

## A. INTRODUCTION

This document summarizes and responds to comments on the Draft Environmental Impact Statement (DEIS) for the Coastal and Social Resiliency Initiatives for Tottenville Shoreline, Staten Island, NY. The Notice of Availability and Notice of Completion for the Draft Environmental Impact Statement (DEIS) for the Proposed Actions was issued by the New York State Governor's Office of Storm Recovery (GOSR) on March 24, 2017. GOSR held a duly noticed public hearing on the DEIS on April 26, 2017, at Public School 6, 555 Page Avenue, Staten Island, NY 10307. Oral and written comments were received during the public hearing. Written comments were accepted from issuance of the Draft Scope of Work through the public comment period, which ended May 8, 2017.

Section B lists the organizations, and individuals that provided relevant comments on the DEIS. Section C contains a summary of these relevant comments and a response to each. These summaries convey the substance of the comments made, but do not necessarily quote the comments verbatim. Comments are organized by subject matter and generally parallel the chapter structure of the DEIS. Where more than one commenter expressed similar views, those comments have been grouped and addressed together. A number of commenters submitted general comments to the proposed project but did not have specific comments related to the DEIS. These comments were given due consideration but are not itemized below. Where relevant and appropriate, edits have been incorporated into this Final Environmental Impact Statement (FEIS).

## B. LIST OF ORGANIZATIONS AND INDIVIDUALS WHO COMMENTED ON THE DRAFT SCOPE OF WORK

### AGENCIES

1. National Oceanic and Atmospheric Administration/National Marine Fisheries Service, letter dated May 22, 2017 (NOAA/NMFS)
2. New York City Department of City Planning, letter dated May 5, 2017 (DCP\_004)
3. New York State Department of Environmental Conservation, letter dated May 26, 2017 (NYSDEC\_074)
4. State of New York Department of State—Jeffrey Zappieri, Manager, Federal Consistency Review, Office of Planning and Development, letter dated May 10, 2017 (DOS\_O25)
5. U.S. Department of Housing and Urban Development, letter dated May 8, 2017 (HUD\_007)
6. U.S. Department of the Interior, letter dated May 8, 2017 (DOI\_005)
7. U.S. Environmental Protection Agency, letter dated May 5, 2017 (EPA\_006)

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<sup>1</sup> This chapter is new to the EIS.

**ORGANIZATIONS AND BUSINESSES**

8. Coney Island Beautification Project—Pamela Pettyjohn, Founder and President, written comments submitted on April 26, 2017 (CIBP\_008) and oral comments delivered on April 26, 2017 (Pettyjohn\_060)
9. Natural Resources Protective Association—James Scarella, email dated May 6, 2017 (NRPA\_038)
10. NY/NJ Baykeeper—Meredith Comi, Restoration Program Director, letter dated May 5, 2017 (Baykeeper\_026)

**GENERAL PUBLIC**

11. Robert Abdenour, letter dated April 11, 2017 (Abdenour\_009), and oral comments delivered on April 26, 2017 (Abdenour\_049)
12. Joseph Abela, oral comments delivered on April 26, 2017 (Abela\_065)
13. Tony Amato, oral comments delivered on April 26, 2017 (Amato\_058)
14. Alan Benimorf, oral comments delivered on April 26, 2017 (Benimorf\_070)
15. Andrew Blancero, email dated May 8, 2017 (Blancero\_027)
16. John Blatchfar, Wagner College, oral comments delivered on April 26, 2017 (Blatchfar\_057)
17. Louraine Castallano, oral comments delivered on April 26, 2017 (Castallano\_047)
18. Patricia Crispi, email dated April 27, 2017 (Crispi\_010)
19. Robert DeBiase, email dated May 6, 2017 (DeBiase\_028)
20. Ayman Farid, oral comments delivered on April 26, 2017 (Farid\_053)
21. Tina Fulginiti, written comments submitted on May 5, 2017 (Fulginiti\_011)
22. John Galarzo, oral comments delivered on April 26, 2017 (Galarzo\_069)
23. Giovanna M. Gentile, email dated May 8, 2017 (Gentile\_G\_029)
24. John Gentile, email dated May 3, 2017 (Gentile\_012), and letter dated May 3, 2017 (Gentile\_073)
25. Michael A. Greco, oral comments delivered on April 26, 2017 (Greco\_046), written comments submitted on May 5, 2017 (Greco\_013), and email and letter dated May 8, 2017 (Greco\_030, Greco\_075)
26. Blayse Halvorsen, written comments submitted on May 5, 2017 (Halvorsen\_Blayse\_014, Halvorsen\_Blayse\_031)
27. Goodwin Halvorsen, emails dated May 8, 2017 (Halvorson\_G\_032), May 8, 2017 (Goody\_044), and May 8, 2017 (Goody\_045); letter dated May 8, 2017 (Halvorsen\_G\_033); and oral comments delivered on April 26, 2017 (Halvorsen\_G\_052)
28. Jaiden Halvorsen, oral comments delivered on April 26, 2017 (Halvorsen\_J\_054)
29. Kerry Halvorsen, CAC Member, oral comments delivered on April 26, 2017 (Halvorsen\_K\_055), and written comments submitted on May 5, 2017 (Halvorsen\_K\_034)

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## Responses to Comments on the DEIS

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30. Julie Liotti, email dated May 8, 2017 (Liotti\_035)
31. Karen E. Lund, email dated May 8, 2017 (Lund\_036)
32. Peter Malinowski, Billion Oyster Project, oral comments delivered on April 26, 2017 (Malinowski\_059)
33. John Malizia, FCA/Citizens Advisory Committee, oral comments delivered on April 26, 2017 (Malizia\_051)
34. Jennifer Marino, written comments submitted on May 5, 2017 (Marino\_037)
35. Maureen Murphy, written comments submitted on May 5, 2017 (Murphy\_M\_015)
36. Robert Murphy, written comments submitted on May 5, 2017 (Murphy\_R\_016)
37. Anthony Panarello, written comments submitted on May 5, 2017 (Panarello\_A\_039), and oral comments delivered on April 26, 2017 (Panarello\_A\_048)
38. Christina Panarello, written comments submitted on May 5, 2017 (Panarello\_C\_040)
39. Michael Panarello, written comments submitted on May 5, 2017 (Panarello\_017), and oral comments delivered on April 26, 2017 (Panarello\_M\_050)
40. Unknown Panarello, letter dated April 27, 2017 (Panarello\_072)
41. James M. Pistilli, Tottenville Civic Association Inc., President, oral comments delivered on April 26, 2017 (Pistilli\_068), and letter dated May 7, 2017 (TottenvilleCivicAssoc\_042)
42. Marie Reback, oral comments delivered on April 26, 2017 (Reback\_061)
43. Diane Rivela, oral comments delivered on April 26, 2017 (Rivela\_066)
44. Ricard Sarnes, oral comments delivered on April 26, 2017 (Sarnes\_062)
45. George Salvo, oral comments delivered on April 26, 2017 (Salvo\_063)
46. Steven Shapiro, oral comments delivered on April 26, 2017 (Shapiro\_067)
47. Diane Silverman, oral comments delivered on April 26, 2017 (Silverman\_064)
48. Sarah Taormino, written comments submitted on May 5, 2017 (Taormino\_018)
49. Tottenville Resident, written comments submitted on May 5, 2017 (Tottenville\_Resident\_019)
50. Tottenville Resident, written comments submitted on May 5, 2017 (Tottenville\_Resident2\_20)
51. Tottenville Resident, written comments submitted on May 5, 2017 (Tottenville\_Resident3\_21)
52. Tottenville Resident, written comments submitted on May 5, 2017 (Tottenville\_Resident4\_22)
53. Tottenville Resident, written comments submitted on May 5, 2017 (Tottenville\_Resident5\_23)
54. Tottenville Resident, email dated May 8, 2017 (Tottenville\_Resident6\_041)
55. Unknown, letter dated April 17, 2017 (Unknown\_024)

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56. Unknown, letter dated May 8, 2017 (Unknown\_043)
57. Unknown, letter dated April 26, 2017 (Unknown\_071)
58. Kristian Wredstralm, Environmental Sustainability Club/Wagner College, Founder/President, oral comments delivered on April 26, 2017 (Wredstralm\_056)

### **PETITIONS**

59. Group Letters—Petitions received May 5, 2017 (GroupLetter1\_002, GroupLetter2\_003)
60. Tottenville Residents Group Petition—Petition received May 5, 2017 (TottenvilleResidentsPetition\_001)

## **C. COMMENTS AND RESPONSES**

### **PUBLIC PARTICIPATION**

**Comment 1:** I would like to be seriously considered to be on the CAC. I feel that I can be an asset to this committee being that I am a resident and business owner here on Staten Island. (Gentile\_012)

**Response:** GOSR continues to review applications for CAC membership. Additional members have been added to the CAC following application review and approval.

**Comment 2:** How many CAC members do you have, and how many live in Tottenville, below the boulevard? Why are people that don't even live here, in Tottenville being allowed to make life changing decisions for us? (Reback\_061)

People that don't even live here are making life changing decisions for us (pathway, HUB location, living breakwaters) (Halvorsen\_K\_034)

**Response:** GOSR has held a number of meetings with local community residents, Staten Island Community Board 3, elected officials, preservation and environmental groups, and other local and regional community based organizations. GOSR established a Citizens Advisory Committee (CAC) to offer additional opportunity for public input and for the State, and its design teams, to receive advice on design as the project progresses through construction. There are currently 22 members on the CAC; 17 from Staten Island, 10 of which are from Tottenville. To date, eight public CAC meetings have been held in the Tottenville, Staten Island community providing an opportunity for input on project elements and design. The CAC also joined GOSR and its design teams on multiple shore-walks to further raise awareness of the project site and the elements of the project as it progressed through design.

### **PURPOSE AND NEED AND ALTERNATIVES**

**Comment 3:** We as taxpayers need this storm recovery money to be spent on the right projects and that's for protection from another superstorm in the lower area where lives and homes were lost and that would be from Sprague Ave heading west to the

Conference House Park at the end of Hylan Boulevard. (Fulginiti\_011, GroupLetter2\_003, Reback\_061)

**Response:** Comment noted. As described in Chapter 1, “Purpose and Need and Alternatives,” of the EIS, the Shoreline Project had its genesis in the New York Rising Community Reconstruction initiative established by Governor’s Office of Storm Recovery and was further developed in consultation with NYC Parks. The plan for the East and South Shores of Staten Island included hybrid dunes with a stone core and sand cap, planted for stabilization, from Brighton Street to Joline Avenue, including two beach access points. After evaluating site-specific field data such as site surveys and borings, and in response to public input, it became clear that one coastal strategy did not fit all areas of the shoreline as was originally proposed as part of the New York Rising Community Reconstruction planning process. In some cases, there was not enough space on the beach between the property line of Conference House Park and above mean high water to accommodate the width that a hybrid dune would require (for example, the area where Surf Avenue is built out between Loretto Street and Sprague Avenue). Additionally in response to public comments during the EIS public scoping process, the area west of Brighton Street to Swinnerton Street was added to the project. Hence, a comprehensive design for the Shoreline Project was developed to respond to the changing character of the shoreline between approximately Carteret Street and Page Avenue. These include a series of shoreline risk reduction measures, including an earthen berm, a hybrid dune/revetment system, eco-revetments, raised edge (revetment with trail), wetland enhancement, and shoreline plantings. From approximately Carteret Street to Brighton Street through a wooded portion of Conference House Park, the system would include an earthen berm that would serve as a tie-in to an eco-revetment and a reinforced, planted hybrid dune/revetment system proposed from approximately Brighton Street to Loretto Street. A proposed eco-revetment would extend between Loretto Street and Sprague Avenue. In the area east of Sprague Avenue, the limit of wave action does not extend into the community, and the residential community is less dense near the shoreline. Therefore, the goal for the Shoreline Project in this area is to control erosion while accounting for future sea level rise with revetments incorporating a modest rising of the grades at the edge of the beach.

To inform the design and the benefits of the proposed breakwaters system, an understanding of existing wave conditions and shoreline erosion and the response of these conditions to the proposed project were required. Additionally, understanding of the existing hydrodynamics and water circulation patterns and potential changes due to the proposed project were critical to the understanding of any potential water quality effects of the breakwater system. The results of extensive modeling were used to optimize the design of the breakwater system to achieve the goals of reduced erosion and reduced wave exposure along the length of the project area (see Chapter 1 of the DEIS).

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**Comment 4:** For what reason was this project conceived? Why was this location picked? Were other locations also picked and why? (Greco\_075)

**Response:** As described in the EIS:

Staten Island's South Shore was once buffered from wave action by a wide, shallow bathymetric shelf known as the "West Bank." Until the mid-19th century, oyster reefs and then leased oyster beds extended across the shallow waters of Raritan Bay, filtering water, enhancing the biodiversity and quality of the fisheries in the lower harbor and buffering the south shore from erosion-causing wave action. In the 19th and 20th centuries, changes in land use and populations drove widespread decline in water quality, habitat extents and beach widths across the bay, decreasing the quality of the Bay ecosystem and increasing coastal risk to inhabitants and assets along its shoreline.

On October 29, 2012, Superstorm Sandy approached New York City with tropical-storm-force winds. The resultant waves and storm surge battered the city's coastline, causing 44 deaths in New York City—23 of which occurred in Staten Island—the destruction of homes and other buildings, and damage to critical infrastructure. Sandy's effects—including powerful waves and large volumes of water—were particularly intense in neighborhoods across Southern Queens, Southern Brooklyn, and the East and South Shores of Staten Island. According to the New York City Department of Buildings (NYCDOB), these neighborhoods accounted for over 70 percent of the buildings in Sandy-inundated areas that had been seriously damaged or destroyed as of December 2012.

Winds out of the northeast generated powerful waves along the South Shore of Staten Island (which adjoins the waters of Raritan Bay), resulting in significant erosion, including at the area's protective bluffs and along the shoreline areas with already narrow beach conditions. The peak storm tides in Tottenville measured approximately 16 feet, almost five feet higher than at the Battery in Manhattan. Many of the homes that were hit around Tottenville Beach were destroyed. Tottenville businesses also sustained structural damage, with some emerging from the storm with only wall studs remaining on the first floors.

Superstorm Sandy significantly impacted the project area, highlighting existing deficiencies in the project area's resiliency and ability to adequately protect populations and facilities from major coastal storm events.

Post-Sandy, coastal protection initiatives were recommended in the City's Community Rebuilding Resiliency Plan for the East and South Shores of Staten Island, including along the Tottenville reach. In particular, the City's Coastal Protection Initiative 15 calls for the implementation of a "living shoreline project—likely to consist of oyster reef breakwaters, beach nourishment, and maritime forest enhancements—in areas adjacent to Conference House Park in Tottenville."

In June 2013, HUD launched Rebuild by Design, a competition to respond to Superstorm Sandy's devastation in the northeast region of the United States and promote a design-led approach to pro-active planning for long-term resilience and climate change adaptation. The Staten Island Living Breakwaters Project, which proposed a resiliency approach to promote risk reduction through erosion prevention, wave energy attenuation, and enhancement of ecosystems and social resiliency, was one of the selected projects.

Also, the NY Rising Community Reconstruction Program was established by New York State to provide rebuilding and revitalization assistance to communities severely damaged by Superstorm Sandy, Hurricane Irene and Tropical Storm Lee. The Tottenville Shoreline Protection Project was conceived through the NY Rising planning process and further developed through the design process.

**Comment 5:** We would like to see a break down and itemization of the cost of each of the five categories of Project proposals. Where was the money allocated from? Who allocated the amount for each project? Will this amount of money be taken from our Tottenville budget for other more important issues? (Greco\_075)

Where is the funding coming from? (Reback\_061, Halvorsen\_J\_054)

**Response:** The Living Breakwaters Project (Breakwaters Project) is funded through a \$60M award from U.S. HUD through the Rebuild by Design Competition. GOSR also continues to identify potential opportunities and sources for leveraging additional funds.

The Tottenville Shoreline Protection Project (Shoreline Project) is funded through the Community Development Block Grant—Disaster Recovery Program and State and City allocations with a preliminary estimate of 33.5M.

**Comment 6:** If any of projects goes over budget will it be completed, and when? And where will the money come from? (Greco\_075)

**Response:** The design teams are working to design all elements to be implementable with the funding provided. They may explore design or construction options that allow modifications to the design without losing the multi-functional performance of the projects should implementation costs be higher than estimated. GOSR also continues to identify potential opportunities and sources for leveraging additional funds. All proposed projects are budgeted with a construction contingency.

**Comment 7:** Do you really think this Project and so called improvement of nature is going to benefit our Bay? How? And Why? (Greco\_075)

**Response:** As described in Chapter 1, "Purpose and Need and Alternatives," of the EIS, the Proposed Actions (which include the Breakwaters Project and the Shoreline Project) would reduce the risk of wave action and coastal erosion, address the impacts of coastal flooding, and increase the resiliency of the communities and

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ecosystems within the project area, thereby protecting critical infrastructure and facilities, residences, businesses, and ecological resources during hurricanes and other severe weather storm events. The Proposed Actions will also enhance aquatic habitats, and foster community education on coastal resiliency.

**Comment 8:** We demand the Governor's Office of Storm Recovery (GOSR) and the senior program manager of the Living Breakwaters project use the 60 million dollars given for this project to replenish and pump sand onto the beach. (GroupLetter1\_002, Panarello\_017, TottenvilleResidentsPetition\_001)

Why are you not replenishing the sand from Pave Ave to Sprague Ave on the shoreline (Halvoren\_G\_033)

**Response:** As described in Chapter 1, "Purpose and Need and Alternatives" of the EIS, beach nourishment was considered as an alternative coastal strategy, but was eliminated from further consideration as nourishment alone would not meet the purpose and need of the project. While beach nourishment of sufficient size, if maintained (regularly re-nourished) can provide some wave attenuation and act as sacrificial erosion protection to the land behind, large scale beach nourishment alone would not provide the desired storm wave attenuation (to less than 3 feet) under the target storm conditions (100 year event plus 30 inches of sea level rise), nor would it result in habitat enhancement for the project's target functional groups (target species). However, as part of the Breakwaters Project, sand placement to restore the historic shoreline position is being proposed between Loretto Street and Manhattan Street, where building the beach will have the most benefit in the vicinity of elements of the proposed Shoreline Project. This area was selected for one-time shoreline restoration because of high historical and projected erosion rates (around 2.0ft/year from 1978 to 2012), narrow beach width. This one-time placement of sand would approximate the historic 1978 shoreline position, augment the accretion potential that can be provided by the breakwaters and add sediment to the overall system, particularly contributing to one of the narrowest and most erosion-prone areas of beach in the site and generally enhancing overall beach growth potential.

**Comment 9:** We demand the Governor's Office of Storm Recovery (GOSR) and the senior program manager of the Living Breakwaters project use the 60 million dollars given for this project to build a better hardened dune system in the low areas, (this should be done west of Sprague Avenue toward the Conference House). (GroupLetter1\_002, Murphy\_M\_015, Murphy\_R\_016, TottenvilleResidentsPetition\_001, Unknown\_024, Halvoren\_K\_055)

Why are you not using large rocks and boulders for a dune system? (Halvoren\_G\_033)

**Response:** As discussed in Chapter 1, "Purpose and Need and Alternatives," of the EIS, the Shoreline Project proposes a reinforced, planted hybrid dune/revetment system

(constructed first with bedding stone then armor stone, and topped with sand and beach grass planting), that would extend along the shoreline between Manhattan and Loretto Streets, for approximately 937 linear feet. In addition, an eco-revetment would extend approximately 338 linear feet between Brighton Street and Manhattan Street, and another section of eco-revetment would extend approximately 396 linear feet between Loretto Street and Sprague Avenue.

**Comment 10:** 70 Million could do so much to restore the shoreline of Staten Island, restore the environment and ecosystems around it and build a sea wall which would protect from another storm surge (Greco\_030)

**Response:** Consistent with the comment, as described in Chapter 1 of the EIS, the purpose of the Proposed Actions is to reduce wave action and coastal erosion along the shoreline in Tottenville, while enhancing ecosystems and shoreline access, use and stewardship. Also as described in Chapter 1, based on an evaluation of the City's entire shoreline and categorization of each shoreline reach by its geomorphology and land use, the City's *Urban Waterfront Adaptive Strategies* (UWAS) study assessed coastal resiliency measures that would be appropriate for different categories of shoreline. This study categorizes the Tottenville Shoreline as "Oceanfront Slopes," a typology characterized by glacial till plains and hills, low fetch, medium elevation/medium slopes, unreinforced shorelines, and a mix of sediment types. For this type of reach, strategies that were identified with high "likely applicability" included: upland waterfront parks, and in-water breakwaters, artificial reefs, and constructed breakwater islands. While shoreline seawalls were also found to have likely applicability, the study notes that seawalls may disrupt sediment transport and lead to the erosion of beaches, which would not meet the purpose of the Proposed Actions.

**Comment 11:** While we understand the purpose and need for the project, we don't understand why there is no emphasis on land acquisition for flood buffering in the project area. There are numerous private parcels along Manhattan Ave that should be acquired for flood plain management, omission of acquisition is a big mistake. The Final EIS needs to have one -sixth of the total project funds for flood plain parcel acquisition, the project will have a greater chance for success. We respectfully request that you amend the DEIS to include State buyout of flood plain parcels, and / or work with NYC DEP to expand the Bluebelt in the affected area. (NRPA\_038)

**Response:** The private property referred to in this comment is outside of the project area, and the funds secured for the Shoreline and Breakwaters projects are not available for the purchase of private property. GOSR has operated a Buyout Program in certain areas selected with the active participation and cooperation of the affected homeowners. This was not the case in Tottenville. According to GOSR policy, eminent domain is not used to acquire properties where owners do not want to sell.

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**Comment 12:** I do feel the idea of reintroducing oyster beds to the bay, adding sand, and extending the drain pipes would help our community. This is how the funding for the Living Breakwater Project should be spent. (Gentile\_012)

**Response:** Comment noted.

**Comment 13:** This bay thrived with oysters before man polluted it, why do we need break waters to have oysters now? (Greco\_075)

The Raritan Bay has made a comeback and is thriving with sea life including oysters, clams mussels, crustaceous, dolphins, seals, whales, and many other marine life forms. We do not need 70 million dollars' worth of concrete and Polypropylene to have Oysters. (Greco\_030)

Oysters in our areas left because of the contaminants in our waters. They did not leave because the land washed away; they left because of the dirt. The oysters will come back all by themselves. We do not need to start building things and adding things to bring back the oysters (Sarnes\_062)

**Response:** The bay did have large oyster populations prior to overharvesting of oysters, dredging activities within the bay that removed oysters and modified habitat, and the discharge of untreated wastewater and sediments resulting from land development activities. As a result, the extensive oyster reefs that once lined the south shore of Staten Island have all but disappeared, resulting not only in the loss of live oysters, but also suitable substrate for oysters and other bivalves such as mussels to grow on within this area of the harbor. The proposed breakwaters may provide a suitable substrate for these bivalves to thrive on. As described in Chapter 1, "Purpose and Need and Alternatives," of the EIS, a Comprehensive Restoration Plan has been developed for the Hudson-Raritan Estuary (HRE CRP), which specifically identifies the project area as having high suitability for oyster reef restoration.

The design, construction, and operation of the Breakwaters Project would result in the creation of ecologically designed, three-dimensional structures that would increase the diversity of the aquatic habitats available for a variety of marine animals, plant and invertebrate species that provide or form habitat found in Raritan Bay (e.g., brown algae and local shellfish like mussels, barnacles, and oysters). Any active oyster restoration that is planned for areas on and adjacent to the breakwaters would be subject to separate regulatory approvals.

**Comment 14:** Section 1.5.4 does not fully address periodic beach nourishment as a strategy to grow the beach and reduce risk from erosion. More detail should be provided about this potential alternative and how, coupled with other social and ecological measures, it would perform versus the preferred alternative. (NYSDEC\_074)

**Response:** While beach nourishment of sufficient size, if maintained (regularly re-nourished) can provide some wave attenuation and act as sacrificial erosion protection to the

land behind, large scale beach nourishment alone would not provide the desired storm wave attenuation (to less than 3 feet) under the target storm conditions (100 year event plus 30 inches of sea level rise), nor would it result in habitat enhancement for the projects target functional groups (target species)—beach nourishment alone would not provide hard structured (reef-like) habitat or increase the habitat diversity of the project area. It would also not be sustainable beyond the project funding timeline (2022). For these reasons, beach nourishment alone would not fully meet the purpose and need of the project. This explanation has been added to section 1.5.4 in Chapter 1, “Purpose and Need and Alternatives.”

**Comment 15:** We demand the Governor’s Office of Storm Recovery (GOSR) and the senior program manager of the Living Breakwaters project use the 60 million dollars given for this project to build jetties that run from the shoreline out into the bay. (Fulginiti\_011, Panarello\_017, TottenvilleResidentsPetition\_001, Tottenville\_Resident5\_023)

Please help us with protection. We have an old wooden jetty at the end of Brighton Street and Surf Ave. This is the only thing holding the sand in place if and when we lose this old wooden jetty we will lose the hold shoreline. (GroupLetter1\_002, Goody\_045)

Why don’t you build up the wooden jetty at the end of Brighton and Surf Ave? (Panarello\_A\_039, Halvoresen\_G\_033)

New York City Parks took over the shoreline in the seventies and never fixed or maintained the jetties, and we lost our protection to the point that Surf Avenue got washed away where you can see a ten inch City water line on the beach at the bottom of Rockaway Street. Why are we not installing jetties running south of the shorelines? (Halvoresen\_K\_055)

Stormwater outfalls are the cause of beach erosion on the shorelines they need to be extended and made into jetties so we can catch sand and hold the sand in place and also act as breakwaters for protection. (GroupLetter1\_002, Benimorf\_070, Halvoresen\_G\_052)

How about extending the outfalls, which is causing the beach erosion with rock jetties over them and replenish the sand on the beach so that people can go to a beach with sand as opposed to cement? (Reback\_061, Panarello\_072, Halvoresen\_G\_033, Halvoresen\_K\_055, Unknown\_024)

It is the storm outfall drain lines that are too short that cause the wash out of our beaches and any erosion until the small waves replenish it. (Greco\_030)

The storm drains should be extended and covered with natural rocks. (Panarello\_017, Panarello\_A\_039, Marino\_037)

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Every time it rains, a huge amount of water washes the beach away. That water comes from the storm pipes. If those were extended, the beaches would build up, and there could be short groin jetties that would resolve all of the issues (Greco\_046)

By extending storm drains with transition fittings and check valves, removing miscellaneous rocks, boulders, and pilings, raising and extending the beach will solve everyone's needs and desires. A means of egress for passerby's, beach walkers and sun tanners, the public, small Parks department equipment such as a Gator and other vehicles can transverse the area for clean-up and maintenance. (Greco\_030).

**Response:** DEP infrastructure improvements are not within the scope of the RBD funding. The term jetty (a structure used to stabilize an inlet) is sometime misused to refer to a groin. A groin is a structure constructed across the beach, perpendicular to the shoreline, and is designed to trap sand moving in the longshore transport system. The coastal structures that were once intact at points in Tottenville were actually groins, although many people refer to them as jetties. Jetties are larger structures used to maintain the opening to a navigational channel such as a tidal inlet.

While the breakwaters proposed for this project are intended to modify and slow longshore sediment transport, groins are typically intended to stop or interrupt longshore transport. Groins trap sediment until such time as the groin becomes "full" to capacity due to the collection of sediment or due to beach fill to capacity. As groins stop or interrupt longshore transport there is a much higher likelihood of down-drift erosion than with breakwaters. The trapping of sediment and down-drift erosion is often evident in aerial photographs of groin fields where the beach develops a "scalloped" shape. It should also be noted that beach fill is often required as a stipulation of groin installation to reduce down-drift impacts.

As described in Chapter 1 of the EIS, one of the goals with respect to the Tottenville shoreline is to attenuate wave energy before it reaches the shore, and address specific erosion patterns along the shoreline by reducing or controlling longshore transport, but not blocking it along the shore. Additionally, the project seeks to enhance marine habitat that groins would not address. While groins are a useful tool and have application in shoreline protection, they would not fully meet the purpose and need of the project in terms of wave attenuation or addressing the specific erosion patterns of the Tottenville shoreline. Therefore, this alternative was eliminated from further consideration.

**Comment 16:** Storm lines need seagates or check valves to be installed this will help stop the flooding in the lower areas during a storm, as well as a stormwater pump station (which will also help clean the bay). (GroupLetter1\_002, Goody\_045, Panerello\_A\_039, Halvoresen\_G\_052, Halvoresen\_G\_033)

The project should include permanent solutions to the clogging of outfalls which results in flooding when the area is hit by storms/ heavy rain/ high tides (TottenvilleCivicAssoc\_042)

Fix the storm drains lines, install flood gates on storm lines, and fix the storm water outfalls that run on the beach and keep washing away the sand. (Halvoren\_K\_055)

**Response:** DEP infrastructure improvements are not within the scope of the RBD funding.

**Comment 17:** The Projects propose innovative designs and, due to their novelty, there are uncertainties associated with long-term coastal hazard reduction performance. The Department recommends that the design (or service) life of the Projects be clearly stated in the Project Purpose, Section 1.3.1. Clarifying how long the Projects are anticipated to function is critical to adequately and accurately monitoring performance. (DOS\_025)

**Response:** Section 1.3.1 has been revised in the FEIS to address this comment.

**Comment 18:** In Section 1.4 on page 1-9, the DEIS references the New York City Panel on Climate Change (NPCC) projections for the 2050s to the 2080s timeframe. This is an outdated local projection that has been superseded by 6 NYCRR Part 490 (see <http://www.dec.ny.gov/regulations/103877.html>) for major projects in New York State. Part 490 is not binding on this project but is recommended best practice. The Department recommends either using Part 490 or providing an explanation for why Part 490, which is the current standard for planning and design, is not being used. Furthermore, essential infrastructure that protects urban life safety should be designed for at least a 100-year effective life span. If the purpose is not life safety but erosion reduction, infrastructure should be designed to function based on current sea level rise projections. (DOS\_025)

**Response:** Section 1.4 in the FEIS has been clarified to note that the 30 inches of sea level rise used in modeling future conditions is consistent with both the 6 NYCRR Part 490 and NPCC projections for the 2050s to 2080s timeframe.

Coastal structures are typically designed for a 50 year service life. This is because coastal environments and uses are constantly changing and it is impractical to design for time spans much in excess of 50 years. The breakwater will be designed to withstand and function during a 100 year storm event throughout its design life, including accounting for sea level rise. That being said, stone structures in the coastal environment can continue to perform well past their intended design life. The concrete armor units are also anticipated to have a service life greater than 50 years. However, the breakwaters may have a reduced capacity to attenuate waves after they have reached their service life. It is anticipated that that breakwaters would continue to provide habitat enhancement and erosion protection past their 50 year service life. It should also be noted that stone rubble mound structures are adaptable and could be modified in the future to extend their service life.

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**Comment 19:** The DEIS references a 30-inch sea level rise (SLR) scenario as being used in project modeling and analysis, and is based on New York City Panel on Climate Change (NPCC) projections for the 2050s to 2080s timeframe (Page 1-9). However, it is not clear where this projection falls with respect to the magnitude percentile of projections. Without such discussion, it is hard to evaluate the full context of the project with respect to SLR. Please consider adding this information to fully elaborate on the 30-inch SLR scenario and where it falls with respect to timeframe and percentile. Furthermore, Page 1-9 should include a reference to the New York State Community Risk and Resiliency Act and the official NYS SLR projections, found in 6 NYCRR Part 490. CRRA is mentioned in Chapter 15, however NYS SLR projections are not. The DEIS should note where the 30-inch SLR scenario falls with respect to NYS projections, in both timeframe and percentile. (NYSDEC\_074)

**Response:** Chapter 1 of the FEIS includes additional information regarding the magnitude and percentile of the sea-level rise projections used for design and analysis. Chapter 15 provides clarification regarding NYS and NPCC sea-level rise projections.

**Comment 20:** Please clarify whether the proposed design has accounted for subsidence once these structures are constructed. The breakwaters, hybrid dune system, and eco-revetment contain a significant amount of rock and concrete that would be anticipated to compact the substrate beneath. Both naturally and artificially induced subsidence, if significant, could decrease the elevation of these structures and compromise the ability of the Projects to achieve the stated coastal protection goals. (DOS\_025)

**Response:** As part of the breakwaters design process, a total of 28 marine borings were completed in the project area and geotechnical analysis was performed to support the breakwater design. A preliminary geotechnical subsurface investigation was performed in 2015, which included 20 in-water borings throughout the project area. Eight additional in-water borings were conducted in 2017 to obtain more complete and structure-specific subsurface information in order to better support the design. Geotechnical laboratory testing was performed on selected soil samples obtained from the borings to evaluate the soil's engineering properties, including compressibility of the soil strata that may be prone to long-term subsidence. Analysis of this information indicated that while immediate settlement is anticipated of about 2 to 6 inches among various structures, this will be accounted for during the construction process as the structures are being built. The immediate settlement should not affect the long-term performance of the breakwaters, as the finished crest elevation is expected to be stable over time. Analysis indicated only one area where long-term settlement of the breakwaters might be greater than a few inches; and this was breakwater A1 located in the far western end of the project area. Accordingly, the design of A1 accounts for this potential long-term subsidence. The design modification will not impact the

breakwater's footprint. Bearing capacity and global slope stability were also evaluated and deemed to be adequate for each breakwater.

With respect to the Shoreline Project, the hybrid dune/revetment system, earthen berm, and eco-revetments, propose grading and fill that will increase soil pressures and result in some settlement. The settlement was estimated as the sum of the following:

- Immediate (elastic settlement)
- Primary Consolidation of fine grained soils
- Secondary Consolidation of fine grained soils to a 50 year project design life

Estimated total settlement varies by amount of load applied by the proposed features and by the stratigraphy of the underlying soils.

The estimated total settlement varies from about 0.75 to 7 inches. The 7 inch (higher end) of settlement estimate is based on construction of the hybrid dune/revetment directly above existing grade and compressible materials. This higher end estimate neglects replacement of organic layer with armor stone fill. Since actual armor stone will be below grade and replace compressible organic material, this settlement is controlled and reduced by about 3 inches.

Immediate (elastic settlement) can occur within all soil layers and is expected to occur while construction of the Shoreline Project is ongoing. The primary and secondary consolidation occurs within fine grained, non-free draining, soil layers.

The primary consolidation is estimated to be complete within 7 months following construction. The secondary (creep) consolidation is expected to continue over the design life of the project.

The crest of the hybrid dune/revetment has been considered to accommodate such settlement.

**Comment 21:** Are you using concrete or recycled concrete for any part of these projects or is it all natural stone? What kind of natural stones are you using? How much does each of the different models of the concrete cubes cost? Where are they being manufactured? How many miles away do they have to be shipped or trucked? How much do the different size rocks cost? (Greco\_075)

**Response:** As described in the EIS, the breakwaters will be rubble mound structures made of a combination of hard stone and ecologically enhanced concrete armor units. The ecologically enhanced concrete units are engineered to have the same structural performance as the stone units; they utilize a special mix of concrete to create a more ideal material for ecological recruitment than standard Portland cement. The type of natural stone to be used will partially be determined by availability and the contractor once they have been selected, but it will likely be locally sourced granite or other locally available, hard, durable stone. Specifications will be prepared to ensure the appropriate durability and specific gravity of the stone and

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concrete used. The source location of the stone and fabrication location of the ecologically enhanced concrete units will not be determined until a construction contractor is selected. However, there are a number of local precast concrete manufacturers that are capable of producing the units, and quarries in the region (tri-state area) likely able to supply the stone.

Elements of the Shoreline Project would also use both natural stone and concrete. The project is currently in the design phase. The specific materials to be used have not been determined.

**Comment 22:** We need to see the MSDS Sheets on any and all materials being used. (Greco\_075)

**Response:** The specific materials to be used have not yet been determined to that level of specificity. The MSDS sheets will be manufacturer specific and not available until after a construction contract is issued. All materials to be used for the breakwaters will be permitted and approved.

**Comment 23:** The Proposed Actions include a number of temporary and permanent structures in the coastal zone. The Department would appreciate additional assurances that these structures will be maintained and protected once constructed and, where possible, have been designed to be self-sustaining to minimize future long-term management responsibilities. The DEIS states that the land within the study area is primarily under the jurisdiction of the New York City Department of Parks and Recreation (NYC Parks) and that operation of the Water Hub would be shared between NYC Parks and the New York Harbor Foundation. Details on anticipated maintenance requirements were not provided, which are important to understanding how the coastal zone within the project area would look and function over time if the Proposed Actions are undertaken. Therefore, the Department requests the following clarifications for each proposed structure and improvement:

- Identify the owner and, if different, the party responsible for installation, operation and maintenance;
- Describe routine maintenance that may be required and the frequency with which it should be undertaken;
- Describe safeguards to secure the structure(s) during severe weather events;
- Estimate life expectancy or design life and measures to increase durability; and
- Explain what would be done when the project elements have exceeded their design life (e.g., removal, reinforce/rebuild).

The Department recommends detailing the anticipated maintenance requirements in the aforementioned Monitoring and Adaptive Management Plan. In the plan, please also describe the potential for debris accumulation along the breakwaters

and shoreline structures and how debris removal and disposal would be undertaken. (DOS\_025)

Who is going to maintain these projects after they are built? Where is your plan and budget for that? Will this path area and new beach replenishment specifically be cleaned by Parks? (Greco\_075, Halvorsen\_G\_033, Reback\_061)

Where is the money coming from for the maintenance over the life expectancy of the pathway, and who will be maintaining it? (Halvorsen\_J\_054)

NYC Parks is supposed to maintain the entire area along Page Avenue, but it is not being kept up at all, grass is not being cut. What will happen with this project? (Savlo\_063)

What is the life expectancy of the shoreline project, and when it needs replacing (Halvorsen\_J\_054)

**Response:** It is anticipated that the State of New York, non-profit organizations and other government agencies involved in the construction and ownership of elements of these projects will maintain and operate their respective project components. Through final design, GOSR will develop robust maintenance and operation plans, working collaboratively with appropriate state, city and federal agencies, as well as non-profit organizations.

GOSR will be the agency responsible for the construction of the breakwaters. A firm with maritime construction experience will serve as an owner's representative providing guidance and oversight of the construction process. After construction completion, the breakwaters will be turned over to NYSDEC. NYSDEC will own and take full responsibility for maintenance of the breakwater structures.

The DEIS states that it is anticipated that the Water Hub facility would be used by the New York Harbor Foundation, NYC Parks, and local schools and community groups. Operation and maintenance for the Water Hub will be dependent on the final siting of that project component. The proposed Water Hub, if constructed on shore within Conference House Park, would be owned and operated by the State and/or City, with assistance from a non-for profit organization. The cost of the management will be determined as design progresses. The Water Hub will also be used by a non-profit organization for educational programming and that organization would support some portion of the maintenance. If a floating vessel is selected for Water Hub activities, the non-profit organization would operate and maintain the vessel.

A seasonal floating dock is proposed in association with an on-shore Water Hub option (Potential Locations 1 and 2). The seasonal floating dock would be maintained by either the State agency conducting the long-term maintenance of the breakwaters or the non-profit organization using it for educational activities.

If the proposed vessel for the Water Hub is selected (Potential Location 3), a floating dock would not be included as part of the project.

NYC Parks will both own and manage the structures that are constructed as part of the Shoreline Project.

Maintenance requirements for the project components are as follows:

### **Breakwaters Project**

Basic maintenance and operations of breakwater structures is anticipated to be minimal; regular visual inspection of structures (annual or less). The most likely possible drivers for maintenance needs would be scour, settlement, or the dislodgment or displacement of armor units. Maintenance will likely be episodic, following storm events. A basic post-storm event inspection may reveal maintenance work such as stone adjustments or replacement, but such maintenance is usually minimal, particularly for storm events less than the 100-year storm design conditions. Any debris removal will be part of the operations and maintenance plan.

The breakwaters have a 50-year design life, though it is anticipated they will function beyond this time frame. The breakwaters are designed to function in a 100-year storm. The functionality is derived from the use of appropriate material sizes and configurations for a breakwater design that utilizes wave dissipation as the wave attenuation process rather than energy absorption. The dissipation process alters the wave characteristics causing it to degrade as it passes onto or over the Living breakwater. In this way a well-designed breakwater can become submerged by increased water depths (storm surges) and still continue to provide wave protection for landward properties providing long term durability.

The navigation markers on the breakwaters may require periodic maintenance and potential replacement. These markers will be maintained by the project owner.

The proposed shoreline restoration is intended to be a one-time placement of beach material (sand). Shoreline change modeling undertaken as part of the design process indicates that the breakwaters will effectively prevent significant erosion of this shoreline restoration, thus periodic beach nourishment will not be required.

- Action when design life is exceeded: The breakwaters are anticipated to function well beyond their design life although their storm wave attenuation abilities may be reduced over time with sea-level rise. The ecological benefits are anticipated to increase over time. No necessary action is anticipated.

### **Shoreline Protection Project**

The Shoreline Project is composed of a combination of hard (such as stone and concrete) and soft (such as plantings, earthen berms) features. The target functional design life is 50 years. All features will require typical grounds

maintenance such as monitoring plant growth and litter pickup similar to existing operations in the NYC Parks property.

To accommodate durability in the coastal environment, the project design will refer, as appropriate or applicable, to recommendations within FEMA P-55, Coastal Construction Manual: Principles and Practices of Planning, Siting, Designing, Constructing, and Maintaining Residential Buildings in Coastal Areas and the U.S. Army Corps Engineering Coastal Engineering Manual, and New York City Building Code.

The structures will be monitored on a routine basis through the city-wide Waterfront Inspection Program managed by the Economic Development Corporation (EDC), in accordance with EDC's inspection manual, to determine whether repairs would be necessary.

In addition, the following maintenance measures are required of each design feature:

#### Earthen Berm

The earthen berm will require typical grounds care. The plantings should be monitored and tended for signs of stress.

#### Hybrid Dune/Revetment

The plantings should be monitored and tended for signs of stress.

The grade of the dune sand is expected to change, even outside of major storm events, due to normal wind, rain, seasonal, and coastal effects. Additionally, there will be no separation between the dune sand and the stone armor core. The stone armor core will have large voids that will fill with sand over time. The specifications for dune sand placement will consider timing and construction methods to place sand and provide infill within the stone voids, but the infill process will continue to some extent over time.

Due to the armor stone core, maintenance of the sand is not required for the intended function of the structure. The armor core stone is expected to require no practical maintenance and will be concealed under most circumstances. If the armor core is exposed, the stone should be monitored or inspected annually for signs of movement.

#### Eco-Revetment

The plantings should be monitored and tended for signs of stress.

The revetment stone is expected to require no practical maintenance. The stone should be monitored or inspected annually for signs of movement.

The concrete is designed in accordance with New York City Building Code *Section BC 1904 Durability Requirements* and applicable durability requirements of ACI 318 for exposure to chlorides from saltwater and seawater spray. To better

accommodate the salt environment consistent with ACI and other design guidelines such as USACE, the concrete is proposed to be specified for a minimum 28-day compressive strength of 5,000 psi and a specified mix with a water to cement ratio of 0.40. Concrete should be monitored or inspected annually and any cracks or spalling should be patched.

#### Transition Nodes

The transition nodes will be constructed of concrete with the same durability requirements and maintenance discussed above with the eco-revetment.

The earthen berm, revetments, and stone armor core structures are designed to be stable under the hydrodynamic loads associated with the 1 percent annual chance exceedance flood without special requirements prior to severe weather.

**Comment 24:** Where will the money come from to maintain the pathway, hub, breakwaters? (Halvorsen\_Blayse\_031, Halvorsen\_K\_034)

**Response:** The proposed pathway will be maintained by NYC Parks. The proposed Water Hub, if constructed on-shore within Conference House Park, would be owned and operated by the State and/or City, with assistance from a non-for profit organization. If a floating vessel is selected for Water Hub activities, the non-profit organization would operate and maintain the vessel. New York State will own breakwaters and NYSDEC will maintain the breakwaters. See above.

**Comment 25:** How are you going to close this pathway? Are you installing lights or cameras? Parks are open dawn to dusk and this would be a 24 hour, 7 day a week operation with no gates. How are you going to stop people, criminals, from trespassing off this pathway especially at night and when people are at work? How are you going to stop people from trespassing onto homeowner's property to and from his pathway that will run through yards? (Halvorsen\_K\_055, Halvorsen\_G\_033)

Will this pathway have gates at either end so it could be opened at dawn and closed at dusk or will it be accessible 24/7? Will this path area specifically be policed? (Greco\_075, Halvorsen\_G\_033)

**Response:** Conference House Park property is open dawn to dusk. The proposed trail would operate as all other Conference House Park property. GOSR and NYC Parks have initiated discussions with the NYPD and with NYC Parks' Enforcement Patrol (PEP) unit to discuss post-construction patrol activities.

**Comment 26:** Further information should be provided on ownership and management responsibility of both the TSPP and breakwater structures. For example, the proposed actions encourage public engagement with both structures. How will the public be managed in all the different proposed use scenarios? The Project Resource Statement in Appendix D notes maintenance of the Living Breakwaters at a cost of \$633,495 per year for 50 years. Who will ensure, and fund, maintenance to sustain structural integrity of the breakwater structures? In

addition, maintenance responsibilities for the TSPP structures should be clarified. Further coordination with the Department will be required to develop a detailed monitoring plan, which would include analysis of physical and ecological performance of the proposed actions. (NYSDEC\_074)

**Response:** Please see response to Comment 23. A monitoring plan and adaptive management plan will be prepared as part of the project documents for permitting in consultation with NYSDEC.

**Comment 27:** How come the Army Corp of engineers is not doing this project? They have the equipment, expertise, and experience. (Greco\_075)

**Response:** As described in the EIS, rebuilding and resiliency planning post-Superstorm Sandy has led to various initiatives around the city, including in Tottenville, that have been coordinated among Federal, State and City agencies, including USACE. USACE and GOSR are Cooperating Agencies throughout the environmental review process and are working closely on permitting requirements.

**Comment 28:** Who are the designers of the breakwaters? Have they designed breakwaters before? (Greco\_075)

**Response:** The Breakwaters Project is being designed by a team led by SCAPE Landscape/Architecture PLLC. Team members include Arcadis, COWI, SeaArc Ecological Consulting, Ltd., and WSP among other consultants. The coastal engineers on the team are very versed in designing breakwaters, both in the New York region and worldwide. The marine biologists on the team have also designed habitats for breakwaters and other coastal structures worldwide.

**Comment 29:** Are there other locations in the United States where this same design for breakwaters is currently being used? (Greco\_075)

**Response:** The exact design for the breakwaters is unique in order to respond to the challenges faced along the South Shore of Staten Island – no two shorelines are the same and a uniform approach would not be effective. However, breakwaters are a common shoreline protection measure that is used throughout the United States and elsewhere, including Plumb Beach in Gateway National Recreational Area, in Sunset Park, Brooklyn, Winthrop Beach, MA, and Grand Isle, LA.

**Comment 30:** From your current plans what will be the overall foot print of these structures? And how many are there going to be constructed? What are the planned elevations above low tide and high tide for these breakwaters? How will the heavy breakwater structures affect the above sea level part of this project? (Greco\_030, Greco\_075)

**Response:** As described in the FEIS:

The breakwater system as currently proposed (preliminary 60 percent design) would have nine breakwater segments with a total length of approximately 3,200 linear feet within Raritan Bay and would be located between approximately 790 and 1,170 feet from the shoreline.

Three types of breakwaters will be constructed, defined largely by their differences in crest elevation (in North American Vertical Datum of 1988 [NAVD88]) and overall height, are proposed: Type A, Type B, and Type C. All would extend some height above MHW.

Type A breakwaters, or “low crested” breakwaters, have been designed to prevent shoreline erosion but would have minimal impact on wave heights during severe storms. The Type A breakwaters have been designed for locations where the shoreline and assets near it are less vulnerable to storm wave attack. Two segments of Type A breakwaters would be installed in the western portion of the project site near Ward’s Point. These breakwaters would have a crest elevation of 5 feet NAVD88 and an overall height of 11 feet and their crests would still remain above MHW with up to 30 inches of sea level rise.

Type B and C breakwaters have been designed to reduce risk to portions of the shoreline most vulnerable to storm wave attack. Five segments of Type B breakwaters would be installed, with a crest elevation of 14 feet, an overall height of 20 feet. Two Type C breakwaters would be installed offshore in the eastern portion of the project site, with a crest elevation of 14 feet, an overall height of 24 feet. Considering up to 30 inches sea level rise, modeling indicates that these breakwaters would be able to reduce wave heights to less than 3 feet in a 100-year storm event (a severe storm of a 1-percent probability in any given year), thereby reducing event-based as well as long term shoreline erosion and structural damage to assets on shore.

**Comment 31:** Where will the breakwaters be located as far as measurements from north to south? How far from the shoreline will they be? We need both the GPS locations and the closest Street from the shore as a landmark. What is the distance between each other? How will they be oriented with regards to the shoreline with compass direction? (Greco\_075)

**Response:** The eastern most breakwater segment would be about 1,095 feet offshore from approximately the terminus of Page Ave ( $74^{\circ} 13' 44''$  W,  $40^{\circ} 29' 55''$  N). The western most breakwater segment would be about 795 feet offshore from Ward’s Point ( $74^{\circ} 14' 47''$  W,  $40^{\circ} 29' 38''$  N). As currently proposed, the breakwaters would have a length of approximately 3,200 linear feet within Raritan Bay and would be located between approximately 790 and 1,170 feet from the shoreline. The distance between breakwater segments would vary, but generally would be a minimum of 200 feet apart. The breakwaters would generally be parallel to the shoreline to provide the maximum “wave shadow” at the shoreline from both storm damage and erosion causing waves. The most easterly breakwaters would

be placed at a steeper angle from shore. This is due to the fact that analysis of 30 years of hourly wave data indicated that virtually all waves greater than 3 feet in height came from the east or southeast. The easternmost breakwaters would be angled to maximize the storm wave attenuation potential for waves from this direction.

**Comment 32:** Can the locations, size, elevation, and or amount of these structures change during the project or construction phase? (Greco\_075)

**Response:** The elevations described in the EIS are based on the current design. Refinements in the design will occur as design progresses to 100 percent. To the extent feasible the breakwater structures will be constructed in accordance with the final design and within the maximum parameters analyzed within the EIS.

**Comment 33:** Can and will these structures affect beach erosion in a negative way? (Greco\_075)

**Response:** As described in the EIS, the breakwater system is designed to reduce or reverse erosion by holding sand in the system through wave energy reduction along the shoreline. The general direction of longshore transport through the project area is from the northeast to the southwest, thus the only down-drift feature from the project area is the bay itself. At the western tip (down-drift end) of the study area near Ward's Point, the breakwaters would likely reduce sand migration into the Federal Navigation Channel. The breakwaters were also designed to promote shoreline growth, or accretion, in places where the beach is most narrow, as well as to reverse the pattern of historic land loss, promoting the stabilization or accretion of beach in areas of the greatest observed historic land loss.

Shoreline change modeling of the current breakwater design scenario using the GENSIS shoreline change model indicates that the breakwaters will generate a net growth in beach (will reverse erosion) in the future. Down-drift erosion issues are not anticipated as the direction of longshore transport is east to west, and there is no beach southwest of the project area, only the federal navigation channel and Raritan Bay.

**Comment 34:** Are these breakwater structures test models? Have these structures by design, size, and contractor been used before in the United States? Where? When? How long ago? And what were the results? (Greco\_075)

**Response:** This exact design is crafted in order to respond to the challenges faced along the South Shore of Staten Island—no two shorelines are the same and a uniform approach would not be effective or technically advisable. However, breakwaters are a common shoreline protection method used throughout the United States and elsewhere, including Plumb Beach in Gateway National Recreational Area, in Sunset Park, Brooklyn, Winthrop Beach, MA, and Grand Isle, LA. The proposed design helps to bring more ecological enhancement opportunities into the design and create opportunities for colonization of the structures by bivalves. A qualified

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construction contractor will be selected through a competitive procurement process.

**Comment 35:** The breakwaters are something that is being put there to prevent wave action. There are no three foot waves in the bay. When Superstorm Sandy came, the problem was not the waves, the problem was the water running into our property, and water overflowing. This will not prevent water overflowing. (Farid\_053)

Super Storm Sandy was a tidal surge and these concrete islands will do nothing to prevent flooding if it were to happen again. (Greco\_030)

I am here to tell you that there are no waves. There are no waves, it is beautiful here. For them to want to come in and destroy what we have is really ridiculous. It is really hard to analyze what they want. (Castallano\_047)

Since the Raritan Bay is very shallow and only produces at best three foot waves, why do you need break waters here? (Greco\_075, Greco\_030, Greco\_046)

**Response:** As described in Chapter 1, “Purpose and Need and Alternatives,” the purpose of the Proposed Actions is to reduce wave action and coastal erosion along the shoreline in Tottenville, while enhancing ecosystems and shoreline access, use and stewardship. The Breakwaters Project has been designed to meet all aspects of the project’s purpose and need.

While the Tottenville shoreline is somewhat protected from ocean waves by Sandy Hook and the bay can be very calm, during certain storm events, the area is subject to damaging waves. As part of preliminary planning and design for the project, the design team used the SWAN wave transformation model to transform USACE wave hindcast data from the entrance of New York Harbor to the project area in order to obtain information on the long term wave climate of the area. In addition, the waves have been monitored in the area using two Acoustic Doppler Profiling (ADCP) units over the past year. Results of this analysis and monitoring show that while typical waves are smaller, waves over 3 feet do reach the project site during storm events. It should also be noted that modeling indicated that the smaller waves experienced on a day-to-day basis still drive erosion of the beach over time. Additionally, based on the revised preliminary FIRMs, the study area is fully within the 100-year floodplain in Zone AE (the area with a 1 percent chance of flooding each year) and Zone VE (an area of high flood risk subject to inundation by the 1 percent annual-chance flood event with additional hazards due to storm-induced velocity wave action, a 3-foot or higher breaking wave).

As part of the analysis of existing and historic conditions performed to inform the project design, the breakwater team analyzed 40 years of hourly historic wave data generated by transforming wave data from the USACE WIS station offshore using a SWAN wave transformation model. These data indicated that, while most waves were small, waves over three feet were reaching the project area during storm events. It should be noted that the significant wave height for the project

area reported by FEMA for the 100 year storm event is 5.3 feet (associated with a Stillwater elevation of 12.9 feet).

Additionally, wave attenuation provided by the breakwaters on a day-to-day basis would help to maintain beach conditions by reducing long term beach erosion rates, reducing exposure of shoreline structures to erosion, and encouraging accretion in priority beach zones.

**Comment 36:** Hurricane Sandy measured a 32' tidal wave off of Sandy Hook. These breakwaters will do nothing for a 32' tidal wave, they are completely useless. What will cause beach erosion is, Nassau Smelting, the person who bought that property is planning on putting a ferry, a fast ferry that will go 50 miles an hour, creating a 4' wake going through the channel and past these breakwaters. That is going to cause beach erosion. (Sarnes\_062)

**Response:** See response above regarding wave data in the project area. The wake created by the proposed fast ferry mentioned in the comment would be well within the range of wave heights accounted for in the design of the breakwater structures. Additionally, the fast ferry is expected to travel within the Federal Navigation Channel which would be at least 700 feet from the breakwater structures.

**Comment 37:** You do not need these block sized islands to stop a two and a half foot wave. It is ridiculous, and as far as erosion, we have people on the beach that have taken measurements for the past 35 years from a benchmark that have been unmoved, and there is no erosion whatsoever. The only erosion that does happen is from the storm outdoor pipes that need to be extended. Every time it rains you get a huge amount of water that washes the beach away. (Greco\_046, Greco\_030)

**Response:** Aerial photo documentation indicates that there has been significant erosion of the beach area over the last 35 years. Historic erosion analysis using high resolution aerial imagery provided by NYSDEC and NYC DOITT dating back to 1978 was performed as part of the project documentation and indicated that significant erosion has occurred. In some areas, erosion rates greater than 2 feet/year were observed.

While the outfalls have a temporary, localized impact on beach erosion, they are not the primary driver of the overall loss of beach width. Based on observation, the erosion channels observed immediately following storm events recover quickly due to the overall longshore and cross shore beach transport. In addition, the erosion is primarily observed above the bay water level because the water velocity from the outfalls quickly dissipates when it meets the bay. As the water velocity slows, the flow no longer moves the sediment and it is re-deposited on the beach. Since the velocities dissipate quickly, it is probable that most of the displaced sand remains in the system, and as such does not contribute significantly to the overall erosion pattern.

Two related factors are the likely primary drivers of beach erosion in the study area. Based on the observed wave conditions, the primary direction of sand movement is from northeast to southwest. The first cause of beach erosion is an overall lack of sediment entering the system from the northeast. This is likely due to human-influenced (anthropogenic) factors such as updrift armored bluffs, groins and potentially dredged channels. Such structures capture sediment and prevent that sediment from reaching downdrift locations. Second, the project area location at the southwest corner of Staten Island and the general northeast to southwest movement of sediment drives the sand past Ward's Point and into the Arthur Kill, where the sediment is lost to the beach system.

**Comment 38:** As the Projects reach the end of their design life, more information should be provided regarding their adaptability to either be enhanced to extend their functionality or be repurposed to meet other (possibly similar) goals and functions. For example, the breakwaters represent relatively large in-water structures, which pose challenges with respect to maintenance and longevity. What measures can be taken to ensure the breakwaters continue to reduce coastal hazard risks and provide diverse habitats even as the concrete's durability lessens over time? (DOS\_025)

**Response:** Future performance of breakwaters depends on severity of extreme events, sea level rise trend, and level of maintenance. The structure's design does not prohibit future modifications as climate change impacts our environment. Periodic inspections and a set of maintenance activities will be identified to ensure breakwater system performance. With maintenance (anticipated to be minimal), breakwaters are expected to retain their ability to provide habitat, protect shoreline, and reduce coastal hazards after their service life end at a likely reduced level.

**Comment 39:** The breakwaters would be rubble mound structures made of a combination of hard stone and biologically enhanced concrete armor units. Concrete has a lower specific gravity than most rock, therefore it is more buoyant. As a result, either the concrete has to be enhanced to be as stable as the rock (how does the concrete mixture achieve this), or the concrete has to be anchored (how will this be done). Please clarify how the concrete will remain in place.

The weight of the armor stone needs to be greater than the wave forces breaking on the structure in all conditions. Is the size of the armor stone adequate to ensure the structure's stability? The D50 size noted on Figure 1-7 appears to be smaller in comparison to rock used for projects, such as jetties, in other locations around the outside of the Harbor. (DOS\_025)

Concrete blocks from breakwaters will “go through everybody’s house” as driftwood did during Superstorm Sandy. (Rivela\_066)

What will happen with the ebb tides changing daily and storm currents moving even faster around the perimeters at the base of these heavy structures [breakwaters] will be undermined causing separation of concrete and stone. The separation of concrete and stone caused by the changing tides on the base of these heavy structures will cause large cracks, which could become unescapable for seals that use rock formations to climb onto for sunning. (Greco\_030) (Greco\_030).

The design of the breakwaters shows "core stone" surrounded by geotextile layers as forming the core of the breakwaters. Additional discussion should be provided surrounding the stability of these stones, and the proposed armor stone, in the face of various storm scenarios. Given the large fetch in Raritan Bay and its exposure to nor'easters, there is potential for rock to move or become dislodged during a storm if not adequately sized or engineered. (NYSDEC\_074)

**Response:** Specific gravity is the relationship of a cubic foot of a substance to a cubic foot of water. Granite has a specific gravity of 2.6 to 2.7, Basalt or "Traprock" has a specific gravity 2.8 to 3.0 and concrete, although dependent on the mix ratio has a specific gravity of approximately 2.3. To obtain suitable stability the materials are selected by size. By controlling the shape and size of the structure it is designed to function in existing and future conditions. Breakwater armor stone parameters were determined using industry accepted methods (Hudson formula) and comply with USACE Coastal Engineering Manual (CEM) recommendations. Stability of concrete units was established using analytical methods from CEM. Further stability of armor and concrete units will be identified during scaled physical modeling tests.

A detailed analysis of long-term wave data has been performed and conservative 100 year design parameters have been established. All elements of the breakwaters were designed for the 100 year environmental parameters. Physical testing will provide higher level of confidence in the breakwater design.

The breakwaters, including the placement of armor stone and bio-enhancing concrete units, have been designed to be structurally stable and retain the breakwater's form and functionality under observed and projected tidal and storm conditions (both surge and waves). Scaled models of the breakwater design have been tested in a wave tank and the design and materials were found to be stable, even under conditions exceeding the design parameters. Numerical models of flood and ebb tides were performed to examine the potential for scour around the structures. Using this analysis, the breakwaters have been designed to account for scour and avoid any undermining of the structures that might result in dislodging significant numbers of stone, settlement in the structure, or separation between armor units described in the comment.

**Comment 40:** They want to use polypropylene mats that they call a bio text product. This is extremely deceptive. Then they say that they are using toe armor units. Those are

concrete blocks. I priced them at \$2,000. This is where and why this project was conceived in the first place for someone or group to make most of the money on these unneeded, unwanted, unnatural, \$2,000 each concrete cubes. They are probably going to use 100,000 of these blocks to build these things (breakwaters). These things are nothing more than an environmental nightmare about to happen. I have yet to see man improve upon nature, and this hair brain scheme of putting concrete blocks in our bay with polypropylene, the polypropylene is going to disintegrate, the crabs, the fish, and all the marine species that are under it are going to be eradicated.

There is also a second upper layer of this polypropylene that will also come apart into trillions of pieces becoming an environmental and ecosystem nightmare for generations to come. The fish, crabs will eat these pieces and get into the food chain of larger fish, birds, and humans. This material is not natural to the Ocean environment and should not be used in any way, shape, or form. As admitted by manufacturer specs the ocean and sun will break it down.

Armored toe units, AKA Concrete Cubes, by the tens if not hundreds of thousands, this is another man made compound that is not natural that will leach chemicals that will affect the PH level of the water and effect all marine life in this very shallow bay area. Putting Concrete Cubes on top of the polypropylene will create an addition chemical reaction which will speed up the deterioration effects and pollute our loved Raritan Bay, our eco system, and environment. (Greco\_046, Greco\_030)

**Response:** Geotextiles are a durable material commonly used in marine construction. Geotextiles are either woven or non-woven permeable fabric, synthetic materials used as permeable protection layers, to secure other materials in place to reduce the potential for erosion, resuspension of sediment, or mixing of materials. They can also provide a foundation to prevent the erosion of base soils and ensure the structural stability of coastal structures such as breakwaters, groins, and jetties. Geotextile materials are designed to last indefinitely, only affected negatively if directly exposed to UV radiation consistently.

The current design includes a single layer of geotextile placed under the breakwater before the stone is laid down to reinforce surficial soil at the bay floor and distribute loads of the breakwater to help ensure stability throughout the structure. The second layer of geotextile shown in the DEIS design between adjacent layers of stone is not currently included in the updated design as it was deemed not to be necessary to prevent stone mixing.

Geotextiles have a long history of use in marine construction. The first documented uses of geotextile within the U.S. date back to the late 1950's, when waterfront property owners began looking for a more efficient way to provide a filter layer for protective structures, in place of the costlier graded granular layers that were normally used. In 1972, after 10 years of evaluating the new concept,

the USACE issued their first comprehensive specification for filter fabrics, thus accepting geotextile layers as the superior construction technique.

The concrete used in the breakwaters will be bio-enhancing concrete units. Overall, approximately 1 out of every 47 armor units will be made of bio-enhancing concrete (based on volume); the remainder will be natural stone. There are two types of bio-enhancing concrete units that will be used in the breakwaters: (1) Bio-Enhancing Concrete Armor Units, Cubed-Shaped Armor Units With Chamfered edges and faces specifically contoured (textured) to create complex surfaces that attract biological organisms and allow them to settle and stay on the units; and (2) Bio-Enhancing Concrete Tide Pool Units, basin-shaped units capable of holding water between tides, designed to mimic the form of natural rock pools to be placed in the intertidal zone. The current design proposes use of up to 2,500 bio-enhancing concrete armor units and tidepools combined (most likely less).

The bio-enhancing technology intended for use for the manufacturing of these concrete units is scientifically tested and is based on specially developed concrete composition, micro-surface texture, and designs that encourage growth of target marine flora and fauna. In various case studies and lab tests, the bio-enhancing concrete products successfully supported a high range of native marine species, reducing the native/invasive species ratio, increasing localized biodiversity and favoring key marine species such as oysters. Promotion of engineering species like oysters, tube worms and barnacles, which by the deposition of a calcium carbonate layer on the concrete surface, create biogenic build-up, not only increases the availability and heterogeneity of biological niches on the structure, but also contributes to the structures' stability and longevity via Bioprotection, a process in which animals and plants protect the surfaces they colonize from weathering and erosion (<http://www.biogeomorph.org/coastal/bioprotection/>)

As discussed in Chapter 9, "Natural Resources," of the EIS, the proposed ecologically enhanced concrete has also been tested in the marine environment.

Peer reviewed research papers were published on the positive performance for biodiversity and species recruitment for the material being considered thus, any substitute material would be required to provide equal documentation of positive environmental performance.

There is no indication that contact between the concrete units and geotextile would provide active chemical reactions.

The rock proposed for use in the breakwaters structures is a naturally occurring material. Further, all materials used in the construction of the breakwaters will require approval of the NYSDEC and USACE.

The proposed breakwater structures are designed to be compatible with the existing conditions of soil conditions, current and predicted water depth, wind energy, and the resulting wave activity. Additionally, the proposed sites of the

Living Breakwaters were selected based on an extensive assessment of the sites and the aquatic biota present within this portion of the Raritan Bay. While there will be some displacement and even destruction of some bottom dwelling organisms, the increase in habitat complexity, including those due to changes in the natural wave activity would result in increasing the diversity of invertebrates and fish on and in the vicinity of the breakwater structures.

**Comment 41:** On page 1-13, the Breakwaters System paragraph states: “Additionally, the vast majority of the breakwater structures would be located more than 1,500 feet from the Federal Navigation Channel with one breakwater segment located more than 700 feet from the channel.” It is unclear whether 700 feet is the minimum clearance to the breakwaters. Although the channel is low speed and confined, vessels do not always stay on course and could damage the breakwaters. (DOS\_025)

The Breakwaters in our bay seems to be a very dangerous idea as well. There are many large vessels as well as small ones using this very narrow bay and adding large cement structures in the bay would be deadly. Who will be accountable for the injuries and deaths caused by this? Please reconsider using these funds toward cleaning up our city rather than adding more dangerous structures to it. (Liotti\_035)

From the beginning Ward's Point of the Arthur Kill to Page Ave. 700 to 1,200 feet off shore they plan on building 10 massive concrete cube structures 5 to 14 feet above sea level with a base footprint which could exceed one million square feet. This is the most poorly conceived project of them all, because this not only puts people's lives, eco systems, and the environment at risk, it puts marine navigation in great peril. Much of the traffic in this shipping lane has commercial size craft that transport fuel for the airports, Mixing fuel ships with a much increased potential for collision is diabolical, and insane. Marine navigators will have an obstructed field of view with these structures jutting up to 14 feet many marine craft will simply not see approaching craft in time to avoid collision, they're going to be boaters going in and out between islands causing T-Bone collisions with larger craft.

This will also cut your length of view from a distance of what is coming and going to and fro from the Arthur Kill creating many blind spots for navigators. Boats and ships do not have ABS Disk Brakes. High winds, snow storms, fog, heavy rain, all play a factor in control and visibility putting these structures at this location is a 100 percent recipe for disaster with maritime craft and shipping. Lightning, solar flares and break downs can contribute to the loss of GPS navigation control, combined with foul weather and darkness will cause environmental disasters when large tankers breach their hulls on these concrete fortresses and leak millions of gallons of fuel into our Bay. Weather 14 foot or 5 foot above sea level all these structures are very dangerous because small craft cannot see over the 14 foot areas and large craft will have trouble seeing the 5

foot areas. About thirty years ago, in dense fog, a 600' plus tanker meandered from the dredged channel reach imprecisely the area currently designated for the offshore reef system, finally grounding along the beachfront between Sprague Ave. and Yetman Ave., some fifty feet from the high water mark, dragging two channel-marking buoys with it. Pilot had more than 30 years' experience. Had the proposed reefs been in place rather than the currently extant hard sand, it is more than likely that there would have occurred a breach of the double bottom hull with consequent spill of catastrophic proportions. The large cracks associated with sea level rise would also cause the [channel] lights to come apart with structure separation losing the connection and lights to fail, causing serious night time (which will require a man 24/7 to be on duty for maintaining them). Any underwater structure will bring fish, fish brings fishermen, and drifting boats close to shipping in the channel will bring marine collisions without any doubt. (Greco\_030)

I also think that the breakwaters need to be reconsidered as well. I sit and look out of my window as large ships, small boats, jet skis and more are going back and forth in the bay and wonder "will they be able to see the breakwaters? Will they crash into them?" (Gentile\_G\_029)

Since the breakwaters will be off shore, we would also like to see the system design for powering and lighting to curtail night navigational accidents. The long groin jetty's off Reynolds Channel, Breezy Point, Coney Island, Norton's Point, Red hook, and Sandy hook have all been locations of maritime accidents and deaths. I have seen nothing to show how this would be lighted and maintained; then again the people that came up with the project probably think these shipping lanes are closed at night time. (Greco\_075, Greco\_030)

**Response:** As described in Chapter 1 of the FEIS, the breakwater system as currently proposed (preliminary 60 percent design) would have nine breakwater segments with a total length of approximately 3,200 linear feet within Raritan Bay. The vast majority of the breakwater structures would be located more than 1,700 feet from the Federal Navigation Channel with the closest breakwater segment located more than 700 feet from the channel. The breakwater structures would occupy approximately 495,900 square feet (approximately 11.4 acres) on the bottom of Raritan Bay.

There are two components of the response due to the initial focus of the DEIS statement of proximity to the Raritan Bay Federal Navigation Channel, Ward Point Bend (East) and local navigation outside that federal channel. Raritan Bay is a shallow water embayment particularly in the proposed Living Breakwaters area. Although the Federal Navigation Channel is maintained at minus 35 feet of depth at mean lower low water (MLLW) the adjacent shallows are typically waters with depths of less than ten feet at MLLW. This shallow water restricts deeper draft vessels from leaving the Federal Channel because of the potential for grounding. In 2015 the US Army Corps of Engineers (USACE) modified Section

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408 of their regulations dealing with the Rivers and Harbors Act of 1899 and Federal Navigation Projects. The revision requires that work being performed within a setback distance of three times the authorized depth of a Federal Channel coordinate with them. In the case-at-hand that setback distance is 105 feet. All the Living Breakwater structures are well outside that zone.

For both commercial and recreational shallow draft vessels, leaving the channel is an option and to help boaters navigating in that area the National Oceanic and Atmospheric Administration (NOAA) issues navigation charts that are regularly updated to reflect local conditions. In the project area their Chart number 12332 (Raritan River Bay to New Brunswick) provides water depth insights. It is anticipated that the US Coast Guard will require navigation aids to provide visibility to mariners as is typically done for these structure types. The type and location of the navigation aids will be provided in accordance with federal regulations for the structure's classification.

As noted in the DEIS, the project proponents do not anticipate there being any navigation issues created by project implementation or operation.

**Comment 42:** A portion of the eastern-most breakwaters appears to extend into New Jersey waters and coordination with New Jersey officials may be necessary. (DOS\_025)

**Response:** No portion of the Breakwaters Project extends into New Jersey waters.

**Comment 43:** Where, when and how many times was the flushing test performed? (Greco\_075)

**Response:** As described in the DEIS, hydrodynamic modeling (using DELFT 3D) was conducted to analyze tidal flushing in the project area. This modeling analysis projected that negligible changes in tidal flushing would result from the proposed breakwater alignment. Changes in residence times (time water remains in the area shoreward of the breakwater segments) were modeled as less than a few hours. Thus, modeling confirmed that the Breakwaters Project would have negligible, if any, impact on water circulation and flushing and thus water quality within the study area. Detailed information regarding this modeling can be found in Appendix E-5 of the EIS.

**Comment 44:** How much beach fill is being planned? Are you planning to make the beach longer? By how much? (Greco\_075)

**Response:** As described in the EIS:

Sand placement to restore the historic shoreline position is being proposed between Loretto Street and Manhattan Street, downdrift (southwest) of the outfall at Loretto Street, where building the beach will have the most benefit in the vicinity of elements of the proposed Shoreline Project., and where the beach is currently narrow and has experienced high rates of historic erosion (around 2.0ft/year from 1978 to 2012). The proposed area of shoreline restoration would extend along approximately 806 feet of shoreline in an area of approximately 3.1

acres. This 3.1-acre area was selected for one-time shoreline restoration because of high historical and projected erosion rates, and narrow beach width. The shoreline restoration would extend the beach at +5.0 NAVD88 by approximately 50 feet and then slope downward to meet the existing bathymetry. This one-time placement of sand would approximate the historic 1978 shoreline position, augment the accretion potential that can be provided by the breakwaters and add sediment to the overall system, particularly contributing to one of the narrowest and most erosion-prone areas of beach in the site and generally enhancing overall beach growth potential.

**Comment 45:** The proposed "Shoreline Restoration" element requires further justification. Placement of 15,369 CY of sand below mean high water constitutes an adverse impact to the littoral zone wetlands, and based on the similar modeling performance in Appendix E of Scenarios 15 and the 30 percent Design Scenario, the DEIS is not clear as to why this project element is necessary to ensure the performance of the breakwaters. It is noted this placement of sand would protect the hybrid dune/revetment from erosion until this area accretes as a result of the breakwaters. Were any other interim protection strategies analyzed for the hybrid dune/revetment section in this area? Could the amount of sand placement be reduced? (NYSDEC\_074)

**Response:** As described in the EIS, a 3.1-acre area was selected for one-time shoreline restoration because of high historical and projected erosion rates, narrow beach width. The shoreline restoration would extend the beach at +5.0 NAVD88 by approximately 50 feet and then slope downward to meet the existing bathymetry. This one-time placement of sand would augment the accretion potential that can be provided by the breakwaters and add sediment to the overall system, particularly contributing to one of the narrowest and most erosion-prone areas of beach in the site and generally enhancing overall beach growth potential. The results of modeling indicate that without the proposed shoreline restoration, this stretch of beach would be slow to respond to the breakwaters and may not achieve the necessary width for risk reduction and maintaining public access.

The Shoreline Project's design team has analyzed storm induced scour potential of the beach and hybrid dune/revetment without the proposed beach nourishment. At the location of the proposed shoreline restoration, the estimated scour at the toe of the armor core stone was the highest relative to the other project areas due to the closer proximity of the hybrid dune/revetment to the water line. The armor core stone in the preliminary (30 percent) design was set to an embedment depth and size to provide stability under this scour condition, assuming no shoreline restoration. However, the proposed shoreline restoration would have the benefit of affecting a longer lifespan and reducing required post-storm maintenance of the beach to maintain the toe of hybrid dune/revetment.

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**Comment 46:** The proposed project includes a 1,500 square foot floating dock installed adjacent to the Type C eastern breakwaters to "facilitate monitoring and research activities." The need for a dock of this size is not fully justified in the DEIS. How many vessels will utilize the dock at any given time? In the event of a storm, how will the dock be secured? How will the design prevent the dock from hitting submerged breakwater sections? The full intended use of this dock should be further explained and justified. Were any other alternatives to a dock (i.e., temporary mooring for research vessels) analyzed? (NYSDEC\_074)

**Response:** It should be noted that as described in the FEIS, a floating dock is proposed in association with an on-shore Water Hub option (Potential Locations 1 and 2). If the proposed vessel for the Water Hub is selected (Potential Location 3), a floating dock would not be included as part of the project. If included, the floating dock would be used seasonally by a non-profit organization (such as the Billion Oyster Project [BOP]) to bring local students and volunteers to the breakwaters to monitor ecology of the breakwaters and structures themselves. The dock would provide the necessary workspace for these activities. This type of community engagement is intended to promote the understanding of marine habitat, climate change, and coastal resilience in NY Harbor.

For logistical reasons, it is expected that one boat would be used at a time to bring students and volunteers to the breakwaters.

This floating dock will be modular, and therefore lightweight, flexible, and can move with waves. This built-in flexibility will allow the floating dock to adapt to changes in wave frequency and height. The dock will be secured to a mooring block system of bio-enhancing concrete units and will be placed an adequate distance from any breakwater segment to prevent the dock from striking the submerged portions of the breakwaters.

**Comment 47:** The Department has concerns surrounding the seasonally deployed, temporary floating dock to be located at the Water Hub, particularly at Potential Location 1 (Page Avenue). This is a structure of substantial size (210' long, 8' wide), and would be located within a Coastal Erosion Hazard Area and be subject to the wave action and currents of Raritan Bay. How would this structure be anchored to the bottom of the Bay (Page 1-16)? Please provide more information surrounding how visitors and researchers would access the floating dock, and whether the dock would be removed prior to large storm events — and who would be responsible for doing so. The structure would be vulnerable to wave action and damage since it is not protected by the breakwaters. Also, Figures 1-10 and 1-11 call the structure a "boat launch from shore", which conflicts with other DEIS descriptions as a floating dock. This project element would need to be further developed in coordination with the Department as part of the permitting process. (NYSDEC\_074)

**Response:** The floating dock and floating boat launch are two separate project elements. A floating dock is proposed in association with an on-shore Water Hub option (Potential Locations 1 and 2). If the proposed vessel for the Water Hub is selected (Potential Location 3), a floating dock would not be included as part of the project. The floating dock is a floating dock structure anchored/moored offshore in the lee of one of the two type C breakwaters. It would serve research vessels visiting the breakwaters from outside the project area. The floating boat launch is a floating, seasonal structure that would allow boat access to the shoreline at the proposed Water Hub. Given that the Page Avenue site is no longer being considered as a site for the Water Hub, the floating boat launch proposed at that location would no longer be necessary. However, in the interest of completeness and to allow for a thorough comparative analysis of alternatives, the FEIS conservatively retains the analyses that were presented in the DEIS that were associated with this location for the Water Hub.

The floating dock will be anchored to the sea floor with bio-enhanced concrete armor units would be placed on the seafloor and used as anchors for the dock. Once installed, the floating dock will be located in the protected lee of the breakwaters. While waves may come from many directions, analysis of 30 years of historic transformed wave data in addition to a year of wave data collected from Acoustic Doppler Profiling (ADCP) units deployed on site indicate that the dominant wave direction is from the east / southeast, and that the largest waves come exclusively from that direction. The dock will be placed west of the breakwaters in the “wave shadow” of the breakwaters to minimize wave exposure and potential damage. Additionally, current plans call for the dock to be unmoored and towed to harbor for storage during the winter months when it is not being used.

**Comment 48:** What is the Water Hub going to be used for and what kind of activities will be taking place? What kind of outdoor activities will take place? (Greco\_075)

**Response:** As described in the FEIS, since the publication of the DEIS, an additional option for Water Hub activities (Potential Location 3) has been included. Potential Location 3 would involve a “floating” Water Hub—a vessel operated by a non-profit organization (e.g., BOP) that would visit the project area, operating out of existing facilities in the City.

The proposed Water Hub—including associated wayfinding locations and signage at points along the shoreline—would provide a place for access to the waterfront, orientation, education, information on shoreline resiliency, community gathering space and if located on-shore, potential equipment storage for NYC Parks maintenance. In particular, the Water Hub programming could include classrooms and labs, engaging students in waterfront education, citizen’s science, oyster restoration and reef building, and cultivating long-term estuary stewardship. The educational programming for the Water Hub would directly tie to the in water components, as well as to any shoreline resiliency components of

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the Proposed Actions. In addition to ecological engagement, the Water Hub facilities and programs are intended to educate residents on the risks and benefits of living in the coastal environment and build awareness, preparedness and stewardship within the community. The Water Hub may also include other elements, such as, exhibition space, maintenance-related storage space and offices, and terrace space.

**Comment 49:** What is the elevation of the Water Hub? (Greco\_075)

**Response:** As described in the EIS, different locations are being evaluated for the proposed Water Hub. Potential Location 1 would be in the vicinity of the southern terminus of Page Avenue (involving the construction of a new structure). Potential Location 2 would be in the north-western portion of Conference House Park (involving the rehabilitation and adaptive reuse of an existing NYC Parks building). Potential Location 3 would involve a “floating” Water Hub—a vessel that would visit the project area, operating out of existing facilities in the City. At Potential Location 1, the Base Flood Elevation (BFE) is approximately +14 NAVD88 east of Page Avenue and approximately +13 NAVD88 west of Page Avenue. While no design plans have been finalized, if sited at Potential Location 1, the enclosed programming within the new Water Hub structure would be well above the Design Flood Elevation, which is three feet above the BFE of the selected location. Programming below the enclosed structure would be floodable. If sited at Potential Location 2, the Water Hub would be at approximate elevation +64 NAVD88 within the existing Henry Hogg Biddle House, or at approximate elevation +35 to 40 NAVD88 within the existing Rutan-Beckett House. Both of these locations are well above any current or future potential flood elevations.

**Comment 50:** What are the hours and days of the week this building will be open? (Greco\_075)

**Response:** If the Water Hub is located within Conference House Park (Potential Locations 1 and 2), it would adhere, at most, to existing Conference House park visitor hours. If the floating hub option is selected (Potential Location 3), the vessel would operate during day time hours from approximately April to November, host community events approximately twice per month, and hold student based teaching events approximately once per week.

**Comment 51:** Will the windows of the Water Hub be able to open? (Greco\_075)

**Response:** While the design plans for the proposed Water Hub have not been finalized, it is anticipated that any habitable space (e.g., excluding storage) in all options would have operable windows.

**Comment 52:** How many children at one time can be expected to come to this facility? (Greco\_075)

**Response:** As described in the EIS, although there are many different activities that could take place within the proposed Water Hub, the frequency of these activities are

expected to be sporadic (and spread out among different days of the week and time of the day) and most events would not draw many patrons. A typical school group could potentially have approximately 35 students, plus their teachers/chaperones.

**Comment 53:** Will there be a parking lot next to the proposed Water Hub building? If so, how big is the parking lot? (Greco\_075)

There is not enough parking along Page Avenue to accommodate a Hub as there is no place for residents to even park their cars (Rivela\_066)

**Response:** As described in the EIS, depending on the selected site, the Water Hub would include parking for visitors adjacent to or near the facility. If located on-shore (Potential Locations 1 or 2), parking (either existing or proposed) would accommodate one bus and up to approximately 20 cars. No new parking will be provided for the floating vessel Water Hub option (Potential Location 3).

**Comment 54:** Will you be serving food at the proposed Water Hub? (Greco\_075)

**Response:** The proposed Water Hub would not include a retail food establishment.

**Comment 55:** Will you have a dumpster outside? (Greco\_075)

**Response:** The proposed Water Hub is still in conceptual design phase; if located on-shore within Conference House Park, it is expected that waste management will be consistent with NYC Parks practices.

**Comment 56:** Who will pick up the garbage – NYC or private sanitation? (Greco\_075)

**Response:** Solid waste collection in Conference House Park is currently handled by the City. It is anticipated that current practices would continue with the project.

**Comment 57:** If you are having activities in the water, will you have a life guard present? (Greco\_075)

**Response:** The organizers of any in-water activities will meet the NYC Parks and/or Department of Education safety requirements.

**Comment 58:** The Water Hub building needs to be located at Conference House Parks at the end of Hylan Boulevard. It will cost millions less to build and maintain. You have 267 acres; it's away from a community now you have a buffer zone you're not taking away the safety and quality of life and will not be an invasion of privacy of the community. It will be safer for the building and visitors you already have pathways, parking, public transportation, restrooms, and it will also bring more money to the parks so they can make improvements to the parks. (Fulginiti\_011, GroupLetter2\_003, TottenvilleResidentsPetition\_001, Tottenville\_Resident4\_022, Unknown\_024, Panarello\_A\_048, Panarello\_M\_050, Amato\_058, Galarzo\_069, Panarello\_072, TotenvilleCivicAssoc\_042, Halvorsen\_K\_055)

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Why are we installing a pathway, hub that has nothing to do with protection especially a water hub...Water hub location to be put at proposed site #2 or #3 not at the bottom of Page Ave. where the infrastructure is not there. Infrastructure is already in place at the proposed sites. (Halvorsen\_Blayse\_031, Halvorsen\_K\_034)

There should be no pathway/fence or water hub building running east of Sprague Ave to Page Ave. It will only put this community in harm's way, and the community is totally against. The millions of taxpayers' dollars saved by not doing this project can be used for protection and other projects. (Fulginiti\_011, GroupLetter1\_002, GroupLetter2\_003, Tottenville\_Resident3\_021, Unknown\_024, Halvorsen\_Blayse\_031, Goody\_045, Panarello\_A\_048, Abdenour\_049, Farid\_053, Halvorsen\_J\_054, Amato\_058)

The subject is the Tottenville shoreline pathway and water hub east of Sprague Ave to Page Ave. We the Tottenville residents need to know who are the city and state officials who are giving input and making decisions on the safety and lives of the Tottenville community on this project. (Halvorsen\_G\_052, Halvorsen\_K\_055)

The water hub proposed to be erected down Page Avenue is not a good idea either. This would not be accessible to anyone! It would end up being an abandoned building—again being a place for illegal acts to be performed. This hub would be beneficial if it were in another location where all of Staten Island residents can access it and benefit by it. A good location would be down by the Conference House or Near the Staten Island Ferry Terminal- where all New Yorkers would benefit. (Liotti\_035)

We need the water hub building to be located at the Conference House (at the south end of Hylan Boulevard), where it has a 260-acre buffer zone. This hub can bring money to the conference house and be protected from the bay. Parking and public transportation are already in place to access the water hub if built at this location. (TottenvilleResidentsPetition\_001)

Put the water hub at Conference House Park, which would provide a buffer zone for the community. (GroupLetter2\_003, Panarello\_017, Tottenville\_Resident2\_020)

The hub according to the DEIS, states that it is for resilience, and to bring people in, and to have people be able to share the waters and enjoy the water. The fact is, the water is there, the beach is there, and people can enjoy it, and there is no reason to build a house or structure there for people to come and enjoy it. If the hub has to be built, it needs to be down shore in the Conference House, not behind residences. (Farid\_053)

Finally, the proposed Water Hub locations are unsuitable. They are in out-of-the-way places, not easily accessible and lacking parking spaces for visitors and bus access for schools and youth groups. Current street access is not adequate for emergency vehicles, if and when such may be needed. A better location would be

near the Conference House, where there is already adequate access and parking (which could be slightly improved as part of the Water Hub), along with restrooms and connection to New York City Water and Sewer lines. Locating the Water Hub near the Conference House would reduce the construction time and expense by making use of existing resources. It would also promote more visitors by making it convenient to a popular cultural resource. (Lund\_036, Reback\_061, Savlo\_063, Abela\_065)

The areas that this project wants to add this hub and walkway to are not easily accessible, not well lit, and not even paved. This makes it dangerous to walk down to access these proposed elements. It would be even more dangerous to drive to these places. There's barely enough room for one car to drive down to that area, having two cars driving in opposite directions would be extremely hazardous, and would increase traffic and become a logistical nightmare. This additional traffic would also be dangerous to pedestrians who walk down these streets every day. The proposed walkway along the beach could also potentially be dangerous to people who would try to access it since there is no direct walkway from the street and one has yet to be proposed. This could be deadly if an emergency occurred on this walkway since EMS, NYPD or FDNY would have no way to get to their victims in time. How would they drive their trucks down the narrow streets? How would they access this walkway with our homes in the way? (Gentile\_G\_029, Shapiro\_067)

Bringing a commercial size building (a school) at the end of Page Avenue into a residential area that does not and cannot handle the utilities required, sceptic required, commercial traffic such as school buses to bring people back and forth, the trucks to resupply and remove garbage, a means of emergency vehicles not having easy access and last but not least encroaching on an area that is slatted Ever Wild is just another betrayal to nature. We scouted several areas where you would have the grounds, facility, parking, utilities, and public transportation on a major avenue with sewers. These areas can use the attention such as the base of Buffalo Street at Great Kills Park, Seguine Ave on Huguenot Beach, Wolf's Pond Park, Mount Loretto, across the street at Cunningham Road going to the Ranger Station or last the Conference House Park. These Locations can provide the needs for a school with room for expansion with no interference to residential areas. They would be a shorter ride for buses from other areas. Instead of a small school (The water Hub) you could build a world class marine biology / Nature / Farm institute with all levels of study and teaching for all ages. Think about what a positive impact this could have for future generations to come on Staten Island, once the garbage dump of NYC. Then before you plan to do anything else with nature, our environment and ecosystem you should be forced to attend this school to learn something before you meddle in it with any more of your delusional plans. (Greco\_030)

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**Response:** As discussed in the FEIS, since the publication of the DEIS—in response to public comments received during the public review process and additional feasibility considerations—Potential Location 1 for the Water Hub (in the vicinity of the southern terminus of Page Avenue) has been removed from further consideration for implementation. However, in the interest of completeness and to ensure a detailed comparative assessment of potential alternatives, the FEIS conservatively retains the analyses that were presented in the DEIS that were associated with this location. It should be noted that the DEIS also considers Water Hub Potential Location 2, which would be in the north-western portion of Conference House Park and involve the rehabilitation and adaptive reuse of an existing NYC Parks building. Additionally, since the publication of the DEIS, an additional option for Water Hub activities (Potential Location 3) has been included to further consider minimizing the project’s onshore footprint and to enhance the connectivity with the Breakwaters, which is key element with respect to the purpose and need for the Water Hub. Potential Location 3 would involve a “floating” Water Hub—a research vessel operated by a non-profit organization. The proposed trail would continue to Page Avenue as described in the DEIS, to further NYC Parks’ continued commitment to providing waterfront access within City parkland. GOSR and NYC Parks have initiated discussions with the NYPD and with NYC Parks’ PEP unit to discuss police patrol access.

**Comment 59:** Are you going to build a pier at the location of the Water Hub? If so, how high and how far out will the pier go? What will the pier be made out of and who designed it? Will it disturb the marine life already existing? Will the boat be left at this site or pier? (Greco\_075)

**Response:** Construction of a pier is not proposed as part of the project. As described in the EIS, if an on-shore Water Hub location were to be selected (Potential Location 1 or 2) access to the water from the shore would be provided by means of a seasonally deployed temporary floating boat launch. Use of the boat launch would generally coincide with educational activities taking place at the Water Hub, with additional sporadic trips during the month for research or education related to the breakwaters from a not-for profit or other researchers in the harbor. The proposed boat launch would be anchored about a foot above mean high water and would extend approximately 210 feet. No boat will be left at the site of the boat launch. The DEIS provides a comprehensive environmental analysis for all aspects of the project, including potential impacts from the proposed water access related to the Water Hub. A seasonal floating boat launch would not be provided if a vessel for the Water Hub is selected (Potential Location 3).

**Comment 60:** Is the Water Hub going to have shuttle boat service? If so, from what location to where? If so, who will be the operator/company? Who will pay for the cost of this boat maintenance? What is the size of this boat? How many people will it hold? (Greco\_075)

**Response:** No shuttle boat service will be provided. However, boat service would be related to the educational programming described in the EIS to accommodate the educational activities related to the Water Hub programming. For example, Water Hub Potential Location 3 involves a boat which will be docked at existing facilities in the City. The “floating” Water Hub—would be owned, operated and maintained by a non-profit organization (e.g., BOP). The capacity of the boat would be approximately 50 people.

**Comment 61:** Are you going to be busing or boating inner city children to this area? (Greco\_075)

**Response:** School children particularly from Staten Island but also elsewhere in New York City as well as students of the Harbor School will visit the Water Hub for specific activities. They may arrive by school bus or by the Harbor Foundation’s small boat.

**Comment 62:** Since this Bay area is very shallow, are you going to dredge here at the foot of Page Avenue? (Greco\_075)

**Response:** Dredging activities are not required for any element of the Proposed Actions.

**Comment 63:** Are you planning any changes to Page Avenue? If so, what would those changes be? How long will the construction last for the changes to Page Avenue? (Greco\_075)

**Response:** No changes to Page Avenue are being proposed as part of this project.

**Comment 64:** How long will the construction last for the Water Hub? (Greco\_075)

**Response:** The analysis in the EIS conservatively assumes that construction duration of a new Water Hub facility at Potential Location 1 would be approximately 12 months. Similarly, rehabilitation and adaptive reuse of an existing Parks building at Potential Location 2, including very limited construction for wayfinding elements and potential storage for kayaks near the terminus of Page Avenue, is conservatively assumed to last approximately 12 months. Potential Location 3 would involve a floating Water Hub which would not involve any construction, and wayfinding elements and potential storage for kayaks that would require very limited construction activity.

**Comment 65:** How many oysters will be reintroduced to the Raritan Bay? Where are they coming from? Are there any cages or equipment that is part of this project? If so, what kind? And what is the cost? What is just the cost of the oyster themselves? What is the expected growth rate of the oysters? Of the many marine species why are oysters being selected? What species of oyster are you using, or are you going to use different species of oysters? Is the oyster restoration project going to be monitored? (Greco\_075)

**Response:** The design, construction, and operation of the Breakwaters Project would result in the creation of ecologically designed, three-dimensional structures that would increase the diversity of the aquatic habitats available for a variety of marine animals, plant and invertebrate species that provide or form habitat found in Raritan Bay (e.g., brown algae and local shellfish like mussels, barnacles, and oysters). Any active oyster restoration that is planned for areas on and adjacent to the breakwaters would be subject to separate regulatory approvals. The details of any active oyster restoration would be determined at that time those regulatory approvals are sought, but could include consideration of alternative bivalve species through this process.

If active oyster restoration were to occur, it is not possible to give an exact number of oysters that would be reintroduced. It is anticipated that the eastern oyster (*Crassostrea virginica*) would be cultivated (hatched and grown) locally. Any future integration into the proposed breakwaters structures, if approved, would involve a variety of techniques including spat on shell and the oyster gabions (both techniques currently widely used by the Billion Oyster Project (BOP) and other organizations and agencies restoring oysters to the harbor), as well as new techniques such as the seeding of oyster spat on bio-enhancing concrete disks placed in specially designed breakwater armor units. Seeding of oysters on these disks is currently being tested by researchers at BOP and students at the NY Harbor School. The cost of the oysters is not yet known, but as they would be grown locally by a non-profit organization, the cost is expected to be below market. The expected growth rate is variable and difficult to predict, however preliminary results from studies in Lemon Creek in 2016 indicate higher than average growth rates for caged oysters that were temporarily deployed there. Any re-introduction of oysters would be monitored.

**Comment 66:** The proposed hybrid dune system would be a planted “dune” with a reinforced rock core extending approximately 1,160 linear feet along the shoreline. A dune and a beach operate as a system where the adjacent features dissipate wave energy and exchange sand. A solid core structure that cannot exchange significant quantities of sand with the beach is not a dune. It is either a revetment or a seawall, or a combination of both. On the outside, the hybrid dune system will look like a natural dune, but over time may function very differently. Additionally, if the Projects are implemented in tandem, the DEIS models demonstrate that this would result in accretion and increase beach width. Implementing both Projects could off-set the sand loss and long-term maintenance concerns that were identified as shortcomings of the “dune without stone core” alternative on page 1-24. Therefore, the Department requests that consideration be given to removing the inner rock core, and instead establishing a natural dune system that can function dynamically with the beach and shoreline over time.

If the solid core is not removed from the structure, we prefer that it be called a hybrid revetment. The Department is not opposed to protective structures where

they are necessary to defend infrastructure that has no effective safety option from non-structural measures; however, unless it is free to exchange the full volume as sand to the beach, move over time with wind and beach conditions, and re-grow when the beach is wide, it should not be referred to as a dune. (DOS\_025)

**Response:** Comment noted. Given the constraints of the site, the risk reduction goals of the project are better met by the proposed system (with stone core) as opposed to a natural dune system. While the shoreline element proposed between Brighton Street and Loretto Street (referred to in the DEIS as a sand-capped “hybrid dune”) is not technically a natural dune, because the word “dune” has been used in prior public presentations and because it is useful to distinguish it from other treatments along the continuum of the shoreline, the word “dune” has been retained and “revetment” has been added to the description. Therefore, this element is called the “hybrid dune/revetment” in the FEIS.

**Comment 67:** Provide additional justification regarding the stability of the materials and habitat and whether these would be substantial enough to resist waves. Could these features be eroded at the toe of slope or sink into the sand with high water events? Also, in Figure 1-20, what is the large structure extending out into the water on which the woman is standing, and how many of these structures are proposed? (DOS\_025)

**Response:** Materials were chosen to mimic the natural shoreline as much as possible to blend with the existing habitat and character of the site. The stability of these materials was accounted for in the design of the structures. The design criteria were set such that the proposed earthen berm, hybrid dune/revetment core, eco-revetment, and raised edge revetment structures will remain stable under hydrodynamic loading from a 1 percent annual chance of exceedance (“100-year” return period) storm event plus 30 inches of sea level rise. The dune sand may erode or scour, similar to a natural dune. A coastal analysis was performed to quantify the hydrodynamic loads of the 1 percent annual chance of exceedance storm, estimate scour depth of sand for both the existing beach and proposed hybrid dune/revetment, to calculate appropriate revetment stone size gradation for stability of the stone, and evaluate susceptibility of erosion for vegetation and reinforced vegetation on the earthen berm. Analysis was also performed to evaluate the structural stability with seepage, slope stability and settlement analyses and will continue to be studied in the 30–60 percent design phase as the design progresses.

The crest elevation and side slopes of the raised edge, eco-revetments, hybrid dune/revetment and earthen berm were dictated by site constraints and due to these restrictions, the hybrid dune/revetment is located close to the water. The sand topping of the hybrid dune/revetment will be vegetated to increase its stability, but it will remain susceptible to erosion and is considered sacrificial, and for this reason, the rock core is proposed. The depth of the toe of the eco-revetment, hybrid dune/revetment’s rock core, and raised edge was set such that it would remain buried during the design storm event. The scour depth was

estimated in accordance with the recommendations in the USACE's Coastal Engineering Manual. The stones making up the revetment and hybrid dune/revetment's core were sized such that 0–5 percent of stones will be displaced during the design storm. This corresponds to the “no-damage” level used in the 1984 Shore Protection Manual.

The coastal analysis showed that the earthen berm could be subject to damage if left un-reinforced, and as such it is proposed that this structure be stabilized with high-performance turf reinforcement mat and planted to mitigate this potential damage.

The design criteria for slope stability of embankments of hybrid dune/revetment, earthen berm, eco-revetments, and raised edge features is based on a minimum factor of safety, as computed by using limit equilibrium methods, as follows:

<b>Analysis Condition</b>	<b>Required Factor of Safety</b>
End of Construction	1.3
High Water (Steady State Seepage, Elevated Water Level)	1.5
Rapid Drawdown	1.1–1.3
Earthquake	1.0

The design evaluation for stability within the hybrid dune/revetment armor core is considered with and without loss or scour of the overlying dune sand.

Settlement was estimated for the proposed loading associated with the proposed structures. The maximum estimated settlement of the design features was 7" in the vicinity of the proposed hybrid dune/revetment. It is anticipated that the majority of this settlement will take place during the construction duration and therefore will likely not be noticeable at the earth structures such as the revetment and hybrid dunes/revetment. Section 6.2 of the 30 percent Basis of Design Report makes several recommendations to mitigate settlement.

The structure in Figure 1-20 of the DEIS (Figure 1-19 in the FEIS) is in the location of an overlook which is existing on the site now. This is what is referred to as a transition node in the project. At the time of the DEIS, three transition nodes were proposed as part of the Shoreline Project. There are currently two transition nodes proposed in the design. The transition nodes occur at points along the shoreline where two design types meet; where the hybrid dune/revetment meets the eco-revetment at Loretto Street, and where the eco-revetment meets the raised edge at Sprague Avenue. The transition nodes do not extend out into the water but are located above the Mean Higher High Water MHHW line. When the two structural systems meet, the systems must be designed to merge together and function as one complete system of risk reduction. In addition to serving this purpose, the transition nodes serve as access points for the community providing both visual and physical access to the shoreline.

**Comment 68:** Many components of the Projects would increase land elevations. Explain whether the new project elements have the potential to trap water inland and exacerbate localized flooding and property damage during a storm surge. (DOS\_025)

**Response:** The Shoreline Project has been designed to reduce risk for the shoreline area of Tottenville from wave action. Comprised of a series of porous structures (earthen berm, eco-revetments, hybrid dune/revetment, and raised edge), the Shoreline Project would allow water to seep through, either from the upland side to the Raritan Bay side, or from the Raritan Bay side to the upland side; the project is not intended to prevent Raritan Bay storm surge from entering the land, nor would it retain water inland. Risk of exposure to storm surge would occur with or without the implementation of the Shoreline Project. However, with the Shoreline Project, as long as storm surge conditions do not exceed +8.0 feet NAVD88, the structures would serve to delay water inundation to the land side, based on the seepage rate calculated for the structures. Seepage through/under the structures to the land side would continue until reaching the approximate elevation of the water on the Raritan Bay side. Once the water on the bay side would begin to recede back towards mean high water (MHW), the water on the land side would seep back through to the bay side. For storm surge conditions where Raritan Bay water elevation exceeds +8 feet NAVD88 (i.e., the raised edge structure would be overtopped), the volume of water behind the shoreline structures would remain in place until the water level on the Bay side recedes, at which point that water would seep through the structures towards the Bay. See FEIS Chapter 11, “Sewer and Water Infrastructure” for a summary of the seepage analysis conducted for the Shoreline Project. A physical impact of the shoreline system will be the addition of fill and the associated additional loads that will be placed on the existing storm water outfalls. These outfalls are located at Loretto Street, Sprague Avenue, Joline Avenue and Bedell Avenue. In addition, the approved Amended Drainage for the eastern end of the site shows a new outfall (83”W x 53”H) at the extension of Page Avenue. Addressing the additional load on these outfalls will need to be coordinated with NYCDEP as the project moves through the design phase.

**Comment 69:** Figure 1-19 shows a walking path adjacent to the hybrid dune. It would be helpful to have more details about this walking path, including where it would be routed in the hybrid dune section of the TSPP and what materials would be used for its surface. Proposed pathways could be located within tidal wetlands adjacent areas and/or coastal erosion hazard areas, and design of their surface materials and placement would be further coordinated with the Department as part of the permitting process. (NYSDEC\_074)

**Response:** At this time, the pathway adjacent to the hybrid dune is proposed on the landward side of the structure (as per the current 30 percent design). See Figure 1-16 and 10-5 of the FEIS. Details of the proposed route will be addressed in the next phase of the design (60 percent). Possible surface materials include concrete and/or

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asphalt pavement., Other options will continue to be studied during design development in close coordination with multiple agencies, including NYC Parks and NYSDEC.

**Comment 70:** It is well documented that reveted structures can create erosion problems for immediately adjacent areas of shoreline. Further explanation is required regarding how the reveted portions of the TSPP will not promote erosion on the adjacent shoreline areas. (NYSDEC\_074)

**Response:** The design of the structure considered the potential for damaging adjacent properties. The reveted areas of this project include the hybrid dune/revetment, eco-revetments, and raised edge. In compliance with NYS DEC's *Protection against Wave Based Erosion* <[http://www.dec.ny.gov/docs/water\\_pdf/waverosion\\_revetment.pdf](http://www.dec.ny.gov/docs/water_pdf/waverosion_revetment.pdf)> criteria, the reveted structures were designed:

- To minimize the extent waterward. These structures were placed as far landward as possible given the site constraints. Waterward and landward limits were imposed by boundary lines, properties, and infrastructure, including an existing public street. In addition, the footprint of these structures was limited to only be as wide as necessary for a stable structure.
- To minimize impacts to adjacent properties. These structures are adjacent to each other and will be transitioned as smoothly as possible within site limits to avoid abrupt ends or boundaries. The hybrid dune/revetment will transition into a section of eco-revetment which will then transition into the earthen berm. The earthen berm will be protected by a high-performance turf reinforcement mat and plantings. The berm will be returned to existing higher grade. The raised edge will be tapered into upland grade in a similar manner to the how the berm is terminated.
- To ensure structural stability. The design criteria were set such that the proposed earthen berm, hybrid dune core, eco-revetments, and raised edge revetment structures will remain stable under hydrodynamic loading from a 1 percent annual chance of exceedance (“100-year” return period) storm event plus 30 inches of sea level rise.
- To be constructed with materials suitable for exposure to wave action. Materials that had the potential for damage due to wave action, scour or erosion were reinforced to ensure the structure’s stability.
- The sand on the hybrid dune/revetment was reinforced with a rock core. The stones making up the revetment and hybrid dune/revetment’s core were sized such that 0–5 percent of stones will be displaced during the design storm. This corresponds to the “no-damage” level used in the 1984 Shore Protection Manual. The coastal analysis showed that the earthen berm could be subject to damage if left un-reinforced, and as such it is proposed that this structure be stabilized with a 12” thick layer of stone and planted to mitigate this potential damage.
- To avoid end effects and flanking. The structure was laid out to avoid abrupt, shore-perpendicular ends and has “rounded” curves. It will be returned to the

existing higher grade or transitioned into another project to avoid end effects and flanking.

- To have proper toe protection to prevent sliding failures, scour and undermining. The depth of the toe of the eco-revetment, hybrid dune/revetment's rock core, and raised edge was set such that it will remain buried during the design storm event. The scour depth was estimated in accordance with the recommendations in the U.S. Army Corps of Engineers' Coastal Engineering Manual.

The design criteria for slope stability of embankments of Shoreline Project hybrid dune/revetment, earthen berm, eco-revetments, and raised edge features is based on design to a minimum factor of safety, as computed by using limit equilibrium methods, as follows:

Analysis Condition	Required Factor of Safety
End of Construction	1.3
High Water (Steady State Seepage, Elevated Water Level)	1.5
Rapid Drawdown	1.1-1.3
Earthquake	1.0

The design evaluation for stability within the hybrid dune/revetment armor core is considered with and without loss or scour of the overlying dune sand.

**Comment 71:** The handout for the April 26, 2017 public hearing shows a proposed pathway from Sprague Ave to Page Ave along the beachfront. My comment is that it be bicycle capable. Currently the only other bicycle option is on Hylan Blvd., which has seen increasing traffic in the past few years as a result of increased development. (DeBiase\_028)

**Response:** As the design stands now, the trail would accommodate bicycles as well as pedestrians. The design will continue to evolve through 100 percent design and it is the current goal of the project to maintain bicycle access along this trail.

**Comment 72:** What is the proposed elevation of the pathway? What is the width of the pathway? What material will the pathway be made out of? (Greco\_075)

**Response:** As described in the DEIS:

The elevation of the 8-foot-wide pathway would range along the stretch of the Shoreline Project. In the areas of the proposed earthen berm, the eco-revetment between Brighton and Manhattan Street and the hybrid dune/revetment, the proposed pathway would be on the landward side of these elements at close to existing grade. The pathway adjacent to the proposed eco-revetment between Loretto Street and Sprague Avenue would be at elevation +12.5 feet NAVD88 and along the Raised Edge, the pathway would be at either +8 feet NAVD88 or +12.5 feet, depending on the location. The trail would comprise a concrete or asphalt pavement. Approximately 1.7 acres of native coastal vegetation would be planted as part of the raised edge, comprising about 17 percent of the raised edge footprint.

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**Comment 73:** How far off the homeowner's property is this pathway? (Halvorsen\_G\_033, Halvorsen\_J\_054)

**Response:** The proposed continuous trail from the western portion of Conference House Park to Page Avenue varies with respect to distance from homes, depending on the location. Figure 10-5 of the EIS provides a preliminary illustration of the proposed route and circulation elements.

**Comment 74:** What is the draining capability of the swale located next to the pathway? How was it designed to prevent clogging from leaves, brush, dirt, clay which will be carried by heavy rains and cause back flooding? Where is the water supposed to be drained out to? (Greco\_075)

A drainage system should be considered to be placed under the proposed dunes to allow flood waters collecting at the bottom of the streets adjacent to the dunes to drain towards the beach (TottenvilleCivicAssoc\_042)

**Response:** The intent of the proposed bioswale is to infiltrate any runoff from the proposed pathways and direct it away from the upland side of the project components. The bioswale design will be advanced as the project design progresses from 30 percent, when details regarding runoff volume and maintenance will be refined. Also, see response to Comment 68.

**Comment 75:** You have a proposed bridge that goes from Manhattan Street to Brighton Street, which will run along the side of my home. This is a terrible idea. This will only attract unwanted criminal activity to this area and become a hang out at night with people doing drugs. (Crispi\_010)

Is the Wetland Bridge really needed? Consider alternatives. (TottenvilleCivicAssoc\_042)

**Response:** Since the publication of the DEIS, design of the Shoreline Project has progressed and the wetland bridge and associated transition nodes originally proposed at this location have been eliminated from the plan. The revised plan includes an eco-revetment and pathway between the proposed earthen berm and hybrid dune/revetment, along the northern edge of the delineated wetland. The current design proposes the pathway on the landward side of the revetment. GOSR and NYC Parks have initiated discussions with the NYPD and with NYC Parks' PEP unit to discuss post-construction patrol activities.

**Comment 76:** Why waste money on a walkway when sand needs to be added to the lower elevated areas? (Halvorsen\_Blaysse\_014)

The millions of dollars saved by not installing a pathway running from Sprague Avenue to Page Avenue can be used to get families back into their homes with better protection, which will save lives. (TottenvilleResidentsPetition\_001, Halvorsen\_G\_052, Halvorsen\_K\_055)

Creating a walkway or pathway would encourage strangers to come into our backyards. I fear for invasion of privacy, vandalism, and other disturbances. (Fulginiti\_011, Murphy\_M\_015, Murphy\_R\_016, Taormino\_018, Halvorsen\_Blayse\_031, Halvorsen\_K\_034)

The walkway proposed would have no benefit to the residents of Tottenville or Staten Islanders. Only a select few would be able to access this walk way and they would be there to do harm and not good. I have seen the element that frequents the beach and they are there to do drugs, engaging in perverse acts and starting fires. The beaches are not clean and are full of debris and trash. What would be beneficial is having the beaches cleaned and adding more sand so that we can access the beach and walk along a clean beautiful beach. Adding a walkway that would not be maintained or be destroyed by the weather and beach elements would only be adding to the debris and trash already existing on our beaches. (Liotti\_035)

Why would you consider a walkway from Page Ave to Main St instead of Main St to the Conference House (Hub location option 2) (Panarello\_A\_039)

There should be no walkway unless south of Brighton Street. (Panarello\_017)

I do not want a boardwalk in my backyard. The boardwalk won't be manned, policed, or cleaned up. I think you should go back to the drawing board and think what's best for the people, the island, and our beaches, not what's best for some people's pockets. (Abdenour\_009)

The last time the parks ran a fence east of Sprague Ave to Page Ave it only brought crime into our community. We learn from mistakes so why are you trying to run this path way? (Fulginiti\_011, Greco\_013, Tottenville\_Resident\_019, Unknown\_024)

The pathway would provide access for people to come on our property, and also access for thieves to leave our property. (Panarello\_050)

This pathway will have groups of people using it at night hanging out drinking doing drugs selling drugs and disturbing the peace of the community. There is no way to protect the lives of the community from criminal and people trespassing from this pathway. This pathway will also run right in the backyards of homeowners. We rather lose one night of sleep to another Super Strom then having sleepless nights for the rest of our lives over a pathway that will only put our live at risk. (Fulginiti\_011, GroupLetter2\_003)

This is Staten Island not Manhattan we live here for the safety of our families and the quality of life we have from Joline to Page Avenue some families been here since the 1940s. By trying to install a pathway on top of this embankment from Sprague Avenue to Page Avenue you're putting our lives at risk there is so much criminal actions that take place on the shoreline and now all you're trying to do

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is put this mess right in our backyards and we will not stand for this. (Unknown\_043, Unknown\_071, Halvoren\_G\_033)

We are totally against this pathway that's going to run from Sprague Avenue to Page Avenue. (Fulginiti\_011)

The walkway was intended to increase resiliency and to increase the access for the public. The beach is there, people walk there all the time and they come and they walk and there is no problem. We do not need to build a walkway (Farid\_053)

Fix the trails and pathways that are already in place at Conference House Park. Why is there a need to extend these trails and pathways? The current trails and pathways are not being maintained as they should. We don't need a 24 hours, 7 day a week un-policed pathway behind our homes. We have safety concerns for our homes, property, children, and grandchildren. (Reback\_061. Halvoren\_G\_033)

We have heard time and time again many of the people on the design team will tell you that you knew this property was owned by Parks when you bought it. Not so, and a complete lie, for many, this property was sold under duress to the City or would have been taken under imminent domain against our will in 1973. So this was originally all owner-owned to the high tide water mark. Since Parks took it, nothing was done with the exception of being poorly, or not maintained at all, and constantly visited by strangers, dealing and doing drugs, graffiti, vandalizing, dumping garbage and refuse, setting fires, and home being broke into. As for the people that did know the property was owned by Parks when purchased, never did we dream Parks would do such an irresponsible thing like a public pathway right outside our backyard doors and windows which is inconceivable in a normal, caring, and rational mind. (Greco\_013)

We (the homeowners) used to own the property up to the high-tide mark from Joline Lane to Page Avenue; we were forced to sell to the Department of Traffic for a sewer line project back in the seventies. We were told to use the property as if it was ours and that nothing else would come after the sewer line project. (Fulginiti\_011, Halvoren\_G\_033)

Why is the safety of those in Tottenville secondary to this "project"? (Halvoren\_Blayse\_014)

Have pathway be installed on lower grounds where homes and lives were lost. No need to put pathway on the higher elevation. This will do nothing for protection but only be a recipe for more crime, kids drinking, drugs, fires that we currently experience. There will be no policing of this pathway – lights, etc. Therefore allowing anybody to walk onto our property being there is no buffer zone between the pathway and the homeowner's backyards. (Halvoren\_Blayse\_031, Halvoren\_K\_034, Halvoren\_G\_052, Halvoren\_K\_054)

Park crime is up 34 percent, this area will have 24 hour access, this area is very secluded and will make the homes venerable here, and this will become a criminal's paradise for pregnable victims of home invasion, kidnapping, rape and murder. All the dead end streets down by the water with special attention to Page Ave, Billop Ave, Joline Ave, and Brighton Ave are hot spots for drug dealing, drug use, graffiti, vandalism and more serious crimes. This water front property was owned by the home owners until 1973 when it was taken away against the will of the owners, then left in horrible manor of which the home owners in good conscience clean it themselves because parks has not maintained it properly. It only took 1 week for the new wood fence at the end of Joline Ave to get graffiti, and when it went along the beach area before Sandy took it apart and sent it through the home causing flooding it was a invite trail to follow to people's homes for more crime, since it was washed out, there has been less incident behind home but not crime less. A hardened pathway will simply give criminals a faster and easier way for egress and escape. (Greco\_030)

I'm a 3<sup>rd</sup> generation living on this shoreline we moved here for our protection and now for some reason you're trying to take that away from us. This is probably one of the last spots where you don't need a fence in your backyard we have 4' embankment at the edge of a property this is our buffer zone. There's a lot criminal actions that take place on the shoreline especially at night. Why are you trying to install this pathway from Page Avenue to Sprague Avenue. It's only going to take our safety away because now these criminals are going to be right in our backyards taking away our buffer zone and quality of life. (Goody\_044, Halvorsen\_G\_032, Halvoren\_G\_033, Halvorsen\_K\_034, Panarello\_C\_040, Fulginiti\_011, Halvoren\_K\_055)

The NY Parks tried this pathway/fence and it only destroyed our community. We learn from mistakes, so why are you going to waste millions of taxpayer's money only to destroy our community again? (Halvoren\_G\_033)

The area between Page and Sprague Avenues is not a large area; it has poor public access, no lighting, and no parking. It's hard to access these areas now. To add a walkway and a public building can only destroy what's there now. It will not only add congestion and pollution, to a point we will not be able to maintain, it makes the area unsafe. The far better place to add walkways and a public building is at the end of Hylan Blvd—where there are large amounts of parking, well-lit areas and walkways that would not interfere with private residential properties. (Gentile\_012)

The parks wasted millions on a pathway, and Superstorm Sandy took that pathway away. We as a community feel safe again, and we learned from mistakes. (Fulginiti\_011)

The pathway is an unnecessary addition to an already beautiful beach that is traversed daily by residents and visitors from all over the Island. The plan should focus more on the protection of our shorelines with the beach extension and the

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living breakwaters. It should not focus on creating another park that will do nothing to alleviate our environmental concerns (Panarella\_A\_048)

You know if this pathway goes in you also will have to run a water line for the beach fires and then the wood fire and then the home fires. 1963. (Halvorsen\_G\_033)

Are they going to give funding to the Police Department and the Fire Department if they create this walkway along the beach? (Shapiro\_069)

I am grandfathered in and I have a boat ramp which we use and will need access to. (Halvorsen\_G\_033)

**Response:** As described in the DEIS, the proposed trail responds to the purpose and need of the project to increase physical and visual access to the water's edge, consistent with NYC Parks' continued commitment to provide waterfront access within City parkland. However, GOSR and NYC Parks have initiated discussions with the NYPD and with NYC Parks' PEP unit to discuss police patrol access with respect to all elements of the Shoreline Project. This project poses no additional fire risk. As discussed with the community at the CAC meetings, and as communicated by NYPD, existing public safety resources are sufficient for this area.

As stated in Chapter 1 of the EIS, with the exception of a small portion of the Shoreline Project proposed within an unbuilt portion of the NYCDOT Surf Avenue right-of-way, all on-shore project components would be constructed within the boundaries of Conference House Park. All existing conditions (with respect to ownership, easements, rights of way, etc.) within the footprint of the proposed projects will be evaluated in detail prior to construction.

**Comment 77:** The DEIS cites the implementing regulations of the Freshwater Wetlands Act as 6 NYCRR Part 662. This citation must be changed to Part 663. Part 662 applied to the Department's issuance of interim permits prior to the filing of official freshwater wetlands maps. Part 663 contains the implementing regulations of the Freshwater Wetlands Act which are applicable to this project. (NYSDEC\_074)

**Response:** Comment noted. This is reflected in the FEIS.

**Comment 78:** Lists of potential regulatory approvals, where applicable, should include a Beneficial Use Determination (BUD) under 6 NYCRR Part 360 relating to the potential re-use of excavated fill or material. This potential approval would be applicable to re-use of illegal fill material at Tricia Way. It would also be applicable for the re-use of any material excavated as part of overall construction of the TSPP. Many areas of Conference House Park are considered to be fill based on historic images which show the area as marsh. Any material imported to construct the elements of the TSPP would need to meet the Department's requirements as well. Source and quality of imported material can be coordinated with the Department as part of the permitting process. (NYSDEC\_074)

**Response:** Comment noted. Chapters 9, "Natural Resources," and 17, "Construction," include a Beneficial Use Determination (BUD) under 6 NYCRR Part 360 as a potential regulatory approval for the Proposed Actions. This has also been included in Chapter 1, "Purpose and Need and Alternatives."

**Comment 79:** The DEIS does not address the proposed enhancement of the 0.8-acre delineated wetland through the installation of tidal sluice gates in any detail. It is not clear how such a system would function, how it may affect beach use, or what ecological benefits, if any, might be realized. Adding any hardened structure to wetlands, in this case the bridge and "nodes", has an adverse impact due to footprint, and generally, avoiding damage and disturbance to an existing, functional wetland is preferred to enhancement or restoration. More detail on this project element must be provided. Additionally, design specifics of a tidal sluice gate, the wetland bridge, and transition node(s) in this area would be developed in coordination with the Department as part of the permitting process. (NYSDEC\_074)

**Response:** Since the publication of the DEIS, design of the Shoreline Project has progressed and the wetland bridge and associated transition nodes originally proposed have been eliminated from the plan. The revised plan includes a section of eco-revetment between the proposed earthen berm and hybrid dune/revetment. The proposed eco-revetment in this area will run along the northern edge of the delineated wetland and avoid footprint impacts as much as possible. The exact location, position, and footprint width of the eco-revetment will be finalized after further study during the 60 percent design phase. For the purposes of the FEIS, a conservative footprint width has been considered with the intention of studying possibilities for a narrower footprint. Because the system is now proposed to run along the northern edge of the delineated wetland, there will no longer be hardened structures proposed that would traverse across the wetland (in the north-south direction). During the 60 percent design phase, the designers will also study possibilities to increase tidal flushing by, for example, re-grading the inlet to Raritan Bay after removal of the temporary dune, or potential design changes to the pipe at the existing inlet.

**Comment 80:** Are you planning on removing those unsightly and very dangerous pilings, broken piers and docks? (Greco\_075, Greco\_046)

Why are you not cleaning the whole shoreline? (Halvoren\_G\_033)

**Response:** Although it is not clear what specific objects are referenced in this question, the project area will be subject to a major redesign and restoration which will render it safe and attractive. The Proposed Actions does not include the removal of any in-water debris or structures.

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**Comment 81:** Are you planning to remove individual boulders that possess a danger in the water? There are probably over a hundred sunken vessels. (Greco\_075, Greco\_046)

**Response:** Although it is not clear what specific objects are referenced in this question, the project does not intend to remove anything from the water.

**Comment 82:** Do you plan on cutting down trees for this project? If so, how many trees? (Greco\_075)

**Response:** As described in the EIS, very few trees would be removed as a result of the Shoreline Project. Some trees would be removed for the construction of a potential ADA accessible ramp leading from the selected repurposed NYC Parks building to the shoreline if the Water Hub at Potential Location 2 is selected. To the extent feasible, the potential ramp would be sited to minimize tree loss. All work would be performed in compliance with Local Law 3 of 2010 and NYC Parks' Tree Protection Protocol. All required replacement and/or restitution for removed trees would be provided in compliance with Local Law 3 and Chapter 5 of Title 56 of the Rules of the City of New York.

**Comment 83:** How many trees are scheduled for planting? How much do these trees cost individually? How many plants are going to be planted? How many different species were selected and why? Where are they coming from? Where will they be planted? Do you plan on cleaning the area up from evasive species before you plant? What time of year will they be planted? (Greco\_075)

**Response:** At the completion of the 30 percent Design phase, there are general areas of the site identified for potential plantings. However, the number, species, size and cost of these plants have not been identified. This will be part of an extensive study in future design phases. The species list for the project will be developed in close coordination with the Greenbelt Native Plant center with hyper local ecological communities in mind. Any invasive species removal efforts will be closely coordinated with NYC Parks and planned in a future design phase.

**Comment 84:** Do you plan on planting on the breakwaters as well as the revetments? (Greco\_075)

**Response:** Currently there are no plans of active planting on the breakwaters. There are plans to introduce plantings to the eco-revetments and hybrid dune/revetment.

**Comment 85:** Did the Army Corps of Engineers approve the plans? (Greco\_075)

**Response:** Implementation of the Proposed Actions may involve Federal, State, and local approvals, including those from the US Army Corps of Engineers (USACE). The project permit has been submitted to USACE and is undergoing review.

## LAND USE, ZONING, AND PUBLIC POLICY

**Comment 86:** Please write out Waterfront Revitalization Program (WRP) in the first sentence (pg. 2-9). (DCP\_004)

**Response:** The FEIS reflects this change.

**Comment 87:** Zoning – “Because Conference House Park is not mapped as a Designated Open Space under the SSRDD, the provisions of that special district also do not apply to the Proposed Actions.” The way this is depicted is not necessarily correct (the waterfront esplanade which is part of DOS is mapped along the boundaries of the Park). Please remove this sentence (pg. 2-11). (DCP\_004)

**Response:** The FEIS reflects this change.

**Comment 88:** Please explain why you choose the study area you did. Is there a buffer from the project? Per City Environmental Quality Review (CEQR) section 310 in the Land Use Chapter, the study area should generally include at least the project site and the area within 400 feet of the site’s boundaries. Secondary impacts can occur within a radius of 0.25 to 0.5 miles from the site of a proposed project. If you’ve chosen differently please explain. (DCP\_004)

**Response:** The study area includes additional areas beyond the referenced buffers. Additional clarifying text has been added to section 2.0.1 Study Area of the FEIS.

**Comment 89:** Please discuss land use changes to areas within the study area other than park. (DCP\_004)

**Response:** Land use changes that would occur in parts of the study area outside of parkland are described in the analysis of the No Build Alternative, section 2.4.1. This section enumerates several land use changes that would occur before the DEIS analysis year.

The Proposed Actions would be built entirely within City parkland, mapped City streets, and near-shore waters and therefore would not result in land use changes in other parts of the study area. These are described in the analysis of the three build alternatives, which can be found in sections 2.4.2 through 2.4.4.

**Comment 90:** Land uses in the study area are characterized in the DEIS as a mix of parkland and residential uses with some privately owned vacant parcels, particularly east of Sprague Avenue to Page Avenue, that represent developable land in the 100-year floodplain (1 percent Annual Chance Flood Hazard). The DEIS states that implementing the Proposed Actions would reduce the risk of property damage from wave action and erosion and could increase the desirability of the neighborhood as well as reduce costs associated with investing in resiliency measures at individual properties. These factors have the potential to encourage development in the coastal zone, and the Department requests that the analysis of

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the Proposed Actions' potential to attract development within the coastal zone be expanded specifically as it relates to reasonably foreseeable coastal effects, Policy 1 of the New York City's Waterfront Revitalization Program (NYCWRP), and Policy 13 of the New York State Coastal Management Program (NYCMP). We recognize that these lands are unlikely to be developed by the build year (i.e., 2020), but should be analyzed as either "projected" or "potential" sites that are more likely to be developed as a result of the Proposed Actions (see *CEQR Technical Manual*, Chapter 2, Section 423. Determining a Reasonable Amount of Future Development). (DOS\_025)

**Response:** The DEIS states that while the project could increase the desirability of the neighborhood and reduce costs associated with resiliency measures at individual properties, it would not introduce a substantial new use that would alter market conditions. Specifically:

- Market conditions already reflect the close proximity of the waterfront as a valuable residential amenity; the Proposed Actions would improve the area's amenities, but would not introduce a substantial new use that would alter market conditions.
- Study area property values and rents historically have not discounted value based on the risk posed by major storm events. In this respect, rather than leading to substantial increases in property value and rent, the project would be expected to maintain pre-Sandy levels of interest, investment, and property values in the study area.
- Specific to the parcels in question within the 100-year floodplain immediately east of Sprague Avenue, many of the parcels have remained vacant for decades (well before Superstorm Sandy) and there are numerous other market factors at play that influence decision-making with respect to the development of these parcels.

Based on the above, development of the vacant parcels within the 100-year floodplain is not a reasonable foreseeable consequence of the project, given there are numerous other factors that play into a development decision, including market demands which the project would not substantially influence, as laid out in the DEIS. There is not a reasonably close causal relationship between the action and development of these parcels to project that the project would induce growth in this manner.

If, in the future, development were to occur on these parcels, in accordance with applicable regulatory programs, it would be attributable to numerous factors, many of which are outside of the project's influence, and it would be extremely limited in nature. Based on existing zoning on these parcels (which the project does not alter), the sites would be expected to be developed with single-family housing similar to, and within the context of, the surrounding neighborhood. Furthermore, it would be extremely limited in terms of the total housing stock within the socioeconomic study area used for the DEIS analysis.

For these reasons, the EIS does not include the requested expanded analyses.

**Comment 91:** The Transportation section of the scoping document states that “[t]he level of visitation for the beachfront and adjacent parkland may increase as a result of the Proposed Actions, as an improved shoreline could make the beachfront more attractive for recreational use.” Given the potential increase in visitation rates, the Department believes an Open Space and Recreation analysis is warranted. Moreover, information including but not limited to existing visitor rates, parking, surfing, fishing, swimming, and recreational boating as well as an assessment of potential changes to open space and recreational resources under the future with the Proposed Actions are anticipated to be needed for the Department’s pending consistency review. (DOS\_025)

**Response:** The EIS has been revised to include a section in Chapter 2 “Land Use, Zoning and Public Policy,” describing the existing park user activity levels within Conference House Park, and how these levels are expected to change as a result of the Proposed Actions.

**Comment 92:** While unrelated to open space, the Department also requests further assessment of the potential impact to commercial maritime traffic (e.g., barge or local boat traffic). The DEIS provides no information on the existing level of maritime activity outside the navigation channels and it is not possible to determine whether there would be a use conflict. (DOS\_025)

**Response:** For both commercial and recreational shallow draft vessels, leaving the channel is an option and to help boaters navigating in that area the National Oceanic and Atmospheric Administration (NOAA) issues navigation charts that are regularly updated to reflect local conditions. In the project area, their Chart number 12332 (Raritan River Bay to New Brunswick) provides water depth insights. It is anticipated that the US Coast Guard will require navigation aids to provide visibility to mariners as is typically done for these structure types. The type and location of the navigation aids will be provided in accordance with federal regulations for the structure's classification. This information has been included in the FEIS. Also, as noted in the EIS, the project proponents do not anticipate there being any navigation issues created by project implementation or operation.

## **ENVIRONMENTAL JUSTICE**

**Comment 93:** Chapter 4 contains the Environmental Justice (EJ) analysis, and states that the “analysis will also be used by the New York State Department of Environmental Conservation (NYSDEC) in its environmental permit review process associated with the proposed permit actions and its application of the State Environmental Quality Review Act (SEQRA), and is required under CP-29, ‘Environmental Justice and Permitting,’ which is the NYSDEC’s policy on environmental justice.”

While the Department will use this EJ information in the SEQRA process and has no comment on the analysis as presented in Chapter 4, it should be noted that

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DEC Commissioner's Policy 29 (CP-29) applies Environmental Justice protocols only when the Department processes the following permit types: State Pollutant Discharge Elimination System (Article 17), Air Pollution Control (Article 19), Solid Waste Management (Article 27), Industrial Hazardous Waste Management (Article 27), and Siting of Industrial Hazardous Waste Facilities (Article 27). None of these permit approvals are anticipated for the proposed actions, and thus it is unlikely that CP-29 would apply to the permitting process for the proposed actions.

While the proposed actions will require GP-0-15-002, the SPDES General Permit for Discharges from Construction Activity, CP-29 exempts general permits from the policy. (NYSDEC\_074)

**Response:** Comment noted.

### **HISTORIC AND CULTURAL RESOURCES**

**Comment 94:** The DEIS states that limited portions of the upland areas were determined to possess moderate sensitivity for pre-contact archaeological resources and moderate sensitivity for historic period archaeological resources. A Phase 1B archaeological investigation was recommended for those areas of archaeological sensitivity and would be completed along with any additional archeological investigations prior to construction. Please note that the Department will need to review the findings of and consultations associated with subsequent archeological investigations as part of our federal consistency review process. (DOS\_025)

**Response:** As provided in Appendix B of the EIS, to address Policy 23 of the Federal Consistency Assessment Form, the analysis notes that any additional archaeological investigation or consultation with the consulting parties would be completed pursuant to the terms outlined in the Programmatic Agreement, executed in May 2013, among the Federal Emergency Management Agency (FEMA), SHPO, the New York State Office of Emergency Management, the Delaware Nation, the Delaware Tribe of Indians, the Shinnecock Nation, the Stockbridge-Munsee Community Band of Mohicans, LPC, and ACHP and specifically pursuant to Appendix D to the Programmatic Agreement, which pertains to the CDBG-DR program for activities in New York City. Any additional archaeological investigations completed subsequent to the Phase 1B investigation (e.g., a Phase 2 archaeological survey or Phase 3 Data Recovery) would be completed in consultation with SHPO, LPC, and the Tribal Nations prior to construction. All consultation materials will be forwarded to DOS as necessary.

### **URBAN DESIGN AND VISUAL RESOURCES**

**Comment 95:** Please clearly define study boundary. (DCP\_004)

**Response:** The FEIS includes a clarification of the study area boundary.

**Comment 96:** The DEIS notes that Chapter 6 — Urban Design and Visual Resources — was prepared in compliance with DEC's memorandum DEP-00-2 Assessing and Mitigating Visual Impacts ("memo"). Page 6-3 of the DEIS states that per DEP-00-2, "an 'impact' would occur when there is a detrimental effect on an aesthetic resource that interferes with or reduces the public's enjoyment of a resource and when the mitigating effects of perspective, such as vegetation, distance, and atmospheric perspective or other designed mitigation, do not reduce the visibility of a project to insignificant levels." This singular given definition is a combination of definitions given in DEP-00-2 for "aesthetic impact" (memo Pg. 9), "visual impact" (memo Pg. 10), and "significant aesthetic impact" (memo Pg. 5), which are all separate phenomena. The definition of "impact" on Page 6-3 of the DEIS should either be revised or clarified to align with DEP-00-2 and DEC's definition and guidance on visual and aesthetic impacts. The most notable implication of this clarification is that aesthetic impact occurs when there is a detrimental effect on the perceived beauty of any place or structure; the stated definition in the DEIS only references inventoried resources as triggering impacts. (NYSDEC\_074)

**Response:** The FEIS includes clarification of the definition of "impact."

**Comment 97:** Page 6-16 notes that the views of the breakwaters are "similar to the context of existing views of the land masses that can be seen from the current viewer vantage points. Therefore, these project components would not affect views toward the waterfront and Raritan Bay..." This description does not seem to accurately describe potential impacts to views and aesthetic resources, as the breakwaters present visual elements which would be completely new and unique to users of Conference House Park and residents of Tottenville. While Chapter 6 includes a variety of renderings and figures depicting the views of the area with and without the proposed project(s), the DEIS lacks a visual depiction of a larger portion of the breakwaters project since the most breakwater segments included in any visual rendering is three. Eight to ten breakwater segments would be visible from most vantage points along the shoreline. More detail, and additional visual depictions, regarding the breakwaters and the aesthetic and visual impacts of the structures, specifically with regard to overall views of Raritan Bay should be included. (NYSDEC\_074)

**Response:** Additional views toward the breakwaters have been included in Chapter 6 of the FEIS (the views are consistent with visual depictions associated with existing figures and comparatively show existing conditions views and views with the Preferred Alternative). The figures showing the breakwaters have also been reorganized to show the breakwaters more comprehensively with multiple breakwaters visible in views from representative on-shore vantage points. The analysis has been revised to include a more detailed discussion of the breakwaters and their potential to result in aesthetic and visual impacts.

## **HAZARDOUS MATERIALS**

**Comment 98:** Could there be issues with disturbing PCB sedimentation in the water? There is no discussion in this chapter at all; however, it is discussed minimally in the Natural Resources and Construction chapters. (HUD\_007)

**Response:** As indicated in the Hazardous Materials chapter, this chapter focuses only on the upland portion of the Proposed Actions; the in-water portion is addressed in Chapter 9, "Natural Resources." With respect to PCB sedimentation in the water, as presented in Chapter 9, "Natural Resources," in general, sediment samples indicated low levels of contamination that were generally at concentrations considered Class A (i.e., no toxicity to aquatic life). No Class C concentrations of contaminants (i.e., acute toxicity to aquatic life) were collected. Out of the 30 locations sampled, only one location had elevated concentrations of PCBs and it was considered a Class B concentration (i.e., chronic toxicity to aquatic life), that also exceeded the 6 NYCRR Part 375 standard for unrestricted use. The analysis also notes that there would be limited resuspension of bottom sediment due to construction of the project. Therefore, the project would not have the potential to result in significant adverse effects due to disturbance of sediment containing PCBs.

**Comment 99:** Pages 8-4 and 9-71 describe results of the soil boring investigation performed for the area of illegal fill at Tricia Way to be removed. At GOSR's request, the Department previously reviewed this report. Discussion in the DEIS should be clarified regarding the soil sampling results. The DEIS states that there were no exceedances of soil cleanup objectives (SCOs) for protection of groundwater or residential use. However, the report showed exceedances of groundwater SCO for acetone. While acetone is a typical laboratory contaminant which gets detected in samples and is generally dismissed as such, this should be clarified to accurately depict the results. The DEIS does not mention that there were exceedances of the unrestricted SCO for the metals lead and nickel, as well as the pesticide DDT and its metabolites DDE and DDD. The DEIS also fails to note that borings were not taken, and thus material was not characterized, from areas within the Surf Avenue right-of-way, which comprises the majority of the area of fill to be removed. The Report on Soil Investigation, prepared by Preferred Environmental Services dated August 2016, should be included as an Appendix. (NYSDEC\_074)

**Response:** Chapters 8, "Hazardous Materials" and 9, "Natural Resources" have been updated in the FEIS to reflect this comment.

## **NATURAL RESOURCES**

**Comment 100:** Section 9.2 lists all regulatory context items under "Federal", including those of New York State. This should be corrected so New York State jurisdictions are not characterized as "Federal". (NYSDEC\_074)

**Response:** The text has been corrected in the FEIS.

**Comment 101:** Federal agencies have responsibilities under section 7(a)(2) of the ESA to consult with the Service regarding projects that may affect federally listed species or designated critical habitat. The DEIS notes that the GOSR will initiate consultation under section 7 of the ESA following publication of the DEIS. We note that shoreline restoration and the installation of breakwaters will likely increase the width of the beach in the project area. Wider beaches may attract nesting or migratory shorebirds including the piping plover (*Charadrius melanotos*) and/or red knot (*Calidris canutus*). Piping plovers nest on beaches in the nearby area at Sandy Hook, New Jersey, and Breezy Point, New York, and red knots have been documented on other beaches and coastal areas on Staten Island and Jamaica Bay, New York. Measures to address the possibility of listed shorebird use in the project area will be discussed with the GOSR when consultation is initiated. (DOI\_005)

**Response:** Although the breakwater alignment, segment length and distance from shore are designed to promote beach accretion, but avoid the creation of tombolos (a sand spit connecting the shore and breakwater created through deposition, which would act like a terminal ground extending into the water from the beach, encroaching on NYSDEC littoral zone tidal wetlands), the beach will likely remain too narrow to support nesting piping plovers or other beach-nesting waterbirds. Beaches less than 80 meters wide (262 feet), for example, are considered narrow for piping plovers (Maslo et al. 2011, Restoration Ecology 19:194-203). In a study in New Jersey, piping plovers were not found to nest less than 10 meters (32 feet) away from the high tide line (Maslo et al. 2011, Restoration Ecology 19:194-203). The hybrid dune/revetment would be too high and too steeply sloped for piping plovers to nest on. In the event that piping plover or other beach-nesting birds are found to nest on the beach, NYC Parks would enact the required management and protection protocols for each species in consultation with regulatory agencies. It is expected that red knots and other shorebirds may occur on the beach during spring and fall migration with the same likelihood as at present. The shoreline restoration and breakwaters may improve benthic invertebrate communities as well as horseshoe crab nesting habitat, and in turn, improve refueling conditions for migrating shorebirds. The EIS has been revised to incorporate this analysis of potential future use by shorebirds and waterbirds.

**Comment 102:** The DEIS identifies a number of migratory and probable breeding bird species within the study area. The installation of the earthen berm, hybrid dunes, eco-revetment, raised edge, and water hub will occur in maritime beach and dune, successional forest, and southern hardwood habitats that may support these nesting or migratory birds. The DEIS indicates the construction of the earthen berm will be scheduled outside the early May through July primary bird-breeding season, when many species of birds are still nesting, to the extent practicable. However, we encourage work in these areas, particularly tree-cutting, should be

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avoided from April 1 to August 31 in any given year. We recommend that the GOSR coordinate with the Service on monitoring and surveys that may support tree cutting from May to July, as proposed. These surveys would be focused on the presence of active nests, eggs, or young in trees targeted for removal. In the event that active nests, eggs, or young were not present, then tree cutting could potentially commence during the April 1 to August 31 window. (DOI\_005)

**Response:** Comment noted. Minimal tree removal is expected for the project. Should construction activities requiring tree clearing be necessary during April or August (i.e., the beginning and end of the breeding period), GOSR will coordinate with the USFWS with respect to conducting active nest surveys that may support tree cutting during this period. These surveys would be focused on the presence of active nests, eggs, or young in trees targeted for removal. In the event that active nests, eggs, or young are not present, GOSR will inform USFWS of the results before commencing any tree cutting.

**Comment 103:** Due to the height 14 foot above sea level birds will be landing here often and dropping their fecal matter by the tons, this will in turn dry up in the hot sun being too high to be washed off by the sea, will become airborne as very fine dust particulates making landfall and getting the residents of Tottenville very sick. (Greco\_030)

**Response:** The breakwater segments would be located between approximately 790 and 1,170 feet from the shoreline. Moreover, while portions of the breakwater segments would be exposed, as with any water structures, these areas would be subject to wave action, salt spray and precipitation which would control accumulation of bird droppings.

**Comment 104:** The installation of the breakwaters will adversely impact 12.7 acres (ac) of estuarine, subtidal, unconsolidated bottom. The installation of the breakwater structures would result in the replacement of 12.7 acres of subtidal and sand gravel aquatic habitat with subtidal, intertidal, and emergent hard/rocky habitat composed of rock and bio-enhancing concrete of varying sizes. We recommend that GOSR coordinate with the New York State Department of Environmental Conservation to ascertain whether mitigation is appropriate for conversion of habitats in this area.

The proposed project also includes the installation of a path and bridge to connect the earthen berm to the proposed hybrid dunes. The installation of these project elements will cause a loss of 0.24 acres of a 0.8 acres unmapped tidal wetland. To mitigate for this loss, GOSR proposes to enhance the remaining 0.56 acres of this wetland, by increasing tidal exchange. Two thirds of the wetland is reportedly dominated by common reed (*Phragmites* spp.) (including the impacted area), and the increase in tidal flow is expected to restore a more natural wetland community. The DEIS does not specifically address how increased tidal exchange would be

achieved or how successful mitigation would be measured or monitored. (DOI\_005)

**Response:** Comment noted. Since the publication of the DEIS, design of the Shoreline Project has progressed and the wetland bridge and associated transition nodes originally proposed have been eliminated from the plan. The revised plan includes an eco-revetment between the proposed earthen berm and hybrid dune/revetment landward of the wetland. The proposed eco-revetment in this area will run along the northern edge of the delineated wetland and avoid footprint impacts as much as possible. The exact location, position, and footprint width of the eco-revetment will be finalized after further study during the 60 percent design phase. For the purposes of the FEIS, a conservative footprint width has been considered with the intention of studying possibilities for a narrower footprint. Because the system is now proposed to run along the northern edge of the delineated wetland, there will no longer be hardened structures proposed that would traverse across the wetland (in the north-south direction). During the 60 percent design phase, the designers will also study possibilities to increase tidal flushing by, for example, re-grading the inlet to Raritan Bay after removal of the temporary dune, or potential design changes to the pipe at the existing inlet. The impacts to the existing wetland identified in the FEIS are less than identified in the DEIS, by approximately 42 percent. GOSR will continue to coordinate with the NYSDEC to ascertain whether mitigation is appropriate for conversion of habitats in this area.

**Comment 105:** What is the depth of water where these breakwaters are being proposed for construction and is there existing marine life at this depth? If so, what kind of marine life? (Greco\_075)

**Response:** The depth of the water in the area of the proposed breakwater segments ranges from four feet to 12 feet (from mean low water (MLW) level). As described in the FEIS, the types of marine life found in the study area include phytoplankton, macroalgae, macroinvertebrates, and fish, as described in detail in Section 9.4.3 Aquatic Resources, in Chapter 9, "Natural Resources" of the FEIS.

**Comment 106:** Why did you name this project "living break waters" when you are going to cover large portions of the Bay's bottom with man-made polypropylene mats, with concrete cube on top that will block out the sun, photo synthesis, oxygen, and nutrients that existing life forms need to survive, essentially killing any and all existing life forms that already are thriving, such as fish, clam beds, nests, eggs, seaweed, nutrient rich micro-organisms and other marine life? These islands, after killing all sea life below them, will also block and prevent the micro rich nutrients carried by the changing tides to other life forms relying on this food source for survival thus killing much of the sea life between the islands and the shore, also somewhat stagnating the water, which can produce foul smells. (Greco\_030, Greco\_075)

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**Response:** The primary breakwater materials will be a combination of regionally sourced stone and bio-enhancing concrete. Geotextiles are a durable material commonly used in marine construction that have a long track record of successful installations in similar environments (see detailed response regarding geotextiles below). As described in the FEIS, Chapter 9, "Natural Resources," of the FEIS provides a detailed analysis of both the potential impacts to aquatic biota due to the placement of the breakwater materials and the ecological enhancement provided by the system.

The proposed breakwater system would increase habitat diversity through the establishment of structural habitat, which is currently limited within Raritan Bay. The high-relief rocky habitat provided by the breakwaters would be designed to attract and retain habitat-creating benthic invertebrates and shellfish, including oysters. Ecological design features of the breakwaters (i.e., varying levels of elevation, inclination, bio-enhancing materials, textures, interstitial spaces, water retaining elements, reef streets and grain sizes) would facilitate the recruitment of a rich benthic community of habitat-forming encrusting invertebrates and algae, while also providing suitable sheltering and foraging habitat for fish and benthic invertebrates, including threatened and/or endangered and EFH species that could occur in Raritan Bay. Additionally, crevices and void spaces at the interface of the breakwaters segments with the seafloor would be available for use by benthic fish and invertebrate species.

As presented in Chapter 9, "Natural Resources," the Proposed Actions would result in the conversion of approximately 11.4 acres of existing sand/gravel substrate and the loss of any benthic invertebrates associated with this habitat that are unable to move from within the footprint. This loss would constitute just 2 percent of nearshore habitat present within the approximately 610-acre study area within Raritan Bay and would not result in a significant adverse impacts to populations of benthic invertebrates within Raritan Bay or result in significant adverse impacts to fishery resources due to this loss of forage resources. Additionally, this 2 percent loss of foraging habitat would occur sequentially over the 11-month construction period (6 months in the first year and 5 months in the second year) as the breakwater segments are installed, rather than all at once. Benthic prey species are expected to recolonize the sand and gravel among the breakwaters, as well as the breakwaters themselves, following construction.

As discussed in Chapter 9, "Natural Resources," the breakwater segments have been designed to minimize changes to tidal flushing and water residence in order to avoid adverse impacts to water quality.

**Comment 107:** All this Bay needs to thrive is man's better understanding of Marine Biology and nature, how it works, and respect. That would mean to stop polluting it! Man-made mats and concrete are not natural to this environment and thus polluting. We demand to witness and see the results of these man-made materials and samples of each put into a salt water tank with the same species in our Bay and it

to be monitored over a year's time before we let you contaminate our Bay and potentially set life forms back a 100 years. (Greco\_075, Greco\_030)

**Response:** Geotextiles are a durable material commonly used in marine construction that have been tested in the marine environment.

Geotextiles are either woven or non-woven permeable fabric, synthetic materials used as permeable protection layers, to secure other materials in place to reduce the potential for erosion, resuspension of sediment, or mixing of materials. They can also provide a foundation to prevent the erosion of base soils and ensure the structural stability of coastal structures such as breakwaters, groins, and jetties. Geotextile materials are designed to last indefinitely, only affected negatively if directly exposed to UV radiation consistently.

The current design includes a single layer of geotextile placed under the breakwater before the stone is laid down to reinforce surficial soil at the bay floor and distribute loads of the breakwater to help ensure stability throughout the structure. The second layer of geotextile shown in the DEIS design between adjacent layers of stone is not currently included in the updated design as it was deemed not to be necessary to prevent stone mixing.

Geotextiles have a long history of use in marine construction. The first documented uses of geotextile within the U.S. date back to the late 1950's, when waterfront property owners began looking for a more efficient way to provide a filter layer for protective structures, in place of the costlier graded granular layers that were normally used. In 1972, after 10 years of evaluating the new concept, the USACE issued their first comprehensive specification for filter fabrics, thus accepting geotextile layers as the superior construction technique.

The concrete used in the breakwaters will be bio-enhancing concrete units. Overall, approximately 1 out of every 47 armor units will be made of bio-enhancing concrete (based on volume); the remainder will be natural stone. There are two types of bio-enhancing concrete units that will be used in the breakwaters: (1) Bio-Enhancing Concrete Armor Units, Cubed-Shaped Armor Units With Chamfered edges and faces specifically contoured (textured) to create complex surfaces that attract biological organisms and allow them to settle and stay on the units; and (2) Bio-Enhancing Concrete Tide Pool Units, basin-shaped units capable of holding water between tides, designed to mimic the form of natural rock pools to be placed in the intertidal zone.

The bio-enhancing technology intend for use for the manufacturing of these concrete units is scientifically tested and is based on specially developed concrete composition, micro-surface texture, and designs that encourage growth of target marine flora and fauna. In various case studies and lab tests, the bio-enhancing concrete products successfully supported a high range of native marine species, reducing the native/invasive species ratio, increasing localized biodiversity and favoring key marine species such as oysters. Promotion of engineering species

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like oysters, tube worms and barnacles, which by the deposition of a calcium carbonate layer on the concrete surface, create biogenic build-up, not only increases the availability and heterogeneity of biological niches on the structure, but also contributes to the structures' stability and longevity via Bioprotection, a process in which animals and plants protect the surfaces they colonize from weathering and erosion (<http://www.biogeomorph.org/coastal/bioprotection/>)

As discussed in Chapter 9, "Natural Resources" of the EIS, the proposed ecologically enhanced concrete has also been tested in the marine environment.

Peer reviewed research papers were published on the positive performance for biodiversity and species recruitment for the material being considered thus, any substitute material would be required to provide equal documentation of positive environmental performance.

There is no indication that contact between the concrete units and geotextile would provide active chemical reactions.

The rock proposed for use in the breakwaters structures is a naturally occurring material. Further, all materials used in the construction of the breakwaters will require approval of the NYSDEC and USACE.

**Comment 108:** Invertebrates are an important food resource for shorebirds, waterfowl, waders, etc., and are a pathway for bioaccumulation of contaminants, if present. Due to the proximity of the living breakwaters and the proposed oyster nursery to the Arthur Kill, there is concern that oyster restoration may not be successful at this location due to contaminants. Wintermyer and Cooper (2003) studied the effects of dioxin and dioxin-like compounds on egg development and fertilization of the eastern oyster (*Crassostrea virginica*) and evaluated the potential for restoring oyster populations in the New York/New Jersey Harbor area. The two study sites were located in Newark Bay and the Arthur Kill. The study found that dioxins, furans, and polychlorinated biphenyls (PCB) were still bioavailable in Newark Bay and that 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) impaired gonadal development, egg viability, and larval production in oysters transplanted into the Arthur Kill. The authors concluded that, due to the documented adverse effects of these compounds on the oyster, restoration efforts in Newark Bay and the Arthur Kill were unlikely to result in successful recruitment of oysters in these areas.

The results presented in this chapter indicate the presence of some of the aforementioned contaminants in sediments and/or clam tissue within the study area. The GOSR may consider if further analyses or characterization of contaminants are needed to determine if the project may increase chemical exposure to fish and wildlife species found in, or may be attracted to, the project area. (DOI\_005)

**Response:** Sediment samples within the project area indicated low levels of contamination that were generally at concentrations considered Class A (i.e., no toxicity to

aquatic life). No Class C concentrations of contaminants (i.e., acute toxicity to aquatic life) were collected. Levels of contaminants are generally higher in the Arthur Kill and Newark Bay than in Raritan Bay due to more historic point-source discharges to these industrial waterbodies. Raritan Bay also has greater flushing and circulation because it is oceanic. This flushes contaminants but also reduces and minimizes anaerobic conditions that favor the metabolism of contaminants by bacteria into more bioavailable forms of the contaminants (e.g., mercury to methylmercury). Additionally, dioxins and furans have been shown to accumulate preferentially in fine sediment particles (< 10 µm),<sup>2</sup> which are not common in the study area.

Regarding exposure of birds, levels of trace elements (i.e., arsenic, lead, mercury, etc.) in bivalve tissues are higher in the Upper Hudson Raritan Estuary than the Lower Hudson Raritan Estuary, where the study area is located.<sup>3</sup> This suggests that birds feeding on invertebrates in the project area could ingest lower concentrations of trace elements than elsewhere within the Hudson Raritan Estuary.

As described in the EIS, sediment disturbing activities during construction would be minimal. The project has been designed to minimize any scouring at the base of the breakwaters such that resuspension of bottom sediment and any associated contaminants would not be expected to differ significantly from the existing condition. Modeling was performed to analyze the bed stress created by the movement of ebb and flood tides around the individual breakwaters. While some resuspension is likely, resuspension will be highly localized and within shallow scour areas. Modeling was also performed to analyze the potential for changes in sediment transport conditions with and without breakwaters installed by performing simulations of wind and tide driven water levels, currents, and waves. Modeling of overall sediment transport indicated that the breakwaters reduce potential for wave induced sediment resuspension inshore of the breakwaters, but cause insignificant changes to overall tidal induced scour potential.

While 2,3,7,8-TCDD was present in clam tissue samples from the study area, the average concentration was 0.204 nanograms per kilogram (ng/kg). This concentration is lower than the 2,3,7,8-TCDD concentrations of 0.5 to 1.1 ng/kg reported in the soft shell clam (*Mya arenaria*) at nearby Wards Point, NY in

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<sup>2</sup> Lee, S., J. Kim, Y. Chang, and M.H. Moon. 2006. Characterization of polychlorinated dibenzo-pdioxins and dibenzofurans in different particle size fractions of marine sediments. Environmental Pollution 144:554-561.

<sup>3</sup> Kimbrough, K.L., S. Commey, D.A. Apeti, and G.G. Lauenstein. 2010. Chemical contamination assessment of the Hudson-Raritan Estuary as a result of the attacks on the World Trade Center: analysis of trace elements. Marine Pollution Bulletin 60:2289-2296.

1994,<sup>4</sup> supporting that the level of contamination in the waterbody is decreasing. The levels of TCDD present in clams tissues from the study area is also significantly lower than the levels documented to cause reproductive and developmental effects in the eastern oyster and soft shell clam. Wintermyer and Cooper (2007)<sup>5</sup> found that 2,3,7,8-TCDD concentrations of 2 ng/kg cause adverse reproductive effects in female eastern oysters and that concentrations of 10 ng/kg result in complete inhibition of gonad development in both males and females. Cooper and Wintermyer (2009)<sup>6</sup> also found that 2,3,7,8-TCDD concentrations of 2 to 20 ng/kg affect gonad development in soft shell clams as well as eastern oysters and could affect early development in both species. The lowest 2,3,7,8-TCDD concentration level known to cause reproductive effects (2 ng/kg) in bivalves is an order of magnitude higher than the average concentration in clam tissues from the study area. Therefore, dioxin is not expected to have any effect on bivalves colonizing the breakwaters in the project area.

It should be noted that the EIS and permit application for the Proposed Actions focuses on the breakwater structures, which have an independent purpose, need and utility from any future active bivalve restoration activities. Any active bivalve restoration that would occur on and adjacent to the breakwaters would be subject to separate environmental review and regulatory approvals.

**Comment 109:** Horseshoe crabs (*Limulus polyphemus*) and horseshoe crab eggs have been documented at beaches within the study area. The DEIS proposes to avoid construction and sand placement between Manhattan Street and Loretto Street during peak spawning season (late May to early June). The DEIS also anticipates that sand placement would be avoided early January through late May to avoid spawning winter flounder. This additional restriction would also benefit horseshoe crabs. We support these time-of-year restrictions. To further minimize impacts to horseshoe crabs, the sand used for shoreline restoration and the construction of the hybrid dunes should match the existing sand (grain size, shape, texture, etc.) so that it is suitable for spawning horseshoe crabs and for the timely recovery of other benthic invertebrates. (DOI\_005)

**Response:** Comment noted.

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<sup>4</sup> Brown, R.P., K.R. Cooper, A.Cristini, C. Rappe, and P. Bergqvist. 1994. Polychlorinated dibenzo-*p*-dioxins an dibenzofurans in *Mya arenaria* in the Newark/Raritan Bay Estuary. Environmental Toxicology and Chemistry 13:523-528.

<sup>5</sup> Wintermyer, M.L. and K.R. Cooper. 2007. The development of an aquatic bivalve model: evaluating the toxic effects on gametogenesis following 2,3,7,8-tetrachlorodibenzo-*p*-dioxin (2,3,7,8-TCDD) exposure in the eastern oyster (*Crassostrea virginica*). Aquatic Toxicology 81:10-26.

<sup>6</sup> Cooper, K.R. and M. Wintermyer. 2009. A critical review: 2,3,7,8-tetrachlorodibenzo-*p*-dioxin 2,3,7,8-TCDD) effects on gonad development in bivalve mollusks. Journal of Environmental Science and Health, Part C 27:226-245.

**Comment 110:** The DEIS states that native coastal plant species will be used for the Shoreline Project and Water Hub elements of the projects. We support this ecologically beneficial component of the project. We note that for successful establishment of native plants at the project location and for the maximum benefit to pollinator species, it is best to use genetically diverse and locally sourced plants for plantings. (DOI\_005)

**Response:** Comment noted. It is anticipated that plants used for the Shoreline Project will be supplied by the Greenbelt Native Plant Center on Staten Island.

**Comment 111:** There are two potential locations discussed in the DEIS for the proposed Water Hub. ‘Potential Location 1’ would require the construction of a new 5,000-square-feet (sq ft) facility and 35,500 sq ft of site improvements, including a parking lot, landscaping, and other elements. ‘Potential Location 2’ would reuse one of two already-existing structures. Overall, to reduce the impacts of the project on native habitats, location of the Water Hub should be assessed to avoid additional buildings and parking lots in existing natural areas, and consideration should be given to the potential reuse of previously developed sites not prone to flooding.

In terms of recreational water access points, we support adding water access to the existing pavilion instead of building ramps that would require the removal of trees at the Biddle House or Rutan-Beckett House, and the use of a temporary floating dock instead of a permanent or year-round structure. (DOI\_005)

**Response:** Comment noted. Based on feasibility studies conducted subsequent to the publication of the DEIS, the potential pavilion water access location has been eliminated. The FEIS has been updated to reflect this change. The location of the Water Hub has not been finalized. Should Potential Location 2 be selected for Water Hub activities, any potential water access provided near the Biddle or Rutan Beckett houses would be temporary.

**Comment 112:** A monitoring plan should be included in the referenced adaptive management plan to evaluate the success of and potential modifications to these resiliency projects as they relate to natural resources. Adaptive management should also include a corrective management plan should any proposed mitigation not achieve its intended purpose. (DOI\_005)

**Response:** A monitoring plan and adaptive management plan will be prepared as part of the breakwater project documents for permitting. Monitoring for the Shoreline Project will be in accordance with the city-wide Waterfront Inspection Program managed by EDC.

**Comment 113:** Were USFWS and NOAA consulted with for threatened and endangered species? The statement that there are no significant adverse impacts to terrestrial or aquatic species is made without an “effects” determination and not supported by a

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concurrence from USFWS or NOAA that mitigation and avoidance measures are acceptable to avoid adverse impacts. (HUD\_007)

**Response:** GOSR initiated informal consultation with NMFS under Section 7 of the Endangered Species Act on April 19, 2017. The Section 7 consultation process with NMFS was completed on May 19, 2017, with a concurrence from NMFS with GOSR's conclusion that the proposed action is not likely to adversely affect the ESA-listed species and/or designated critical habitat under NMFS jurisdiction. GOSR initiated consultation with USFWS on April 17, 2017. Consultation was completed on January 17, 2018 with a concurrence from USFWS with GOSR's conclusion that the Proposed Actions are not likely to adversely affect ESA-listed species under USFWS

**Comment 114:** The DEIS states that the seasonal floating dock would provide water-based access to the breakwaters for observation, monitoring, maintenance, and stewardship of the floating oyster nursery and breakwaters. Furthermore, the "Adjacent Artificial Habitat Survey Report" included in Appendix E – Natural Resources states that fishing activities and associated debris were noted around hard structures in the area. Encouraging oyster and shellfish colonization of the breakwaters advances restoration objectives for the Hudson-Raritan Estuary and there are obvious complimentary aspects of the breakwaters to recreational fishing. These activities would be expected to increase after the breakwaters are constructed. To ensure there would be no significant displacement of recreational boating and fishing opportunities, the Department requests further assessment on the existing and future demand for recreational boating and fishing in the project area and information on whether use restrictions could be imposed to prevent illegal shellfish harvesting. (DOS\_025)

**Response:** The FEIS includes an analysis of existing and future demand for recreational fishing in the project area. To reduce or prevent illegal poaching of bivalves off the breakwater structures, project partners will work together to install signage along the coast of the breakwaters about the purpose of the structures, why colonization by bivalves, including oysters, on the structures is important, and the health hazards of illegally poaching of bivalves from Raritan Bay.

NYSDEC officers currently patrol Raritan Bay eight times each month.

**Comment 115:** Oyster restoration is discussed throughout the DEIS at a conceptual level, and large-scale restoration is cited as a future goal and benefit of the proposed actions; however, the DEIS does not provide a sufficient level of analysis and discussion of the scope and scale of oyster restoration — both that which is proposed now, as part of the proposed actions outlined in the DEIS, or in possible future separate project efforts by any project stewards, including but not limited to the Billion Oyster Project. Thus, further detail should be provided in this regard.

The Department would like to point out that a supplemental EIS including further details and impact analysis will likely be required for future restoration efforts as they are not addressed in this document. Given the public health concerns raised by potential illegal harvest of shellfish from the uncertified waters of Raritan Bay and DEC's compliance with the National Shellfish Sanitation Program (NSPP), coordination with the Department will be required to determine if appropriate security measures can be achieved for any oyster nurseries or restorations that would take place on or around the breakwaters. It is also unclear how potential oyster restoration would impact the existing sustainable hard clam beds and habitat in Raritan Bay, and this should be discussed. (NYSDEC\_074)

**Response:** The design, construction, and operation of the Breakwaters Project would result in the creation of ecologically designed, three-dimensional structures that would increase the diversity of the aquatic habitats available for a variety of marine animals, plant and invertebrate species that provide or form habitat found in Raritan Bay (e.g., brown algae and local shellfish like mussels, barnacles, and oysters). Any active bivalve restoration that would occur on and adjacent to the breakwaters would be subject to separate environmental review and regulatory approvals. The EIS and permit application for the Proposed Actions focuses on the breakwater structures, which have an independent purpose, need and utility from any future active bivalve restoration activities.

It is understood that the attractive nuisance problem is a real concern and that compliance with the National Shellfish Sanitation Program will be necessary. GOSR, through project stewards, plans to coordinate with the DEC shellfisheries division to ensure that all security measures, and monitoring meet the department's requirements. Also see response to Comment 114.

**Comment 116:** Due to water quality conditions, the waters off Staten Island are not open to shellfish harvest. Despite this, the Breakwaters Project would promote the colonization of oysters and over time could create an attractive nuisance. There is a potential for contaminated shellfish to be illegally harvested from the breakwaters and pose a public health threat due to the ease of access to water created by the proposed boat launch and dock and the proximity of the breakwaters to shore. Measures to secure the breakwaters and oyster nursery from illegal harvesting or other tampering should be provided. (DOS\_025)

**Response:** See response to Comments 114 and 115.

**Comment 117:** The issue of habitat replacement does not appear to be thoroughly analyzed in the DEIS. A habitat tradeoff analysis is needed to evaluate lost habitat values versus the new breakwater habitat values. It may also be beneficial to highlight the restorative benefits of the project in promoting the return of habitats, such as oyster beds, that once flourished in this area. (DOS\_025)

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**Response:** The FEIS includes a more detailed evaluation of the habitat conversion and enhancement resulting from the Proposed Actions.

**Comment 118:** The “Adjacent Artificial Habitat Survey Report,” included in Appendix E – Natural Resources, states on page 29, “During the design phase this aspect of recreational fishing activity will need to addressed, in terms of reducing the risk of fishing debris to the developing biological communities, the potential impact of selective fishing on different species, and the safety of users.” The Department requests an analysis of potential fishing impacts to fishes and other estuarine communities attracted to the breakwaters. (DOS\_025)

**Response:** The Natural Resources chapter of the FEIS includes an analysis of potential fishing impacts to fish stocks within Raritan Bay.

**Comment 119:** The DEIS identifies that a post-construction monitoring and adaptive management plan will be prepared and implemented to assess the structural integrity and condition of breakwater structures, their effectiveness at attenuating storm waves and reducing shoreline erosion, along with establishing what corrective measures may be needed should an issue arise and when such corrective measures should be implemented. A copy of this plan should be provided to the Department as part of its consistency review. (DOS\_025)

**Response:** Comment noted. A copy of the plan will be provided to the New York State Department of State.

**Comment 120:** The DEIS states on page 9-56, "The Governor's Office of Storm Recovery (GOSR) will initiate consultation under Section 7 of the Endangered Species Act following publication of the DEIS." However, the document proceeds to make statements about impacts to various listed species that are misleading, as they imply that consultation has already occurred. For example, page 9-89 states, "the 12.7 acres of displaced nearshore [Atlantic sturgeon] habitat may affect but is unlikely to adversely affect this species." This statement appears to be stating that this action is not likely to adversely affect (NLAA) the species, however an NLAA determination can only be made in concurrence with the Services. The statement should be clarified to say that GOSR expects that the action will result in an NLAA determination, but this is pending concurrence from the Service(s) under Section 7 of the Endangered Species Act. Similar language is repeated throughout Chapter 9. (EPA\_006)

**Response:** GOSR initiated informal consultation with NMFS under Section 7 of the Endangered Species Act on April 19, 2017. The Section 7 consultation process with NMFS was completed on May 19, 2017 with a concurrence from NMFS with GOSR’s conclusion that the proposed action is not likely to adversely affect the ESA-listed species and/or designated critical habitat under NMFS jurisdiction.

**Comment 121:** The Cumulative Effects section of the document similarly states that the project will have beneficial impacts on listed species; however, without completion of consultation, this statement is misleading. Further, even positive effects require consultation and concurrence. Only "No Effects" determinations can be made without consultation with the Service(s). Page 9-83 in the Natural Resources chapter states, "Given the increase in habitat complexity and diversity that will benefit EFH species, Alternative 2 would not result in substantial adverse effects on EFH." Again, without an EFH consultation, this statement is misleading. There are inherent habitat trade-offs that will occur as a result of the construction of the breakwater for winter flounder and other EFH and ESA listed species. There is a level of uncertainty regarding the species that the breakwaters will attract and in what abundance, as well as the amount of time that will be required for the breakwaters to be colonized to optimal levels. Broad statements regarding the impacts of the project, such as these, minimize the uncertainty associated with the potential beneficial impacts this project may have on the ecosystem of the Raritan Bay. (EPA\_006)

**Response:** GOSR initiated consultation with NMFS for EFH on April 11, 2017. As requested by NMFS, GOSR added another year of baseline biological sampling for fishes and benthic macroinvertebrates following the same sampling protocol used in 2015. The FEIS includes a full EFH assessment augmenting the analysis included in the EFH Worksheet presented in the DEIS. As per NOAA's final EFH consultation letter dated May 8, 2018, NOAA/NMFS has concluded that "the revised EFH assessment adequately evaluates how the project components, both individually and cumulatively, will affect federally managed species, their EFH, and the ecology of Raritan Bay."

**Comment 122:** Figure 9-12 shows that the proposed potential location of the oyster nursery structure is located on the landward side of Type C breakwater. The breakwaters are designed to help reduce coastal erosion by increasing sedimentation. They will alter sediment transport along the shore for the purpose of attenuating waves. In doing so, it is unclear how the increased sedimentation that will occur between the breakwaters and the shoreline could impact the oyster nursery. Oysters are susceptible to impacts from increased sedimentation and could potentially experience a decreased ability to reproduce due to changes in sedimentation rates. This should be clarified in the Final EIS. (EPA\_006)

**Response:** The design, construction, and operation of the Breakwaters Project would result in the creation of ecologically designed, three-dimensional structures that would increase the diversity of the aquatic habitats available for a variety of marine animals, plant and invertebrate species that provide or form habitat found in Raritan Bay (e.g., brown algae and local shellfish like mussels, barnacles, and oysters). Any active oyster restoration that would be planned for areas on and adjacent to the breakwaters would be subject to separate environmental review

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and regulatory approvals. The oyster nursery structure referenced in the comment has been removed from the project.

**Comment 123:** The DEIS notes that the proposed actions would not result in significant adverse impacts to natural resources, and thus no mitigation is required. As previously discussed, DEC anticipates the need for compensatory mitigation due to the permanent loss of areas of marine habitat from the proposed actions, irrespective of the need for mitigation as defined by NEPA. The exact quantity and nature of mitigation of impacts would be developed in coordination with the Department as part of the permitting process. (NYSDEC\_074)

**Response:** Comment noted. As noted in Chapter 9 of the EIS, the Proposed Actions would result in the conversion of soft bottom sandy substrate to complex rocky habitat within the study area, and by design, would be expected to benefit the target species groups identified for the project. The loss of approximately 3.6 acres of Waters of the U.S. and associated habitat due to the portion of the breakwaters above MHW would result in adverse impacts. Mitigation measures for the loss of the approximately 3.6 acres of Waters of the U.S. and associated habitat may include the purchase of available credits from an approved mitigation bank, and restoration/enhancement of Waters of the U.S. within the Raritan Bay watershed in New York.

**Comment 124:** The fish and benthic invertebrate sampling, as described by the DEIS and Natural Resource Appendix E utilizes a relatively short period of sampling to inform a broader, long-term analysis of how the breakwaters would impact these ecological communities. Single year sampling fails to account for inter-annual variability and changes in other environmental conditions. More justification is required to ensure that the conducted sampling is robust and informative enough to perform a long-term analysis. More detail should be provided regarding the potential for inter-annual variability and how that may affect a long-term analysis. (NYSDEC\_074)

**Response:** As requested by NMFS, GOSR added another year of baseline biological sampling for fishes and benthic macroinvertebrates following the same sampling protocol used in 2015. The results of this additional sampling have been included in the FEIS.

**Comment 125:** The document states that the proposed actions would have no impact to sturgeon. As described in Chapter 9 — Natural Resources (Page 9-89 and 9-90), they are known to utilize these waters during certain times of the year. Additional rationale is needed to support the DEIS's claim that the proposed actions will not adversely affect sturgeon. (NYSDEC\_074)

**Response:** GOSR initiated informal consultation with NMFS under Section 7 of the Endangered Species Act on April 19, 2017. The Section 7 consultation process with NMFS was completed on May 19, 2017, with a concurrence from NMFS

with GOSR's conclusion that the proposed action is not likely to adversely affect the ESA-listed species, including Atlantic sturgeon, and/or designated critical habitat under NMFS jurisdiction.

**Comment 126:** The DEIS should include more detailed analysis of the breakwaters' effect to Essential Fish Habitat (EFH) (Pages 9-82 and 9-83). The loss of 12.7 acres of sandy benthic habitat would adversely affect bottom-feeding fish (such as winter flounder) which feed on the abundant hard clams, polychaetes, and amphipods currently in the benthos. Thus, the breakwaters would not universally benefit all EFH species as is stated on Page 9-83 and this analysis should be expanded upon. (NYSDEC\_074)

**Response:** GOSR initiated consultation with NMFS for EFH on April 11, 2017. As requested by NMFS, GOSR added another year of baseline biological sampling for fishes and benthic macroinvertebrates following the same sampling protocol used in 2015. The FEIS includes a full EFH assessment augmenting the analysis included in the EFH Worksheet presented in the DEIS. As per NOAA's final EFH consultation letter dated May 8, 2018, NOAA/NMFS has concluded that "the revised EFH assessment adequately evaluates how the project components, both individually and cumulatively, will affect federally managed species, their EFH, and the ecology of Raritan Bay."

**Comment 127:** Page 156 of Appendix E Part 3 appears to show incorrect formulas (Section 5.4.4.8). Percent difference between standard and observed dissolved oxygen readings should be  $(DO_{obs}-DO_{std}/DO_{std}) \times 100$  (shown formula is missing "x 100"). The same is true for section 5.4.5.10 (Page 158) for calculating percent difference in conductivity readings.  $(Cobs-Cstd/Cstd) \times 100$ . Please include charts which compare observed water quality data to existing standards. (NYSDEC\_074)

**Response:** While the formulas in the DEIS were shown incorrectly in the text, the calculations were done correctly. The FEIS contains the corrected formulas.

**Comment 128:** The Natural Resource Appendix (Appendix E, pages 452-459) contains conflicting statements regarding the occurrence and/or utilization of Raritan Bay by multiple fish species:

- Page 452: states that alewife are a pelagic species and that neither spawning nor nursery habitat occurs within Raritan Bay. In fact, river herring have been confirmed to occur in the Raritan Bay drainage area, and a juvenile alewife was recorded in the July seine survey. The statement that the breakwaters may provide habitat for alewife prey species requires additional justification, given that they are open water swimmers that feed upon zooplankton.
- Page 453: states that American eel can occur in Raritan Bay year-round, but also that neither spawning nor nursery habitat for American eel occurs within Raritan Bay. It should be noted that the Department has found that glass eels

and elvers occur in tributaries of Raritan Bay. There is likely to be some loss of habitat for this species due to construction of the breakwaters.

- Page 453: states that American shad can occur in Raritan Bay and were observed during sampling, but the Hudson River is noted as the only spawning location. It is possible that the Hudson is not the only area where shad spawn, and there will definitely be a loss of useful sand and gravel habitat areas due to construction of the breakwaters. The EIS also states there is an important shad fishery. In fact, commercial and recreational fishing for American shad is prohibited in both the NY Marine and Coastal District, and on the Hudson River.
- Page 454: states that Atlantic menhaden can occur in Raritan Bay year-round, and that larvae and juveniles use estuarine areas. However, the DEIS also states that menhaden are pelagic and neither spawning nor nursery habitat occurs within Raritan Bay. Yet, small (30 — 55mm) "peanut bunker" were found in the July fish surveys.
- Page 455-456: although blueback herring was not observed in Raritan Bay during the sampling period, statements are made that they can occur in Raritan Bay, and that juveniles spend time in estuarine waters. However, the DEIS also states that diadromous fish species (blueback herring): "are pelagic and neither spawning nor nursery habitat occurs within Raritan Bay".
- Page 459: states that striped bass "are pelagic and neither spawning nor nursery habitat occurs within Raritan Bay". However, sub-adult striped bass were found in the seine surveys. The DEIS also states that juveniles move into higher salinity waters as they grow. Not all adults migrate, and further justification needs to be provided to support that adults would not be found in the Bay when they are not spawning.

These references and descriptions should be corrected to accurately reflect these observations and the results of sampling. (NYSDEC\_074)

**Response:**

GOSR initiated consultation with NMFS for EFH on April 11, 2017. As requested by NMFS, GOSR added another year of baseline biological sampling for fishes and benthic macroinvertebrates following the same sampling protocol used in 2015. The FEIS includes a full EFH assessment prepared in consultation with NMFS that addresses these comments. As per NOAA's final EFH consultation letter dated May 8, 2018, NOAA/NMFS has concluded that "the revised EFH assessment adequately evaluates how the project components, both individually and cumulatively, will affect federally managed species, their EFH, and the ecology of Raritan Bay."

**Comment 129:** Potential Location 1 for the Water Hub may require installation of a septic tank. Installation of a Water Hub, and all its accessory elements (septic tank, parking lot, etc.) would need to comply with the tidal wetlands development restrictions in 6 NYCRR Part 661.6 (a). With specific regard to septic systems, the restrictions require any septic system be set back a minimum of 100' from the most landward edge of any tidal wetland, and there must be two feet of soil between the bottom

of a septic tank and the seasonal high groundwater level, rock, hardpan, or other impermeable materials. These development restrictions must be taken into account if a septic tank is to be installed at Proposed Water Hub Location 1, at either of the location (Page East or Page West) options. (NYSDEC\_074)

**Response:** Based on further feasibility analyses and comments received from the public, the Page Avenue site for the Water Hub (Potential Location 1) has been eliminated from further consideration. A discussion of this alternative is contained in the FEIS to provide a thorough comparison of potential alternatives. Therefore the development restrictions mentioned in the comment are no longer relevant.

**Comment 130:** Page 9-79 states that "local, small-scale changes in water circulation, water quality, and sediment transport could increase local retention of planktonic invertebrates and fish larvae and their subsequent recruitment to the breakwaters..." Use of the word "increase" should be edited to "change" since these studies were not done in regards to this specific site and breakwater design. Expected changes in water circulation, and the subsequent effects, should be explained in further detail. (NYSDEC\_074)

**Response:** Comment noted. The FEIS includes additional discussion pertaining to the potential change in water circulation.

**Comment 131:** Chapter 9, "Natural Resources" should more fully explain how changes to longshore processes and down drift impacts due to installation of the breakwaters could affect natural resources (i.e., through excessive accretion and/or erosion in particular areas or patterns, changes in ecological community composition over time, etc.). This should include analysis for both short and long-term timeframes, as the breakwaters are designed to change the hydrodynamics of a sizeable portion of shoreline and shallow water habitat. (NYSDEC\_074)

**Response:** The shoreline change modeling conducted for the project indicates that the breakwaters will significantly reduce erosion over time, resulting in positive impacts due to additional shoreline habitat stability and prevention of loss of upland habitats. The geographical location of the project helps minimize the potential for down drift impacts. Based on the observed wave conditions, the primary direction of sand movement is from northeast to southwest. As the project is located at the southwest corner of Staten Island, it is assumed that most of the current sand movement continues to the southwest past Ward Point and into the Arthur Kill. More detailed sediment transport modeling is being conducted as part of the design. As such, there is little potential for down drift impacts, with the possible exception of reducing the amount of sediment entering the Arthur Kill channel (a positive impact). It should be noted that the timescale for the accretion shown is 20 years. The ecological community along the shoreline would be expected to adjust to this gradual level of accretion.

**Comment 132:** The breakwaters have the potential to attract seals as a haul out site, particularly in the winter months. The DEIS recognizes that harbor seals can be found hauling out on the Staten Island shoreline, and that harp seals commonly occur at nearby Sandy Hook, NJ (Page 9-48). Discussion and analysis should be provided as to any potential effects (with regard to both ecology and public recreation around the breakwaters) of seals being attracted to the structures. (NYSDEC\_074)

**Response:** Similar to behavior observed in other areas of Staten Island, seals may be attracted to the proposed breakwaters. Signage, if deemed necessary, indicating that interaction with seals is prohibited will be installed in consultation with State and Federal Agencies. This measure has been identified in the FEIS.

**Comment 133:** Page 9-70 describes a trail on the "Raised Edge" revetment comprised of "a top layer of either porous rubber pavement or porous resin bond aggregate pavement." While DEC is always interested in new pervious materials, we are concerned about friability, functionality, maintenance requirements, lifespan, and contaminant leaching from proposed surface materials in the tidal wetlands adjacent areas and coastal erosion hazard areas. Additional information about these materials should be provided, including examples of their previous use in similar locations with exposure to salt water. As porous rubber is made from recycled tires, it may be possible for contaminants to leach into soil and sand. Resin pavement has a tendency to clog, in which case blown sand could end up on the street. Also, the proposed materials need a subsurface, such as gravel or concrete, as well as perimeter curbs, and more detailed information about all these components would be helpful in understanding these potential effects. (NYSDEC\_074)

**Response:** As the design progresses, the selection of the trail material will be coordinated with NYSDEC and NYC Parks in consideration of the factors mentioned in the comment. Currently, pavement materials being considered are asphalt and concrete.

**Comment 134:** The construction phase of the project will have immediate impacts on four reptiles and amphibians that are listed by New York State as endangered, threatened, or of concern and have the "potential to occur within the study area" (Page 9-57). This list includes the eastern mud turtle, eastern fence lizard, eastern box turtle, and southern leopard frog. These animals will be driven away from the project area and may not find suitable substitute habitat. Care should be taken during breeding and early life stages, which occur in warm weather months, to avoid unnecessary impacts to these species. Further, the construction of hardened shoreline structures such as the eco-revetment, the hybrid dune, and the raised edge will eliminate corridors and accessibility between upland and shoreline for both species of turtle. The DEIS states (Page 9-91) that the eastern mud turtle will remain approximately 250 feet from the project limits of disturbance and that the eastern box turtle could be present only near the proposed earthen berm; however,

these species are known to migrate south to mid-Atlantic states on ocean currents and need access to the shoreline to do so. During construction, successful relocation of animals that attempt to migrate through the construction site, despite silt fencing, is dependent on workers sighting the animal and acting proactively. Measures should be taken to ensure workers are aware of these concerns should they see reptiles or amphibians within the project site. (NYSDEC\_074)

**Response:** The only elements of the project that would be located in or near areas of appropriate habitat for these four species are the earthen berm, the eco-revetment between Brighton and Manhattan Streets, the western end of the hybrid dune/revetment and upland areas associated with Water Hub Potential Location 2. These project elements would be located within Conference House Park where the forest is narrow and closely bounded by beach to the south and residential development to the north. These areas represent a small minority of the habitat within Conference House Park in which eastern fence lizards and eastern box turtles have the potential to occur. Southern leopard frogs and eastern mud turtles would only be expected to occur in the ponds and wetlands associated with the Twin Streams of the Lenape, at least 250 feet away from the limits of disturbance. Of these project elements, only the earthen berm would have the potential to pose an impediment to movement of the eastern box turtle and eastern fence lizard. However, the earthen berm, which would range in height from only 1 to 7.5 feet, and have sloped and vegetated sides, would not affect the movements of either turtle species or eastern fence lizards as each would be capable of easily crossing the berm. The berm would only extend through a small portion of Conference House Park, leaving the remainder of the park fully connected to the shoreline as at present. This includes the wetlands and ponds associated with the Twin Streams of the Lenape; in no way would any hydrological or physical connection of these areas to Raritan Bay be impeded, and any eastern box turtles or eastern mud turtles in that area would have the same degree of access to the shoreline as under present conditions. Following construction, eastern fence lizards and eastern box turtles would be expected to occur in the area with the same likelihood and in the same abundance as at present. While some individuals would potentially be displaced from the location of these project elements during construction, they would be expected to easily distance themselves from the disturbance because expansive areas of similar habitat are fully contiguous with the site of the proposed berm. This temporary displacement and disturbance would not be expected to significantly impact any populations of eastern fence lizards or eastern box turtles potentially occurring in the park. As discussed in the EIS, appropriate fencing would be erected around the construction area to prevent any reptiles or amphibians from entering. Any individuals found within the fencing would be promptly removed to safe areas of suitable habitat outside of the fencing.

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**Comment 135:** Please provide specifics regarding the overall size of footprint (including square footage within tidal wetland adjacent area) and seaward revetment slope of the "Raised Edge" portion of the TSPP. (NYSDEC\_074)

**Response:** This information has been included in the FEIS.

**Comment 136:** Who is the Marine Biologist that did the case study on these projects? What kind of tests did he/she perform? Where are the printed results of these findings? (Greco\_075)

**Response:** SeArc Marine Ecological Consultants has been working on the Living Breakwaters component of this project for the past 4 years. They are marine biologists by training and have designed similar structures around the world. An Adjacent Artificial Habitat study was done to determine how breakwaters may affect the marine environment, and how similar rocky structures currently in the water in Raritan Bay perform in terms of biodiversity. In addition, fish trawls and traps, water quality testing, sediment type and quality testing, magnetometer, and bathymetric studies were performed as part of the Environmental Impact Assessment.

The findings can be found in Exhibit E-4 of the DEIS and Chapter 9, "Natural Resources."

**Comment 137:** We demand to see the marine environmental impact studies on marine life, and coastal erosion studies for this project.

Did you do a marine life impact study on boat and pier? Who did these studies? What were the results from these studies? Produce these results of these studies. (Greco\_075)

**Response:** The DEIS provides a comprehensive environmental analysis for all aspects of the project, including potential impacts from the proposed water access related to the Water Hub (it should be noted that a pier is not proposed as part of the project). The DEIS for the project was published on the GOSR website on March 24th, 2017. The DEIS and this FEIS contain the environmental impact studies referred to in the comment.

**Comment 138:** Based upon the scope of the project and the potential significant impacts to EFH and other aquatic resources that may result from its construction, an expanded EFH consultation as described in 50 CFR 600.920(f) is warranted. 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; and proposed mitigation, if applicable. (NOAA/NMFS)

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, and analysis of alternatives and any other relevant information. (NOAA/NMFS)

**Response:** The FEIS includes a full EFH assessment augmenting the analysis included in the EFH Worksheet presented in the DEIS (see Appendix E-12). The full EFH assessment includes the requested information on direct, indirect, individual and cumulative effects and proposed mitigation, and results of empirical studies that inform the analysis of impacts to EFH. The FEIS also includes additional information on alternatives evaluated and determined not to be practicable (see Chapter1). As per NOAA's final EFH consultation letter dated May 8, 2018, NOAA/NMFS has concluded that "the revised EFH assessment adequately evaluates how the project components, both individually and cumulatively, will affect federally managed species, their EFH, and the ecology of Raritan Bay."

**Comment 139:** The construction of the breakwater system will result in a permanent loss of winter flounder EFH associated with the footprint of the breakwater system, as well as an eventual loss of spawning habitat in the area between the breakwaters and mean low water on the beach due to sediment accretion. (NOAA/NMFS)

**Response:** This comment is addressed in the full EFH assessment included with the FEIS (see Appendix E-12). As per NOAA's final EFH consultation letter dated May 8, 2018, NOAA/NMFS has concluded that "the revised EFH assessment adequately evaluates how the project components, both individually and cumulatively, will affect federally managed species, their EFH, and the ecology of Raritan Bay."

**Comment 140:** As acknowledged in the EFH assessment, seasonal in-water work restrictions may be necessary to protect EFH and other NOAA trust resources. This includes a seasonal in-water work restriction from January 1 to May 31 for construction activities within EFH for winter flounder early life stages (NOAA/NMFS)

**Response:** Comment noted. The Proposed Actions would comply with all in-water work restrictions.

**Comment 141:** The placement of sand for beach nourishment on nesting beaches during horseshoe crab spawning season may adversely affect both the horseshoe crabs and the fish and shorebirds that depend upon them for food. A seasonal restriction on beach nourishment, as noted in the EFH assessment, may be necessary from April 15 to July 15 to protect horseshoe crab eggs and larvae. (NOAA/NMFS)

**Response:** Comment noted. The Proposed Actions would comply with all in-water work restrictions.

**Comment 142:** The construction of the hybrid dune system and wetland bridge will permanently impact 0.17 acres of a 0.80-acre delineated tidal wetland. Modification of the inlet to the wetland to improve hydrology is proposed as an offset for the loss.

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However, additional details should be provided to demonstrate that the impacts to the wetlands have been avoided and minimized to the maximum extent practicable. In addition, information should be provided to demonstrate that the hydrologic modifications will enhance the existing wetlands and that these enhancements are sufficient to offset the permanent loss of aquatic habitat. (NOAA/NMFS)

The loss of wetlands as a result of this project could adversely affect EFH for a number of federally managed species through the loss of nursery, forage, and refuge habitat; the reduction in prey species; and primary production and 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. (NOAA/NMFS)

**Response:**

Since the publication of the DEIS, design of the Shoreline Project has progressed and the wetland bridge and associated transition nodes originally proposed at this location have been eliminated from the plan. As a result, impacts to this wetland have been further avoided and minimized. Additional information regarding modifications associated with the wetland enhancement plan has been incorporated in the FEIS and in the expanded EFH Assessment (see Appendix E-12). The full EFH assessment included with the FEIS and Chapter 9, “Natural Resources,” provides additional information on the proposed enhancements within the delineated wetland to offset the placement of fill within this wetland, which has been reduced from the DEIS. As per NOAA’s final EFH consultation letter dated May 8, 2018, NOAA/NMFS has concluded that “the revised EFH assessment adequately evaluates how the project components, both individually and cumulatively, will affect federally managed species, their EFH, and the ecology of Raritan Bay.”

**Comment 143:** While the fish and benthic sampling protocol was extensive, it provides only a one-year “snapshot” of the community ecology of the area. The horseshoe crab sampling was coupled with ongoing community assessments to provide evidence that horseshoe crabs spawn on the beach portion of the project area. However, given the scope of the project as well as the permanent impacts to the ecosystem, it is essential to provide a more comprehensive baseline assessment of the community ecology of the project area. To that end, we recommend additional sampling for 2017, preferably repeating some of the sampling protocol from 2015. (NOAA/NMFS)

**Response:**

As requested by NMFS, GOSR added another year of baseline biological sampling for fishes and benthic macroinvertebrates following the same sampling protocol used in 2015. Horseshoe crab sampling was also conducted in 2017 using the same sampling protocol from 2015 with additional sampling points. The FEIS and the Full EFH assessment present the results of the 2017 sampling.

**Comment 144:** Because 150,685 cubic yards of rock and concrete will be placed below MHWS for the construction of the breakwaters, the loss of volume of open water habitat above the substrate should also be considered an impact from the project. (NOAA/NMFS)

**Response:** Chapter 9, “Natural Resources,” of the FEIS and the Full EFH assessment discuss the conversion of existing sand/gravel bottom habitat and the open water habitat below MHW overlying this portion of Raritan Bay to complex hard structure. As per NOAA’s final EFH consultation letter dated May 8, 2018, NOAA/NMFS has concluded that “the revised EFH assessment adequately evaluates how the project components, both individually and cumulatively, will affect federally managed species, their EFH, and the ecology of Raritan Bay.”

#### **FLOODPLAINS AND COASTAL EROSION HAZARD AREAS (CEHA)**

**Comment 145:** While the Early Public Notice of the Floodplains and Wetlands 8-Step Analysis was provided to HUD, there is no reference to the analysis in the DEIS. (HUD\_007)]

**Response:** The Floodplains and Wetlands 8-Step Analysis has been included in the FEIS.

**Comment 146:** Page 10-9 incorrectly cites ECL Article 36 as the statutory authority for 6 NYCRR Part 505. This particular reference should be changed to ECL Article 34. (NYSDEC\_074)

**Response:** This has been corrected in the FEIS.

**Comment 147:** Page 10-10 states that the proposed earthen berm and hybrid dune system are considered natural protective features under 6 NYCRR Part 505. The hybrid dune section of the TSPP does not meet the criteria to be designated a natural protective feature under 6 NYCRR Part 505. Part 505 defines that the principal component of a dune is sand, whereas the proposed hybrid dune structure is comprised of rock as well as earth/sand. Claims that the hybrid dune structure meets the criteria of a natural protective feature under Part 505 should be removed. (NYSDEC\_074)

**Response:** Comment noted. Chapter 10 has been revised to reflect this comment.

#### **SEWER AND WATER INFRASTRUCTURE**

**Comment 148:** Ever since [Superstorm] Sandy, we have been having flooding problems with the outfall. It’s not taking the water. Every time there’s a rain storm, we get water. We need permanent drainage, which has to be part of this project. (Crispi\_010)

**Response:** DEP infrastructure improvements are not within the scope of the RBD funding. As described in Chapter 11, “Sewer and Water Infrastructure,” during extreme surge events, stormwater outfalls along the coastline may experience backflow inundation leading to flooding of inland catch basins. This backflow flooding condition along the shoreline would be experienced with or without the Shoreline

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Project. Its existence is a feature of the current stormwater infrastructure, which falls outside the scope of this Shoreline Project.

**Comment 149:** To ensure the success of the project, with millions at stake, you amend the Final EIS to catalog the properties with Septic Systems, and work with DOB and DEP to get connection to sewer mains, instead of the current, unregulated disgusting discharge of fecal matter into the street, and then it flows to the Bay. (NRPA\_038)

**Response:** DEP infrastructure improvements are not within the scope of the RBD funding.

**Comment 150:** While the DEIS recognizes that coastal flooding would occur with or without the proposed actions, the DEIS does not contain discussion as to whether the TSPP would affect interior drainage of stormwater in any way. A discussion should be included as to how this project will or will not affect interior drainage characteristics of the area. (NYSDEC\_074)

**Response:** The Shoreline Project has been designed to reduce risk for the shoreline area of Tottenville from wave action, and to address future shoreline erosion. Comprised of a series of porous structures (earthen berm, eco-revetments, hybrid dune/revetment, and raised edge), the Shoreline Project would allow water to seep through, either from the upland side to the Raritan Bay side, or from the Raritan Bay side to the upland side; the project is not intended to prevent Raritan Bay storm surge from entering the land, nor would it retain water inland. Risk of exposure to storm surge would occur with or without the implementation of the Shoreline Project. However, with the Shoreline Project, as long as storm surge conditions do not exceed +8.0 feet NAVD88, the structures would serve to delay water inundation to the land side, based on the seepage rate calculated for the structures. Seepage through/under the structures to the land side would continue until reaching the approximate elevation of the water on the Raritan bay side. Once the water on the bay side would begin to recede back towards mean high water (MHW), the water on the land side would seep back through to the bay side. For storm surge conditions where Raritan Bay water elevation exceeds +8 feet NAVD88 (i.e. the raised edge structure would be overtopped), the volume of water behind the shoreline structures would remain in place until the water level on the Bay side recedes, at which point that water would seep through the structures towards the Bay. See FEIS Chapter 11, "Sewer and Water Infrastructure" for a summary of the seepage analysis conducted for the Shoreline Project.

A physical impact of the shoreline system will be the addition of fill and the associated additional loads that will be placed on the existing storm water outfalls. These outfalls are located at Loretto Street, Sprague Avenue, Joline Avenue, and Bedell Avenue. In addition, the approved Amended Drainage for the eastern end of the site shows a new outfall (83”W x 53”H) at the extension of Page Avenue. Mitigating the additional load on these outfalls will need to be coordinated with NYCDEP as the project moves through the design phase.

## **TRANSPORTATION**

**Comment 151:** Are there public transit options to get to the water hub or Shoreline Project? There is some discussion in Greenhouse Gas Emissions chapter; however, there is no mention in the Transportation chapter. (HUD\_007)

**Response:** The proposed Water Hub would be located in an area served by limited transit options. With transit access available directly via the S59 and S78 or by transfer to these local bus routes from the Staten Island Railway, and via X17, X22, and X22A express bus routes, most trip-making to the Water Hub is expected to be made via automobile. This comment has been reflected in the FEIS Transportation chapter.

## **GREENHOUSE GAS EMISSIONS**

**Comment 152:** EPA commends GOSR's commitment to meet LEED standards if possible for the Water Hub. We are including EPA's Green Recommendation's Guide as a reference to demonstrate ways that the carbon footprint of the project can be reduced. EPA recommends the inclusion of specific details of either the design elements, or reuse approach for the Water Hub in the FEIS to the greatest extent possible. (EPA\_006)

**Response:** Comment noted. The FEIS includes design information to the greatest extent possible given the level of detail available at conceptual design stage.

## **CONSTRUCTION**

**Comment 153:** We need a break down of the cost and duration of each of these three projects. Are all three of these projects going to be worked on simultaneously? (Greco\_075)

**Response:** Based on preliminary projections, construction of the proposed Breakwaters Project is anticipated to begin in mid-2019 and be complete by the end of 2020 (over an anticipated 17-month period with approximately 11 months of active construction). It should be noted that the construction schedule may vary and will be dependent on the selection of the contractor for the project. Construction would consist of the following primary stages, which may overlap at certain times: contractor mobilization, construction of the breakwaters system, shoreline restoration, and contractor demobilization.

Based on preliminary projections, construction of the Shoreline Project is anticipated to begin in mid-2019 and be complete by 2020 (an anticipated 21-month construction duration).

For cost information, please see response to Comment 5.

**Comment 154:** The Air Quality section of the Construction impacts (Chapter 17) explains the methodology used to evaluate the applicability of General Conformity to the project. In general, the approach as described for estimating emissions is

appropriate, employing the latest EPA models. However, the report does not appear to be explicit about some key inputs, therefore the analysis cannot be reproduced. The following are not specified: the type, age and size of equipment and engines, the assumed activity (operating hours or miles traveled), and emission and load factors used. These details are necessary to demonstrate a complete evaluation. (EPA\_006)

**Response:** Additional detail has been added to the Appendix I in the FEIS.

**Comment 155:** The general conformity applicability analysis should assess the total direct and indirect emissions from the proposed action. This includes applicable construction related emissions and operation related emissions. While Section 13.5.2 notes that Chapter 17 includes aggregate emissions from both construction and operation, the results presented in Chapter 17 (Tables 17-5, 17-10, and 17-14) only reference construction emissions. Chapter 13's air quality analysis includes operational emissions from the Water Hub's heating and hot water systems and some indirect emissions associated with vehicles. These emissions and the construction emissions should be included in the conformity analysis. It is unclear whether they are. (EPA\_006)

**Response:** Chapter 17 has been revised to reflect this comment.

**Comment 156:** Page 17-22 references the anticipated approvals that may be needed if temporary construction dewatering is required. In addition to those listed for discharges, a Part 601 Water Withdrawal Permit from the Department would be required if the withdrawal of surface or groundwater will meet or exceed 100,000 gallons per day or would meet or exceed 3 million gallons during any 30-day period. (NYSDEC\_074)

**Response:** Chapter 17 in the FEIS has been revised to reflect this comment.

**Comment 157:** Section 17.3.3 discusses general construction tasks involved with the proposed actions. Construction of the breakwater system is to be accomplished by barge. According to Figure 9-12, eight of the ten breakwater structures would be located in waters less than 6' deep at mean low water levels, and the Type A structures appear to be located in waters ranging from only 2' to 4.5' deep at mean low water levels. The DEIS notes as an impact minimization measure that 2 feet of clearance from the bottom of the Bay would be maintained, or work would only be conducted at tide levels sufficient to keep barges and vessels off the Bay floor. The Department is concerned that the draft depths of barges — or tug boats transporting the barges — used for breakwater construction would result in bottoming out on the Bay floor. This constructability concern should be discussed, by evaluating what the potential draft depths will be and how this may affect logistics of construction and what environmental impacts it may have. If tidal cycles are going to affect construction schedules (if work couldn't be conducted at low tide due to insufficient depth), this should be evaluated and considered in

construction timelines. Irrespective of whether bottoming out is anticipated, barges will still be extremely close to the Bay floor. Due to tidal cycles, wave action, and/or overloading of barges, contact with the Bay floor may be unavoidable. Additional coordination with DEC as part of the permitting process will be required to ensure that impacts from barges are avoided, minimized, or mitigated for as part of the construction. (NYSDEC\_074)

**Response:** Since the issuance of the DEIS, design for the breakwater system has progressed and as currently proposed (preliminary 60 percent design), there would be a total of nine breakwater segments. Four of the nine segments would be fully within waters less than 6 feet deep at MLW levels. Three of the segments would be partially within waters less than 6 feet deep at MLW levels. The Type A structures would be located in waters ranging from 5 and 7 feet at MLW levels. NOAA maintains a tidal gauge at Great Kills Harbor, just east of the Living Breakwaters construction site. The data it has collected indicates that the area has an average tidal range of 5.23 feet over the tidal prism from mean lower low water (MLLW) to mean higher high water (MHHW). Adding this tidal range onto the water depth present at MLLW indicates that, for the shallowest breakwater location, (approximately 6 feet NAVD88), barges will have from approximately 3 feet at MLLW to an average of approximately 8 feet at MHHW in which to operate. Shallow draft and jack-up barges can be used by contractors to overcome shallow water limitations. Additionally, it is not unusual for contractors to light load barges to reduce the draft to as little as 2 to 3 feet for shallow water conditions. Further, unloading materials as a tide ebbs allows the barges to occupy less draft and remain afloat.

## NEIGHBORHOOD CHARACTER

**Comment 158:** Please refocus chapter to discuss neighborhood's defining features. Per CEQR, "The discussion should focus on the major characteristics of the neighborhood and how they relate to the area's overall character, and should not merely repeat information about each of the contributing technical areas (e.g., land use, socioeconomic, etc.) found elsewhere in the environmental assessment." It seems some of the information for this section is superfluous such as bus routes and historic resources (if this isn't a defining feature). (DCP\_004)

**Response:** Chapter 19 has been revised in the FEIS to reflect this comment.

**Comment 159:** Please revisit conclusion: "no one defining feature would be considered critical to the character of the neighborhood; rather all the various localized features contribute to it." Seems there is a lot of residential use and parkland in this area, would this not be a defining feature? Defer to your analysis. (DCP\_004)

**Response:** Chapter 19 has been revised in the FEIS to reflect this comment.

**Comment 160:** Is the two-mile buffer the study area? Please clarify. (DCP\_004)

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**Response:** Additional clarifying text has been added to section 19.2, Methodology, in the FEIS to more fully explain the study area.

**Comment 161:** Please refocus alternatives of neighborhood character to discuss how defining features of neighborhood character would be impacted per CEQR guidance. (Currently, it seems the sections explain the project's impacts rather than impacts on neighborhood character.) (DCP\_004)

**Response:** The discussion in the FEIS has been reframed to focus on impacts to the defining features of neighborhood character.

## **MITIGATION AND MINIMIZATION OF IMPACTS**

**Comment 162:** Page 20-4 states that one of the proposed actions to minimize adverse impacts to natural resources includes the "Development of a post-construction monitoring plan in consultation with NYSDEC, National Marine Fisheries Service (NMFS) and USACE to assess use of breakwaters segments by target species groups and fish and benthic communities adjacent to the breakwaters structures." This is an essential element for this project and future living breakwater projects. Given the uncertainty of what species will colonize the breakwaters and how long the structures will take to be colonized, the monitoring plan will be used to guide the development of future similar projects and in guiding the continued management of this project. EPA encourages the inclusion of details of the monitoring plan in the FEIS to the extent possible. (EPA\_006)

**Response:** Details of the monitoring plan have been included to the extent possible in the FEIS.

## **INDIRECT AND CUMULATIVE EFFECTS**

**Comment 163:** Cumulative effects can include time crowding, space crowding, cross-boundary, fragmentation, compounding effect, indirect effects, and triggers and thresholds (see CEQ 1997 – "Considering Cumulative Effects under the National Environmental Policy Act"). This section needs substantial elaboration as it does not provide a detailed quantitative analysis of past, present, and reasonably foreseeable projects. Page 21-5 provides a list of some of the actions within or in proximity of the study area; however, there isn't a substantive discussion of how the projects could contribute to cumulative impacts of the proposed action. Additionally, as mentioned earlier, the cumulative impacts section downplays the potential negative impacts the project could have on threatened, endangered and EFH listed species. (EPA\_006)

**Response:** The cumulative effects of the project listed on page 21-5 with the Proposed Actions are discussed within the analysis of each relevant technical area. In response to the comment, Chapter 21 has been revised to include a map of the projects listed, to better illustrate the locations of these actions, as well as expanded analyses of potential cumulative effects in the relevant technical

analysis areas. In addition, as discussed above, GOSR initiated consultation with NMFS for EFH on April 11, 2017. As requested by NMFS, GOSR added another year of baseline biological sampling for fishes and benthic macroinvertebrates following the same sampling protocol used in 2015. The FEIS includes a full EFH assessment prepared in consultation with NMFS. The results of the full EFH assessment have been incorporated into Chapter 21 of the FEIS.

**Comment 164:** The combined impacts of the shoreline protection component and the breakwaters will provide enhanced protection to the coastal area between Conference House Park and Page Avenue; however, there should be a discussion within the Indirect and Cumulative Effects chapter regarding any potential wave action or flooding impacts from redirected storm surge to areas surrounding the project footprint, and any impacts to the waters between the shoreline and the breakwaters. Given that the purpose of the breakwaters is to increase sedimentation rates, it is difficult to see how there could simultaneously be increased sedimentation rates and no cumulative or indirect effects to the area between the shoreline and the breakwater structures. Though there are pieces of information addressing this concern throughout the document, indirect impacts associated with the project should be readdressed in this section. (EPA\_006)

**Response:** Chapter 21 of the FEIS includes additional information regarding the potential for indirect effects noted in the comment.

**Comment 165:** There is inconsistency in detail of impacts and discussion on construction impacts. Impacts during construction are selectively discussed. For example, the threatened and endangered species and aquatic resources impacts are always discussed as long term positive benefits, but there is no discussion of short term impacts during in-water construction. While for noise the short term impacts during construction are discussed in detail, but not the long-term benefits. (HUD\_007)

**Response:** Chapter 21 has been revised to include a discussion of indirect short-term impacts during construction.

**Comment 166:** There is a lack of discussion on cumulative impacts from the subject project and other projects in the area (for example, the USACE Hudson Raritan Estuary [HRE]) that limits a complete analysis of cumulative impacts. (HUD\_007)

**Response:** Chapter 21 includes additional discussion of potential cumulative effects in the relevant technical analysis areas.

**Comment 167:** There is no discussion about short term impacts during construction for in-water work for breakwaters. There will be short term negative impacts to species and wetlands, but long term cumulative impacts that are cited as positive. Recommend discussing both the short term and long term benefits in greater detail. (HUD\_007)

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**Response:** Chapter 21 has been revised to include a discussion of indirect short-term impacts during construction.

**Comment 168:** Are there long-term cumulative positive benefits of alternatives on greenhouse gas and air quality? Construction impacts are discussed but there is no discussion on cumulative long term benefits such as preservation of maritime forest contributes to alleviating greenhouse gas emissions through continued carbon dioxide sequestration. (HUD\_007)

**Response:** While long term benefits such as preservation of maritime forest may contribute to alleviating greenhouse gas emissions, these potential benefits depend on several factors that are difficult to assess. Therefore, Chapter 21 does not include a discussion of these potential benefits.

**Comment 169:** The USACE Hudson Raritan Estuary (HRE) projects increase recreational, educational and public access. Both HRE and this project complement each other in that regard and yet the cumulative long-term beneficial impacts are not discussed in socioeconomics. (HUD\_007)

**Response:** Chapter 21 has been revised to reflect this comment.

**Comment 170:** What level of coordination exists between GOSR and USACE and other agencies implementing projects? (HUD\_007)

**Response:** Since October 2014, GOSR has engaged in a series of meetings and consultations with federal, state, and local agencies, many of which have been coordinated by the Sandy Regional Infrastructure Resiliency Coordination group (SRIRC). GOSR has also coordinated with the USACE during the pre-application process. GOSR is also actively coordinating with State and local involved and interested agencies under SEQRA, including NYSDEC, NYSDOS, OPHRP, OGS, and the New York City agencies, including the New York City Mayor's Office of Environmental Coordination (MOEC), NYC Parks, NCDOT, NYCDCP, New York City Department of Environmental Protection (NYCDEP), Mayor's Office of Sustainability, NYCDOT, and the New York City Landmarks Preservation Commission. GOSR will continue to consult with key federal, state, and City agencies as needed throughout the environmental review and permitting processes.

## **IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES**

**Comment 171:** There is no discussion of impacts on wetlands and floodplain; the Natural Resources and Floodplains and CEHA chapters include a discussion of temporary impacts during construction. (HUD\_007)

**Response:** Chapter 23 includes a discussion of impacts on wetlands during construction.

## APPENDIX B—COASTAL MANAGEMENT PROGRAM ASSESSMENT

**Comment 172:** Please provide the Flood Elevation Worksheet as a separate attachment to support the Policy 6.2 assessment. (DCP\_004)

**Response:** The Flood Elevation Worksheet has been provided as a separate attachment as requested in the comment.

**Comment 173:** In the response to Policy 6.2, please edit the following statement to specify the datum being used, and if the height of the Water Hub would be higher than the 2080s 1 percent flood elevation with the highest projections for SLR, or the 2080s projections for Mean Higher High Water: “The Water Hub facility at Potential Location 1 was designed as a pile-supported building with a floor elevation of +18 feet. At this height, the Water Hub would remain above the highest predictions for sea level rise through the 2080s and throughout its 50-year design life, and would not likely be susceptible to flooding.” (DCP\_004)

**Response:** The text has been modified as requested in the comment.

**Comment 174:** In the response to Policy 6.2, please see the following edit: “The Type B and C breakwaters would be sited to protect assets in sections of the shoreline that are most vulnerable to storm wave action; thus, these breakwaters would remain above the base flood elevation with up to 30 inches of sea level rise.” (DCP\_004)

**Response:** The text has been modified as requested in the comment.

**Comment 175:** It is our understanding that the Proposed Actions represent a Federal funding action pursuant to 15 CFR Part 930 Subpart F and additional review by the Department will be required when Federal permits are sought. Below are preliminary comments on the consistency assessment provided in the DEIS, which are in addition to the comments detailed above.

- Substantive details on natural resources and technical aspects are missing; however these are in large part provided in the DEIS. References to the respective DEIS sections should be included to ensure the Department is able to locate pertinent information to complete its review.
- Verify whether action by the Federal Emergency Management Agency is needed.
- New York City Waterfront Revitalization Program Consistency Assessment Form
  - Policy 1: Please review for applicability with Proposed Actions.
  - Policy 3.3: Please review for applicability with Proposed Actions.
  - Policy 5.3: Wetland disturbance and enhancement is included in the Proposed Actions and should be described. In particular, provide additional detail on the portion of the 0.8-acre tidal wetland that would be enhanced by increasing tidal exchange (e.g., tidal sluice gates). Are new tide gates proposed or existing gates being

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rehabilitated?

- Policy 6.3: A 3.8-acre area was selected for one-time shoreline restoration between Loretto Street and Manhattan Street. Given that this is one of the most erosion-prone beach areas in the site, what siting and design standards were employed and what provisions would be in place to maximize the longevity of this design feature?
  - For Policy 10.2, additional studies are required to determine whether the Proposed Actions are consistent.
- Federal Consistency Assessment Form
    - Policy 13: The consistency assessment describes how the Breakwaters Project would be consistent with this policy. However, many components of the Shoreline Project would also be characterized as erosion protection structures. The consistency assessment should also address whether the Shoreline Project would have a reasonable probability of controlling erosion for at least thirty years. Additionally, provide assurances for long-term maintenance for each of the Proposed Actions. (DOS\_025)

**Response:** As requested in the comment, references to the relevant DEIS sections have been included in the policy discussions as requested in the comment.

The Proposed Actions does not require any action by the Federal Emergency Management Agency.

Policy 1 of the City's Waterfront Revitalization Program calls for the City to “Support and Facilitate Commercial and Residential Redevelopment in Areas Well-Suited” to such development. As the Proposed Actions is not a commercial or residential redevelopment project, it has been determined “not applicable” with respect to consistency with Policy 1. The Policy discussions for Policies 3.3, 5.3, 6.3, 10.2, and 13 have been updated or clarified to reflect the comment.

## **GENERAL SUPPORT**

**Comment 176:** We concur with the other voices in support of the DEIS as we move toward the final EIS. Of great importance I must spotlight the educational components of the report and applaud the public access and student participation portion. (CIBP\_008)

**Response:** Comment noted.

**Comment 177:** I want to stress the overall urgency of the overall project. The wall all the way through to Carteret along Billop Avenue, and the living breakwaters project may not only help homeowners as far as protecting them, but may also reduce their flood insurance premiums in the future. Please expedite this project, many of the homeowners are very appreciative of it. (Silverman\_064)

**Response:** Comment noted.

**Comment 178:** I support the living breakwaters, a rebuild by design initiative, that will help protect Staten Island from future storms, enhance ecology, and connect residents and students to our shorelines. The proposal by SCAPE and their partners for a living breakwater would reduce the destructive forces of waves, preventing erosion of the beaches and bluffs that protect the community from storms. These reef-like structures are specially designed to enhance coastal ecology important for both the fish and the commercial and recreational businesses that depend on healthy fisheries for their livelihood. (Malizia\_051)

**Response:** Comment noted.

**Comment 179:** I fully support the breakwaters as proposed, including innovative projects built on or near them such as the Billion Oyster Project; the berms and other additions designed to protect against future storm surges and coastal flooding; and the shoreline restoration to repair damage done by hurricane Sandy. (Lund\_036)

**Response:** Comment noted.

**Comment 180:** I am writing to voice my full-throated support for the proposed Living Breakwaters project. Not only will it provide essential shoreline protection, it will literally build up our public spaces and, crucially, provide access to the waterfront. I am particularly concerned by the vocal minority of private property owners crying out NIMBY! The attitude of these few, motivated by the selfish desire to maintain "private" access to a public utility weakens our community and hobbles our ability to respond to disaster. I urge you to attend to the needs of the broader community: resilience, public access to public spaces, and a healthy waterfront community. (Blancero\_027)

**Response:** Comment noted.

**Comment 181:** We thank you for your efforts to increase physical, ecological, and social resiliency in an area that desperately needs it. The Living Breakwaters Protection Project will restore critical ecosystem habitat, improve resiliency and water quality and bring increased recreational use of our shared waters. Superstorm Sandy significantly impacted the project area, highlighting a need for resiliency projects that will protect populations and facilities from coastal storms. We support the efforts and the restoration opportunities recommended in the Draft EIS. (Baykeeper\_026)

**Response:** Comment noted.

**Comment 182:** Since the summer of 2016, we have had several of our members [Environmental Sustainability Club at Wagner College] conducting research with the Building and Oyster Project in Lemon Creek, where the living breakwaters would be. I found out yes, oysters can grow on Staten Island and that they can thrive. (Wredstralm\_056)

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**Response:** Comment noted.

**Comment 183:** I have been part of the student researchers at Lemon Creek and I find it very fascinating that oysters can actually grow mainly in high waters and down street places. (Blatchfar\_057)

**Response:** Comment noted.

### **MISCELLANEOUS**

**Comment 184:** Take a door-to-door survey: nobody voted for this project. (Halvorsen\_Blayse\_014)

**Response:** Comment noted.

**Comment 185:** We would like to see the names and address or every vendor and/or contractor involved with this five-part project. What contracts have been signed and with who concerning these projects? Have any contracts been signed for the construction end of this project if so please provide copies? (Greco\_075)

**Response:** All contractor information is available on the GOSR website.

**Comment 186:** How were the people involved with this project selected and by whom? (Greco\_075)

**Response:** GOSR uses established government procurement practices to ensure qualified vendors are hired at competitive and cost effective rates.

**Comment 187:** Is every person associated with this plan willing to stake their name reputation, responsibility, and accountability for it? Meaning any negative result to marine life or coast erosion will constitute a civil action which you would be personally responsible for and financially responsible for?

**Response:** GOSR is proposing this project based on well-documented scientific reviews, has thoroughly analyzed the impacts and has presented them fully in the DEIS. It is confident in the results.

**Comment 188:** Did you apply for any work permits yet? As of yet did you receive any permits to do work of any of the proposed projects? If so from who and to do what? (Greco\_075)

**Response:** Work permits for the survey work have been applied for and granted. Permit applications to the USACE and NYSDEC have been submitted and are under review.

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