Plan would further reduce this risk and would add risk reduction features for parts of the bayside communities in the form of the High Frequency Flooding Risk Reduction features at Mid-Rockaway, Motts Basin North, and Cedarhurst-Lawrence. For Fort Tilden and Riis Park, the west end taper design on NPS property would include beachfill and groin rehabilitation. See the Revised GRR/EIS for more information. Any part of the recommendation needs to meet Corps policies, including that the benefit to the nation exceeds the cost.
Can somebody consult the system to avoid flooding in Holland?	Comment Noted. Please refer to Appendix A2. The NYNJHATs team which is responsible for further analysis of the storm surge barrier has been in communication with risk managers in Holland and other parts of the world to glean information and lessons learned on storm surge barriers.
Please explain the differences in cost effectiveness (protection of property, sacrificed properties) in building flood gates C2, C1W, C1E? Also the differences in community options with each gate?	Comment Noted. Please refer to Appendix A2.
What was the cost for Breezy Point scope of work? So for 11691 omit 11692 is 1:8. How much for 11693 and 11697?	Comment Noted. Please refer to Appendix A2.
I have a boat ramp on my property and do not want to lose it for a new bulkhead.	Comment Noted.
Of the $3 Billion dollar project proposal how much would be invested in infrastructure jobs and employment opportunities for people who live in the immediate area?	Limited funding is available to implement this project.
How secure will the residents living close to Jamaica Bay and Norton Ave be after the project is completed?	Please refer to the subject report for detailed discussion of risk reduction measures.
In spite of the massive construction that went on in 2016 in raising the street we still have flooding of our homes. Before this	Comment noted.

street raising there was no flood in my house. - Want our homes to be restored (with the BIG project, those of us in the program to have quality work done).	
I would like to know if there are any type of forecast models in place that might give insight of coming event. Here on Rockaway, due to its historical records of weather relative events.	Please refer to Appendix A1 for a detailed description the wave climate and historical information
When is the expected start date? End date? - Is there only the (1) one designated location for the tidal gate? - Would there be consideration to have the tidal gate built in another location - further out of the bay?	Funding is not currently available for the hurricane barrier alternative. Please refer to the subject report for information concerning gate location formulation.
How will the ramps to beach be affected when installing stone revetment? Will the horseshoe crabs in Jamaica Bay be negatively affected from any part of the project?	Beach access will be provided when the project is constructed. Horseshoe crabs are considered in the EIS, please refer to the subject document.
Impact on Animals/Nature/Environment? Standards used to evaluate this impact? (only government or private/not for profit Animal/Environmental Groups?)	Please refer to the subject document.
I would like to see on a few Rockaway beaches a breakwater to reduce the force of the waves so old people, children and somewhat disabled people can enjoy the ocean without the full force of the waves. - On the North shore of Puerto Rico they have groins to reduce waves.	Breakwaters were considered and screened out as a viable alternative. Please refer to Appendix A1 for additional discussion.
The governor said "some places belong to nature" after Hurricane Sandy. Is it impractical to limit development in Jamaica Bay? Jamaica Bay is a wetland its natural function is to flood and absorb storm surge.	Comment Noted.
I am concerned that these plans will be detrimental to the wildlife that inhabits Jamaica Bay.	Comment Noted. Please review the Revised Draft EIS which analyses the potential impact to the environment from the Recommended Plan and discusses how impacts have been

	avoided and minimized and how best management practices will be utilized. In particular, the Recommended Plan includes natural and nature-based features which will provide new and enhanced habitat and help serve as a self-mitigating feature of the project for the areas where some unavoidable impacts are otherwise expected.
I think spending so much money on this plan is not justifiable and may be bad for the three hundred plus species of birds that have been recorded in this important bird area along the Atlantic flyway. Greener alternatives should be looked into.	Comment Noted. The benefits to the national economy have been estimated and are shown to exceed the cost of the project which justifies the federal expenditure. The benefits are based on future damages avoided due to flooding and the cost to repair. The EIS analyzes potential impacts to bird and the natural and nature based features which are included in the Recommended Plan will provide the added benefit of habitat for birds and other flora and fauna.
We came to Queens especially to visit Jamaica Bay for its diverse wildlife. I do not think the environmental ramifications have been sufficiently addressed in this situation. Other solutions which incorporate living shorelines would be cheaper and made sustainable.	Comment Noted. Living shorelines have been included in the Revised Recommended Plan, where feasible.
I think the TSP is too reliant on hard structures which may disrupt the ecosystems in a very important wildlife area. I do not think "modeling" can possibly determine all of the environmental impacts that the implementation of this plan may create and I hope that before this plan is implemented there will be further exhaustive environmental review.	Comment Noted. Nature-based features have been included in the Revised Recommend Plan, where feasible on both the bayside and the Atlantic Shorefront.
Although I want people to be protected from the elements, I am afraid that the tentatively selected plan will be dangerous to the many birds and fish that exist in Jamaica Bay. I hope that you go back to the drawing board.	Comment Noted. The revised Recommended Plan includes nature-based features, where feasible, which will provide habitat for birds and fish and contribute to the resiliency of the plan and the communities it aims to protect.

Please place reefs as a barrier to protect the Rockaways. Think long term and not just a temporary fix.	Breakwaters and reefs were considered and screened out as a viable alternative. Please refer to Appendix A1 for additional discussion.
We're grateful to have received congressional authorization for these much needed improvements. Did congress require any reporting of the effectiveness of this project after its completion and what room will these be to make necessary adjustments in the future?	No such requirements were made by congress but a Monitoring Plan will be prepared based on the results of the ongoing coordination with resource agencies and the Operations and Maintenance Manual will address adaptive management.
Wall and groins will create an unstable erosion area. Kill wildlife already we have islands forming the Army Corps DID NOT MINTAIN THE last dredge, sand filled the channels and they will not take responsibility for it. I swim, sail a study Marine Biology this is a bad idea. MYC hasn't even removed dead trees will not maintain	Comment Noted.
How much protection does this plan offer the shorefront west of C-2?	This area will be addressed now with the NYNJHAT study as the storm surge barrier with tie-ins has been moved to that study which is looking at regional coastal storm risk management.
C2 is a much better alternative to C1 plan. - Much less disruptive to thousands of families. - Minimum additional cost. - Actually saves money over same respect with greater protection.	Comment acknowledged.
C2 is a much more viable plan than C1E with much less impact on the lives of many. NO WALL in Roxbury	Comment acknowledged.
How can Dan Falk state that it is too expensive to install groins and jetties to protect us - where has the money gone	Groins and "jetties" are only deemed cost effective if the amount of sand they save in future renourishments exceeds the initial cost of groin construction. They are only recommended for construction in areas where this is the case.

I have lived in Belle Harbor since 1975 when we purchased our home. My husband and I have lived through three (at least) sand replenishments. Everytime the sand washes away after a few years and is deposited in Breezy Point. The only thing that seems to work is the rock jetties or groins. Why are these stopping at Beach 121 St? We no longer have a Beach 133rd!	Groins and "jetties" are only deemed cost effective if the amount of sand they save in future renourishments exceeds the initial cost of groin construction. They are only recommended for construction in areas where this is the case.
Why are the groins not being placed all the way to 149th street? We are taxpayers and deserve to have protection from storms and flooding.	Groins and "jetties" are only deemed cost effective if the amount of sand they save in future renourishments exceeds the initial cost of groin construction. They are only recommended for construction in areas where this is the case.
Why keep pumping sand - 3.5 million cu. Yd - when it just washes down to Breezy Point? Where are the rock jetties?	Groins and "jetties" are only deemed cost effective if the amount of sand they save in future renourishments exceeds the initial cost of groin construction. They are only recommended for construction in areas where this is the case.
I have many questions, but a simple, immediate one to start: will new stone groins align exactly over the existing wooden remnants or will the old wooden groins present hazards to swimmers and surfers in the fields between the new groins?	No, the new stone groins will be placed in the same spacing as the existing stone groins. Your comment about the existing wooded groins is noted.
The community wants groins on every block, reinforced dunes and reefs and beach replenishment on a regular basis. Can we expect these proposals?	Groins and "jetties" are only deemed cost effective if the amount of sand they save in future renourishments exceeds the initial cost of groin construction. They are only recommended for construction in areas where this is the case.
Would it not be cheaper to just raise/elevate all the homes in Roxbury? Wall devastates Roxbury. Avoid wall from Marine Park Bridge up to Breezy. Can keep Fort Tilden and Riis Park "as is" in Natural State. This savings plus the benefit to Roxbury make this a better alternative. How much would be sand? Put walls only along Beach Channel Drive and west to Beach 141st street and then overland to ocean. Also put around Breezy Point.	Please refer to the subject document to understand the USACE formulation process and how it relates to the Roxbury area.

Ending the groins at B. 122 could be disastrous for those beaches west of that point. Look at B. 88 and B. 149 just west of those groins. If no more than 12 groins can be built, why not place them further apart so as to reach at least Beach 147th? Thanks.	Groins and "jetties" are only deemed cost effective if the amount of sand they save in future renourishments exceeds the initial cost of groin construction. They are only recommended for construction in areas where this is the case.
We need groins in Belle Harbor & Neponsit! How much beach where there be between the dune hill in Belle Harbor and the high tide line? In other words, how much usable beach? Wouldn't C2 allow Roxbury, etc. to be protected without invasive walls?	Groins and "jetties" are only deemed cost effective if the amount of sand they save in future renourishments exceeds the initial cost of groin construction. They are only recommended for construction in areas where this is the case.
Why are the groins not being built all the way west? Why are they stopping at B. 121 St?	Groins and "jetties" are only deemed cost effective if the amount of sand they save in future renourishments exceeds the initial cost of groin construction. They are only recommended for construction in areas where this is the case.
Why are the groins (jetties) not continuing to Beach 149th Street? Have you looked at our beaches since the dunes were installed WE HAVE NONE LEFT!	Groins and "jetties" are only deemed cost effective if the amount of sand they save in future renourishments exceeds the initial cost of groin construction. They are only recommended for construction in areas where this is the case.
1. Why are groins not scheduled to be provided between Beach 123rd and 149th streets? (erosion is already happening on Belle Harbor and Neponsit Beaches). A. How many groins would be required to cover these beaches? B. What is the approximate distance between groins? c. Is it possible to spread groins out to cover these beaches? 2. What is the length, width and elevation of the proposed groins? a. How high will they be constructed above the mean high tide mark? b. Will the National Hurricane Center Consensus Model (average of all models) be used?	Groins and "jetties" are only deemed cost effective if the amount of sand they save in future renourishments exceeds the initial cost of groin construction. They are only recommended for construction in areas where this is the case.
If the rock jetties work from B. 9th to B. 86 st. knowing that you are going to Bch 122, why are they stopping there? Leaving Belle Harbor and Neponsit completely at risk you refurbished not even 3 years ago and we have so much beach erosion yesterday on a	Groins and "jetties" are only deemed cost effective if the amount of sand they save in future renourishments exceeds the initial cost of groin construction. They are only recommended for construction in areas where this is the case.

beautiful beach day I took my grandchildren to beach 120 need for beach chairs we will sit on the grass	
Why do groins stop at 121? They need to construct thru Belle Harbor and Neponsit. Sand replenishment needs to be ongoing.	Groins and "jetties" are only deemed cost effective if the amount of sand they save in future renourishments exceeds the initial cost of groin construction. They are only recommended for construction in areas where this is the case.
Would like to see groins throughout Belle Harbor and Neponsit, reinforced dunes and reefs to hold sand. We have lost a tremendous amount of sand since the last replenishment and have no room for more sand loss with the winter coming, a time for nor'easters which steal our sand!	Groins and "jetties" are only deemed cost effective if the amount of sand they save in future renourishments exceeds the initial cost of groin construction. They are only recommended for construction in areas where this is the case.
Why no groins/jetties from Beach 122 to Beach 149?	Groins and "jetties" are only deemed cost effective if the amount of sand they save in future renourishments exceeds the initial cost of groin construction. They are only recommended for construction in areas where this is the case.
1. Since most of the water came from the ocean (Sandy) why not have sand piles like on Beach 9th street all the way down to Arverne?	Groins and "jetties" are only deemed cost effective if the amount of sand they save in future renourishments exceeds the initial cost of groin construction. They are only recommended for construction in areas where this is the case.
1. We need erection of jetties (groins) through Beach 149th Street 2. Sand replenishment 3. Reinforcement of the present dunes with rock material 4. Installation of man-made reefs	Groins and "jetties" are only deemed cost effective if the amount of sand they save in future renourishments exceeds the initial cost of groin construction. They are only recommended for construction in areas where this is the case.
I am concerned that the last groin on 121 St. will create a scouring effect on the west side of it. This is also a location where the boardwalk lowers. To me this seems like a recipe for the water to seek a low point, the lowered boardwalk and funnel	Groins and "jetties" are only deemed cost effective if the amount of sand they save in future renourishments exceeds the initial cost of groin construction. They are only recommended for construction in areas where this is the case.

down the street. Please place the groins down the whole beach to Gateway. This is only one of my concerns.	
Groins ---Rockaway Park- Belle Harbor - Neponsit - Groins, we love them, we need them - essential for preserving our beaches. Do you agree? Berms - The preliminary design for reinforcing the berm from 126th Street to 149th Street is at best confusing. When can the impacted communities see a more through design that best meets our storm protection needs? Elevation, width, density and placement from baffle wall? Accessd to the beach from the street on each block is important - it is hard to see how that is accomp0lished looking at the preliminary designs. Sand Replenishment - How much sand is anticipated for the next replenishment project for the Rockaway Shore? What is the approximate cost? Reefs - Has the Army Corps ever installed along the eastern seaboard reefs to prevent Beach erosion? Hurricane Gonzalo recently hit Bermuda. It was a category two hurricane. The reefs surrounding Bermuda were reported to have saved homes along the coast by lessening the wave surge. Why aren't we building more reefs to do the same in the Rockaways? General Questions - In the event the communities from 123rd to 149th street were to receive groins, a reinforced berm, additional sand and reefs what would be the logical order for each item to be installed?	Groins and "jetties" are only deemed cost effective if the amount of sand they save in future renourishments exceeds the initial cost of groin construction. They are only recommended for construction in areas where this is the case.

AS owners of a home in Belle Harbor since 1991 a few houses from the beach we have survived several major storms with varying amounts of damage to our property. The narrow width of our peninsula is easy to see when you watch the water from the Atlantic Ocean meet the water from Jamaica Bay somewhere in the middle of our 5-block expanse of land between these major bodies of water. To say Rockaway is a NARROW peninsula is an understatement ! So . . . . what to do to protect lives and property? Quite a few times over the 25 years we've watched the Army Corps of Engineers pipe sand from some distance offshore to replenish the sand on the beach. The results were always promising and welcome. . . . but most always short lived. Strong storms with strong wave action managed to return most of the sand from whence it came! Time and again we were left with a narrow beach as all the expensive piped sand went back out to sea. The COST of each piping of offshore sand to replenish sand on the beach again and again is staggering. Surely there is a better solution. After our own research and seeing the long-lasting, positive results in beach areas where GROINS/JETTIES are in place gives us what is hands-down better, more effective, more permanent solution. Yes, it's an expensive solution. However, if the cost of the offshore piping of sand over and over again is added up as a total, doesn't it make more sense to invest that kind of money in a permanent solution?? Jetties or groins are needed. We've tried other solutions. Now we should go with one that has been proven to work and to last.	Groins and "jetties" are only deemed cost effective if the amount of sand they save in future renourishments exceeds the initial cost of groin construction. They are only recommended for construction in areas where this is the case.
The area East of Beach 9th St has not been included in these plans, why?	
The Belle Harbor and Neponsit Communities need Reefs and Groins to protect and reinforced Rock Berms to safeguard our communities from Hurricane Storms and to safeguard our	Groins and "jetties" are only deemed cost effective if the amount of sand they save in future renourishments exceeds the initial cost of groin construction. They are only recommended for construction in areas where this is the case.

beaches. It is vital and necessary that these projects be instituted now to protect and safeguard our communities.		
76 Form Letters - groins, dunes, reefs, sand replenishment This letter is being written in response to the comments made relating to the proposals presented during the most meeting of the Army Corps of Engineers held at PS 114 in Queens, New York on October 20, 2016. As a Belle Harbor homeowner and tax payer of record, I respectfully request that the proposal for protecting the Rockaway peninsula be reexamined based on comments voiced, and suggestions posed, by the many residents residing in Belle Harbor and Neponsit in particular, and responses from the Army Corps of Engineers. As a survivor of Super Storm Sandy I have attended various meetings, spoken with more than a few individuals, including engineers, who have suggested the best solutions designed to keep us safe from future storms. I am in support of the following measures: a) groins (jetties) be continued from 123rd to 149th Street. b) reinforced dunes (whichj are required to assist in erosion) c) reefs (which prevented great damage in Bermuda during most recent storm) d) sand replenishment (which would be required much less often after above measures are implemented) The aforementioned measures, in the long run, will prevent loss of life and billions of dollars in property damage. If all these elements are properly included they will have long term benefits and be cost effective. Thank you for your consideration to include said measures as it relates to the overall plan to protect individuals residing, not only in the Rockaways, but throughout various portions of New York City and environs.		Groins and "jetties" are only deemed cost effective if the amount of sand they save in future renourishments exceeds the initial cost of groin construction. They are only recommended for construction in areas where this is the case.
TLDR: Building floodgate from tip of Breezy Pt to Kingsborough College would eliminate need for other walls around Jamaica Bay and result in cost savings.		Comment Noted.

I am writing this attachment as the owner of a property located at 932 Bayside, Breezy Point NY 11697 to request the movement of the proposed flood gate. The presentation I attended in October by the Army Corps of Engineers at PS114 in Belle Harbor had the recommended location of the gate on the east side of the Marine Parkway Bridge. This location required building walls on the bayside of areas west of the wall. The proposed walls would be devastating to the communities surrounding Jamaica Bay. Building the flood gate from the tip of Breezy Point to Kingsboro College would eliminate the need for these walls. The cost savings obtained by eliminating the walls could be used to offset the cost of longer flood gate. The western option would allow the communities surrounding the bay to enjoy this special body of water. Thank you for your consideration in this matter.		
Refer to letter.		Groins and "jetties" are only deemed cost effective if the amount of sand they save in future renourishments exceeds the initial cost of groin construction. They are only recommended for construction in areas where this is the case.
20 October 2016 meeting with the Army Corps of Engineers 6:00 p.m. in Belle Harbor=, New York As owners of a home in Belle Harbor since 1991 a few houses from the beach we have survived several major storms with varying amounts of damage to our property. The narrow width of our peninsula is easy to see when you watch the water from the Atlantic Ocean meet the water from Jamaica Bay somewhere in the middle of our 5-block expanse of land between these major bodies of water. To say Rockaway is a NARROW peninsula is an understatement ! So . . . . what to do to protect lives and property? Quite a few times over the 25 years we've watched the Army Corps of Engineers pipe sand from some distance offshore to replenish the sand on the beach. The results were always promising and welcome . . . . but most always short lived. Strong storms with strong wave action		Comment acknowledged. Groins and "jetties" are only deemed cost effective if the amount of sand they save in future renourishments exceeds the initial cost of groin construction. They are only recommended for construction in areas where this is the case.

managed to return most of the sand from whence it came! Time and again we were left with a narrow beach as all the expensive piped sand went back out to sea. The COST of each piping of offshore sand to replenish sand on the beach again and again is staggering. Surely there is a better solution. After our own research and seeing the long-lasting, positive results in beach areas where GROINS/JETTIES are in place gives us what is hands-down better, more ffective, more permanent solution. Yes, it's an expensive solution. However, if the cost of the offshore piping of sand over and over again is added up as a total, doesn't it make more sense to invest that kind of money in a permanent solution>> Jetties or groins are needed. We;ve tried other solutions. Now we should go with one that has been proven to work and to last.	
Refer to letter.	Groins and "jetties" are only deemed cost effective if the amount of sand they save in future renourishments exceeds the initial cost of groin construction. They are only recommended for construction in areas where this is the case.
Refer to letter.	Groins and "jetties" are only deemed cost effective if the amount of sand they save in future renourishments exceeds the initial cost of groin construction. They are only recommended for construction in areas where this is the case.
P.S. The team that presented their proposals at the recent heighborhood meeting in Rockaway were extremely professional and did a very impressive job representing the corps. I commend them for doing their jobs well and calmly in a sometimes angry environment. Congratulations on your team.	Comment acknowledged. Thank you.
34 Additional comment to above letter.	Groins and "jetties" are only deemed cost effective if the amount of sand they save in future renourishments exceeds the initial cost of groin construction. They are only recommended for construction in areas where this is the case.

How can we make sure that FEMA (& other agencies) timely send out forms necessary for re-imbursement (settlement) to insurance company for payment to flood insurance insured. 6 mos. Passed insurance company never got documents. From FEMA (ex: proof of loss). Would still be in limbo if I did not contact insurance company involved. Would like to speak (Briefly).	Comment out of scope.
1. What is the time frame that the water gate will be installed. 2. Will we be guaranteed that if there is a storm surge that the residents will be protected. 3, How will this project impact the premium in our flood insurance?	As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, barrier design and operations as well as the potential environmental consequences of barrier construction and operation will be reexamined as part of the CSRM Study.
What impact will the hard solution have on flood insurance rates? If construction does not meet NFIP specifications, will it be redone?	The Corps planning process aims to maximize net benefits irrespective of flood insurance rates. There may be some benefit to local homeowners flood insurance rates going down as a result of a Corps CSRM project, but this is not a project goal or metric that we use.
For Dan Falt - Interested in Corps info on SLR/SLC for Radio program podcast	Comment out of scope.
Did NYS ever wonder why the islands in the Caribbean & Bermuda can handle extremely large hurricane surf or the winter swells that push down to the Caribbean producing the 20-30 foot waves and after storms such as these, their beaches remain relatively unaffected? The answer is the natural reefs harness the wave energy and minimize the erosion of the beaches. The bottom line is sea level is rising, and the beaches will continue to be eroded. Placing sand and producing a flat beach face only accelerates the lateral transport of sand thus making a need to maintain and increase ongoing dredging operations in NYC	Comment acknowledged.

Harbor Entrance. By harnessing and controlling the wave energy along our shorelines we can slow the erosion and lateral transport of sand. There are two parts to this equation. 1) Sea level rise verse land elevation 2) Harnessing and directing wave energy. The coves in Montauk are an example of harnessing wave energy, nature wants to make new inlets and the beaches are migrating towards the mainland over geologic time. It has been brought to my attention that Mr. Glenn Walton a NYS Employee as a Parks Engineer with decades of erosion mitigation design experience and a lifetime of life experience with coastal geology and barrier beach dynamics has ideas which encompass both rising sea level and harnessing of wave energy are not being acknowledged by authorities in higher rankings than him. WHY IS THIS? Mr. Walton has reef designs that in the long run will save the residents from absorbing wasted finances produced by New York State with ineffective techniques. Why are we not working with nature, and acting like the man animal that pretends we can control nature? I also ponder the questions as to why I am writing to a biologist, not a coastal geologist. Why is this and how long will New York State waste both federal and taxpayers money? Please acknowledge and listen to Mr. Glenn Walton's ideas on coastal erosion and harnessing wave energy to minimize beach erosion, lateral transport of sand and in the end save tax payers money. I believe we are all trying to find the same end result.	
The Army Corps of Engineers recently released the "Draft Integrated Hurricane Sandy General Reevaluation Report and Environmental Impact Statement" (Draft HSGRR/EIS) and General Conformity (GC) Determination for the Atlantic Coast of New York, East Rockaway Inlet to Rockaway Inlet, and Jamaica Bay Reformulation Study for review and submission of comments. As recognized, the Rockaway peninsula was one of the most heavily impacted areas by and during Hurricane Sandy. The draft studies have been reviewed and the following feedback/comment is	The approach to quantifying the effect of estimated sea level change (SLC) on plan formulation is consistent with USACE policy.

made to the previously submitted comments dated September 5th, 2016 for consideration during the final preparation of the final EIS: 12. With reference to the above September letter, Comment #8, factors that attribute to sea level rise in the future is the proposed Multi-Purpose Levees (MPL) installation along a portion of Southern Manhattan's East River waterfront. This high and wide standard river embankment roughly comprises a 1.3 mile long section of Southern Manhattan. The proposed 500' land reclamation will require structural fill inbound of the proposed perimeter structures. Therefore, what is the complete underwater footprint planned in the East River that can contribute to sea level rise (approximate Depth, Length and Width)? Relate this calculation to a building size. 13. In reference to Sea Level Rise and associated effects by the other factors, project the future installation of structures in the Ocean and Rivers elsewhere that can elevate these waters. These man-made structures should be factored into the drafted designs proposed for safeguarding the Rockaway peninsula. 14. The Bay Wall's height from Beach 149th Street to Beach 109th Street should be increased by approximately "more than 2 feet" to significantly reduce water overtopping caused by many factors stated in comment #6 and potential overflowing. It's believed with the above additional factors considered for study, a number of recommendations may be changed, such as the Bay Wall Height (Beach 149th Street to Beach 109th Street), Height of Flood Gates, Sea Level Rise, etc. In addition, for the purpose of the Reformulation Study, the stated year of reconstruction being assumed to be 2020, with a design life of 50 years doesn't appear realistic.	
Did NYS ever wonder why the islands in the Caribbean & Bermuda can handle extremely large hurricane surf or the winter swells that push down to the Caribbean producing the 20-30 foot waves and after storms such as these, their beaches remain	Comments are addressed to the project Biologist because they are responsible for NEPA compliance, which relates to public engagement. Comments are read and considered by the whole project delivery team, including the geologist.

relatively unaffected? The answer is the natural reefs harness the wave energy and minimize the erosion of the beaches. The bottom line is sea level is rising, and the beaches will continue to be eroded. Placing sand and producing a flat beach face only accelerates the lateral transport of sand thus making a need to maintain and increase ongoing dredging operations in NYC Harbor Entrance. By harnessing and controlling the wave energy along our shorelines we can slow the erosion and lateral transport of sand. There are two parts to this equation. 1) Sea level rise verse land elevation 2) Harnessing and directing wave energy. The coves in Montauk are an example of harnessing wave energy, nature wants to make new inlets and the beaches are migrating towards the mainland over geologic time. It has been brought to my attention that Mr. Glenn Walton a NYS Employee as a Parks Engineer with decades of erosion mitigation design experience and a lifetime of life experience with coastal geology and barrier beach dynamics has ideas which encompass both a rising sea level and harnessing of wave energy are not being acknowledged by authorities in higher rankings than him. WHY IS THIS? Mr. Walton has reef designs that in the long run will save the residents from absorbing wasted finances produced by New York State with ineffective techniques. Why are we not working with nature, and acting like the man animal that pretends we can control nature? I also ponder the questions as to why I am writing to a biologist, not a coastal geologist. Why is this and how long will New York State waste both federal and taxpayers money? Please acknowledge and listen to Mr. Glenn Walton's ideas on coastal erosion and harnessing wave energy to minimize beach erosion, lateral transport of sand and in the end save tax payers money. I believe we are all trying to find the same end result.	Nearshore coastal (shore parallel) breakwaters for the Atlantic Ocean shorefront (reefs) were considered (see the list of Management Measures for the Atlantic Ocean Shorefront Planning reach in the report) and were screened out early on for a variety of issues: 1) Based on the changes to the habitat and the use of the area by native species (and recreational users), environmental resource agencies (including the project partners) do not tend to support these features or find them to be acceptable. 2) The cost is substantial compared to sand renourishment. 3) Breakwaters don't significantly reduce the risk of storm surge. 4) Breakwaters and t-groins are useful in very specific circumstances where there are no other good options to keep sand in place, like in Plum Beach and Sea Gate. Breakwaters, or reefs, can be used as shoreline stabilization measures to locally reduce long shore transport capacity and retain sand behind these structures. Reefs certainly do reduce wave energy behind them, but they also change the nature of the beach and the habitat. High energy beaches also need a constant source of sand along the littoral chain so reducing energy with reefs may not necessarily solve eroding beaches problems and could change the characteristics of the beach itself. If you remove enough energy, you may develop a marsh. Also, while wave energy is one aspect, sand supply along the littoral chain is another. A disadvantage of breakwaters is that they offer no high water protection and thus are not effective in providing coastal storm risk management benefits for this project, especially when their high cost is factored in. In short, though breakwaters can reduce the force of wave action and sand may accrete, erosion

	control is only one aspect of our project and recommendations are made to maximize net benefits.
1. The assumed sea level rise since 1970 seriously understates the probable rise - latest projections are from 205 ft. why use such a small rise? 2. In addition to use of ocean what is the wave height assumed a Sandy category storm in 2170?	The approach to quantifying the effect of estimated sea level change (SLC) on plan formulation is consistent with USACE policy.
Please discuss public access of it is not available at present.	As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, the real estate issues will be reexamined as part of the CSRM Study.
The proposed projects are located on federal land and on private property - please confirm that the NPS or private landowners can "opt out" of this project if they desire to do. You mentioned that Public Access is a requirement when ACOE places sand. Is P.A. also required for a project where no sand is involved?	As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, the real estate issues will be reexamined as part of the CSRM Study.
As part of the non-fed sponsor responsibilities can they initiate a Community Advisory Committee to be a local task force lending local knowledge to every feature of the study? This could be the public sounding board for what is working and what isn't working day by day. EX: Living Breakwaters, Rebuild by Design @ Tottenville Staten Island - RPA's Regional Plan #4. What is the plan to involve area residents beyond the EIS process? The community will need a platform before, during, after construction.	As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, the real estate issues will be reexamined as part of the CSRM Study.
The residual risk features should be expanded top include more areas than the 5-7 locations already identified (Norton Basin, Mott Basin, Brookville Blvd, Canarsie, etc.). They should be stand-alone features that can exist with or without the gate, other flood walls, etc. They should be localized, green and gray features. *	As the Jamaica Bay Planning Reach segment is integrated into the New York and New Jersey Harbor and Tributaries CSRM Study, the real estate issues will be reexamined as part of the CSRM Study.

Why isn't green infrastructure like reef streets, living breakwaters considered for the RRF's? Can you build on/next to the JB Greenway? * What is your plan for mitigation for historic districts managed by NPS? * The NPS has to make difficult decisions about what (i.e. Ft. Tilden, Floyd Bennett Field and Dead Horse Bay) Structures they need to invest in vs what they will let go in the changing environment and SLR. How does this study compliment NPS's plan for the future?	
Historic Arverne Community wants to participate in the detailed planning of USACE CSRM features and infrastructure to support it - - how do we make this happen?	Please come to our public meetings October 4th & 10th at 6 pm at the Rockaway Waterfront Alliance and Cedarhurst Village Hall, respectively. More information on our website: http://www.nan.usace.army.mil/Missions/Civil-Works/Projects-in-New-York/East-Rockaway-Inlet-to-Rockaway-inlet-Rockaway-Beach/
What does Residual Risk Mean? Why is Historic Arverne Considered Residual?	The Residual Risk measures (now called High Frequency Flooding Risk Reduction Features) related to the idea that even with a storm surge barrier, there would still be some residual, or remaining flood risk. This is due to the fact that you would not close a storm surge barrier for every small event that causes flooding. The reason being that in some parts of Rockaway, such as Arverne, the areas are so low lying that they experience rainy day flooding or high tide flooding and it would be very expensive to operate and maintain a barrier that is closed that frequently, not to mention the added impact to transportation ann the environment. Hence the idea that smaller coastal storm risk management features could be (and have been) developed to address this frequent flooding without needed to close the barrier twice a day at high tide, etc.
Seawall along Jamaica Bay side of Peninsula	Comment incomplete.

In Manhattan Beach where will the "new" sea wall be built? The Promenade/Esplanade which once was the furthest Southern strip of land is uncompromised structurally and in portions, has been privately and built upon. Also a private citizen on Amherst Street, has built a fence across the street - another example of privatization.	Manhattan Beach is not included in the Recommended Plan but will be addressed as part of the New York and New Jersey Harbor and Tributaries Study.
If there is a wall along the bay how high? Will we still have a beach on the other side?	The Mid-Rockaway, Motts Basin North and Cedarhurst-Lawrence HFFRRFs include some floodwalls, bulkheads, revetments, and natural and nature-based features. The elevations of the floodwalls vary by site based on the elevation at grade. Please see the Revised GRR/EIS for more detail. Beach access to the Atlantic Shorefront will still be provided. Please see the Public Access Plan.
How high will the wall be in bayfront Roxbury in relation to the sidewalk? Or mean high water? How is the 18' measured from where will there be a beach in front of the wall? Will there be access to the beach? How far apart will the beach access points be?	The requested information can all be found in the subject report, including changes to the Recommended Plan.
Are you planning I walls or T walls around Roxbury? Building walls around Roxbury is risky. This is not consistent - some areas are past marsh with a low lier strength. The sand is unproductable also - can easily sink one foot when along shoreline. Conditions similar to bayou in New Orleans where levees failed. Roxbury walls will also fail. Look at the map of the area grew from the 1880s to today. They were marshes alternating with sand.	Comment Noted. The tie-in structures to the proposed storm surge barrier will be further analyzed in the NYNJHAT study. Geologic samples and analysis will be undertaken to ensure structural stability and appropriate design.
The wall is not acceptable for Roxbury. It would destroy the nature of our community. We live here to enjoy our beach during every season of the year. Walking on the beach, fishing, kayaking, swimming, paddle boarding, boating and quiet enjoyment of nature's beauty will be taken away by the wall.	Comment Noted.

The engineer said that they might elevate every house in Roxbury and not build a wall. The costs might be similar. This could be combined with dunes and groins to help with nuisance flooding.	House Raising was determined to not be cost effected in comparison with the gate alternative.
If seawall along Breezy/Rox voted down can they still install gates across the bay? This will cause a back flow and destroy Breezy.	Comment Noted.
No wall in Roxbury. It destroys the beautiful beach community that has existed for many years. It will destroy property value. Groins and dredging have helped this community for many years. That is the plan that should be in place. No WALL. C2 is a more viable plan than C1E.	Comment Noted.
I reside on the Rockaway Bayfront. I do not want my wall in front of my house. I just paid a lot of money to raise and repair my home. This is a beach community. We expect beach and water access. This is why we paid a premium for our house.	Comment Noted.
A wall NAVD + 18.0 is 13 feet above the sidewalk in Roxbury. The wall would take away access to the beach, completely eliminate the scenic views and destroy the natural beauty of our community. Why is the wall so high when Sandy's surge was NAVD + 11.0 (6 feet above the sidewalk).	Comment Noted.
I live in Roxbury NO to the wall	Comment Noted.
No wall or gate by bridge @ Roxbury/Breezy. Need more sand and groins.	Comment Noted.
No wall for Roxbury	Comment Noted.

Will public access be required? Why are groins excluded from Roxbury? The wall is 13 feet above - that is not acceptable. No access, no aesthetic value and beauty of our community.	Comment Noted.
1- Why have we been told for years we cannot disrupt the environment with groins but now this can be done. 2. Why not protect the bay front with dredging and groins and dunes other than a wall.	Comment Noted.
We live on the bayside of Roxbury and do not want the wall and would like to know alternative ways to protect the community.	Comment Noted.
I truly object to this wall it woill devalue our property.	Comment Noted.
Roxbury does not need a WALL. A wall will not protect Roxbury. In fact a wall will destroy Roxbury.	Comment Noted.
I do not want a wall on Bayside Beaches my home is in Roxbury and this is unacceptable.	Comment Noted.
I live in Roxbury and I don't want the 18 foot wall. I love going to the beach every summer. We won't be able to see the beach or go boating, have swimming races etc.	Comment Noted.
I live in Roxbury on the bayside. I do not want a sea wall on the bay in front of my house. I have lived there 63 years. Build out our groins add more groins. You will destroy this community that has been there forever. A wall will render our homes worthless. We want access to swimming and boating and our beaches.	Comment Noted.

I do not want a gate that does not protect Roxbury and I do not want a wall that takes away my beach and boating activity thereby causing my home to have a value of 0. Groins, jetties and dredging periodically always worked.	Comment Noted.
I object to the wall I live in Roxbury on Bayside Ave.	Comment Noted.
I live in roxbury and I am totally opposed to the seawall! Breezy Point is a beautiful community that has a rich history and this will destroy it. It will also totally disvalue our homes.	Comment Noted.
1. As a resident and homeowner in the Rockaways I would like to know what will be done regarding the very badly deteriorated bulkheads on the waterfront by the bay from Beach 72nd Street onwards to Beach 65th Street in Arverne. Seems all work is being done on the shorefront but all homeowners on the bayside are having no repairs or improvements to protect their homes from any form of flooding in any respect.	Please see the Description of the Recommended Plan for the Mid-Rockaway High Frequency Flooding Risk Reduction Features, which include an extensive design for Arverne which should replace deteriorated CSRM features where appropriate and construct new features as well, to include some natural and nature-based features.
How will the bulkhead affect bayfront property owners access to the bay for water access will they lose it? Also will the street get elevated?	Bulkheads are designed to maintain access to the water compared to other CSRM features. Street elevations are not included in the Recommended Plan.
1. What reason for wall being 8 ft high if the beach is already being built, it makes better science that the seawall be high and the bay be science.	Comment noted.
How will the 30 day flushing time issue for Jamaica Bay be corrected?	This is outside of the scope of this study.

How does this plan deal with rising of water taken inside the walls - where does that water go?	Please see the Interior Drainage sub-appendix to the Engineering & Design Appendix A for a detailed discussion of the interior drainage plan.
Bathtub Effect	Comment incomplete.
1. Cleanup Sheepshead Bay canal? 2. Oyster Beds in Manhattan Beach Ocean and Bay? 3. Shut-off values for entire community. 4. How to improve water drainage in Shore Blvd? 5. Sand dunes for Coney Island and Manhattan Beach?	Comment noted.
1. If the waves get higher than anticipated for the heights of the concrete wall, how the water will back up to the ocean and how long will it take for the water to recede? 2. Why can we have walls that are built in the water and raised above the water instead of concrete dune walls?	Please see the Engineering and Design Appendix and the Benefits Appendix for more information on how the Recommended Plan would perform. How long water takes to recede is highly dependent on the specifics of a given storm, the water elevations, rainfall, etc.
1. When will the city do the 69th bulkhead. 2. Will they also do the sewer on Bayfield Ave 3. Bay Street on 72nd St.	This is outside of the scope of this study. This question should be directed to the appropriate local entities.
I would like to see peninsula Hospital back. What is going to happen to the flooding doing a heavy rain storms?	Comment noted. The project would reduce flood risk during heavy rain storms.
1. What are the plans to mitigate the flooding areas now? 2. The City intends to move more than 150 million federal funds originally earmarked for flood protection programs. And $152 Million set aside for a raised shoreline program. How will this impact your task?	The USACE team has worked hand in hand with the City and State and is coordinating between local and federal efforts to ensure there is no conflict. The USACE study/project is funded through the Sandy bill and separately from City-led efforts.
How will this project affect localized flooding that is generated by high tide surges, water comes up through the sewer lines	Local drainage is managed locally and is outside the scope of this study. However, this project includes interior drainage designs for

	the CSRM features which may help to address this problem as an incidental benefit.
What about the sewer system. How are they going to create a system that will enhance our sewer system?	The sewer system is managed by NYC Department of Environmental Protection and is outside of the scope of this study. Where the stormwater and sewer systems are combined, it is possible that the Rockaway project will improve overall capacity of the system by helping to drain stormwater quicker, but this would be an incidental benefit of the project.
TLDR: Beach access is critical. Access ramps should be provided. We would support a long term project that is designed to protect the area from coastal storm floods such as a wall being built in the ocean as opposed to being erected adjacent to Boardwalk. When the plans are detailed for the Brighton Beach Coney Island area please keep in mind that access to the beach is critical for our beach community. Access Ramps should be provided where we presently have access to the beach (steps). However, at this time we need more information before we can make and further comments.	Comment acknowledged.
As a Rockaway resident please consider putting in more and longer jetties	Comment acknowledged.
TLDR: More jetties I am writing this email to request information as well as ask for more rock jetties in Rockaway Beach. I am a proud resident of Rockaway Beach and struggled during the catastrophe of hurricane Sandy. For many years sand has been put down to stop the ocean from destroying the land but this does not work and is a waste of time and money because within months the ocean	Comment acknowledged.

takes the sand. The option of rock jetties seems the most logical way to keep the water from rushing into the land. The proof is that Sandy destroyed the majority of the land that is not protected by rock jetties from 90 street up. Please respect and respond to my request for more rock jetties. Thank you for your help and support.	
TLDR: Build more jetties in the Rockaways I am writing to request the addition of more jetties in Rockaway, Queens, New York. Obviously, the jetties are a useful tool for reducing erosion for the compact urban community, but they are also a huge improvement to the recreation of the area for bird and fish habitat, surfing, swimming safety, and more. Many members of the community support this.	Comment acknowledged.
More jetties	Comment acknowledged.
I am writing to express my sincere hope that more jetties can be installed at Rockaway beaches.	Comment acknowledged.
TLDR: build more jetties in the Rockaways Please grant the Rockaway's more jetties. After the recent storm we have unfortunately seen most of the sand replenishment program that was successful post-Sandy go to waste as the beaches west of the 90th St jetty have eroded so quickly again while those east of it have seem to trap the sand. Please build us more jetties so the replenishment program does not wash away again.	Comment acknowledged.

TLDR: More groins and jetties. Lifeguards, swimmers, and surfers will benefit Hello, I am writing this as a resident of Rockaway beach. Sandy showed us clearly that we need to build more groins and jetties within our beaches, It was apparent to anyone that the beaches with jetties provided both protection during the storm and helped stop erosion both during and after Sandy. We have spent so much money replenishing our beaches, why stop half way through the process? Add some more jetties. The jetties also help lifeguards control and protect swimmers and provide surfers with better waves. The rebirth of Rockaway's popularity is based on its ocean. Please consider more jetties before moving all of your funding and effort to the bay.	Comment acknowledged.
Refer to letter.	Comment acknowledged.
TLDR: Favor the floodgate over the perimeter plan. Environmentalists have no reason for concern. I am very much in favor of the storm surge gate proposal, with the storm gate tied into the high ground on the "mainland" to the north at Brooklyn, and to the south at the ocean barrier on the Rockaway peninsula. In my opinion it is far superior to the "perimeter" plan, which would be more expensive both to implement and maintain, as well as being less environmentally friendly, with waves bouncing off bulkheads. Perhaps most importantly, the surge gate plan is also the most politically viable. Only the surge gate plan protects ALL of Jamaica Bay, and thus would unite all communities within the Jamaica Bay flood zone behind a common goal. The perimeter plan would pit one community against another, in a competition for dwindling funds	Comment acknowledged.

to secure their own little section of the bay. In fact, this is already happening in the planning stage, as the D.E.I.S states, “The community at Broad Channel, which is effectively within Jamaica Bay - as opposed to being a community on the fringe of Jamaica Bay - would not benefit from the perimeter plan, as site specific features for Broad Channel were not cost-effective and eliminated from consideration in the screening." For environmentalists who are horrified at the idea of a massive storm gate at the mouth of the bay, it will be open most of the time. According to this study, the effect on tidal flow with the gate open are almost too small to measure. There's also no reason for ongoing marsh replenishment projects to not continue concurrently, and they may even be able to allow the gate to be kept open for lesser flood events of short duration.	
Thanks for forwarding public meeting info.	Comment acknowledged.

Section 6.0 Revised Jamaica Bay JEM Modeling

JAMAICA BAY

STORM SURGE BARRIER WATER QUALITY MODELING ANALYSIS

Prepared for the

New York City

Department of Environmental Protection

and the

US Army Corps of Engineers

New York District

Revised
October 2017

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Table of Contents

Appendices

List of Tables

List of Figures

EXECUTIVE SUMMARY

When Hurricane Sandy hit New York and New Jersey it brought incredible storm surges and severely damaged areas along the coastal areas. Particularly hard hit by the storm surge and resulting flooding were areas in the Rockaways and the Broad Channel communities. In response to this event and to help prevent such flooding in the future, the USACE is considering the construction of a storm surge barrier to be located near the Rockaway Inlet to Jamaica Bay. This barrier could be closed during a storm event to prevent high tides associated with a storm surge from entering Jamaica Bay. In order to assess the potential impact of a barrier closure on water quality within the Bay, a modeling study was conducted using the Jamaica Bay Eutrophication Modeling system, known as JEM.

JEM was developed for the New York City Department of Environmental Protection (NYCDEP) in the early 2000's to help support the development of a nitrogen control plan for Jamaica Bay. JEM is comprised of a coupled hydrodynamic model and a water quality model, which is capable of simulating eutrophication (nutrients, phytoplankton biomass and dissolved oxygen) and pathogenic bacteria. The original JEM model has undergone several revisions in recent years to improve its spatial resolution and to add functionality to expand the capabilities of the water quality to model additional biological communities that utilize nutrients in the Bay, including macroalgae (*Ulva*) and benthic algae. Also available for use with the JEM modeling system is a watershed or sewershed model, which relates rainfall that falls over the upland drainage basin to determine the pollutant loadings of nutrients and pathogens delivered to the Bay via combined sewer overflows (CSOs), separate sewer overflows (SWOs) and direct runoff to the Bay.

As part of this analysis, the sewershed model was run to generate loadings associated with a 1-in-10 year and a 1-in-25 year rainfall event. It should be noted that damage to the coastal communities during the Sandy event were associated with storm surge as opposed to rainfall. Therefore, larger rainfall events (e.g. 1-in-50 years or 1-in-100 years) were not considered. Analysis of long-term rainfall records for the New York area was performed to determine the magnitude of the 1-in-10 and 1-in-25 year events. Two actual observed rainfall events that were closest in magnitude to the 1-in-10 and 1-in-25 year events were selected. These events were then inserted into the 2008 rainfall record (based on the JFK airport rain gauge) in late August to provide a time history of rainfall to be used as input to the sewershed model to generate a time history of associated runoff volumes and pollutant loading to be used in the JEM modeling system. Late August was selected as the time to evaluate water quality response to a potential storm event and storm surge barrier closure because this is a period of time, when bottom water dissolved oxygen (DO) within the Bay tends to be at its minimum values and perhaps might be most susceptible to adverse impacts from a storm event and storm surge barrier closure. The intent was to model worst case scenario water quality impacts for DO in order to establish a range of potential impacts resulting from the proposed storm surge barrier.

The JEM model was then used to assess a series of model runs that investigated the water quality impacts from a potential storm event and barrier closure. Three conditions were considered:

(1) a base case, i.e., existing conditions with no storm surge barrier in place,
(2) the presence of a storm surge barrier, but with the storm surge barrier always open, and
(3) the presence of a storm surge barrier but with the barrier being closed during the late August storm events.

The analysis included closures of 48 hour and 96 hour durations and the 1-in-10 and 1-in-25 year rainfall events. It was believed that a closure of 48 hours is perhaps the most reasonable closure period, but the analysis was extended to include a 96 hour closure, which was considered to be very conservative. The 96 hour closure was in response to a consideration that it might not be possible to re-open the storm surge barrier gates, perhaps in response to a power outage, if a separate power source was not considered in the design of the storm surge barrier system. These conditions were again chosen in order to establish a range of potential impacts, with the barrier that is never closed being the "best case" range for impacts from an operational standpoint, and the August closure when existing DO conditions are the worst, being the "worst case" scenario. When analyzing duration of closure, again the choice of 48 hours and 96 hours was intended to capture a range of impacts for closure, with 96 hours being the worst case.

The modeling analysis considered both long-term and short-term effects. The long-term effects analysis was meant to evaluate the potential impact of the storm surge barrier system itself, i.e., the physical structure, on water quality. In this case, the analysis compared water quality projections with the barrier in place, but with the gates of the storm surge barrier always in the open position, versus existing conditions, i.e., no storm surge barrier. Model results indicate that the long-term effects include a slight reduction in the tidal range within the bay. Changes to salinity, pathogens, nutrients, chlorophyll, and DO concentrations were generally smaller than could be accurately measured using analytical laboratories. These changes are unlikely to have any impact on aquatic habitat within Jamaica Bay.

The short-term impacts of closing the storm surge barrier were shown to have minimum effects on levels of pathogenic bacteria in the open waters of the Bay and that the attainment of associated standards would be met. However, calculated results for barrier closure scenarios were shown to have a potential greater impact on aquatic habitat, especially related to bottom water DO concentrations. Concentrations of bottom water DO are reduced to between 1.7 and 2.0 mg/L in the open waters of the Bay for the 1-in-25 year storm event for a 96 hour closure. This represents a reduction of between 0.5 and up to 4 mg/L at worst relative to baseline conditions. It is important to note, however, that the JEM consists of 10 vertical layers and the non-attainment is typically limited to the bottom one or two layers of the water column, which represent between 3 and 8 percent of the total vertical water column. Reductions in DO in other upper portions of the water column are much less severe, on the order of a few tenths of a mg/L on average and resulting levels are capable of sustaining aquatic life. In order to minimize the impact of gate closures on DO concentrations it is recommended to minimize the time the storm surge barrier gates are closed. Mobile aquatic life could potentially escape the low bottom DO concentrations, since DO levels in the mid-depth and surface waters of the Bay are capable of supporting pelagic life. However, benthic organisms would likely not be able to avoid low DO and would be subject to detrimental impacts. However, it should be noted that the effects of winds on surface DO re-aeration and vertical mixing, and sediment resuspension were not considered. These factors can potentially impact DO and chlorophyll concentrations and should be incorporated into future phases of the modeling.

Other notable water quality impacts were increases in total nitrogen of between 0.1 and 0.9 mg N/L, depending on location in the Bay and proximity to WWTP discharges (between 10 and 50% increases from baseline), but these increases are not anticipated to detrimentally impact water quality or result in additional phytoplankton growth. This, in part, is due to the fact that current nutrients concentrations are in excess of levels that would limit phytoplankton growth. Model computations also showed

changes in salinity with the top layer typically decreasing by about 1-3 ppt up to almost 9 ppt in a few open water cells and in the CSO tributaries. Salinity, on the seaward side of the storm surge barrier, increased by about 2 ppt. The changes in the water quality parameters were indeed short term, with concentrations of the various water quality parameters of interest returning to near baseline conditions within a few days to a week after the storm surge barrier gates were re-opened.

Summary Conclusion

Preliminary results of the modeling, as presented in this report, indicate the installation and operation of the storm surge barrier could conceivably impact the water quality (e.g., dissolved oxygen) and habitat in the interior tidal tributaries and shallow areas of the Bay. Consequently, additional model refinement and analysis should be conducted by the USACE prior to the Final HSGRR/EIS to better quantify and conclusively address any possible impacts of a storm surge barrier on water quality and fish and benthic species and their habitats in the Bay.

INTRODUCTION

The U.S. Army Corps of Engineers is considering the construction of a storm surge barrier across the width of the Rockaway Inlet in New York City to protect Brooklyn and Queens from tidal surges associated with events such as Hurricane Sandy. To support the evaluation of the storm surge barrier, a modeling study was conducted to assess the impact of the storm surge barrier on water quality under varying rainfall and barrier operating conditions. The hydrodynamic analysis focused on potential changes to the tide range and salinity concentrations. The water quality analyses focused on compliance with existing pathogen (fecal coliform and enterococcus) and DO criteria, as well as other constituents such as nutrients and chlorophyll.

MODELING CONDITIONS

The modeling baseline condition was the year 2008 with rainfall for that year based on data collected at the John F. Kennedy International Airport. The rainfall for this period is considered a "typical" annual rainfall with near average annual rainfall, number of storms and rainfall intensity (HHS, 2011). The model projections considered two storm surge barrier gate structures: an Eastern Option located just east of the Marine Parkway Bridge stretching from Barren Island to Jacob Riis Park; and a Western Option stretching from Manhattan Beach to Rockaway Point. The structures are presented in Figure 1. The portions represented by a line are solid walls that prevent the passage of flow at all times. The ovals represent locations in the structure that can be opened and closed, with the larger openings used for navigation.

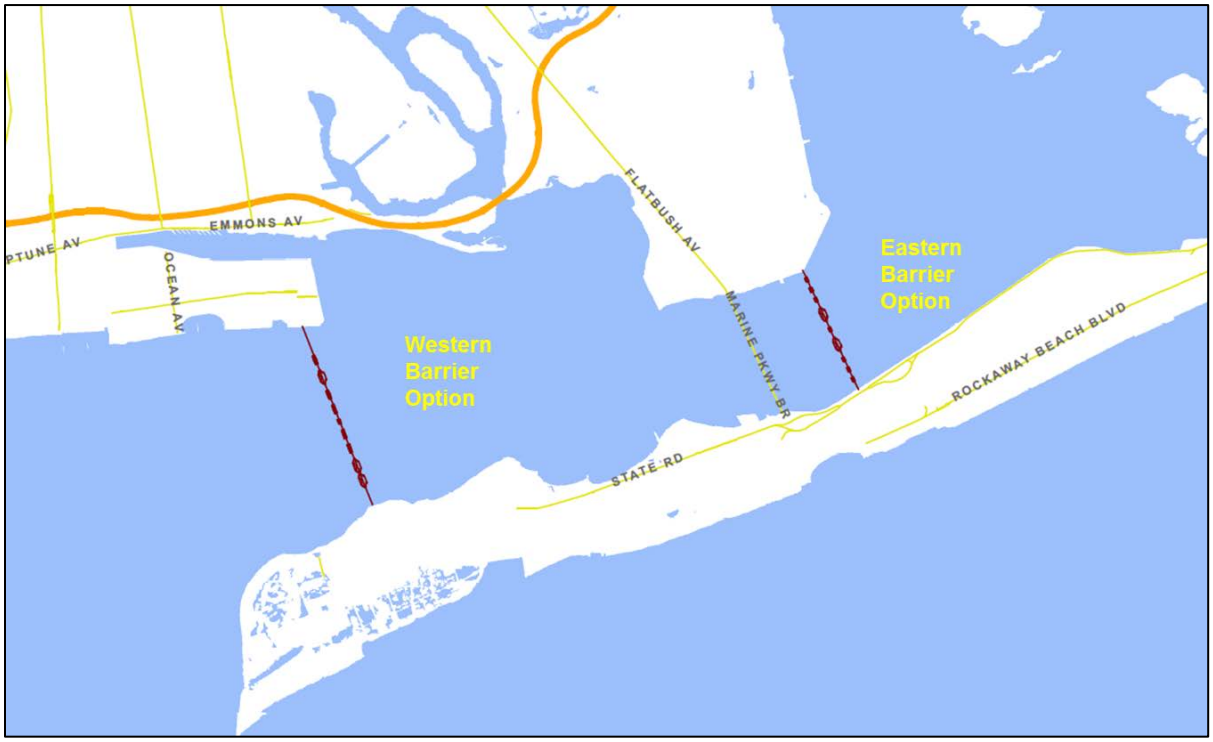


Figure 1. Location of Western Storm Surge Barrier (left) and Eastern Storm Surge Barrier (right).

In addition to the baseline rainfall conditions, two storm conditions were added to the rainfall pattern: a 1-in-10 year rainfall based on a 24 hour period, and a 1-in-25 year rainfall based on a 24 hour period. The 1-in-10 year rainfall event contained 5.78 inches of rainfall and was based on a storm that occurred at LaGuardia Airport (LGA) on August 27, 2011. The 1-in-25 year rainfall event contained 6.60 inches of rainfall and was based on a storm that occurred at LGA on August 14, 2011. Figure 2 presents the rainfall conditions. It should be noted that the 1-in-10 year event had the highest intensity during the middle of the storm, while the 1-in-25 year storm had the highest intensity during the beginning of the storm. These rainfall patterns result in timing differences in the model response to the two different storms. For both the 1-in-10 year and 1-in-25 year conditions the storm rainfall was added to the base 2008 rainfall condition on August 26th.

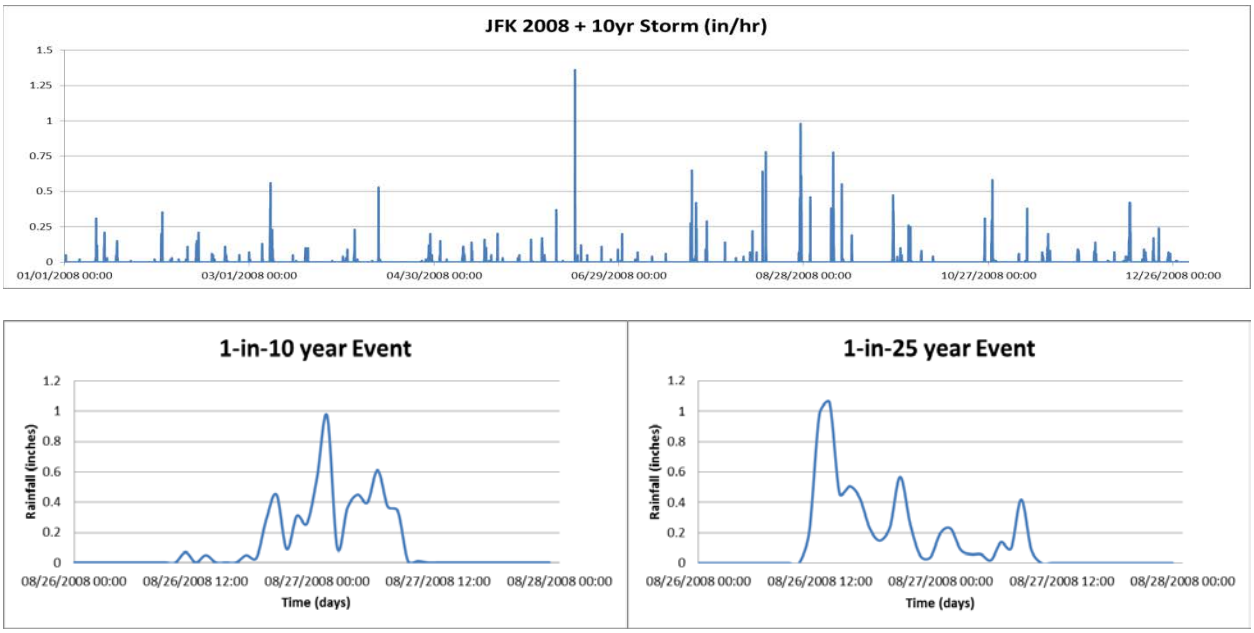


Figure 2. Model Rainfall Conditions.

Modeling was conducted based on four conditions related to the storm surge barrier: no barrier, a barrier with its gates open, a 48 hour gate closure and a 96 hour gate closure. The 48 hour closure was assumed to represent a more typical operating condition, as elevated water levels associated with large storms do not generally last more than a day. The 96 hour gate closure was associated with a conservative length of time that might be associated with a power outage, or other factors that might disrupt the ability to open the gates. Table 1 presents a listing of the 14 model scenarios evaluated.

Table 1. Modeling Scenarios

No Barrier	Eastern Barrier	Western Barrier
1-in-10 year storm	Always open – 1-in-10 year	Always open – 1-in-10 year
1-in-25 year storm	48 hour closure – 1-in-10 year	48 hour closure – 1-in-10 year
	96 hour closure – 1-in-10 year	96 hour closure – 1-in-10 year
	Always open – 1-in-25 year	Always open – 1-in-25 year
	48 hour closure – 1-in-25 year	48 hour closure – 1-in-25 year
	96 hour closure – 1-in-25 year	96 hour closure – 1-in-25 year

The modeling analysis was based primarily on the additional rainfall from an extreme rainfall event. In addition, increased cloud cover was assumed during the previously sunny days of August 26th and August 27th resulting in a reduction of solar radiation by 30 percent to simulate the possible conditions associated with large storm systems. The additional cloud cover would tend to reduce algal primary production on these two days of increased cloud cover. The model analysis did not, however, consider higher winds that might be associated with hurricanes or other large storms. Typically, these increased winds would result in increased vertical and horizontal mixing and increased waves. These winds would also likely increase atmospheric reaeration (i.e., the exchange of DO between the atmosphere and the surface waters of the Bay), and possibly increase sediment resuspension. The latter could result in reduced water clarity that might reduce phytoplankton growth. Increased vertical mixing might increase the exchange of surface water DO with oxygen deficient bottom waters, thus reducing the projected hypoxic conditions.

THE JEM MODEL

The model used for this analysis was the Jamaica Bay Eutrophication Model (JEM). The JEM modeling system actually includes several models applied in the analysis. The first component of the JEM modeling system is a landside or sewershed model of the upland drainage basin. The second component is stand-alone hydrodynamic model, using the Estuarine Coastal and Ocean Model – Sediment Transport framework (ECOMSED), which provides water movement, as well as temperature and salinity information, to the water quality models. The two other components include separate water quality models: a pathogen model applied for fecal coliform and enterococcus; and a geochemical or eutrophication model applied for nutrients, chlorophyll-a, and DO. The water quality models use the Row-Column AESOP (RCA) model framework.

RCA was developed by HydroQual Inc. in the late-1980s and is the most recent extension of the family of water quality models that originated as the Water Quality Analysis Simulation Program (WASP) used by the United States Environmental Protection Agency (Di Toro et al., 1983). The eutrophication form of RCA has been applied to a number of coastal and estuarine systems (Isleib et al., 2007; Testa et al., 2014; Xue et al., 2014; Zhang & Li, 2010). Included in the standard eutrophication form of RCA is a biogeochemical sediment nutrient flux submodel, known as SFM. Initially developed for the US Army Corps of Engineers and the USEPA Chesapeake Bay Program by HydroQual, Inc. in the early 1990's (Di Toro & Fitzpatrick, 1993), it has been applied, together with the water column biogeochemical version of RCA in a number of coastal and estuarine systems (CEC, 2015; HydroQual, 1995, 1996, 2001; JEI, 2014). Details of the RCA biogeochemical may be found in HDR|HydroQual

(2014) and Testa et al. (2014), while the details of the SFM may be found in (Brady et al., 2013; Di Toro, 2001; Testa et al., 2013). Figure 3 presents a conceptualization of the major state-variables and transformation processes included in RCA.

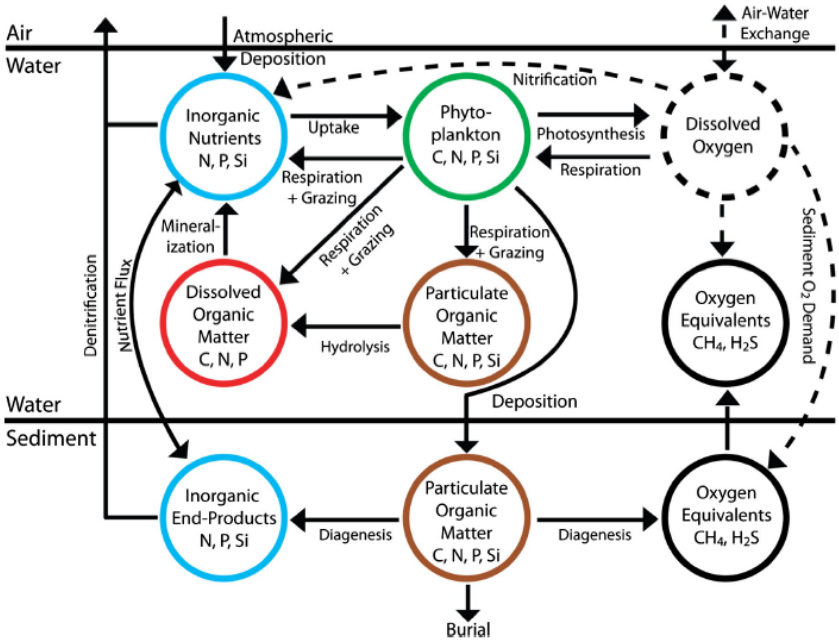


Figure 3. Diagram of the major state-variables and transformation processes in RCA (from Testa et al., 2014)

The original JEM model (model grid shown on Figure 4) was calibrated against an extensive field and laboratory program (Jamaica Eutrophication Study - JES) conducted between July 1995 and June 1996 and funded by the NYCDEP (field sampling locations also shown on Figure 4). Field sampling included measurements of temperature, salinity, tidal currents and water elevations, primary production/community respiration, *Spartina* biomass, *Ulva* biomass, benthic filter feeder biomass, benthic algal biomass, zooplankton biomass (EEA, 1996), and sediment chemistry and sediment nutrient flux and sediment oxygen demand (Corwell and Owens, 1998). Additional monitoring and field efforts included sampling of the wastewater flows and effluent nutrient concentrations from the four NYCDEP waste water treatment plants (WWTPs) that discharge into Jamaica Bay and also included wet weather event sampling of a number of the combined sewer overflows (CSOs) and storm water overflows (SWOs) that discharge into the Bay.

The original JEM model was calibrated against the 1995/1996 JES data set (HydroQual, 2002) and was reviewed by an external Model Evaluation Group or MEG consisting of a scientist familiar with Jamaica Bay biology (Dr. David Franz, Brooklyn College), an estuarine hydrodynamicist (Dr. William Boicourt (University of Maryland), a marine ecologist (Dr. Jay Taft, Harvard University), an experienced water quality modeler (Dr. Mark Dortch, USACE Waterway Experiment Station) and a staff member for the NYS Department of Environmental Conservation (Mr. Philip O'Brien).

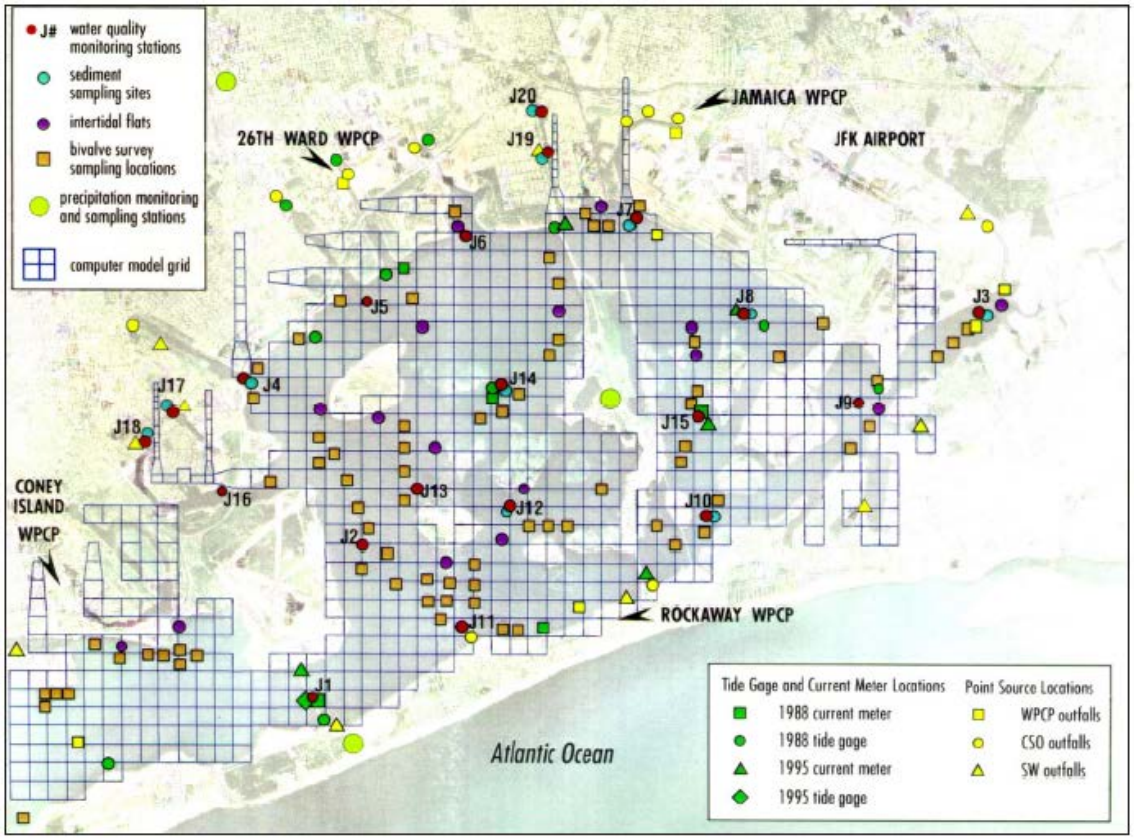


Figure 4. Original JEM Grid and WWTP Locations and 1988 and 1995/1996 Field Sampling Locations.

As part of recent project funded by the National Park Service and the Science and Resilience Institute at Jamaica Bay (Orton et al., 2017), the JEM was expanded both in terms of processes included in the eutrophication model and it's spatial resolution. The expanded eutrophication model includes the original water column eutrophication submodel, sediment nutrient flux submodel and suspension feeder submodel, and new macroalgae (*Ulva*) and benthic algae submodels (Figure 5). The revised model is known as JEM2016.

Figure 6 presents the model segmentation and bathymetry used in the JEM2016 model. The model segmentation applied for this analysis has approximately four times the number of grid cells as the original JEM. The model includes 10 vertical layers. The new segmentation has been applied for larval transport calculations and is being used as part of NYCDEP's CSO Long-Term Control Plan process. The eutrophication model has been re-calibrated to the 1995-1996 JES data and was also calibrated against 2015 NYCDEP Harbor Survey data (Orton et al., 2017). The Harbor Survey program monitors 13 stations in the open waters of the Bay and 11 tributary stations (Figure 6). The Harbor Survey program includes bi-weekly to monthly sampling of physical and chemical water quality parameters, including temperature, salinity, dissolved oxygen, phytoplankton biomass (as chlorophyll-a), and various forms of nutrients, but does not include components of the 1995/1996 JES study such as measurements of primary production *Ulva*, benthic algae, etc.

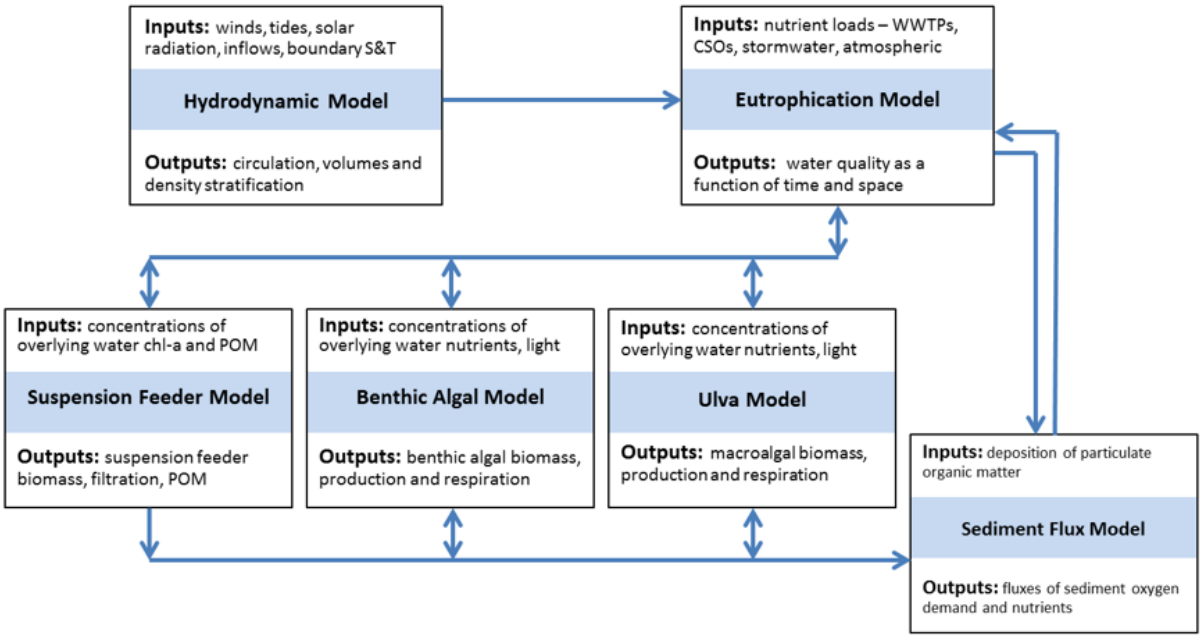


Figure 5. JEM2016 Hydrodynamic and Water Quality Model.

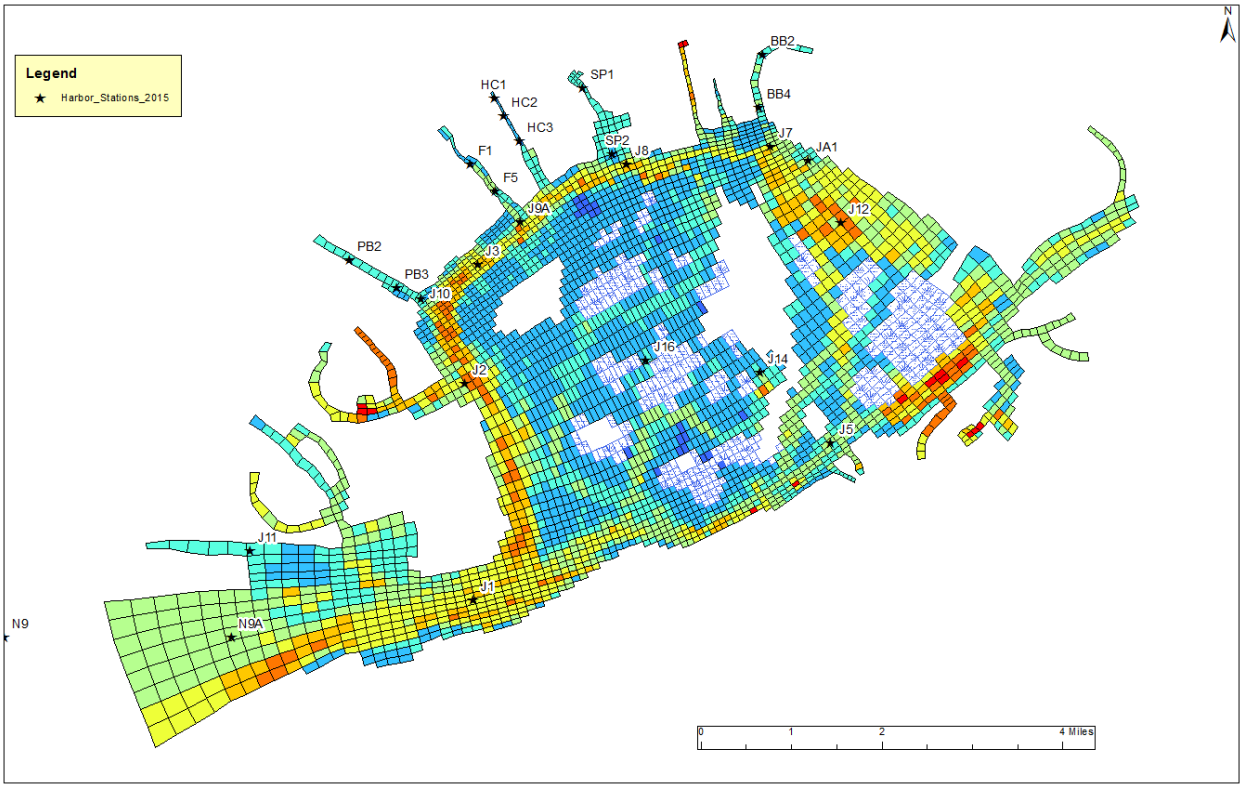


Figure 6. JEM2016 Model Segmentation and 2015 Harbor Survey station locations.

METHODOLOGY

The modeling process began with the application of InfoWorks-based landside models for the five sewershed drainage areas (Coney Island, 26th Ward, Jamaica, Rockaway and a portion of Nassau County) that discharge into Jamaica and provided runoff volume estimates for CSOs, storm sewers and direct runoff to the Bay. Based on a recent analysis of rainfall records for the period 2002-2011 from JFK airport, which showed a 10-year average of about 46 inches/year, the NYCDEP has selected the year 2008, with a rainfall of 46.3 inches/year, as being a typical year (HHS, 2011) and is using this rainfall record for all sewershed and water quality modeling for the City's Long-Term Control Plan for CSOs. As a point of comparison, the 1955-2011 long-term average rainfall is about 41 inches/year. To be consistent with other NYCDEP modeling efforts, this study also used the 2008 rainfall record as input to the InfoWorks models. However, for this study, the 2008 rainfall conditions were supplemented with either the 1-in-10 year or 1-in-25 year storms.

For scenario runs with the storm surge gates closed, hydrodynamic model computations accounted for the changes in water level in the bay due to freshwater inputs. Changes in water levels in the bay affect when tide gates, which cover CSOs or storm sewers, open or close and were included in the InfoWorks analysis. InfoWorks outputs were then used as input for the hydrodynamic model runs.

The model segmentation used by both the hydrodynamic and water quality models is not of a sufficient resolution to precisely reproduce the proposed storm surge barrier structures as shown in Figure 7. However, it is believed that the spatial resolution is sufficient for this screening level analysis. In order to reproduce the effect of the storm surge barrier under conditions with the storm surge barrier gates open, model segments were blocked off to leave only enough area to reproduce the open area of the storm surge barrier design, i.e., the choice of open gates versus closed support structures was chosen such that the cross-sectional areas of the open gates of the actual barrier design is approximately matched in the hydrodynamic model. In Figure 7, open gates are shown in light blue and the support structures that would not allow the passage of flow are shown in green.

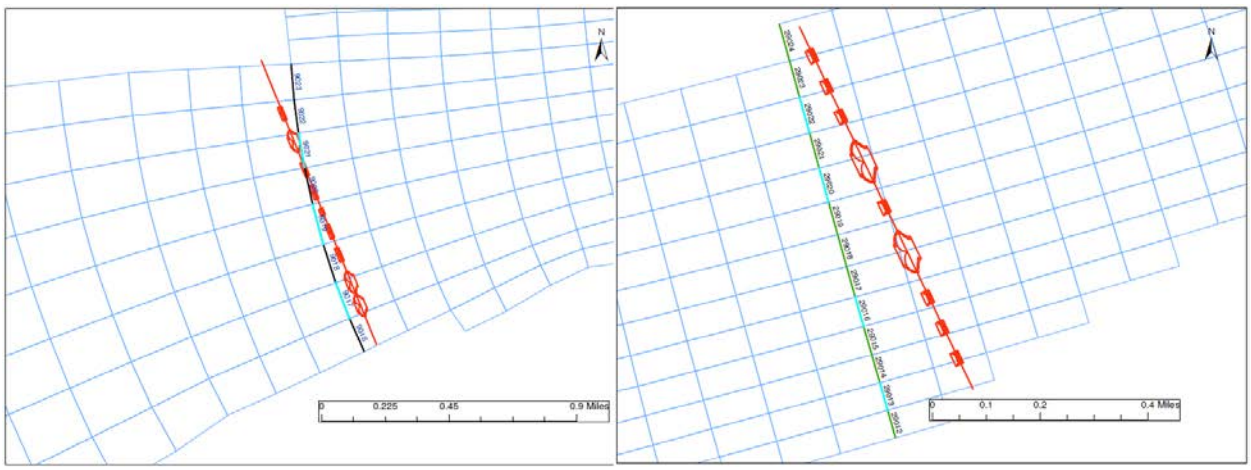


Figure 7. Western Storm Surge Barrier Option (left) and Eastern Storm Surge Barrier Option (right) in Comparison to the Model Segmentation.

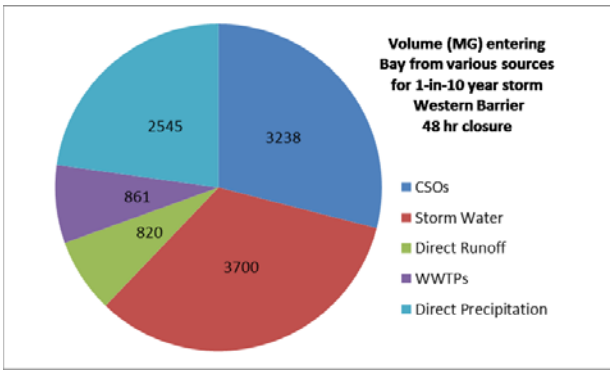
InfoWorks also provided information regarding the fraction of CSO volume that contained sanitary versus stormwater volume in order to determine the pathogen concentrations for the CSOs. NYCDEP provided information concerning 2015 wastewater treatment plant (WWTP) flows and loading. The volumes of water from each discharge source (WWTPS, CSOs, separate storm sewers (SWOs), direct runoff to the bay and rainfall directly impinging onto the water surface of the Bay), during the storm surge barrier closure periods and for each storm event are shown in Figure 8. As can be seen CSOs, storm water, and direct precipitation to the Bay dominate the water volume delivered to the Bay for these storms, with direct precipitation comprising 20 t0 25 percent of the total volume.

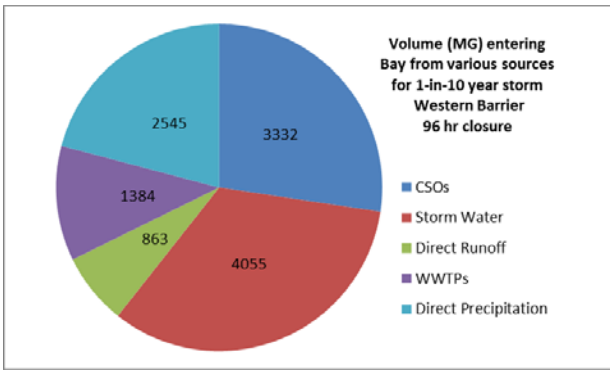
During the modeled storm events, the gates were closed for either 48 or 96 hours. The gate closure began during a low tide period before the storm. This allowed for the largest storage capacity within the bay behind the storm surge barrier. Figure 9 presents the behavior of water levels behind the Western Barrier during the 96 hour closure for the 1-in-10 year storm in the upper panel and the 96 hour closure, 1-in-25 year storm for the Eastern Barrier in the lower panel. Time in the figure is shown in Julian days. The timing of the gate closure is shown as the vertical red line. The vertical blue line shows the timing of the beginning of the rainfall event. As the storm begins, the water level rises (note that the two storms vary in terms of the timing relative to one another - see Figure 2) and then gradually levels off as the precipitation ends and CSOs and SWOs finish discharging. The majority of the increase in water elevation is due to runoff from the surrounding watershed, as the watershed area is several times larger than the surface area of Jamaica Bay. The gates are then re-opened when the water levels inside the barrier and outside the barrier are similar. This approach would avoid high current velocities that could occur if the gates are opened with vastly different water elevations on each side of the barrier.

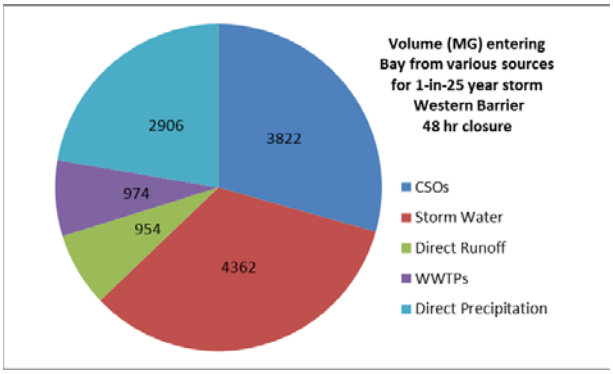
The results from the hydrodynamic model were then used as input for the water quality models to calculate pathogen, nutrient, chlorophyll and DO concentrations. Pollutant loads for the water quality model were developed by assigning pollutant concentrations to the CSO, SWO and WWTP flows calculated by the InfoWorks models. Nitrogen loads from the WWTP were based on the First Amended Nitrogen Consent Judgment concentrations for each of the WWTP.

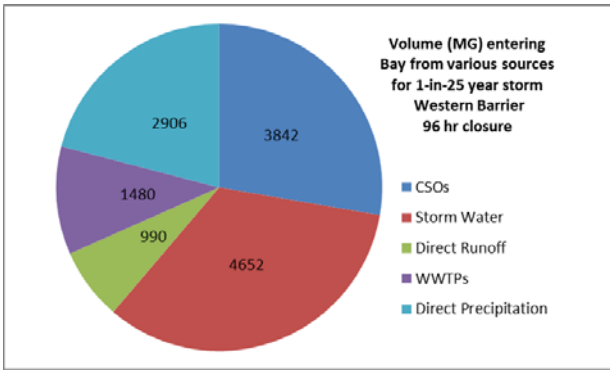
RESULTS

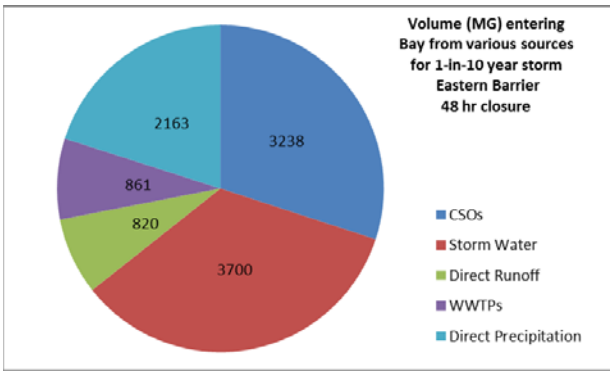
The effects of the storm surge barrier will be presented for both long-term and short-term responses. Under most circumstances, the storm surge barrier once constructed will have its gates open allowing tidal exchange between the nearby Atlantic Ocean and Jamaica Bay via the Rockaway Inlet. The structure will effectively reduce the cross-sectional area of the inlet, which has the potential to reduce tidal flows. The restriction of flows could affect the tidal range, which could impact the tidal marshes, and affect tidal flushing, which could impact water quality. These impacts would likely be more chronic in nature. Short-term effects occur when the storm surge gates are closed. Presumably the storm surge gates would be closed on only the rare occasion when tidal flooding is predicted to occur. Closing the storm surge gates eliminates tidal flushing, which would allow the buildup of contaminants in the waters of Jamaica Bay behind the barrier. This has the potential to negatively impact water quality and attainment of water quality standards. These impacts would tend to be more acute in nature.

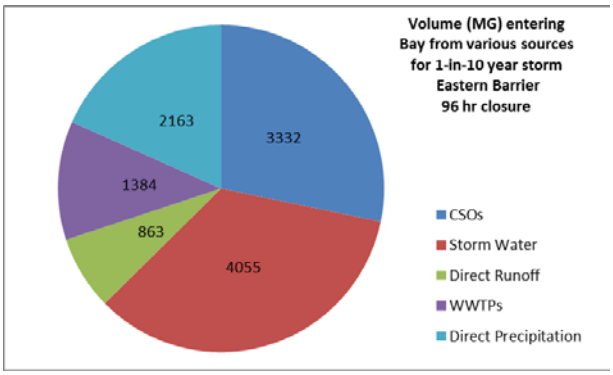


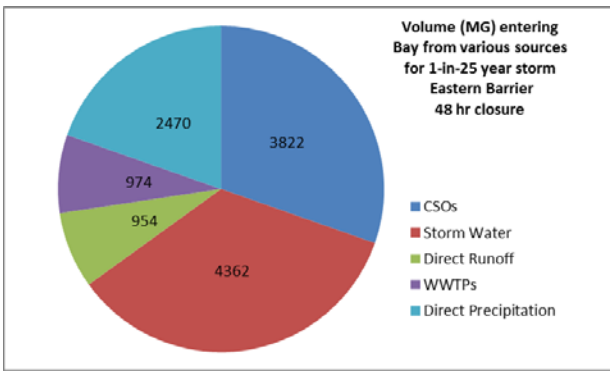












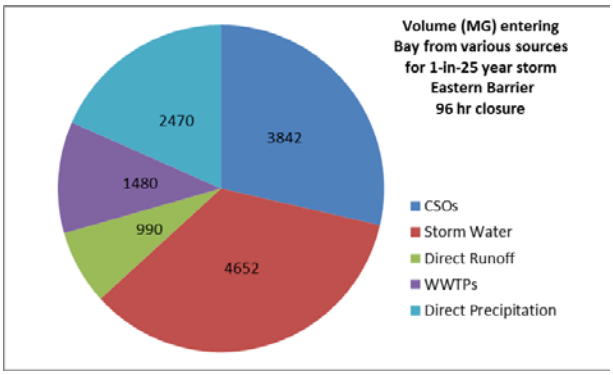


Figure 8. Runoff Volumes for the Various Modeling Scenarios.

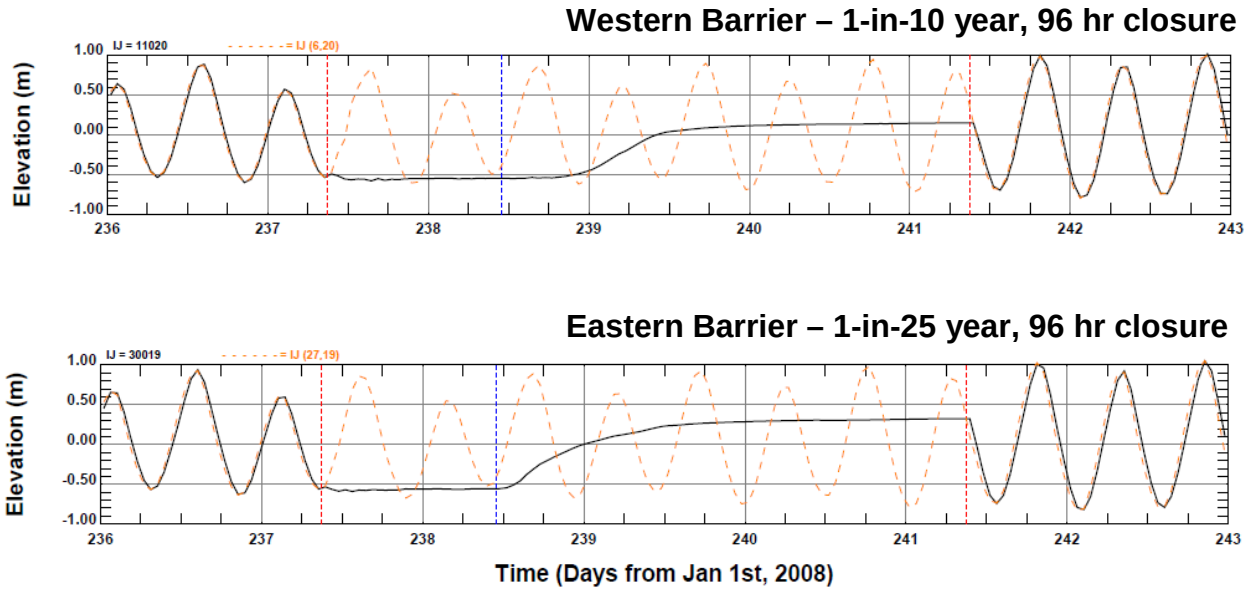


Figure 9. Water Elevations During the 96 hour Closure of the Storm Surge Barrier Gates.

Storm Surge Barrier Open Results

Water Elevation

Changes in tidal elevation range were assessed by tabulating the maximum differences in the tide range on an annual basis. The annual calculation included the extremes for the 2008 conditions. The results will be presented for seven locations within the bay (Figure 10): (1) near the eastern storm surge barrier, (2) near Paerdegat Basin in the North Channel in the northwestern portion of the bay, (3) near Spring Creek in the North Channel in the northeastern portion of the bay, (4) in Grassy Bay, (5) in Grass Hassock Channel, south of Jo Co Marsh, (6) in Beach Channel near Cross Bay Boulevard in the southern portion of the bay, and (7) in Pumpkin Patch Channel south of Duck Point Marsh.

Table 2 presents the maximum annual tidal elevation range that was computed for 2008 for the baseline (no storm surge barrier) and for the eastern and western barrier (assumed to be always open) at each of the seven locations. The model suggests that the implementation of a storm surge barrier will reduce the maximum tidal range. In the case of the construction of an eastern barrier, which is located at a narrower location in the Rockaway inlet as compared to the western barrier, the tidal range is reduced between 6.4 to 7.6 cm or about 3 percent. In the case of the construction of the western barrier, the tidal range is reduced between 1.4 and 2.3 cm or between 0.6 and 1 percent. These changes are fairly small.

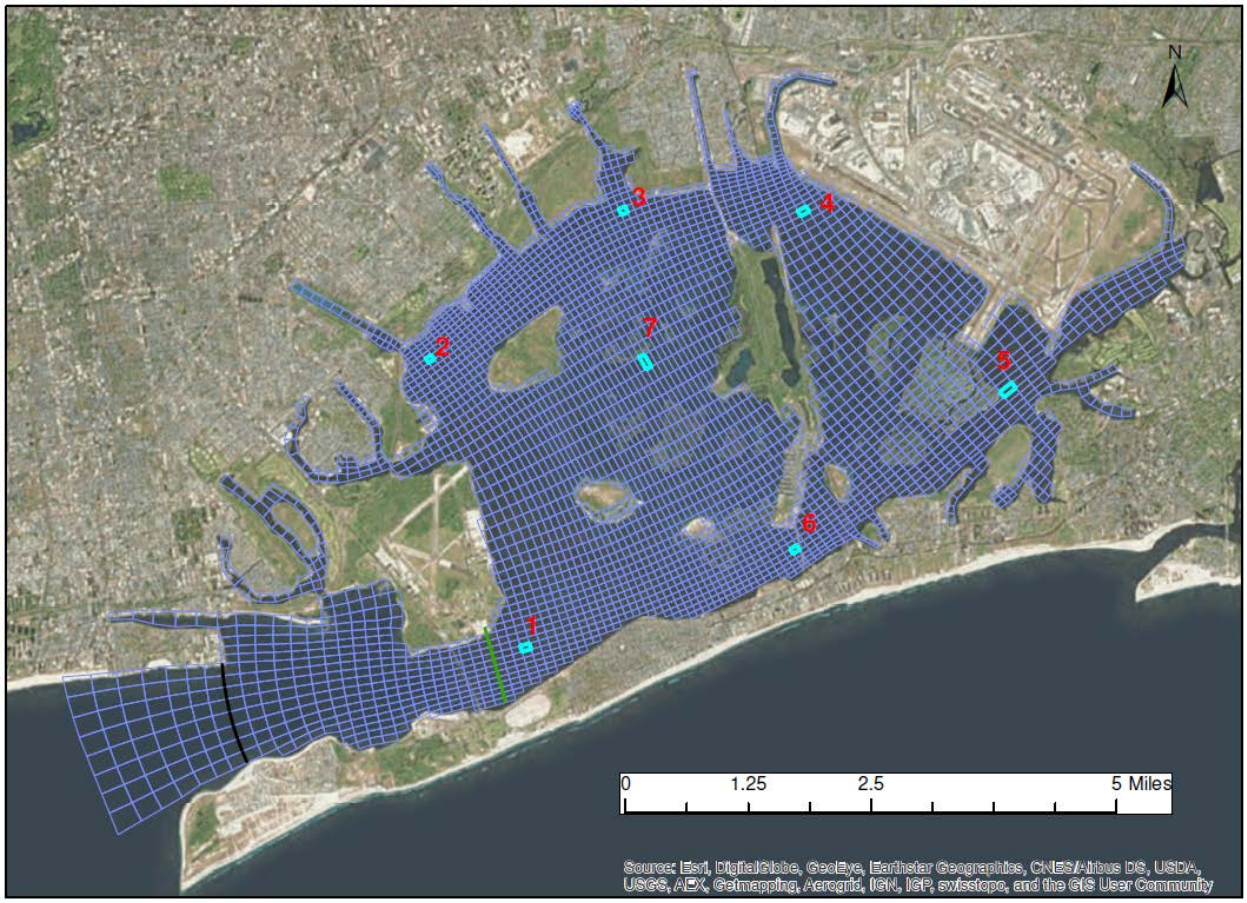


Figure 10. Location Map of Cells Used to Report Tidal Ranges.

Table 2. Maximum Annual Tidal Elevation Range (cm)

Location	Baseline	East Barrier	Difference	West Barrier	Difference
Near east storm surge barrier	231.5	224.8	**-6.7**	230.1	**-1.4**
Near Paerdegat Basin	242.3	235.4	**-6.9**	240.2	**-2.1**
Near Spring Creek	245.3	238.6	**-6.7**	243.0	**-2.3**
Grassy Bay	245.2	238.0	**-7.2**	243.0	**-2.2**
Grass Hassock Channel	245.4	237.8	**-7.6**	243.1	**-2.3**
Beach Channel	242.2	235.3	**-6.9**	240.1	**-2.1**
Pumpkin Patch Channel	242.1	235.7	**-6.4**	240.7	**-1.4**

Water Quality

To assess the changes due to the construction of the storm surge barriers on an annual basis, daily average model concentration results for all model segments were aggregated for the full calendar year, and the 10th, 50th (median), and 90th percentile concentrations were calculated. For the concentration results, the absolute minimum and maximum concentrations were not assessed since there sometimes can be "noise" in the model results at the upper and lower ranges of the calculations.

Salinity

The storm surge barriers have the potential to restrict tidal flow when the storm surge gates are open. Table 3 presents the calculated salinity for the baseline condition, as well as the East Barrier and West Barrier scenarios. The results are presented for the 1-in-25 year scenarios, but the results for the 1-in-10 year scenarios are similar. The model results indicate small changes in long-term salinity levels, on the order of 0.1 ppt due to the construction of the storm surge barriers. However, some short term changes can be observed, particularly during rainfall events. Figure 11, presents contour plots of surface salinity for the Baseline or existing condition, i.e., no storm surge barrier scenario on the left-hand panels, the storm surge barrier gates open scenario on the right-hand panels and the computed differences between the two scenarios in the center panels. This figure indicates that there is a 1-4 ppt difference or reduction in salinity on Day 240 with the implementation of the storm surge barrier. Within a few days after the rainfall event and after storm surge barrier gates are re-opened (Day 244), differences in salinity begin to be reduced.

Table 3. Long-Term Salinity (ppt) Results

Scenario	10^{th} Percentile	50^{th} Percentile	90^{th} Percentile
Baseline	23.51	25.61	27.43
East Barrier	23.25	25.47	27.39
West Barrier	23.54	25.74	27.57

Pathogens

Fecal coliform and enterococci were analyzed on an area-weighted basis using both a geometric and arithmetic annual mean for both the 1-in-10 and 1-in-25 year storm scenarios using surface layer results. The fecal coliform results are presented in Table 4 and the enterococci results in Table 5. The model results indicate that long-term changes to the pathogen concentrations will be minimal. Based on these results there should not be any impact on the attainment of the pathogen water quality criteria.

Table 4. Long-Term Fecal Coliform (cfu/100mL) Results

	Annual Geometric Mean		Annual Arithmetic Mean	
Scenario	**1-in-10 year**	**1-in-25 year**	**1-in-10 year**	**1-in-25 year**
Baseline	7.10	7.68	116.93	138.07
East Barrier	7.13	7.72	117.56	138.96
West Barrier	7.14	7.71	116.99	138.12

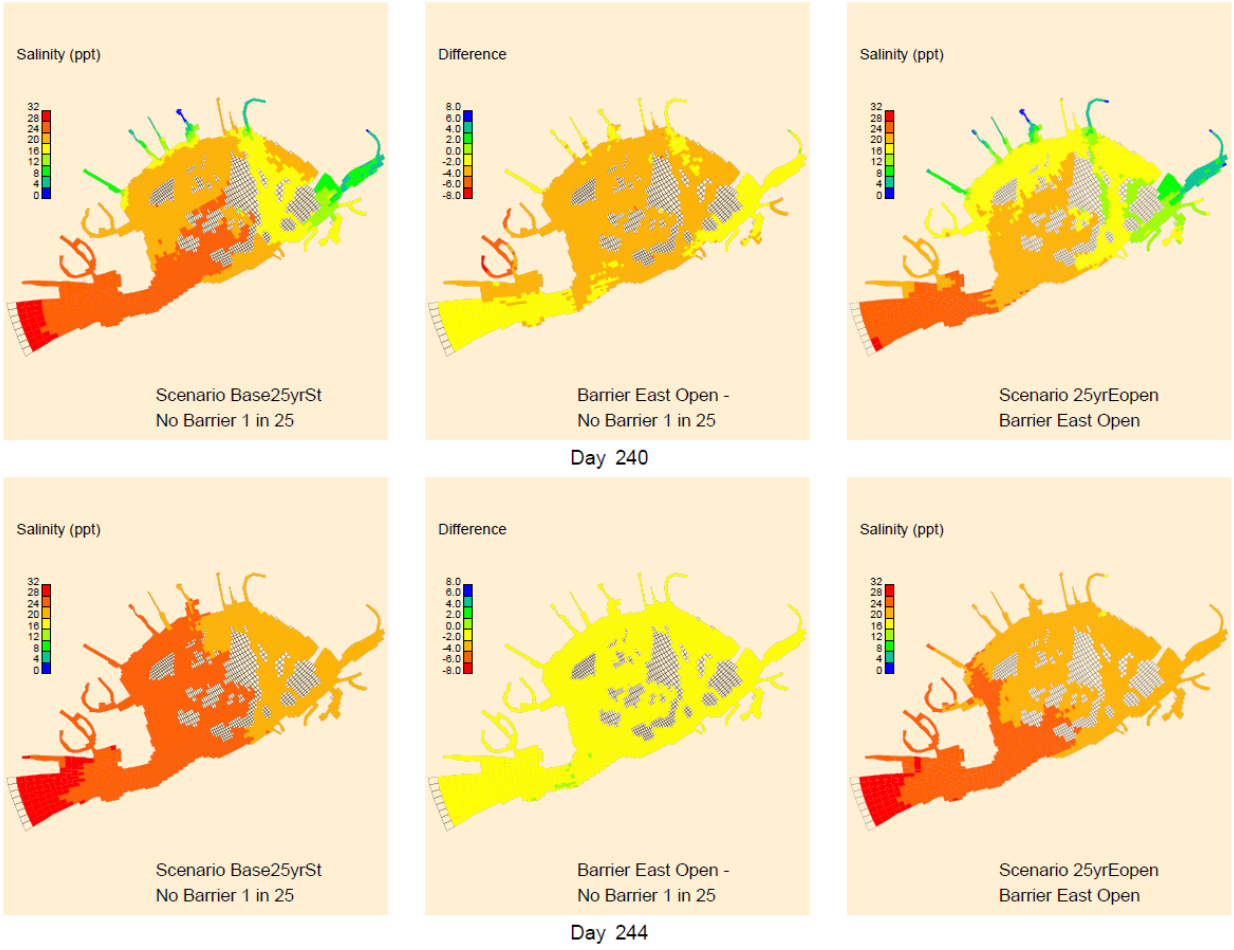


Figure 11. Comparison of Calculated Surface Salinity for the Baseline and Eastern Storm Surge Barrier Open, 1-in-25 year Scenarios.

Table 5. Long-Term Enterococci (cfu/100mL) Results

	Annual Geometric Mean		Annual Arithmetic Mean	
Scenario	**1-in-10 year**	**1-in-25 year**	**1-in-10 year**	**1-in-25-year**
Baseline	4.44	4.65	41.32	46.74
East Barrier	4.45	4.66	41.52	47.02
West Barrier	4.49	4.69	41.36	46.80

Nutrients

The eutrophication model includes six nitrogen state-variables and five phosphorus state-variables. Model results for total nitrogen (TN) and dissolved ammonium (NH_4) are presented as examples. Table 6 presents the calculated TN concentrations and Table 7 presents the calculated NH_4 concentrations for the baseline condition, as well as the East Barrier and West Barrier scenarios. The results are presented for the 1-in-25 year scenarios, but the results for the 1-in-10 year scenarios are similar. The model output is presented to three or four decimal places in order to show the differences between the scenario results. The NH_4 results do not represent the unionized ammonia (NH_3) concentrations. The NH_3 concentration is a fraction of the NH_4 concentration based on the temperature, salinity and pH. The change in NH_3 can be inferred from the change in NH_4 in that small changes in NH_4 likely indicate small changes in NH_3. The model results indicate small changes in TN concentrations, on the order of 0.01 mg/L or less, due to the construction of the storm surge barriers. NH_4 concentrations are not only affected by dilution, but are also affected by algal growth, nitrification and fluxes from the sediment, so there are multiple factors that influence the change in NH_4 concentrations. Differences in NH_4 concentrations are calculated to be on the order of 0.001 mg/L.

Table 6. Long-Term Total Nitrogen (mg N/L) Results

Scenario	10th Percentile	50th Percentile	90th Percentile
Baseline	0.452	0.814	1.309
East Barrier	0.450	0.815	1.313
West Barrier	0.443	0.809	1.297

Table 7. Long-Term Dissolved Ammonium (mg N/L) Results

Scenario	10th Percentile	50th Percentile	90th Percentile
Baseline	0.0347	0.0812	0.1983
East Barrier	0.0348	0.0805	0.2003
West Barrier	0.0351	0.0821	0.1926

On shorter time scales, on the order of a day, the impacts of the barrier are slightly larger, as shown on Figure 12 for dissolved ammonium. This figure compares the Baseline (i.e., existing conditions - no barrier), shown in the left panels, versus the East barrier (gates open), shown on the right panels, for days Julian days 240 (second day of the rainfall event) and 244 (three days after reopening storm surge barrier gates) for the 1- in-25 year storm event. The middle panel presents the difference between the two model scenarios (East Barrier open - Baseline). As can be seen short-term differences lie within a +0.04 and -0.04 mg N/L range.

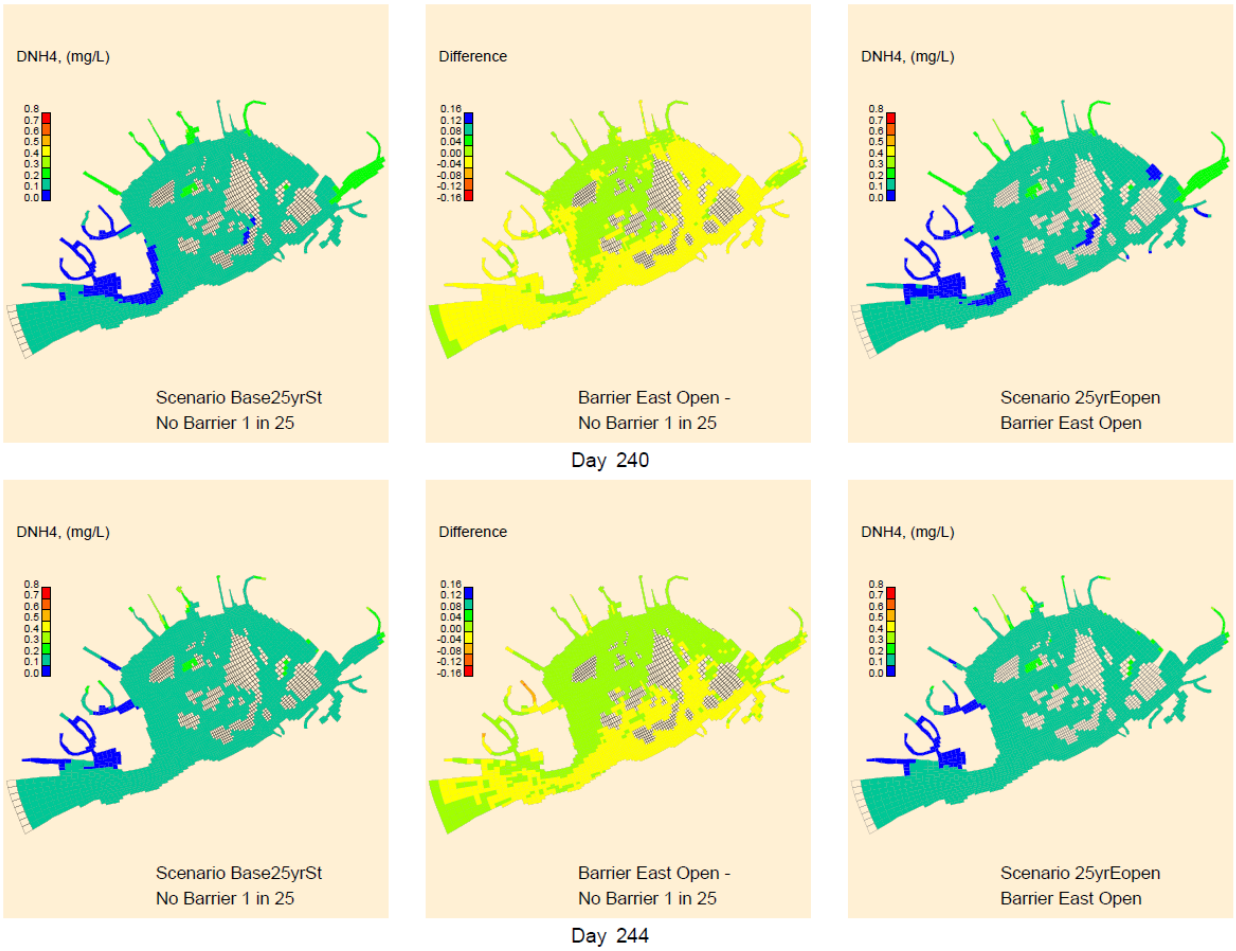


Figure 12. Comparison of Calculated Surface Dissolved Ammonium (DNH4) for the Baseline and Eastern Storm Surge Barrier Open, 1-in-25 year Scenarios.

Chlorophyll

Chlorophyll annual results are presented in Table 8. The model results indicate that like the other constituents, the annual changes resulting from the construction of the storm surge barriers are small.

Table 8. Long-Term Chlorophyll (ug/L) Results

Scenario	10th Percentile	50th Percentile	90th Percentile
Baseline	10.00	24.12	38.64
East Barrier	10.01	24.14	38.57
West Barrier	10.15	24.39	39.09

However, on shorter time scales, the changes between the baseline and the storm surge barrier scenarios are larger than computed on an average annual basis. Figure 13 presents a comparison between the Baseline and the open Eastern Barrier scenarios (the layout of the figures is as described

for Figure 11 above). Generally, the model shows that the barrier reduces chlorophyll on the order of 2-4 ug/L, except in the Gerritsen Creek, Mill Creek, and Shell Bank Creek portion of the Bay, where chlorophyll decreases as much as 8 ug/L. The chlorophyll reductions in the open waters of the Bay represent a reduction of between 7 to 15% from ambient levels.

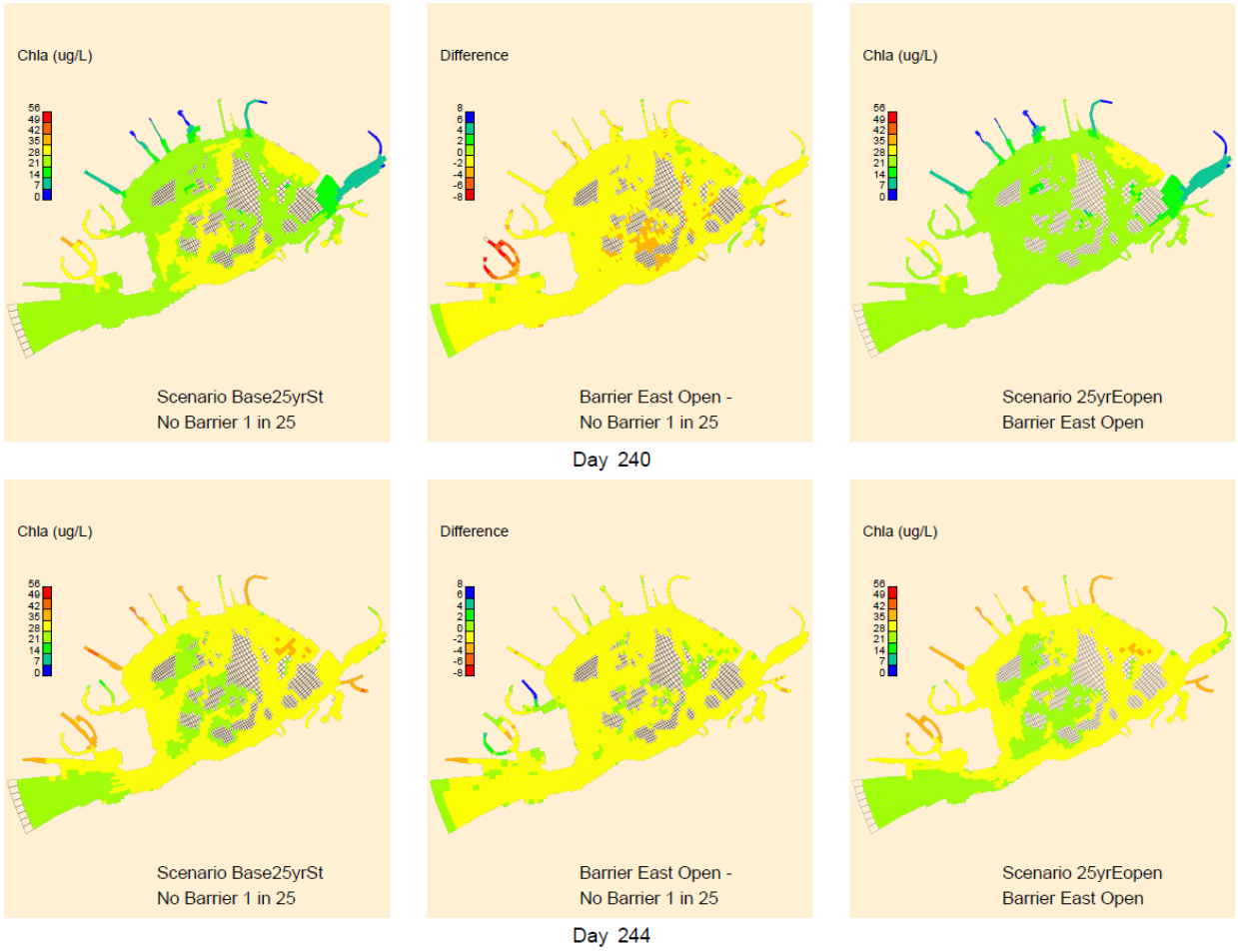


Figure 13. Comparison of Calculated Surface Chlorophyll for the Baseline and Eastern Barrier Open, 1-in-25 Year Scenarios.

Dissolved Oxygen

Long-term or annual bottom DO results are presented in Table 9. The model results indicate that the long-term changes in DO concentrations, due to the construction of the storm surge barriers, will be on the order of 0.01 mg/L, or less.

However, changes in bottom water DO over shorter time intervals are larger than those computed on an annual basis. Figure 14 presents a comparison of bottom water DO for the Baseline and open East Barrier for the 1-in-25 year storm even for Julian days 240 (second day of storm) and 244 (three days after storm surge barrier gates re-opened). The layout of the figure is a described above for Figure 11. While, in general, the bottom water DO for both scenarios show a high degree of similarity, the difference plots indicate that there are some areas of the Bay, mainly in Grassy Bay and in the channels that lie between the marsh islands in the middle region of the Bay, where bottom water

concentrations of DO decrease between 1 to 2 mg/L. However, in these marsh area channels, the bottom DO values are still above the NYSDEC water quality standards. However, over the larger area of the Bay the changes in DO tend to be smaller, between +0.5 and -0.5 mg/L. It is important to recognize, however, that for this JEM model, the bottom layer of the model represents only 3 percent of the total water column depth. As will be shown later, the upper portions of the water column (representing greater than 90 percent of the total water column depth) do not evidence of as low DO concentrations as do the bottom two layers of the model.

Table 9. Long-Term Daily Average Dissolved Oxygen (mg/L) Results

Scenario	10th Percentile	50th Percentile	90th Percentile
Baseline	6.58	9.06	12.20
East Barrier	6.57	9.07	12.21
West Barrier	6.61	9.07	12.17

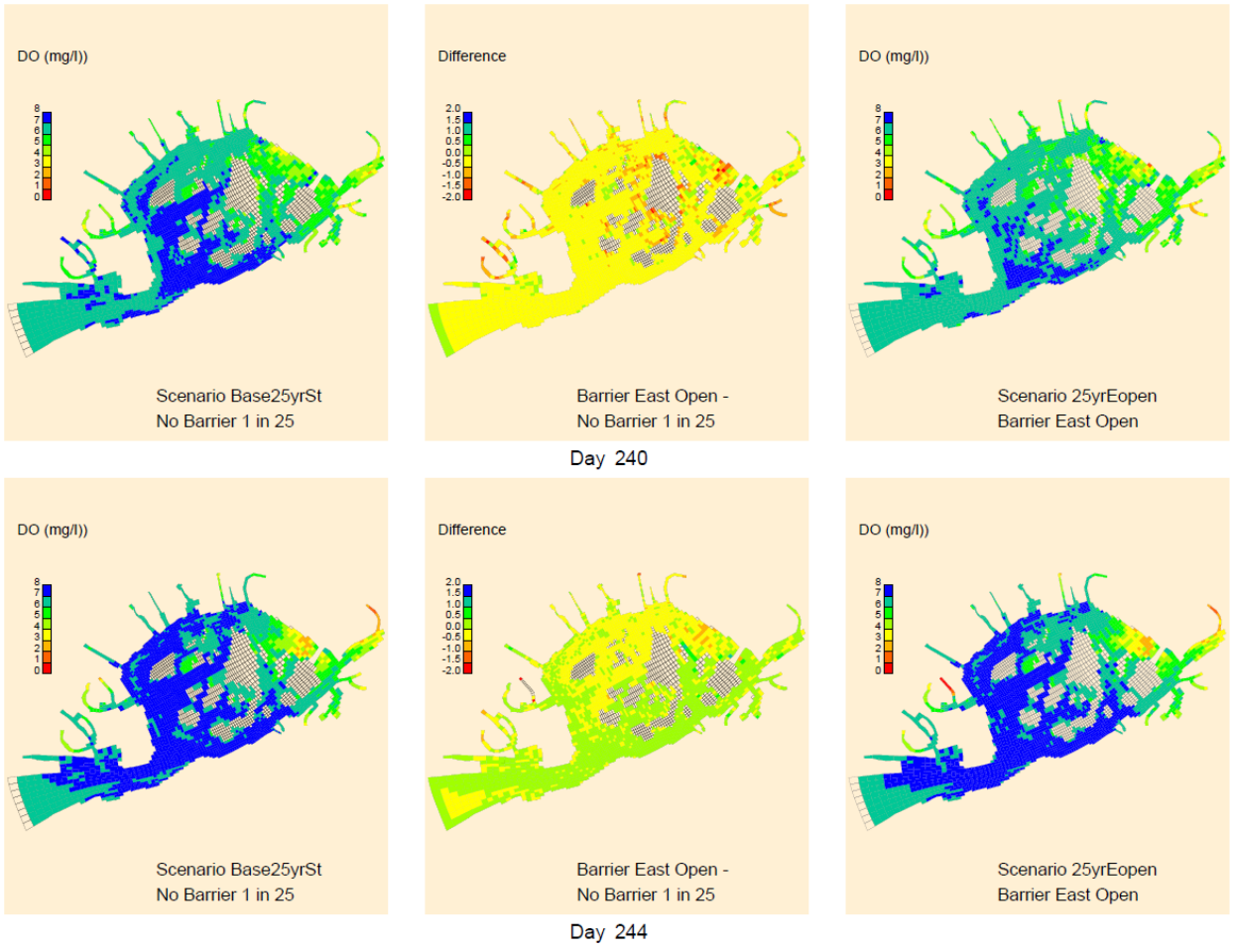


Figure 14. Comparison of Calculated Bottom Dissolved Oxygen for the Baseline and Eastern Barrier Open, 1-in-25 Year Scenarios.

Storm Surge Barrier Closure Results

Short-term changes in water quality in response to closures of the storm surge barrier gates were analyzed both spatially and temporally. Spatially, results provide an overview of which areas of the Bay would expect to be impacted by closure of the storm surge barrier on a daily average basis. The temporal analysis, based on time-series figures, present hourly results at specific locations to help assess the magnitude of impacts at specific locations and over how long a period of time the impacts would occur.

Water Elevation

Water elevation increases in Jamaica Bay, when the storm surge gates are closed, due to freshwater inputs from WWTPs, CSOs, stormwater, direct runoff, and precipitation falling directly on the water surface as previously shown in Figure 9. In the scenarios that were analyzed, the smallest increase in water level occurs for the 1-in-10 year storm, 48 hour closure, Western Barrier scenario. This scenario has the least amount of precipitation, the shortest duration of closure and the largest surface area to accept water. The scenario with the greatest change in elevation is the 1-in-25 year, 96 hour closure, Eastern Barrier scenario. The water elevations within the Bay increase by 2 to 3 feet during the time the storm surge gates are closed in the scenarios that were analyzed, which is about half of the normal tidal range. Table 10 presents the increase in water elevation for each scenario during the period of storm surge barrier closure. The increase in water elevation due to 5.78 to 6.60 inches of rain is largely due to runoff from the Jamaica Bay watershed, which is several times larger than the wetted surface area of the bay, as well as precipitation delivered to the surface waters of the Bay. Roughly, the watershed runoff (CSOs, stormwater, and direct drainage) contributes about 65-75 percent of the increase in elevation, rainfall falling directly on the bay is the source for 20-25 percent of the increase, and WWTPs account for 7-12 percent of the increase in water elevation.

Table 10. Water Elevation (feet) Increase During Storm Surge Barrier Closure

Scenario	Western Barrier	Eastern Barrier
1-in-10 Year, 48 Hour Closure	2.31	2.44
1-in-10 Year, 96 Hour Closure	2.38	2.65
1-in-25 Year, 48 Hour Closure	2.66	2.83
1-in-25 Year, 96 Hour Closure	2.70	3.00

Salinity

Surface salinity was significantly impacted by the closure of the storm surge gates. Figure 15 presents the results comparing the Eastern Barrier Open scenario to the 96 hour closure scenario. Surface salinity decreases by as much as 8 ppt near the storm surge barrier inside the bay. Conversely, salinity increases by more than 2 ppt outside the storm surge barrier as it is cut off from the freshwater in the bay. Salinity within the bay as a whole is reduced due to the large rainfall event even for the scenario

with the storm surge gates open. Since periods of lower salinity are periodic naturally occurring events, it would not be expected that changes in salinity due to the closure of the storm surge barrier would have a significant long-term impact on the existing habitat quality of the bay.

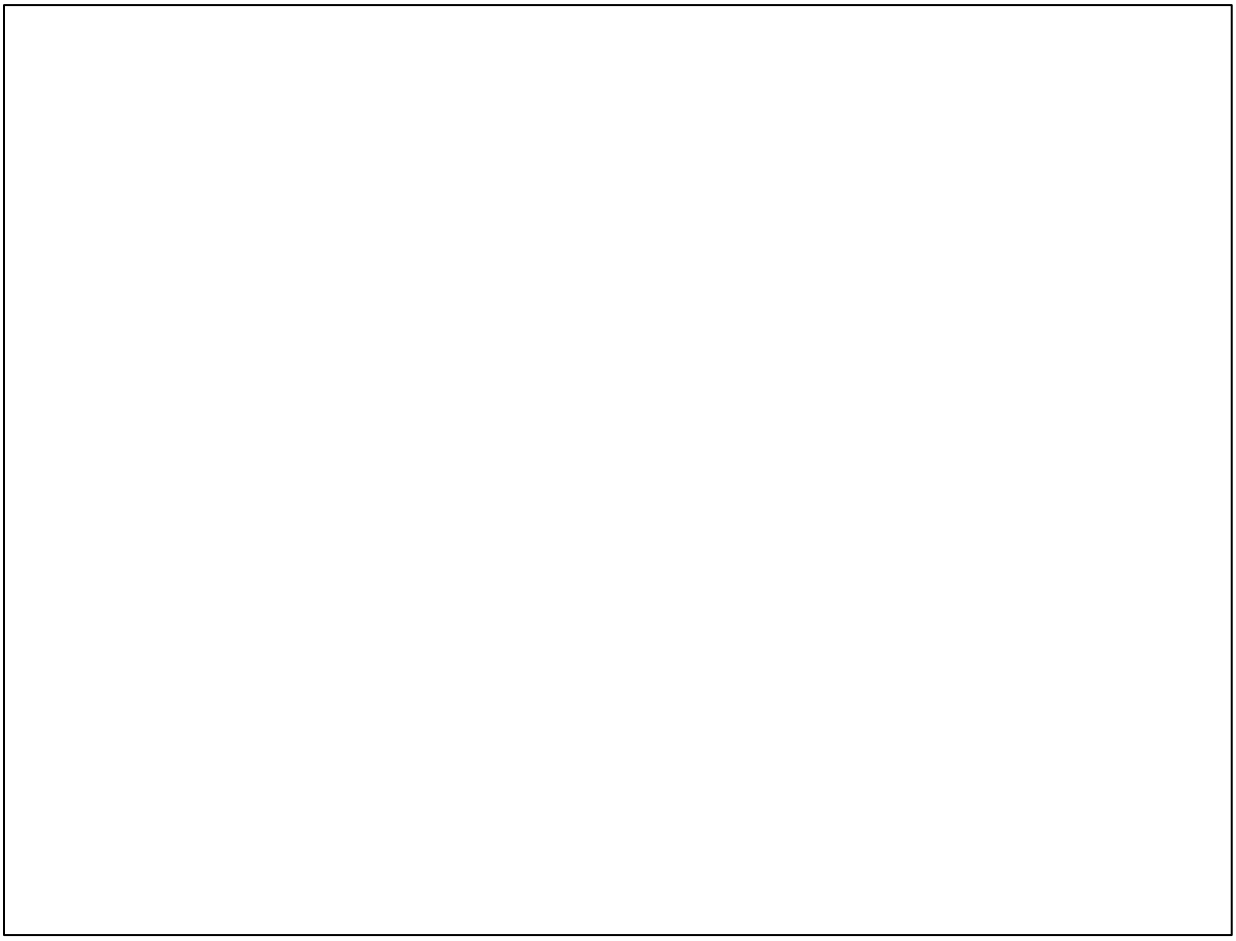


Figure 15. Comparison of Calculated Surface Salinity for the Eastern Barrier Open and 96 hour Eastern Barrier Closed, 1-in-25 Year Scenarios During and After Storm Surge Barrier Gate Closure.

Pathogens

In this analysis the gates were closed for a period in late-August for 48 to 96 hours. As shown in Figures 16 (barrier always open) and 17 (barrier closed for the 96 hour closure) for a location in the North Channel near Bergen Basin, both the fecal coliform and enterococci geometric means were below the existing water quality criteria for these pathogen indicators, i.e., attainment was met. Since the water quality criteria are based on 30-day geometric means, there is a limited response to the 30-day geometric mean concentration due to a perturbation that lasts two to four days as shown in Figures 16 or 17. Additionally, the die-off rate for bacteria is much faster than the flushing of the bay, so the consequences of closing the storm surge barrier has minimal impact on bacteria. The flushing time of Jamaica Bay is on the order of two to three weeks. Since at 20°C the model assumes a die-off rate of approximately 1.4/day, which includes natural die-off and salinity effects, only 24.7 percent of the bacteria discharged into the bay would remain after a single day due to die-off.

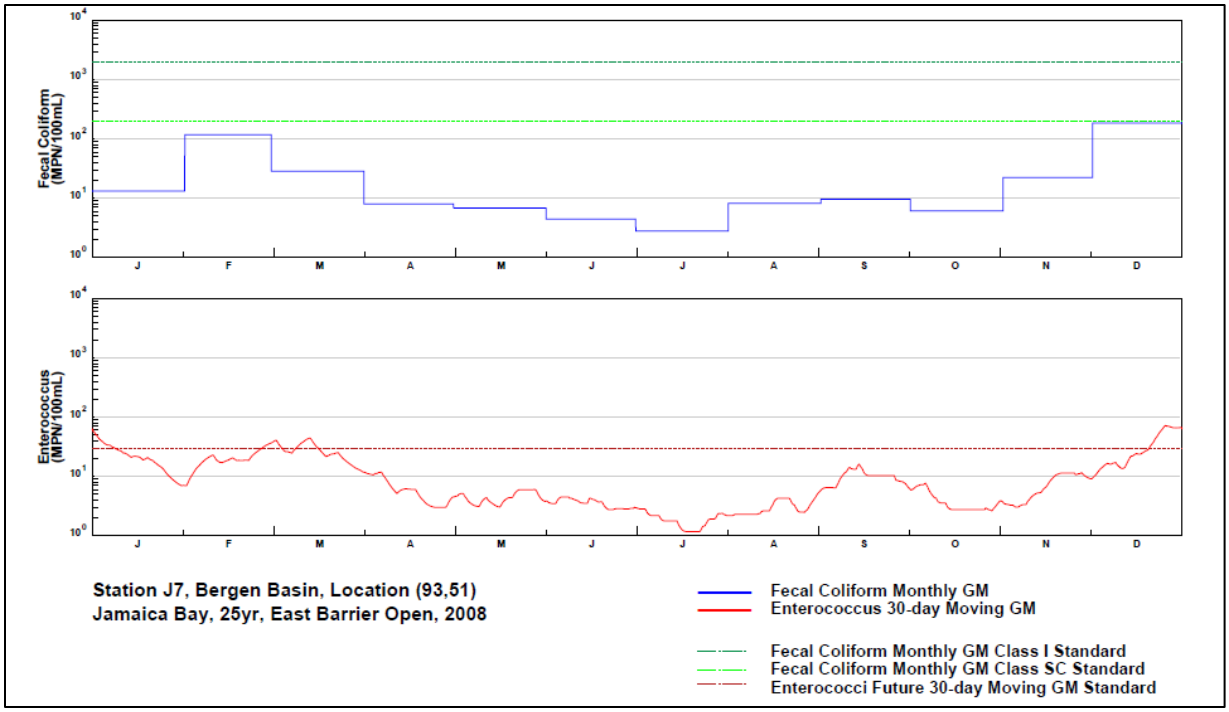


Figure 16. Comparison of Fecal Coliform and Enterococci Model Results Near the Mouth of Bergen Basin to Existing Water Quality Criteria for the Eastern Barrier Open, 1-in-25-year Scenario.

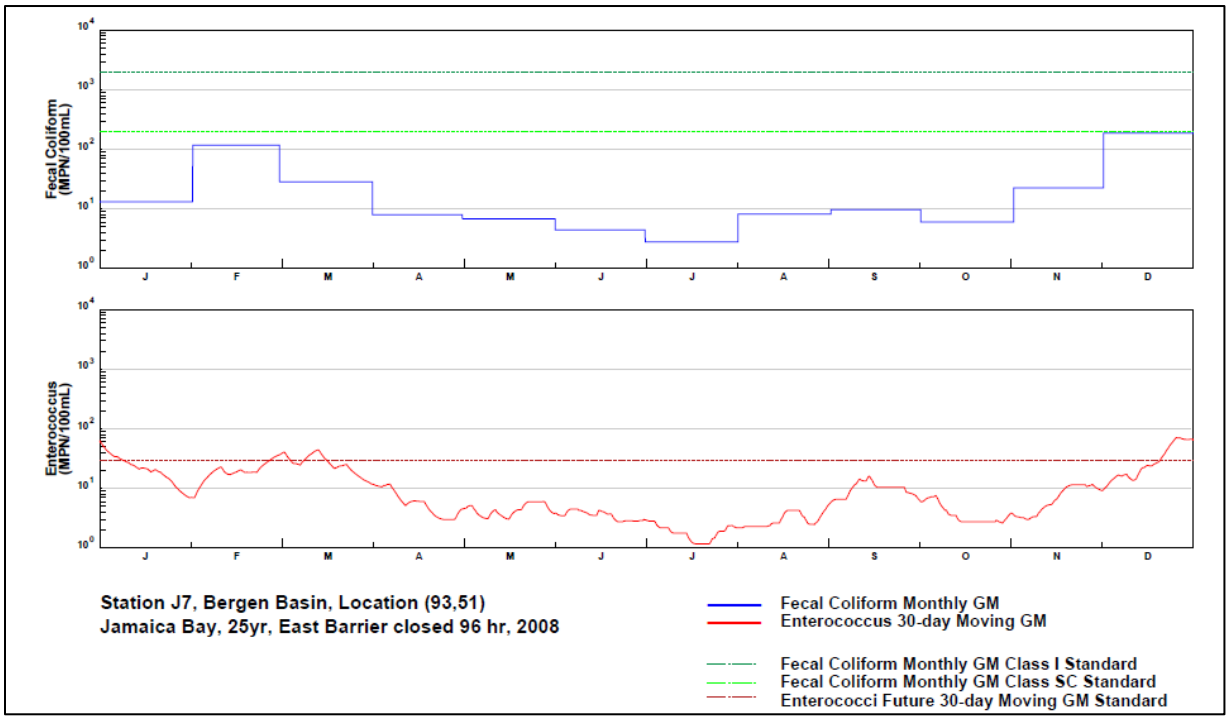


Figure 17. Time-Series of Fecal Coliform and Enterococci Model Results Near the Mouth of Bergen Basin to Existing Water Quality Criteria for the Eastern Barrier 96 hour Closure, 1-in-25-Year Scenario.

Figure 18 presents a spatial comparison of fecal coliform and enterococci attainment during the 30-day period when the western storm surge barrier is open and during the 96 hour closure for the 1-in-25 year event. The figure shows attainment of the criteria virtually everywhere (exceptions are the head of Bergen Basin and the head of Thurston Basin), and no difference between the two scenarios. Similar results were observed for the other scenarios. The analysis represents a period during late-August, when pathogen concentrations tend to be low due to high die-off rates that accompany higher water temperatures. There is, however, the potential for the storm surge barriers to contribute to non-attainment of the pathogen standards if the closure were to occur during a winter/spring nor'easter when water temperatures are cooler.

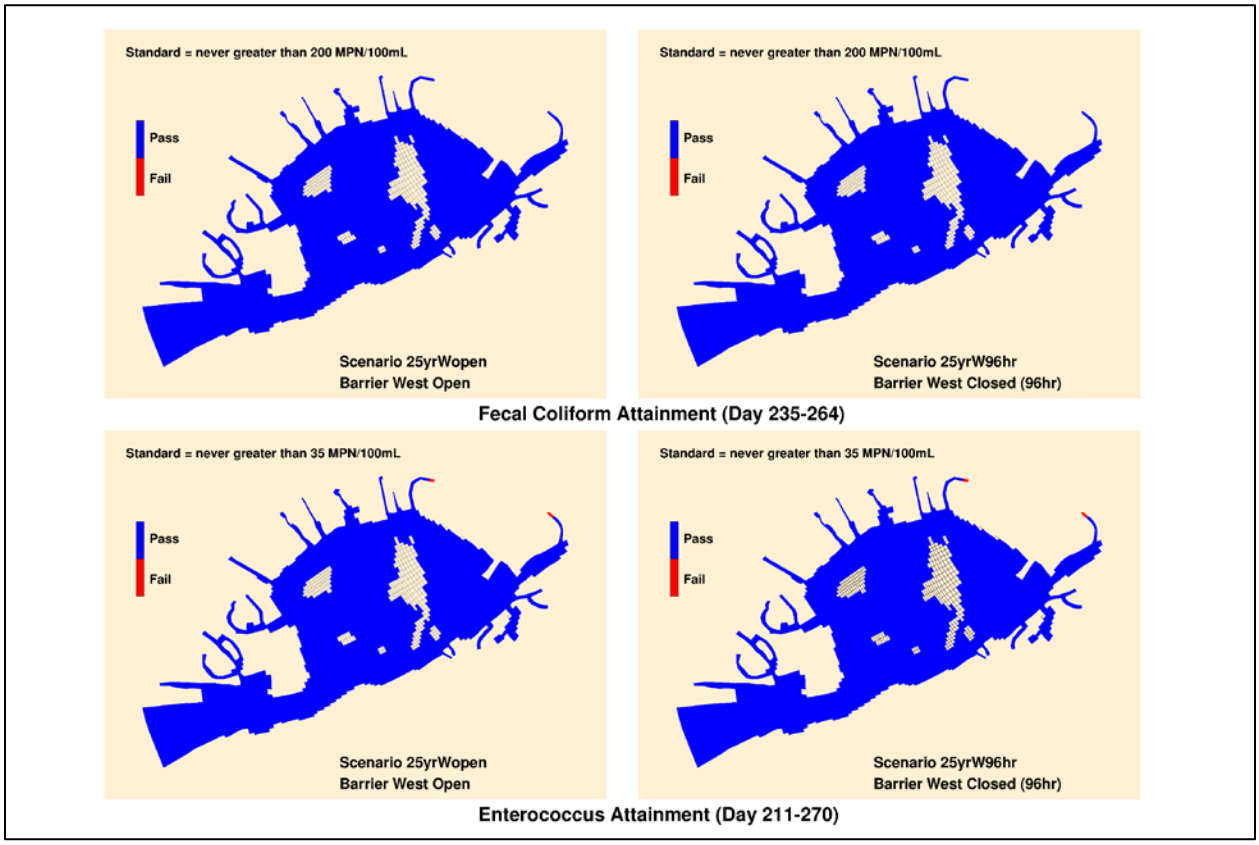


Figure 18. Comparison of Surface Fecal Coliform and Enterococci Model Calculated Attainment for the Western Barrier Open and 96 hour Western Barrier Closed, 1-in-25 Year Scenarios During the Period of Storm Surge Barrier Gate Closure.

Changes in pathogen levels between scenarios with storm surge gates open and closed are greater in the tributaries, which is where the pathogen sources originate. In the open waters of the bay the changes in the pathogen levels are relatively small. The changes in pathogen concentrations are not consistently higher or lower due to the impact of the tides in the open gate scenarios. Time-series Figures 19 through 21 present fecal coliform concentrations for the Barrier East, 1-in-25 year, open barrier and 96 hour closure scenario and the difference between these two scenarios at three locations in the bay (near the MTA railroad bridge trestle in Beach Channel, in the North Channel south of Bergen Basin and at the head of Paerdegat Basin). These time-series figures present surface, mid-depth and bottom fecal coliform concentrations for the period of a few days before the storm surge

gates are closed, the period when the gates are closed as delineated by the vertical lines, and a period after the gates are opened after the storm event.

As mentioned above, the biggest impacts on estimated pathogens occur in the tributaries. Figure 19 shows fecal coliform bacteria in the middle of Paerdegat Basin (a CSO tributary). During the storm event and for a period of about 24 hours after the rainfall ends, fecal coliform in mid-Paerdegat Basin are generally higher during the closure period as compared to the open barrier scenario. There are periods, however, wherein the mid-Paerdegat Basin fecal coliforms are lower during the closure period as compared to the open period. It depends on the point in the tidal cycle. However, the closure high differences are greater in magnitude than the closure low differences are. It is important to note that the maximum differences during closure are only about a factor of two when compared to the actual pathogen cell counts and that the differences between open barrier and closed barrier generally disappear within a few days after the tidal-barrier gates are re-opened. Figures 20 and 21, Harbor Survey Station J7 near Bergen Basin and Station J16, Horse Channel, in the center of the bay, show that the impacts of closure in the open waters of the Bay are much less than computed in the tributaries; maximum differences are less than 50 percent. In all cases, the impact of the storm surge barrier on pathogen concentrations quickly dissipates, so in the long-term impact of the storm surge barrier is minimal. In the case of pathogens, the storm surge gate closure time of 48 hours versus 96 hours is not that important because the die-off rate is much higher than the loss of pathogens due to tidal flushing.

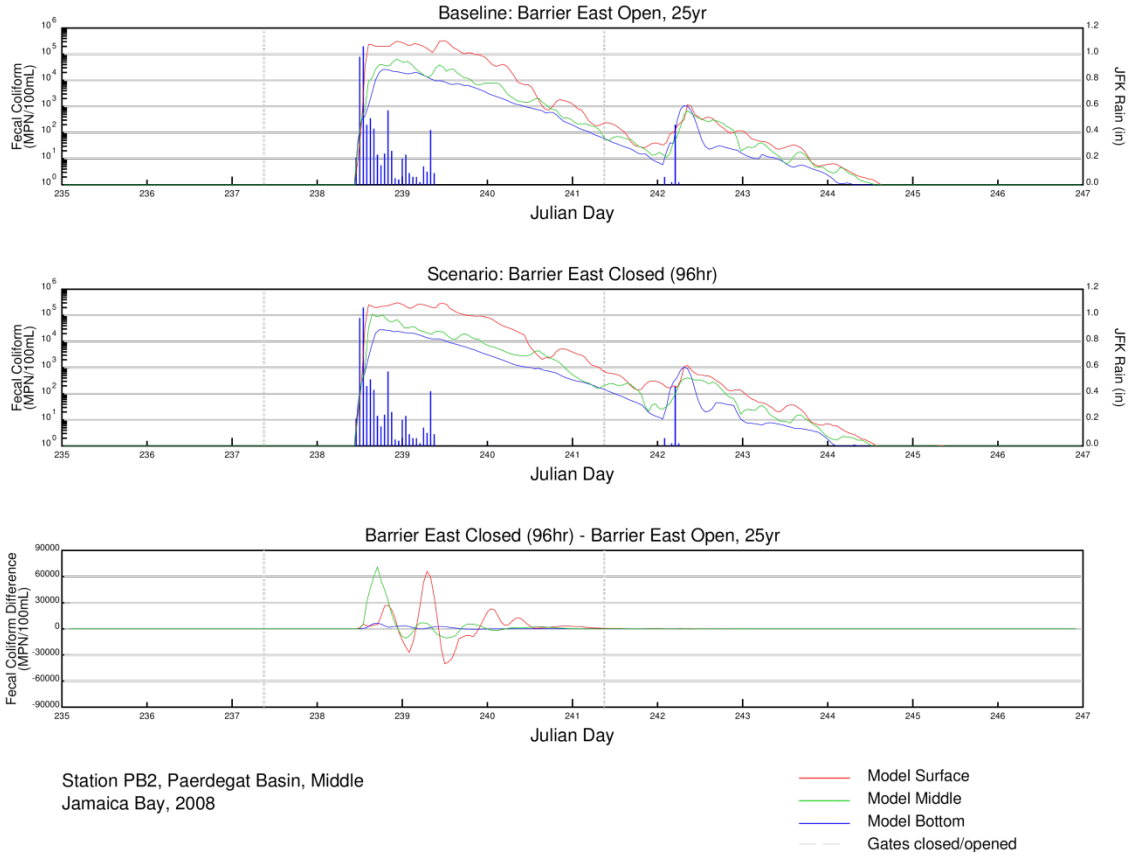


Figure 19. Computed Time-Series for Fecal Coliform in Mid-Paerdegat Basin for the 1-in-25 Year Storm Event with a 96 Hour Closure of the Eastern Storm Surge Barrier.

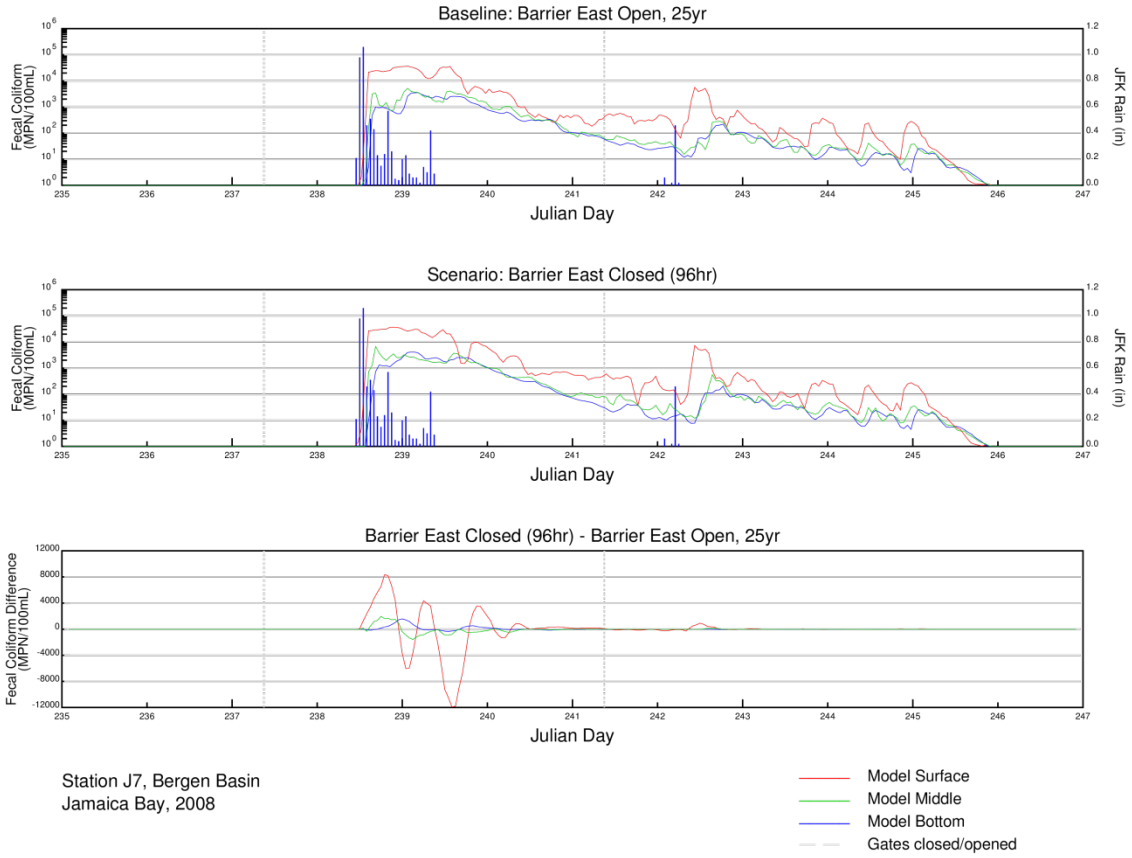


Figure 20. Computed Time-Series for Fecal Coliform at Harbor Survey Station J7 Near Bergen Basin for the 1-in-25 Year Storm Event with a 96 Hour Closure of the Eastern Storm Surge Barrier.

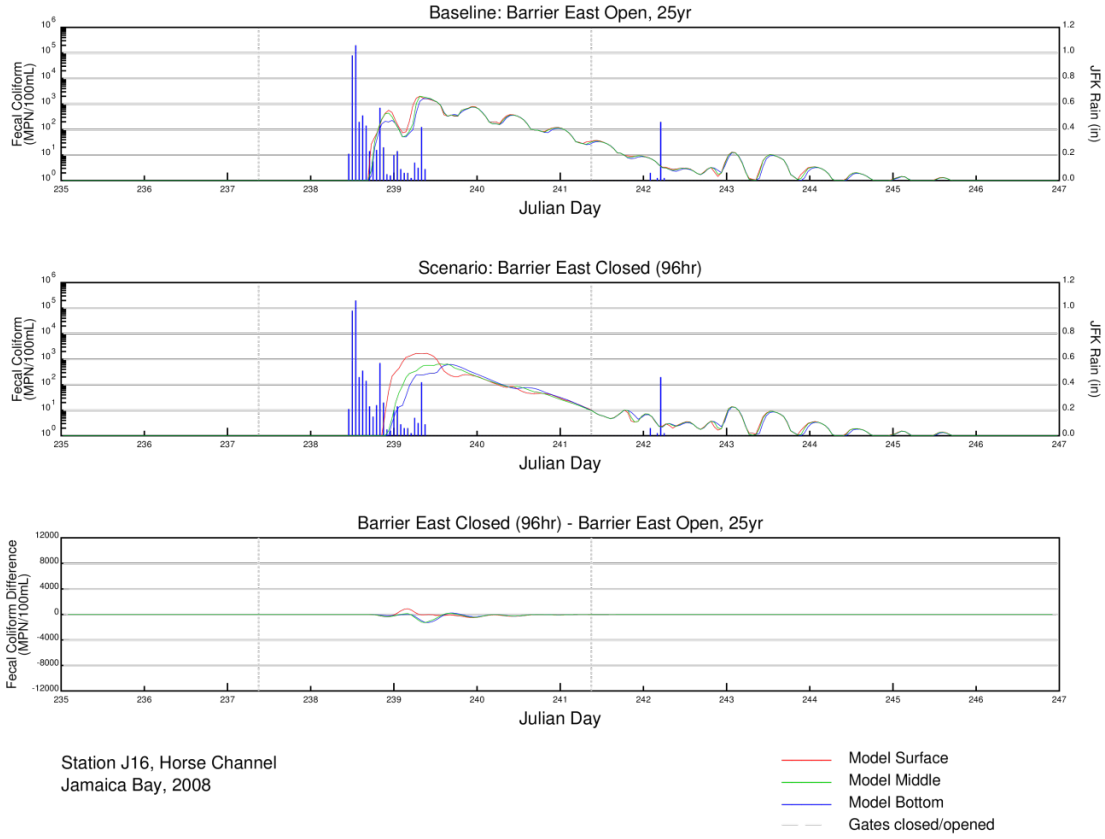


Figure 21. Computed Time-Series for Fecal Coliform at Harbor Survey Station J16 in Horse Channel for the 1-in-25 Year Storm Event with a 96 Hour Closure of the Eastern Storm Surge Barrier.

Nutrients

There are moderate impacts on nutrient concentrations as a consequence of the storm surge barrier gate closure. Figure 22 presents an example comparing the Eastern Barrier Open (left-hand panels) to the Eastern Barrier Closed for 96 hours (right-hand panels) during the 1-in-10 year storm event scenarios for surface dissolved NH_4 during the last day of the gate closure and on the third day after reopening the storm surge barrier gates. The middle panels show the differences between the scenarios. In general, there are calculated reductions in ammonium near the storm surge barrier, and there are small increases further away from the barrier. Most of the changes in the calculated nutrient concentrations are small in the various scenarios analyzed and once the gates are re-opened conditions quickly return to levels previously calculated before the gates were closed. Changes to the surface nutrient concentrations would be expected to have the greatest impact on phytoplankton growth as there is no light limitation for growth at the surface. While the surface nutrient concentrations would be expected to increase more due to the less dense freshwater discharge from WWTPs, the model calculates a greater increase of inorganic nutrients in the bottom layer of the model. This may be due to the release of dissolved ammonium from the sediment bed that results as bottom DO levels decrease in the bottom waters of the Bay and due to vertical stratification of the water column (as will be described below).

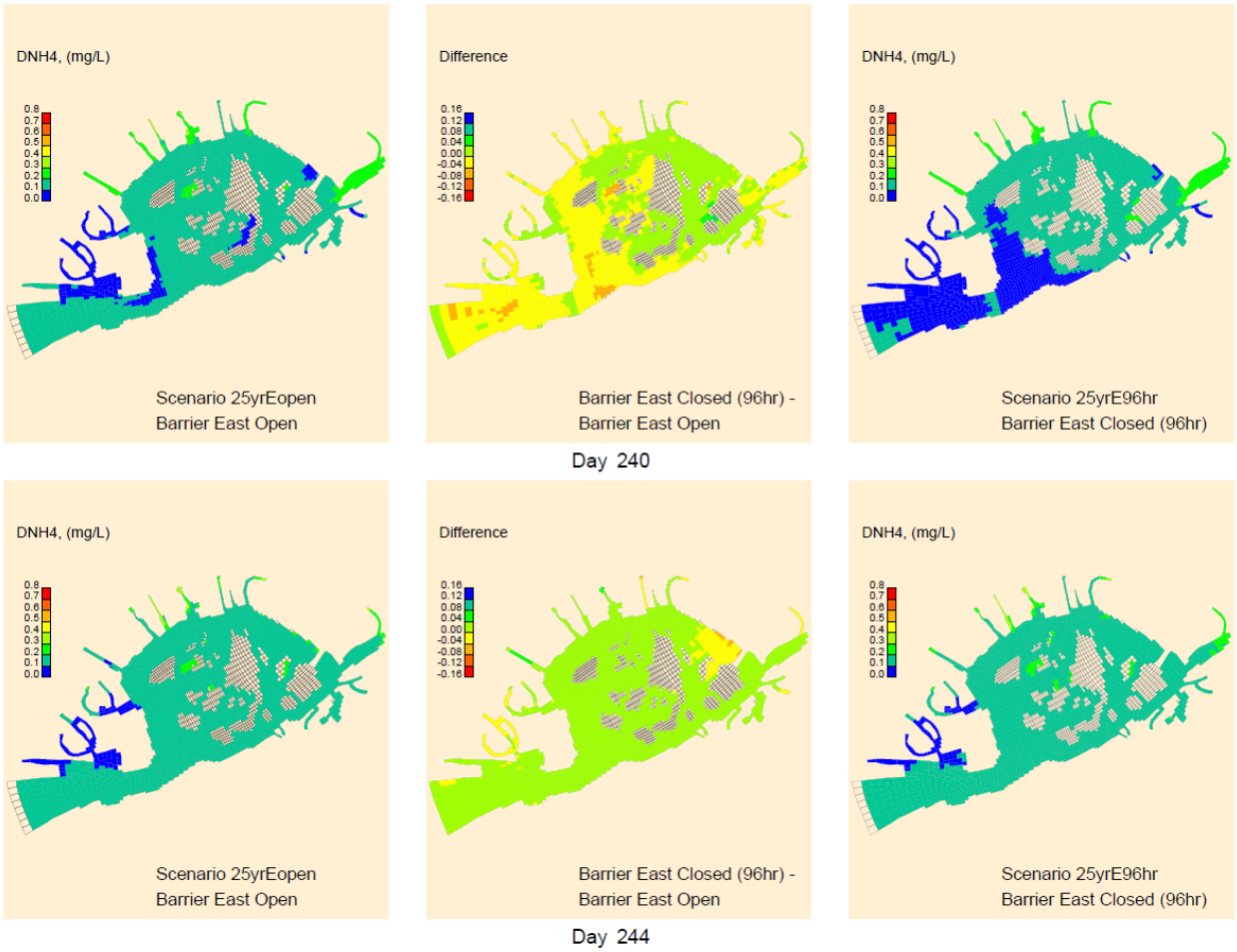


Figure 22. Comparison of Calculated Surface DNH4 for the Eastern Barrier Open and 96 hour Eastern Barrier Closed, 1-in-10 Year Scenarios During and After Storm Surge Barrier Gate Closure.

Times series of total nitrogen (TN) are shown in Figures 23 through 25 at Paerdegat Basin, near Bergen Basin and in the center of the bay, respectively. While TN increases in both the Barrier East Open and Barrier East Closed (96 hour), 1-in-25-year storm scenarios after the rainfall event, the TN continues to increase after the event with the storm surge gates closed, especially in the bottom layer. As will be discussed later, the bottom water DO concentrations decrease with time when the gates are closed. Low DO concentrations result in increased ammonia and phosphate fluxes from the sediment bed. This suggests that a 96 hour gate closure could have negative impacts on water quality and a shorter gate closure would be recommended as the higher TN concentrations are not observed in the first 48 hours of the gate closure. The time-series figures show that the high concentrations calculated just before the gates re-open dissipate rapidly after the opening of the gates, but slightly higher TN concentrations, relative to the open gate scenario,` linger for some time. As Jamaica Bay is generally not nutrient limited, the short period of elevated nutrient concentrations would not be expected to result in significant changes to phytoplankton growth.

Figure 23. Computed Time-Series for Total Nitrogen in Mid-Paerdegat Basin for the 1-in-25 Year Storm Event with a 96 Hour Closure of the Eastern Storm Surge Barrier.

Figure 24. Computed Time-Series for Total Nitrogen at Harbor Survey Station J7 Near Bergen Basin for the 1-in-25 Year Storm Event with a 96 Hour Closure of the Eastern Storm Surge Barrier.

Figure 25. Computed Time-Series for Total Nitrogen at Harbor Survey Station J16 in Horse Channel for the 1-in-25 Year Storm Event with a 96 Hour Closure of the Eastern Storm Surge Barrier.

Chlorophyll

Figure 26 presents a comparison of the Eastern Barrier Open (left-hand panels) and the 96 hour Eastern Barrier Closure (right-hand panels) 1-in-25-year scenario for chlorophyll during the third day of the gate closure and on the third day after reopening the storm surge barrier gates. As can be observed in the middle panels, there are small decreases in chlorophyll in the North Channel in the inner portion of the bay and small increases in chlorophyll in the near shore sections of Island Channel and just to the east of the barrier. Presumably, in the interior shallow portions of the bay the growth rate of phytoplankton is lower than the loss rate of the phytoplankton that are settling out of the water column. Within a few days after reopening the gates, the surface chlorophyll concentrations become quite similar, except for a portion of Grassy Bay. Times series for chlorophyll are presented in Figures 27 through 29 for Paerdegat Basin, near Bergen Basin, and in the center of the bay. The maximum changes in chlorophyll levels are on the order of 10-15 µg/L, and vary in magnitude likely due to tidal influences that are present in the open gate scenario, which are not present when the gates are closed. In other words, much of the difference appears to be related to the timing of the tides rather than actual changes in phytoplankton growth. As the increase in nutrients due to the gate closure is short lived, there is no subsequent algal bloom during the period after the gates are re-opened.

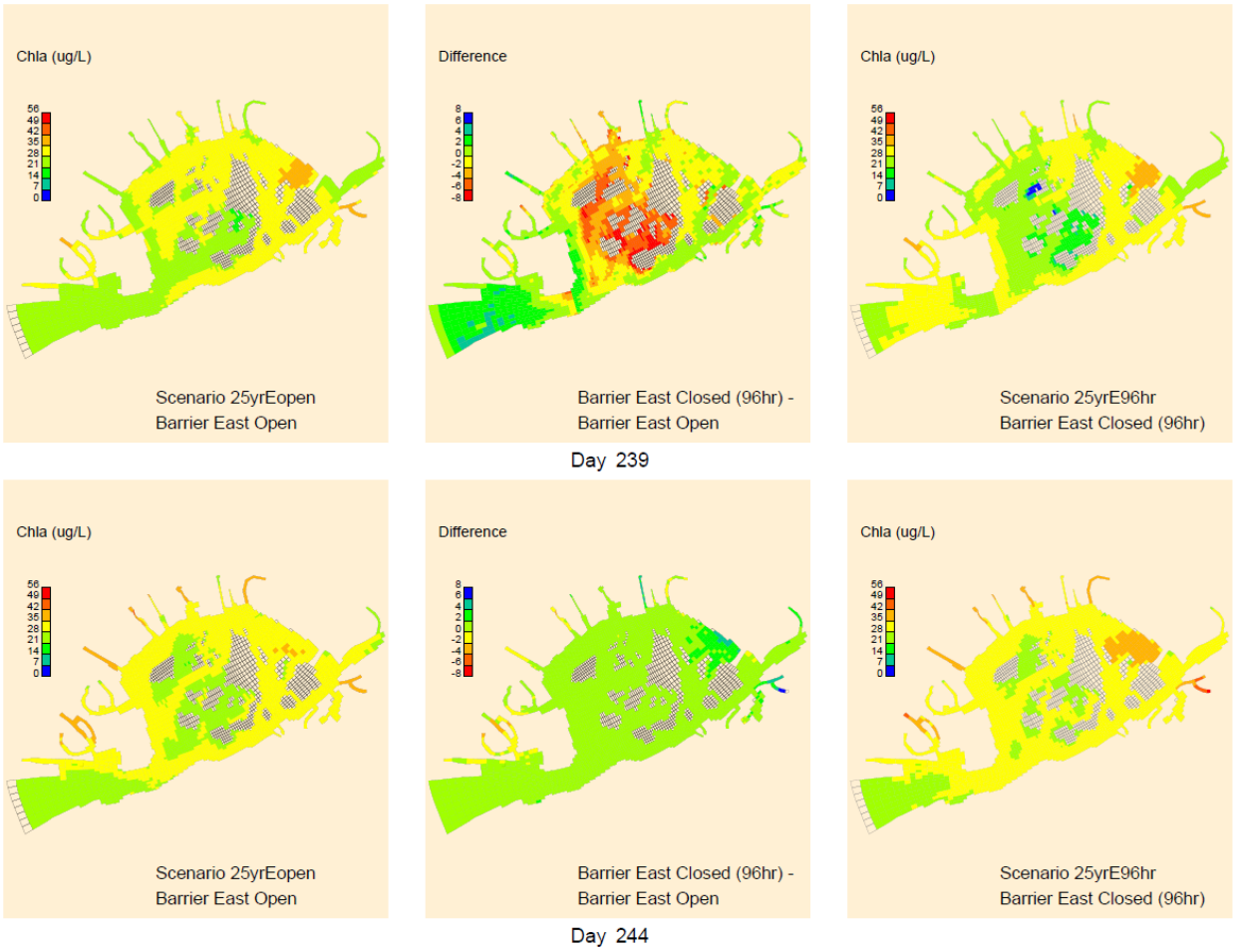


Figure 26. Comparison of Calculated Surface Chlorophyll for the Eastern Barrier Open and 96 hour Eastern Barrier Closed, 1-in-25 Year Scenarios During and After Storm Surge Barrier Gate Closure.

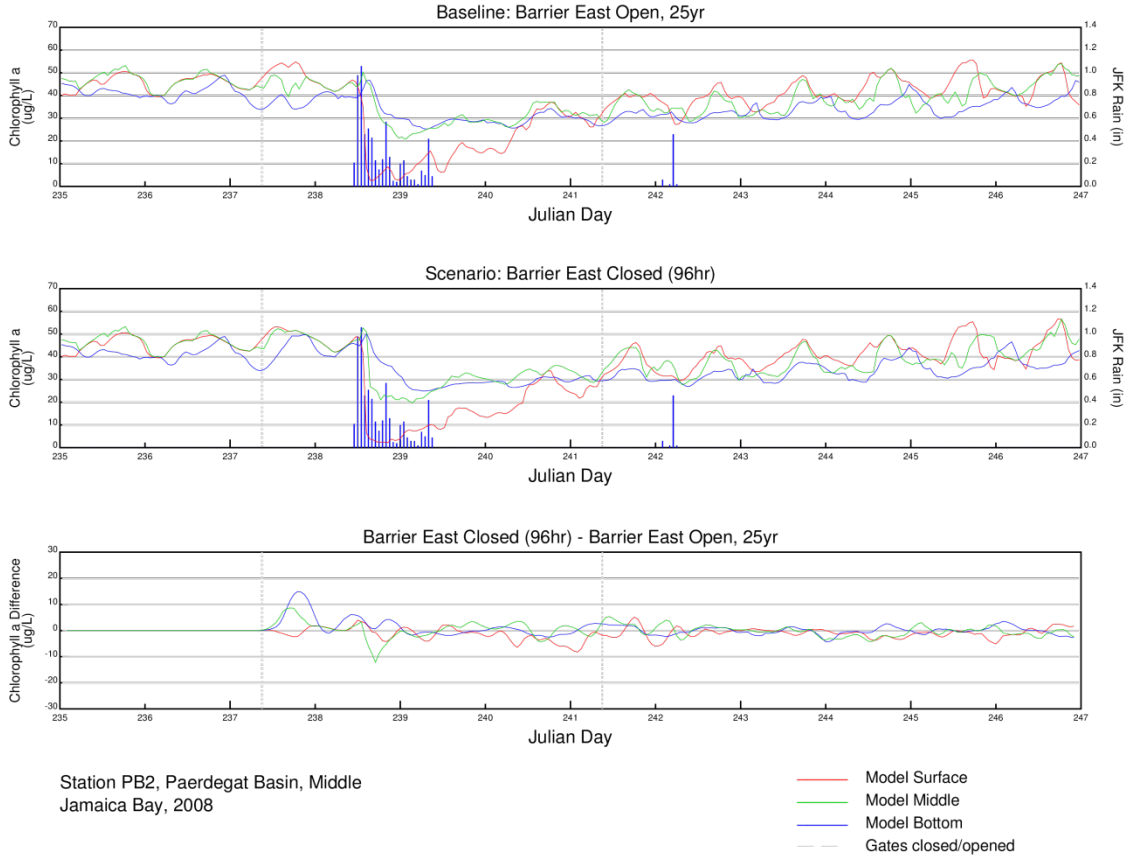


Figure 27. Computed Time-Series for Phytoplankton Chlorophyll in Mid-Paerdegat Basin for the 1-in-25 Year Storm Event with a 96 Hour Closure of the Eastern Storm Surge Barrier.

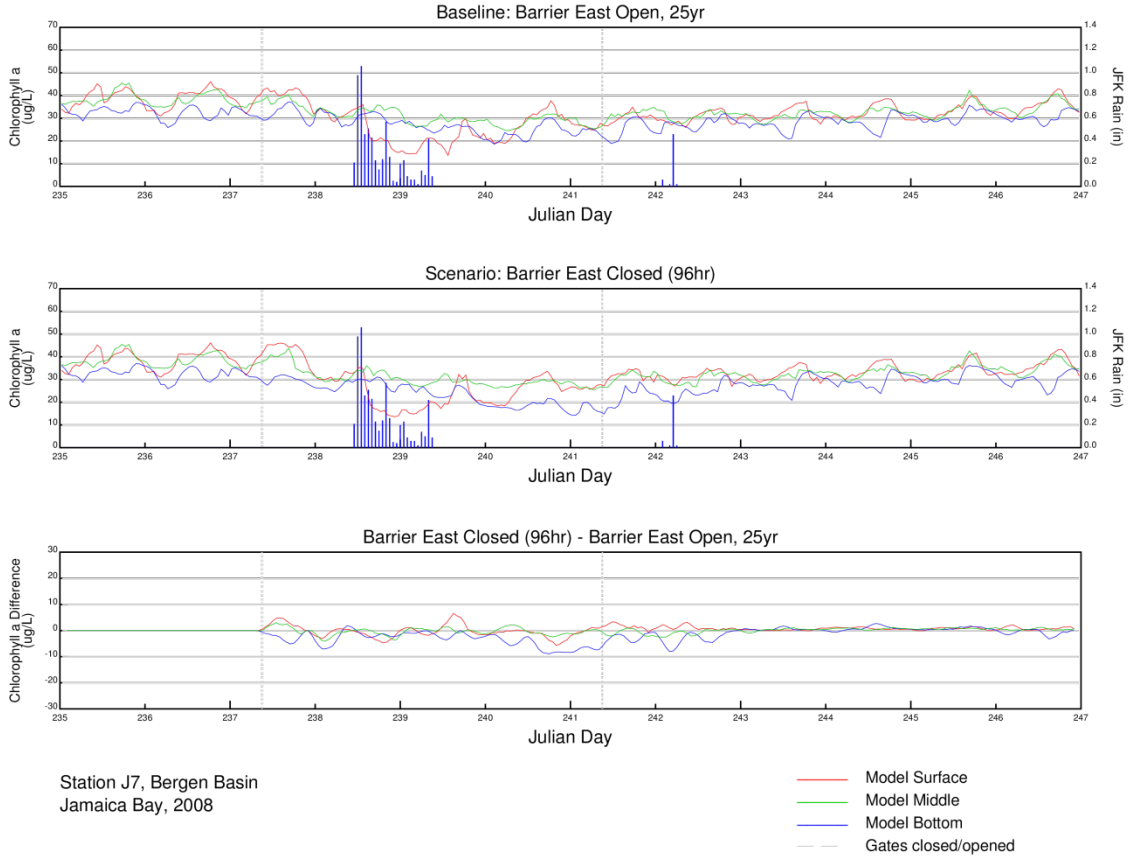


Figure 28. Computed Time-Series for Phytoplankton Chlorophyll at Harbor Survey Station J7 Near Bergen Basin for the 1-in-25 Year Storm Event with a 96 Hour Closure of the Eastern Storm Surge Barrier.

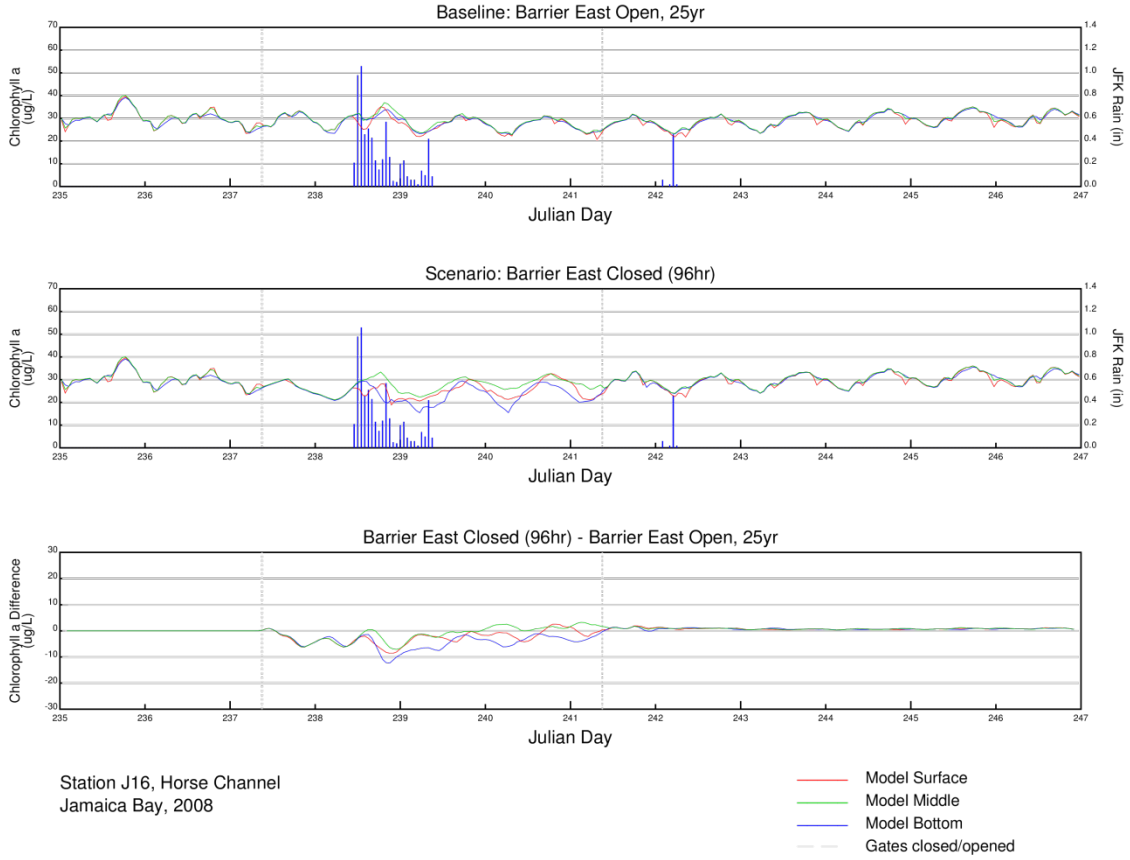


Figure 29. Computed Time-Series for Phytoplankton Chlorophyll at Harbor Survey Station J16 in Horse Channel for the 1-in-25 Year Storm Event with a 96 Hour Closure of the Eastern Storm Surge Barrier.

Dissolved Oxygen

DO is the one constituent that showed the greatest impact from the closure of the storm surge gates. With increasing time of gate closure the area where calculated DO concentrations were less than 3.0 mg/L increased significantly, although there was also a rapid recovery in DO concentrations once the gates were re-opened. Figure 30 presents the area of DO attainment for the chronic standard (daily average DO greater than 4.8 mg/L) and Figure 31 presents the attainment of the acute standard (DO never less than 3.0 mg/L) comparing the Eastern Gate Open scenario (left-hand panels) to the Eastern Gate Closed 48 hour scenario (right-hand panels), 1-in-25 year condition for the last day of gate closure (day 241) and a few days after the gate being re-opened (day 244). The middle panels presents the concentration differences between the two scenarios. Figures 32 and 33 show similar results but for the 96 hour, 1-in-25 year condition. Day 241 shows the maximum extent of standards violation that results from low DO concentrations and by day 244, three days after re-opening, the extent of bottom water DO non-attainment begins to show recovery.

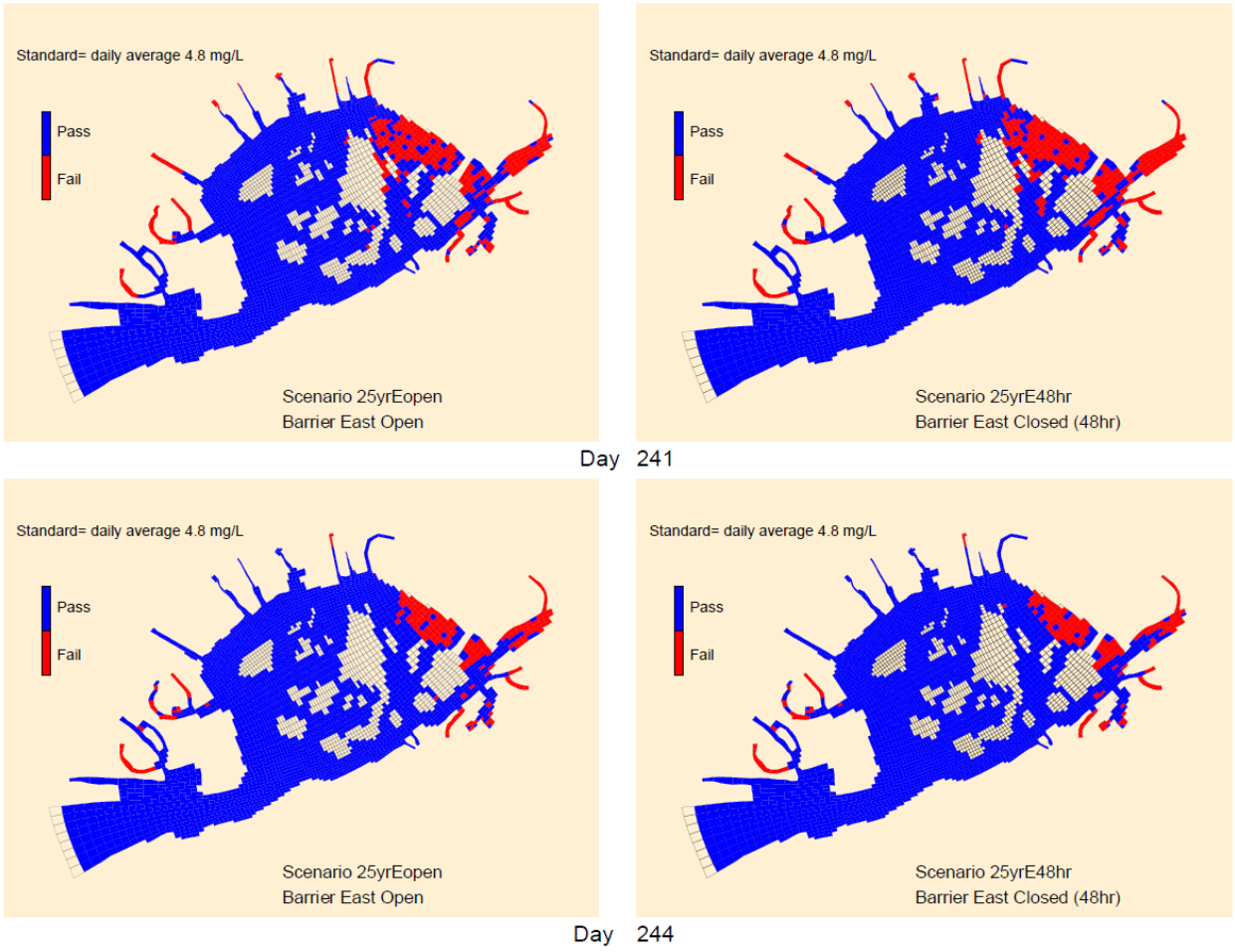


Figure 30. Comparison of Bottom Dissolved Oxygen Model Calculated Attainment of the Chronic Criterion for the Eastern Barrier Open and 48 hr Eastern Barrier Closed, 1-in-25 Year Scenarios.

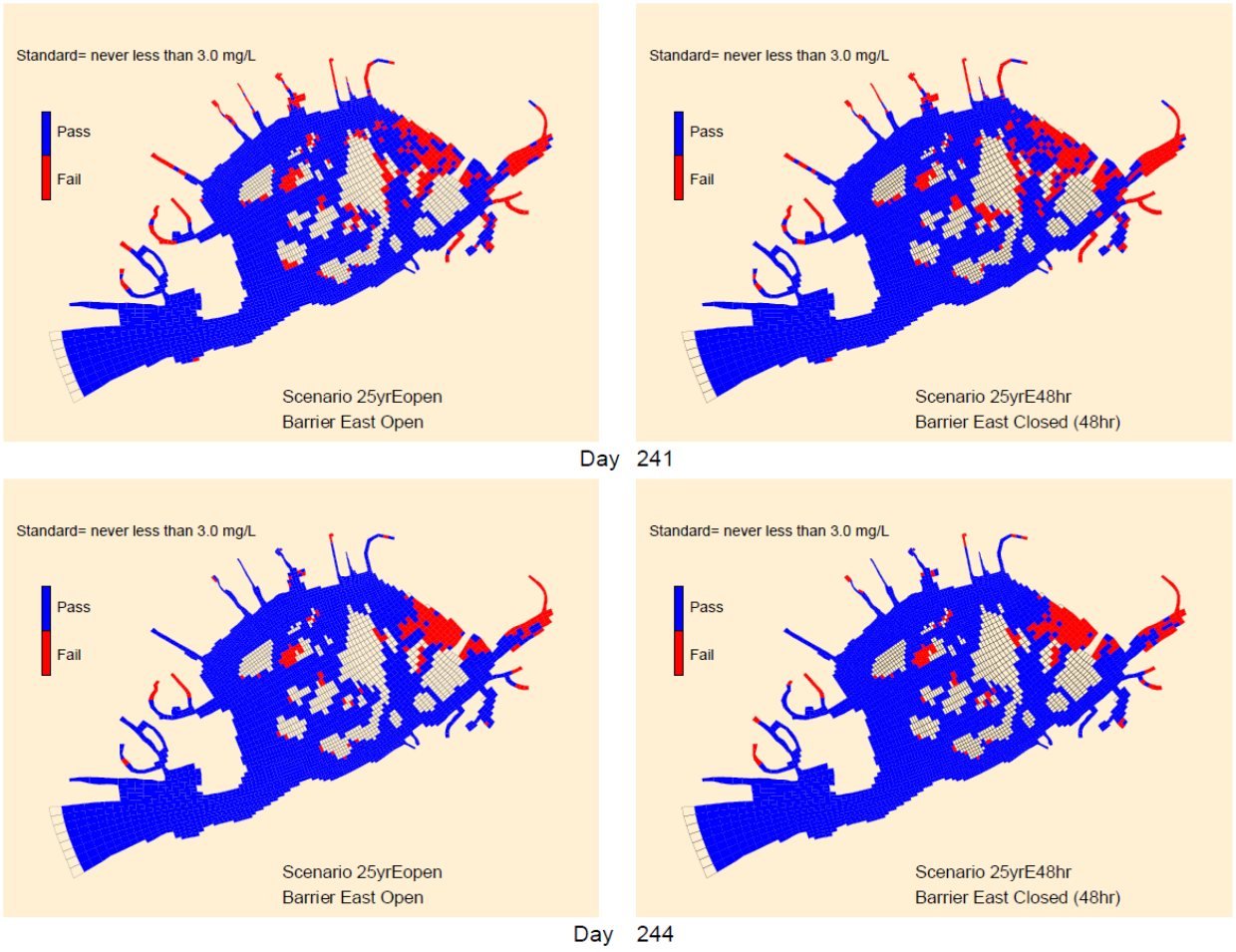


Figure 31. Comparison of Bottom Dissolved Oxygen Model Calculated Attainment of the Acute Criterion for the Eastern Barrier Open and 48 hr Eastern Barrier Closed, 1-in-25 Year Scenarios.

For the 48 hour gate closure conditions, the results for the chronic and acute criteria show minimal changes in the area of non-attainment of either standard when the gates are closed. Upon re-opening the spatial extent of non-attainment for both criteria are virtually the same. As shown in Figure 33, the spatial extent of non-attainment is much larger for the 96 hour closure. However, it is important to note, that the recovery of bottom DO attainment for both criteria is very rapid after the storm surge barrier gates are re-opened. It is also worth noting, that a 96 hour closure is probably not necessary and may be extremely conservative, if the barrier design were to include a back-up or alternative power source. Furthermore, both the 48 hour and 96 hour closure runs did not result in an increase in the surface water-air exchange (i.e., increased reaeration) and an increase in vertical mixing, which would increase the exchange of surface water oxygen with oxygen deficient bottom waters. Therefore, the results presented in Figures 32 and 33 represent a very conservative estimate or worst-case conditions. In addition, it is important to note that this evaluation of non-attainment is for the bottom-most layer of the water column and for the current JEM grid, this represents only the lower 3 percent of the water column depth.

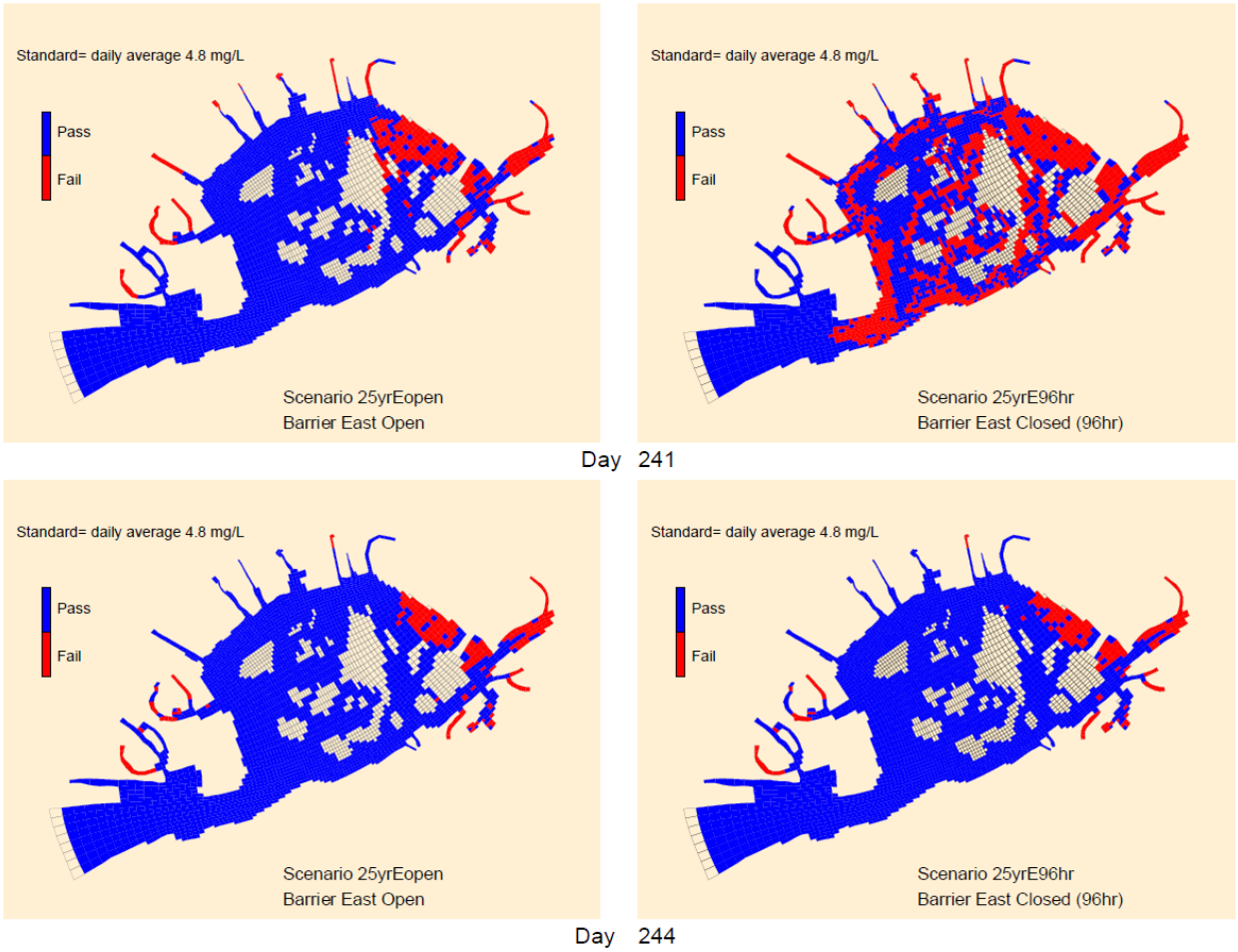


Figure 32. Comparison of Bottom Dissolved Oxygen Model Calculated Attainment of the Chronic Criterion for the Eastern Barrier Open and 96 hour Eastern Barrier Closed, 1-in-25 Year Scenarios.

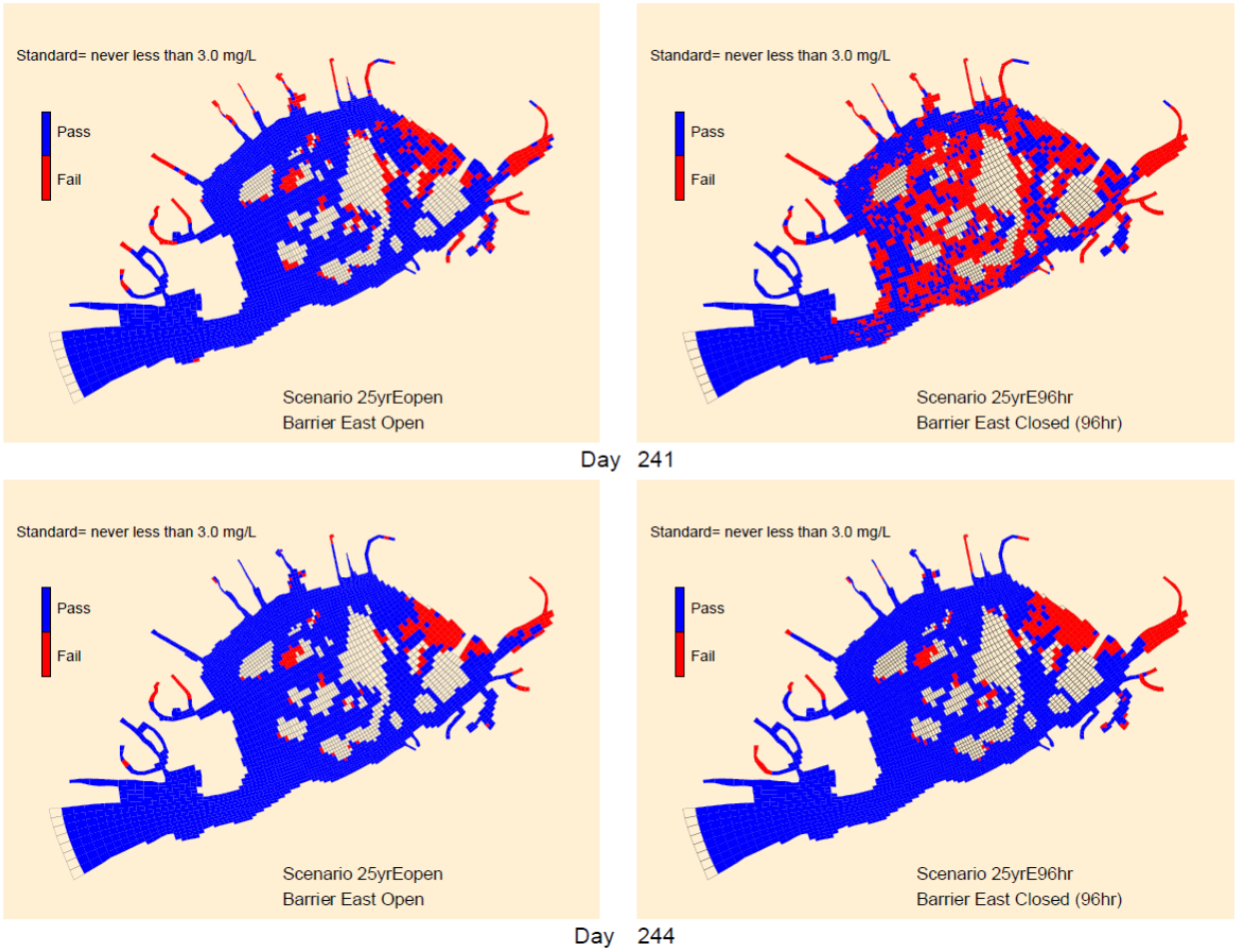


Figure 33. Comparison Of Bottom Dissolved Oxygen Model Calculated Attainment of the Acute Criterion for the Eastern Barrier Open and 96 hour Eastern Barrier Closed, 1-in-25 Year Scenarios.

Figure 34 presents a spatial plot of acute DO attainment for the 1-in-25 year, 96 hour closure for the Eastern storm surge barrier as a function of total water column depth. In this plot, attainment of the acute standard is evaluated in each vertical layer of the water column (for JEM the water column is divided into 10 depth layers). The plot shows the number of vertical layers in attainment. As can be seen, on day 241 of the 96 hour closure scenario, the model indicates that, in most of the bay, 9 or 10 layers of the water column are in attainment. In the case where 9 layers are in attainment it implies that only the bottom layer (i.e., the lower 3 percent of the water column) is in non-attainment. There are, however, several model grid cells, in the shallower interior sections of the bay, where up to 4 layers, corresponding to the bottom 25% of the water column, are not in attainment. Day 244 begins to show the fairly rapid response of the Bay's water coming back into attainment once the gates are re-opened. The recovery response is, however, somewhat delayed in Thurston Basin.

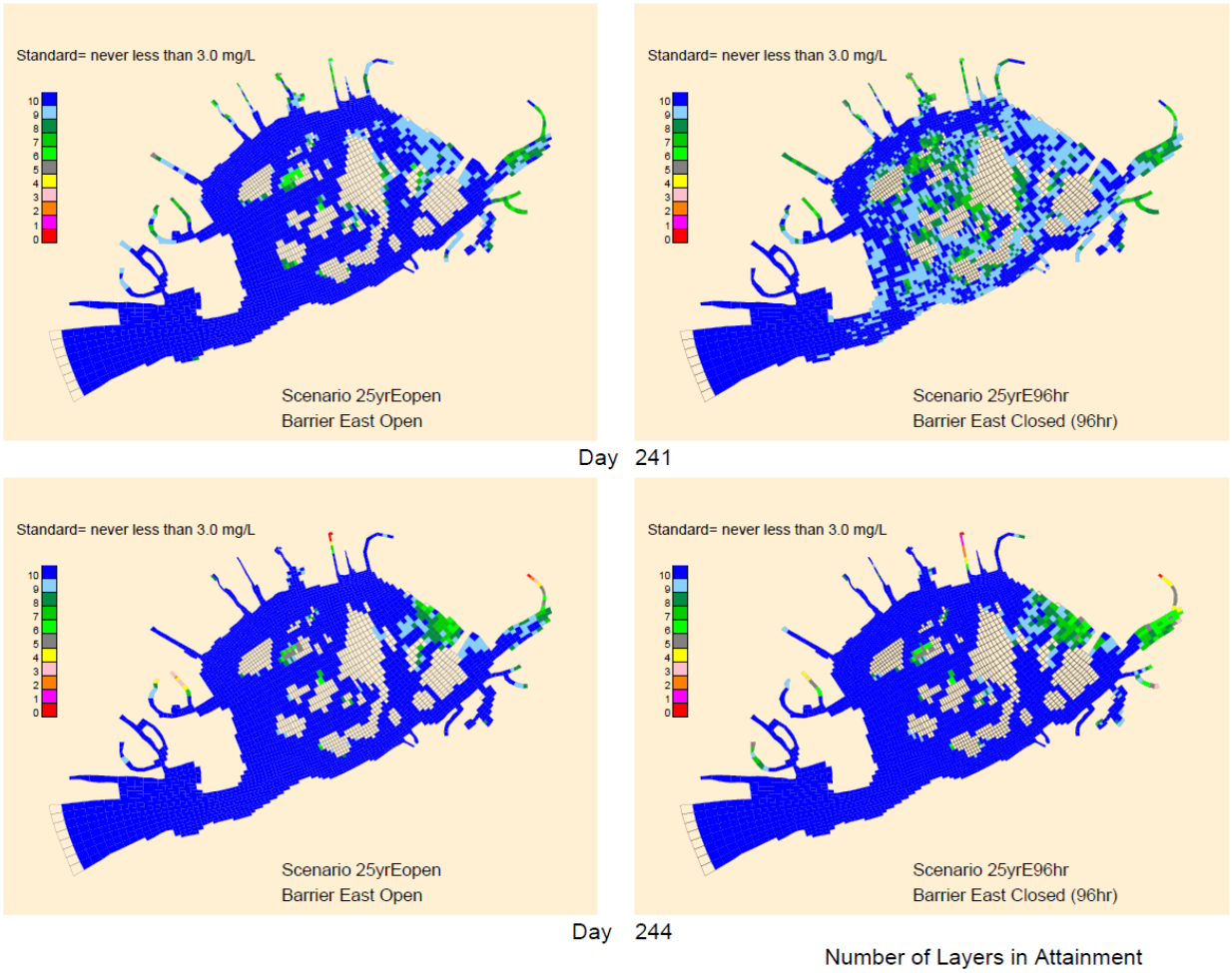


Figure 34. Comparison of Dissolved Oxygen Model Calculated Attainment of the Acute Criterion for the Entire Water Column for the Eastern Barrier Open and 96 hour Eastern Barrier Closed, 1-in-25 Year Scenarios

The processes that affect bottom water DO are influenced by a number of factors, including horizontal water movement due to tides, vertical stratification, bottom water algal respiration and sediment oxygen demand (SOD). The closure of the gates and the freshwater entering the Bay, as a result of the storm event, exert some degree of influence each of these factors. With the gates closed horizontal water movement is greatly reduced and this in turn acts to reduce vertical mixing, since tidal velocities influence vertical shear stresses which influences vertical mixing. Freshwater entering the Bay, due to the storm event, tends to remain on the surface of the water column and tends to increase vertical stratification and reduce vertical mixing. Reductions in vertical mixing tend to exacerbate the influence of bottom water algal respiration and SOD in lowering bottom water DO. Once the gates are re-opened and freshwater inputs decline, vertical mixing tends to increase and enhances the transfer of surface rich oxygenated waters to the bottom waters deficient in DO. Time-series figures illustrating the processes are presented in Figures 35 through 37 for a few model cells in the Bay. These figures show computed vertical mixing coefficients between layers 1 and 2 (surface) and layers 9 and 10 (bottom) of the water column. Minimum vertical mixing is molecular mixing (10^{-6} m^2/sec), while high vertical mixing is on the order of 10^{-3} to 10^{-2} m^2/sec. Also shown on these plots are time-series plots of salinity for a number of layers in the water column to help visualize the vertical stratification. Finally,

time-series plots of surface, mid-depth, and bottom DO are presented to illustrate that the low DO concentrations are mainly limited to the bottom waters of the Bay.

Figure 35 presents the time-series results for a model cell located in Island Channel, just west of Ruffle Bay. Before gate closure and just before the rainfall event both surface and bottom water mixing is fairly high, although the mixing in the surface layer is highly variable. After the precipitation event, the surface and bottom water mixing coefficients decrease to near molecular levels. Approximately 24 hours after the rainfall ends, the surface mixing increases to near pre-closure, pre-storm levels; however, the bottom layer mixing remains at or near molecular levels (i.e., no mixing). Vertical mixing increases immediately after the gates are re-opened and tidal action begins. As can be seen in the salinity time-series, a vertical gradient develops through the course of the storm event and there is a strong vertical gradient in salinity, which begins to attenuate after the gates are re-opened. Finally, water column DO is fairly uniform throughout the water column before gate closure, but begins to stratify slightly immediately after closure. The bottom water DO declines more significantly and more rapidly after the rainfall event when vertical mixing, and in particular. in the bottom layers of the water column decreases to molecular values. Once the gates are re-opened and vertical mixing increases in all levels of the water column, the vertical gradient in DO dissipates and bottom water DO concentrations rapidly increase.

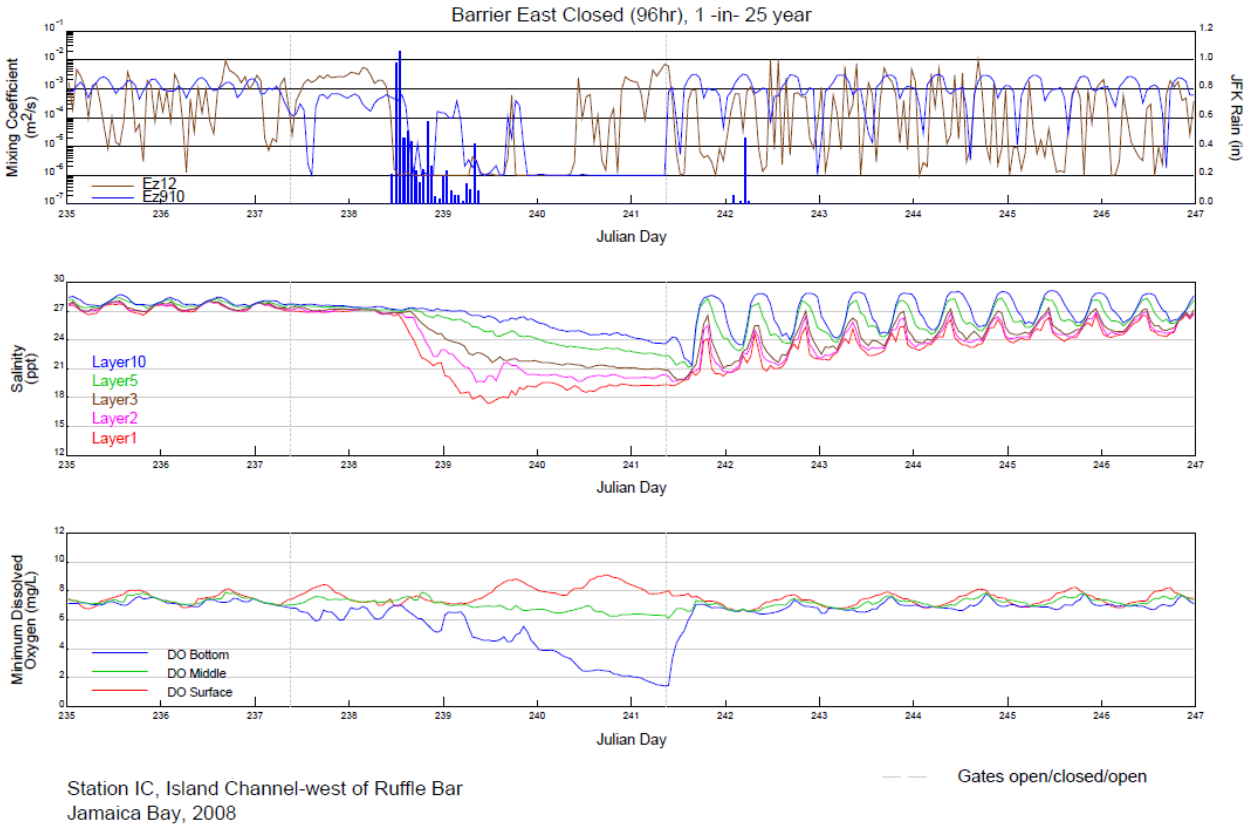


Figure 35. Time-Series Results for Island Channel, West of Ruffle Bar, for the 1-in-25 Year, Eastern Barrier 96 Hour Closure Scenario.

A similar pattern of behavior can also be observed for a model cell located in Big Fishkill Channel, northwest of Ruffle Bar (Figure 36). With the closure of the gates, the bottom water mixing coefficient declines for a short period of time, which leads to the beginning of the decline in bottom water DO. The decline in vertical mixing is more pronounced after the rainfall event, which in turn results in a vertical gradient in salinity and a rapid decline in bottom water DO. One the gates are re-opened vertical mixing increases and the vertical gradients in salinity and DO disappear and bottom DO quickly recovers to levels greater than 5 mg/L.

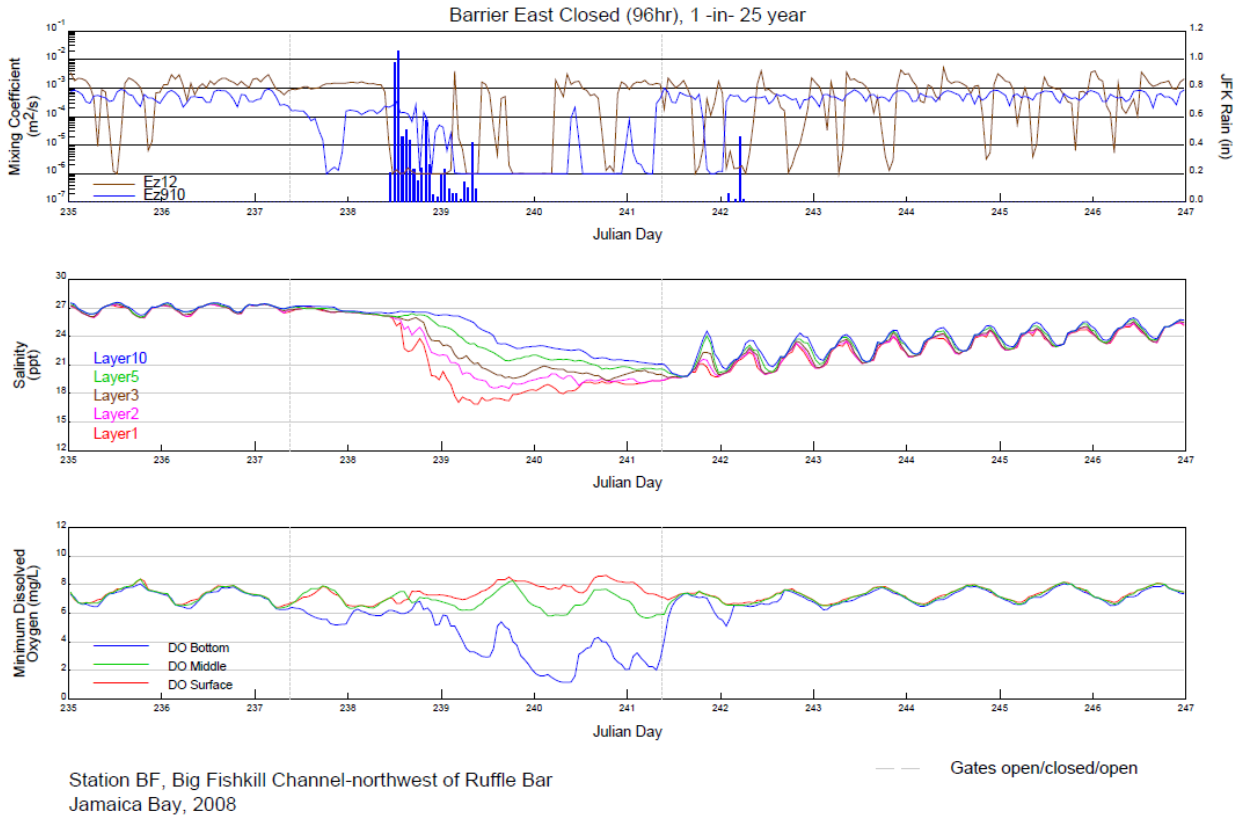


Figure 36. Time-Series Results for Big Fishkill Channel, Northwest of Ruffle Bar, for the 1-in-25 Year, Eastern Barrier 96 Hour Closure Scenario.

Figure 37 presents time-series results for a model cell located in Grassy Bay. While the results are somewhat similar in behavior as observed in Figures 30 and 31, there are some differences. In particular, vertical mixing between the bottom two layers of the water column are already low for some period of time before gate closure. This, in part, explains why the bottom water DO in this cell is already lower than the surface and mid-depth values. With the gate closure and the freshwater associated with the rainfall event, both surface and bottom mixing are significantly reduced and there is an increase in salinity stratification and bottom water DO declines, but at a slower rate than shown for the bottom layers in Island Channel and Big Fishkill Channel. This may result since the Grassy Bay segment is deeper than the other two cells and, therefore, the effects of bottom SOD take longer to exert on a greater depth of water. Also the decline in bottom water DO continues for a period of time, about 2-3 days, after the gates are re-opened. This, in part, may be due to vertical mixing between the bottom layers of the model taking longer to return to pre-closure levels, and perhaps in part due to a greater volume of low DO that needs to be re-oxygenated in the Grassy Bay area.

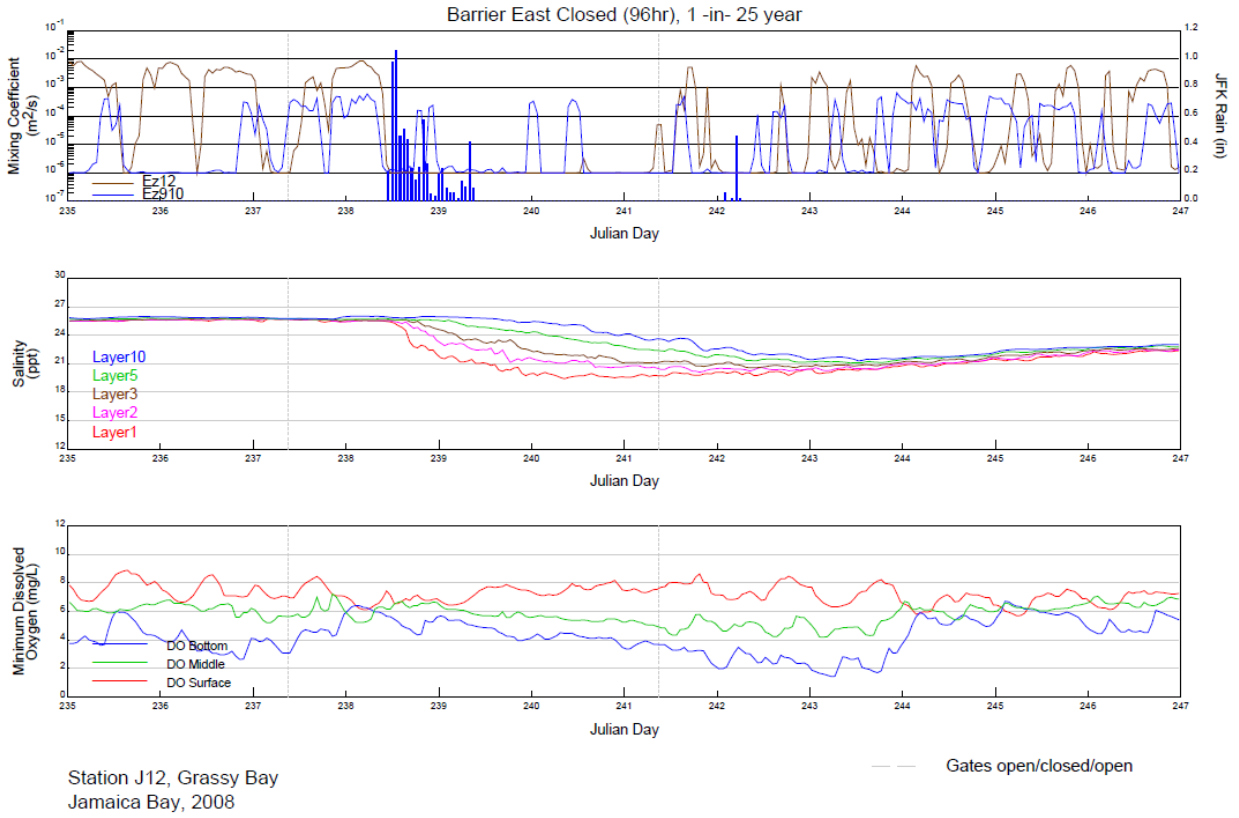


Figure 37. Time-Series Results for Grassy Bay, for the 1-in-25 Year, Eastern Barrier 96 Hour Closure Scenario.

DISCUSSION AND CONCLUSIONS

Modeling was conducted to assess 14 scenarios related to the possible construction of storm surge barriers across the Rockaway Inlet to protect portions of Brooklyn and Queens against flooding during storm surges. The analysis included comparisons of Baseline (i.e., current conditions – no barrier) versus the East and West Barrier options, under different operating conditions, always open versus period of the tidal gates being closed and comparisons of both long-term and short-term effects. For the Baseline versus storm surge barrier gates always open, the long-term effects computed by the model showed a slight reduction in the tidal range within the bay. Changes to salinity, pathogens, nutrients, chlorophyll, and DO concentrations were generally very small. However, the changes were more pronounced over shorter time periods, such as a day. The biggest changes, based on a daily timeframe, were observed in bottom water DO and were generally restricted to Grassy Bay and channels located between the marsh islands in the center of the Bay. It should be noted, though, that the bottom water DO in the channels in the mid-Bay region remained at levels that would not be expected to impact aquatic life. However, the decreases in bottom water DO in Grassy Bay resulting from the construction of the barriers would likely cause additional stresses on aquatic life that might occupy the bottom waters of Grassy Bay.

Short term impacts, introduced by storm surge barrier gate closures, on most water quality parameters considered in the analyses (pathogenic bacteria, salinity, total nitrogen and ammonium nitrogen) were generally small and short lived and would not be expected to adversely affect aquatic life within the Bay. However, short-term impacts of closing the storm surge barrier gates were calculated to have a potentially greater impact on aquatic habitat, especially as related to DO concentrations. Model results indicate that the 96 hour closure results in lower levels of DO and higher levels of non-attainment for the chronic and acute DO criteria than are computed non-closure or for a 48 hour closure, particularly in the bottom waters. Concentrations of bottom water DO are reduced to between 1.7 and 2.0 mg/L in the open waters of the Bay for the 1-in-25 year storm event for a 96 hour closure. This represents a reduction of between 0.5 and up to 4 mg/L at worst relative to baseline conditions. It is important to note, however, that the JEM consists of 10 vertical layers and the non-attainment is typically limited to the bottom one or two layers of the water column, which represent between 3 and 8 percent of the total vertical water column. Reductions in DO in other portions of the water column are much less severe, on the order of a few tenths of a mg/L on average and resulting levels are capable of sustaining aquatic life. In order to minimize the impact of gate closures on DO concentrations it is recommended to minimize the time the storm surge barrier gates are closed. While mobile aquatic life could potentially escape the low DO concentrations by migrating to the upper levels of the water column where DO concentrations are adequate to support life, benthic organisms would not be able to do so and would be more susceptible to DO stress and potential increases in mortality.

It should be noted that this modeling analysis should be considered a screening level analysis, and additional modeling should be conducted should the decision be made to move forward with this project. Currently, the model segmentation is not fine enough to match the size of the gates in the storm surge barriers, although it is believed that this is not a significant detriment in the current analysis. Additionally, the effect of wind and/or sediment resuspension was not considered. These factors can potentially impact dissolved oxygen, via increasing air-water reaeration and vertical mixing, and chlorophyll concentrations by potentially reducing water column clarity.

Consequently, additional model refinement, modeling and analysis should be conducted by the USACE prior to the Final HSGRR/EIS and/or prior to design of the storm surge barrier; to better quantify and conclusively address any possible impacts from construction and operation of a storm surge barrier on water quality and fish & wildlife species and their habitats in the Bay.

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APPENDIX A

RESPONSE TO COMMENTS RECEIVED FROM NYSDOS

NY Department of State Comments on Water Quality Modeling for
Rockaway and Jamaica Bay Reformulation Study Draft Hurricane Sandy General Reevaluation Report and Environmental Impact Statement (HSGRR/EIS)
Last updated on October 25, 2017

As a follow-up to the official comments on the HSGRR/EIS, the U.S. Army Corps of Engineers (USACE or Corps) requested additional detail from the commenting agencies (NYSDEC, NYSDOS, and NYC Planning in NYSDEC letter, dated December 14, 2016). Additional detail was requested regarding the water quality modelling objectives that New York State envision and which data they would like to see developed for better understanding in addressing impacts to Jamaica Bay from the presence and operation of a surge barrier component. The following comments were prepared by the New York Department of State (DOS) to help clarify the remaining concerns and data/impact questions on how a proposed storm surge barrier at the entrance to Jamaica Bay could impact water quality in the bay. The modelers who conducted the Jamaica Bay Eutrophic Model (JEM), which was used to analyze impacts in the Draft HSGRR/EIS to water quality for Jamaica Bay, has provided input to the following responses to address DOS comments. Additionally, the memorandum describing the modeling has been edited to add more detail and better address the issues raised in the below comments.

DOS comments on the JEM modeling with responses from USACE:

1. DOS Comment: *All water quality modelling should compare data across the three barrier alignments* as presented in the Alternatives Milestone dated November, 2014. The JEM model at present includes an eastern and a western barrier option, which appear to correspond to the alignments originally presented as barrier alignments numbers 1 and 2. However, the westernmost option, alignment 3, was dropped from further consideration on a cost basis. We see justification for inclusion of this alignment due to the fact that structural shoreline measures would be significantly reduced with this option and it may be a better choice for the environment. The combined costs for full build out of necessary connecting structures may ultimately be less.

   Response: Under USACE's new SMART Planning paradigm, the level of detailed analysis required to make a decision is analyzed, not more. This is to reduce the overall cost and time required to complete a feasibility study in line with priorities of Congress and multiple Executive branches of the United States. Engineering, economic, and public engagement tools were used to screen the barrier alignments down to a smaller number of feasible alignments, which were then analyzed in more detail for environmental impacts in order to better understand how to avoid, minimize, and mitigate for any potential range of impacts resulting from a storm surge barrier. This approach is consistent with SMART Planning and NEPA. As part of the initial screening, the water depth requirements for alignment 3 made it less cost effective than alignments 1 and 2, even when added tie-in structures along the shoreline were considered. Further information regarding the preliminary screening will be added to the Final HSGRR/EIS to expound upon this screening.

2. DOS Comment: *The scope and complexity of the modelling should be improved to reflect the dynamics of an integrated coastal system.* [*Apply a combined rainfall-runoff + surge model for*

the barrier options, not just a surge only model.[1]] The JEM model and its results presented thus far is not sufficiently complex or rigorous to capture the effects of all of the factors that would be realistically and significantly be influencing the system at any given time, duration, or given storm scenario. Thus, to understand water quality changes, there is a need to apply a more holistic approach – i.e. attempt to model the flows entering the basin from the upland in addition to, and simultaneously with, the changes in tidal amplitude as well as the hydrodynamic circulation within the bay. To be meaningful for analysis, the modelling should ideally be a very iterative process conducted for various storm surge and rainfall scenarios and for each alignment.

Response: With respect to the first part of this comment, NYDOS is misinformed, the modeling that HDR performed did include the watershed modeling. The report discusses the application of the InfoWorks watershed/sewershed model to Jamaica Bay (pages 10-12 of the original report) and provides a summary of the results of the modeling effort in Figure 8 (page 12 of the report). The second part of this comment points out that HDR did not look at more than one storm event. This is correct, HDR focused on the impact of a surge and storm on dissolved oxygen during this critical summer period in order to capture a worst case scenario effect for dissolved oxygen, the water quality parameter of biggest concern previously. However, a similar surge and storm event would have impacts on water quality if the event occurred during the earlier part or later part of the recreational season (May-October) when water temperatures are cooler and death rates for pathogens are lower. In order to address this comment and potential pathogen impact during cooler seasons, the study team will look at another storm event during a different season of the year, either as part of the preparation of the Final HSGRR/EIS, or during future study of a storm surge barrier at Jamaica Bay under the New York and New Jersey Harbor and Tributaries (NYNJHATs) Study. However, additional modeling efforts proposed are subject to funding constraints and the study team may alternatively pursue other ways to assess the range of potential impacts.

3. DOS Comment: *The model should also be run to sufficiently demonstrate multiple barrier closure scenarios.* We would like to be able to understand the influence on various water quality parameters of increased residence times of pollutants (sediments, nutrients, chemicals, pathogens) held within the Jamaica Bay during a barrier closure of a given duration and be able to anticipate the circulation and flushing of pollutants post-opening of the gates. Results presented as "small" changes or "minimal" effects should be couched in understanding the potential significance of impacts of seeming small deviations from "normal" and/ or temporal changes on aquatic organisms and the habitats which support them. Scientific support should be provided for any such statements determining minimal effects.

   Response: Since the JEM model does not include suspended sediments nor (toxic) chemicals, HDR could not address those water quality variables. As the Corps studies further impacts

[1] ***SUPPORT FROM THE LITERATURE AND RESEARCH [For expanding scope and complexity of the modelling] –***

Christian, Jason. Zheng Fang, Torres et al. (2014) American Society of Civil Engineers.

Modeling the Hydraulic Effectiveness of a Proposed Storm Surge Barrier System for the Houston Ship Channel during Hurricane Events. DOI: 10.1061/ (ASCE) NH.1527-6996.0000150.

Mooyaart, Leslie F., Sebastian Jonkman, de Vries, et al. (2014) Coastal Engineering. *Storm Surge Barrier: Overview and Design Considerations*.

Orton, Philip. https://philiporton.com/projects/

associated with the barrier under the NYNJHATs study, the team will consider using the MIKE Suite model (with in-house capacity from Wilmington District) to assess accretion/ trapping of sediments and/ or debris both during barrier operation and also when gates are open. With respect to HDR's comments about "small" or "minimal" changes, these largely refer to an annual basis. Text has been edited to explain this context more. Terms such as "small" or "minimal" effects are based on professional judgment by subject matter experts, and an effort to explain them in the context of the system has been made for the revised memo described above. Effects are larger when looking at the storm event and closure of the proposed barrier and these effects are discussed on pages 21-46 for pathogens, phytoplankton biomass (chlorophyll-a) and dissolved oxygen.

4. DOS Comment: *Additional study/ models should isolate those areas of the bay which are known to be more water quality impaired relative to others during baseline or "normal" conditions. These "hot spots" should be selected for finer scale water quality modelling for each of the barrier and storm scenarios*.

   Response: We believe that the spatial resolution of the current JEM model is sufficient for the purposes of this analysis. The spatial resolution used in for JEM in this analysis (Figure 6) is about a factor of 4.5 times greater than used in the original JEM (Figure 4). Model segment lengths range from about 100 m to 250 m in the open waters of the bay, to as small as 60-70 m in the tributaries. Given the tidal mixing that occurs in the open waters of the Bay, it would not be expected that water quality constituents would vary significantly within spatial areas of 0.025 km^2 (a model segment of 100 m by 250 m).

5. DOS Comment: *Additional study/ modelling should attempt identify extreme or "worst-case scenarios" to fairly understand the risk and level of exposure which may occur. This should include scenarios depicting a potential for operational failure of gates to reopen and a potential failure of WWTPs during a closure.*

   Response: To a certain degree, HDR did try and look at a worst case scenario with the 96-hr closure, i.e., no power to re-open gates. NYDOS does, however, raise a valid point about WWTP failure, however current efforts underway are targeting addressing this risk. The City is in the midst of implementing a resiliency plan for its wastewater facilities. This plan was developed in 2013 and calls for the expenditure of $315 million in upgrades recommended to protect equipment. Therefore the risk of WWTP failure in the future without project condition is considered to be minimal.

6. DOS Comment: *The framework for the models should attempt to integrate with and complement any monitoring network already in place for Jamaica Bay.* "From the monitored parameters, the model will be in a continuously improving process …" Wilfried Michaelis. This will facilitate future water quality management, monitoring, modelling, and research.

   Response: As described in the report (pages 7 and 8), JEM has been calibrated and validated against the NYCDEP JES data set (1995/1996) and NYCDEP Harbor Survey data (2015).

7. DOS Comment: *Areas for further explanation or development within the model report* – Any assumptions should be clearly stated; selected baseline condition (2008 rainfall year at JFK)

should be further explained and justified as the "typical" rainfall year and suitable for modelling future conditions; Model summary statistics should always be included in the report.

Response: The report has been modified to refer to an analysis of rainfall statistics performed for the NYCDEP by Halcrow|Hazen and Sawyer (Technical Note, Nov. 2011, 6 pages), which explain the background for identifying a "typical" rainfall for the area.

Specific data DOS would like the modelling to develop/ specific questions to answer:

8. *Existing condition, without any modeled barrier:*
    a. What water quality parameters have been collected, where have they been collected, and how well does this record document existing flow patterns and water quality conditions around the bay and at the mouth of the inlet?

Response: The report has been modified to describe station locations and the types of data used to calibrate/validate the JEM hydrodynamic and water quality models (pages 7 and 8). A full description of the calibration/validation analysis is contained in reports prepared by HydroQual, Inc. and HDR, Inc. for the NYCDEP (2002) and the Jamaica Bay Science and Resilience Institute (2017).

    b. What are the types, distribution and severity of existing water quality impairments in the bay and at the inlet mouth?

Response: This information (based on 1995/1996) data is contained in the original JEM calibration report prepared by HydroQual, Inc. (2002). More recent data can be found in reports prepared by the NYCDEP Harbor Survey Program (http://www.nyc.gov/html/dep/html/harborwater/harborwater_quality_survey.shtml)

    c. How well does the operating model agree with existing flow patterns and the type and distribution of existing water quality impairments?

Response: See response to 1a above.

9. *Gates open main channel effects – Due to the confinement of the inlet channel by structural features of the surge barrier:*
    a. What is the change in flow pathways and flow velocity profiles across the inlet opening? In other words, is the flow "channelized" through the inlet in any way, and are there areas of relatively faster or slower flow due to the barrier structure?

Response: Yes, there are some changes in currents near the barriers. The major feature is that flows are restricted through the openings or gates in the barriers. Also, there is some reflection of tidal waters along the northern portion of the Rockaway Inlet away from the tidal barriers during a flood tide.

b. What is the change in velocity of tidal flows through the narrower openings, and is the increased velocity sufficient to affect sediment movement on the bed or in the water column?

Response: This question requires the development of a sediment transport model, such as the MIKE Suite model, which will be considered during future study of the storm surge barrier under the NYNJHATs Study.

c. Would the increased tidal flow velocities and/or the barrier structures have any effects on navigation access or small craft usage?

Response: This comment will be addressed under the NYNJHATs Study.

10. *Gates open, back bay effects:*
    a. As a result of changes in flow velocities and pathways through the barrier structures, are there any changes in hydrologic connectivity, flow velocities or interior flushing in other parts of the bay? What types of changes are there, where do they occur and how significant are they?

Response: Flow velocities are certainly reduced in the immediate area of the tidal barrier gates, and in the channelized areas of western Beach Channel and the southern portion of Island Channel. Flow velocities are slightly reduced in the interior portions of the Bay (North Channel, Grassy Bay, Grass Hassock Channel and Head of Bay), but overall, the general circulation in the interior portions of the bay are similar with or without the tidal barriers.

b. Are there any changes in water circulation near the bay shores as a result of changes in flow pathways and velocities through the barrier structures?

Response: Most of the changes in circulation occur in the vicinity of the tidal barriers, with some reductions in near shore velocities with the implementation of the tidal barriers.

11. *Gates closed, external effects:*
    With the surge barrier gates closed, what is the effect on surge water level to surrounding areas external to the barrier, in comparison to surge levels with no barrier? What is the extent of these effects? Assuming the effects attenuate with distance from the barrier, at what locations do they become negligible?

    Response: These questions cannot be addressed with the present JEM as the potential areas of inundation, e.g., Rockaway peninsula overwash from the ocean side or inundation in Coney Island, are outside the JEM model domain. As the Corps studies further impacts associated with the barrier under the NYNJHATs study, the team will consider using the MIKE Suite model (with in-house capacity from Wilmington District) to assess external effects of the gate open and

closed on surge water level and water velocities to surrounding areas external to the barrier, in comparison to surge levels with no barrier and identify the extent of these effects; and identify the change in these effects at different distances from the barrier.

12. *Gates closed, internal effects, assuming a 3 day extra-tropical storm and advance closure time of 6 hours and post-storm opening delay of 6 hours, the gates could be closed 84 hours.*
    a. Is this a reasonable assumption for an extreme event in the project area? How often on average would an event occur that required closure longer that this? If appropriate for potential storms in this region, propose a longer time closure period for estimating water quality impacts.

Response: In choosing a closure time to analyze, HDR looked a 96-hr closure, which is greater than 84-hr closure mentioned here, and which was determined to be a worst case scenario. Future modeling and impact analysis to assess the storm surge barrier impacts will model a wider range of closures to establish a range of potential effects and once more detail is known on the operational and design parameters of the proposed barrier, the team will be able to address duration and likelihoods better. It is early yet to have those details available, which is why the worst case scenario was targeted instead.

    b. Based on an 84 hour closure, or longer time if reasonable based on consideration of potential storms in the region, how will water quality parameters in the vicinity of the inlet channel, interior of the bay, and bay shore areas change?

Response: The report discusses this question in the Results section (pages 13-45) - save for the exterior portion of the model or on the seaward side of the barrier. HDR would not have much faith on the seaward side of the barrier as it is too close to the boundary of the model and the focus of HDR's analysis is what is happening inside of the Bay.

    c. What are the types and sources of water contaminants and pathogens that will enter the bay during the period when surge barrier gates are closed? What effect will these contaminants and pathogens have on water quality, and where will those effects occur?

Response: Both of these questions were addressed in the report: sources - pages 11 and 12 and Figure 8 and impacts – pages 13-45 and Figures 9-37 and Tables 3-10 . The figures, tables and text in the report detail what, where and duration of impacts that might be expected.

    d. For locations around the bay where existing data and modeling indicate significant water quality impairments under existing conditions, how will water quality parameters change during an 84 hour (or longer) closure period?

Response: Again, the report provides this information (pages 21-45 and Figures 15-37).

13. *Gates opening post-storm:* Assuming an 84 hour (or longer) closure period and associated effects on water quality, would water quality parameters return to non-storm conditions throughout the bay? If so, what would be the rate of normalization, and which areas would have diminished water quality the longest.

    Response: This question was also addressed in the report (pages 21-45 and Figures 15-37).

Other information needs that would benefit from further study –

14. *Re: Marshlands* - Separate analyses should superimpose the tidal elevation change projections from the modelling on the marsh islands and coastal wetlands of Jamaica Bay in order to understand and properly frame discussion of impacts to wetlands and habitats.

    Response: While this question is not directly addressed in the report, information concerning inundation of the wetland marshes could be inferred from Figure 9 (page 13) of the report, which shows tidal elevation during barrier closure, as compared to normal tidal elevation range before and after gate closure.

15. *Re: Erosion at the structure* - Separate analyses should directly measure and employ models of hydraulic flow and changes in pattern and flow velocity due to the presence of the structure in order to understand and properly frame a discussion of potential erosional impacts (scouring) which has been known to occur at the foot of the barriers. This will inform future maintenance needs and associated costs.

    Response: As the Corps studies further impacts associated with the barrier under the NYNJHATs study, the team will consider using the MIKE Suite model (with in-house capacity from Wilmington District) to assess potential erosion at the structure to inform future maintenance needs and associated costs.

16. *Re: Trapping of water behind the barrier* – Separate analyses should model the deflection and redirection of water away from the barrier as a consequence of barrier operation (closure) during a large storm to determine the potential field of impact.

    Response: To address this question would require development of a new model. The model would require a greater spatial area on the seaward side of the barriers, since that is where the greater impacts of the question above would be experienced. Again, this was beyond the scope of this analysis.

17. *Re: Factors determining necessity and duration of gate closure* – This should be discussed in detail within the Main HSGRR Report. This is operation and maintenance (to be developed), but critically important to identify upfront and relate directly to the model results.

    Response: Concur. In order to fully address the impacts, operation and maintenance will need to be discussed. However, the study is not far enough along to have this information available. Further study of the barrier, and the operations and maintenance and how they will affect impacts, will now be carried out under the NYNJHATs Study in order to address this and other comments.

18. *Re: Accretion/ trapping of sediments and/ or debris* - Separate analyses should model the potential for trapping sediments and debris during barrier operation and also when gates are open. Implications for ongoing maintenance and also for post-storm response, clearance, and clean-up of debris should be discussed. These issues may impact or delay safe navigation post storm.

    Response: As the Corps studies further impacts associated with the barrier under the NYNJHATs study, the team will consider using the MIKE Suite model (with in-house capacity from Wilmington District) to assess accretion/ trapping of sediments and/ or debris both during barrier operation and also when gates are open.