

Gateway National Recreation Area
New York, New Jersey

U.S. Department of the Interior
National Park Service



Fort Tilden Shore Access and Resiliency Project

*GATEWAY NATIONAL RECREATION AREA,
JAMAICA BAY UNIT, NEW YORK*



ENVIRONMENTAL ASSESSMENT

February 2016

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**United States Department of the Interior National Park Service
Gateway National Recreation Area, Jamaica Bay Unit, New York**

**Fort Tilden Shore Access and Resiliency Project
Environmental Assessment**

February 2016

The National Park Service (NPS) is proposing to improve access, safety, and resiliency along the coastal area at Fort Tilden, while managing for the potential impacts from future storm events on natural and cultural resources and infrastructure.

Action is needed at this time because Hurricane Sandy caused physical changes to the Fort Tilden coastal area, displacing the established foredune system and creating a new environment with safety, access, and resource questions that need to be addressed. These changes affected historic resources on and adjacent to the beach, including Shore Road, the bulkhead and wooden groin system, Battery Kessler, Buildings 15–18, and the Telephone Pit Building, and created new beach habitat suitable for threatened and endangered shorebirds and plants. The proposed project would improve access, safety, and resiliency at Fort Tilden in the coastal area, while managing for the potential impacts from future storm events on natural and cultural resources and infrastructure.

In compliance with the National Environmental Policy Act (NEPA) of 1969, the National Park Service prepared this environmental assessment to evaluate alternatives for improving access, safety, and resiliency at Fort Tilden; describe the environment that would be affected by the alternatives; and assess the environmental consequences of implementing the alternatives. This environmental assessment examines four alternatives: a no-action alternative (alternative A) and three action alternatives (alternatives B, C, and D).

Alternative B would restore and protect geomorphological features and coastal habitats to offer a natural coastal experience to visitors at Fort Tilden. Alternative C would connect Fort Tilden to Jacob Riis Park by constructing an elevated pathway along the vegetation line and providing erosion mitigation through a vegetated revetment at the western limits of the beach. Alternative D would improve connections to the western limits of the beach by constructing a pathway of sustainable clay base with shell aggregate in the location of the destroyed portion of Shore Road and fostering dune accretion through the installation of sand-trapping fences. Alternative D is the NPS preferred alternative and proposed action. This environmental assessment assesses the potential impact on the coastal landscape, special status species, historic districts, visitor use and experience, and public health and safety from these alternatives.

This document has been prepared in accordance with the National Environmental Policy Act; the regulations of the Council on Environmental Quality (40 Code of Federal Regulations 1500–1508); and NPS Director's Order 12: *Conservation Planning, Environmental Impact Analysis, and Decision-making* (NPS 2011) and accompanying NPS NEPA handbook (NPS 2015).

The National Park Service also is using this environmental assessment (EA) to coordinate public review of a draft memorandum of agreement developed with the New York State Historic Preservation Officer in accordance with the implementing regulations for Section 106 of the National Historic Preservation Act. The draft memorandum of agreement can be found in appendix A. It outlines measures to minimize and mitigate adverse effects on historic properties. Comments regarding the draft memorandum of agreement can be submitted along with comments on the EA.

Note to Reviewers and Respondents:

Participation by the public is important to the success of this project. You are invited to share your comments and ideas about the EA at a public meeting on **March 8, 2016**, from 6:00 p.m.–8:00 p.m. at the following location:

Ryan Visitor Center Conference Room
Floyd Bennett Field
50 Aviation Road
Brooklyn, NY 11234

If you wish to comment in writing on this EA, you may mail comments within 30 days to the address below or you may post them electronically at <http://parkplanning.nps.gov/gate>. Before including your address, phone number, email address, or other personal identifying information in your comment, you should be aware that your entire comment, including your personal identifying information, may be made publicly available at any time. While you can ask in your comment to withhold your personal identifying information from public review, the National Park Service cannot guarantee that it will be able to do so.

Office of the Superintendent
Gateway National Recreation Area
ATTN: Fort Tilden Shore Access and Resiliency Project EA Comments
210 New York Avenue
Staten Island, New York 10305

Please postmark your comments by March 25, 2016, for consideration.

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CHAPTER 1: PURPOSE AND NEED

INTRODUCTION

The National Park Service (NPS) is proposing to improve access, safety, and resiliency along the coastal area at Fort Tilden, while managing for the potential impacts from future storm events on natural and cultural resources and infrastructure. The project area is located at Fort Tilden, part of the Jamaica Bay Unit of Gateway National Recreation Area (the park or GATE), in Queens, New York. Figure 1-1 provides a regional context, and figure 1-2 presents a vicinity map of the project area.

This environmental assessment (EA) has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, and implementing regulations, 40 Code of Federal Regulations (CFR) Parts 1500–1508, Director’s Order 12: *Conservation Planning, Environmental Impact Analysis, and Decision-making* (NPS 2011) and its accompanying handbook (NPS 2015). This environmental assessment analyzes the proposed action and alternatives and their impacts on the environment.

PURPOSE OF AND NEED FOR TAKING ACTION

Purpose

The purpose of the proposed project is to improve access, safety, and resiliency along the coastal area at Fort Tilden, while managing for the potential impacts from future storm events on natural and cultural resources and infrastructure.

Need

Hurricane Sandy made landfall on the New Jersey coast on October 29, 2012. The extreme winds and storm surge caused substantial damage to the area. Coastal areas in New York were declared a federal disaster area in the aftermath of Hurricane Sandy.

Hurricane Sandy caused physical changes to the Fort Tilden coastal area, displacing the established foredune system and creating a new environment with safety, access, and resource questions that need to be addressed. These changes affected historic resources on and adjacent to the beach, including Shore Road, the bulkhead and wooden groin system, Battery Kessler, Buildings 15–18, and the Telephone Pit Building, and created new beach habitat suitable for threatened and endangered shorebirds and plants.

This project is needed to:

- improve access for visitors and emergency first responders
- mitigate existing safety concerns
- reduce the risk of future coastal storm damage to infrastructure and resources



- Fort Tilden Project Area
- New York City Borough
- NPS Boundary
- State Boundary

Sources: ESRI World Ocean Base Imagery



Gateway National Recreation Area

Fort Tilden Shore Road
Shoreline Resiliency Project

Regional Overview

FIGURE 1-1: REGIONAL OVERVIEW



- | | | |
|----------------------|--|---------------------------------------|
| Fort Tilden | Observation Deck | Fort Tilden Historic District |
| Existing Structures | Restrooms | Existing eastern extent of Shore Road |
| Existing Roads | Kayak Launch Site | Former western extent of Shore Road |
| Park Entrance | Bus Stop | Existing Bulkhead |
| NPS Personnel Access | Fishermen's Parking (By Permit Only) | Stone Groin |
| No Access | Organized Community Use Parking (By Permit Only) | Timber Groin |
| Picnic Area | | |
| Fishing | | |

Sources: National Parks Service GIS; New York City Department of City Planning; ESRI World Imagery (2016)



Gateway National Recreation Area

Fort Tilden Shore Road
Shoreline Resiliency

Fort Tilden Project Area

FIGURE 1-2: PROJECT AREA

Objectives in Taking Action

The proposed project seeks to achieve the following goals and objectives:

- Provide safe access for visitors and emergency first responders.
- Improve safety along the beach in response to the exposed bulkhead.
- Coordinate with actions by surrounding communities, agencies, and other entities along the Rockaway Peninsula.
- Provide alternate emergency egress for surrounding communities prior to and following a storm event.

ISSUES AND IMPACT TOPICS

Issues Analyzed in this Environmental Assessment

An NPS interdisciplinary planning team, the public, and other agencies identified issues during the public scoping process. Issues are problems, concerns, and opportunities regarding access, safety, and resiliency related to the current and future management of the coastal area at Fort Tilden. These issues contributed to the development of impact topics that are carried forward and discussed in chapter 3 of this environmental assessment. Impact topics identify the resources or values that would be affected by the alternatives. The issue statements and corresponding impact topics are presented below.

- Additions and/or modifications to coastal structures may reduce the area and ecological functions provided by nonvegetated tidal wetlands and adjacent lands. Subsequent changes in the movement of littoral sediment either could reduce natural beach formation processes or potentially accelerate erosion on the western end of the beach at Fort Tilden, increasing the vulnerability of the natural and cultural resources and infrastructure (e.g., beach area, Silver Gull Beach Club, Battery Kessler, and Fisherman's Parking) and changing areas of coastal habitat. These issues are addressed under the impact topic of "Coastal Landscape."
- The addition of a flood-resilient bicycle-pedestrian pathway may reduce habitat for special status plants, seabeach amaranth, and seabeach knotweed known to occur along the shore, and potentially reduce newly expanded habitat for special status birds, including piping plover, roseate tern, common tern, and least tern. These issues are addressed under the impact topic of "Special Status Species."
- Shore Road, the bulkhead system, Battery Kessler, Buildings 15–18, and the Telephone Pit Building are contributing features to the Fort Tilden Historic District (figure 1-2) and eligible for listing on the National Register of Historic Places (National Register). However, these features may pose a safety risk because of their poor condition. The proposed alternatives must balance the need to address safety concerns with potential adverse impacts on historic structures if they are removed. These issues are addressed under the impact topics of "Historic District" and "Public Health and Safety."
- Hurricane Sandy destroyed half of Shore Road, the primary access to the beach. Visitors expressed interest in having that access restored or improved. Alternatives that change access to the beach may conflict with the general management plan recommendations at Fort Tilden to develop appropriate access points and visitor amenities to support

increased beach use, while offering a natural coastal experience (compared to other Gateway beaches). These issues are addressed under the impact topic of “Visitor Use and Experience.”

Issues Considered But Dismissed from Further Analysis

- Removal of existing structures in the coastal area would result in temporary impacts on nonvegetated tidal wetlands, benthic habitat, and habitat for special status species. Temporary impacts on these resources were dismissed from further analysis because they would be mitigated by seasonal restrictions on construction activity and the use of best management practices that minimize habitat disturbance and restore habitat conditions. Construction activities would temporarily affect nonvegetated tidal wetland sediments, benthic invertebrates that provide a prey base for shorebirds, and the potential habitat and seed bank of seabeach amaranth; however, these impacts would be minimized by conducting construction activities during the winter months when shorebirds are not present and prior to the spring germination of seabeach amaranth. This would also avoid direct impacts (i.e., harm or harassment) on shorebirds during construction. The NPS determined that temporary wetland impacts created by the removal of the bulkhead and wooden groins are considered excepted actions according to section 4.2.1g of NPS Procedural Manual #77-1: *Wetland Protection* that allows for minor deviations in the structure’s configuration or fill footprint in wetlands for maintenance and repair of a structure for meeting safety standards. These actions would result in no long-term net loss of wetland habitat. Therefore, the best management practices and conditions described in appendix 2 of the manual have been met or will be implemented, and wetland compensation is not required for these actions. Therefore, this issue was dismissed from further analysis (NPS 2012).
- The US Fish and Wildlife Service (USFWS) official species list (USFWS 2015a) indicates that the federally threatened red knot (*Calidris canutus rufa*) may occur within the project area. The proposed alternatives may affect foraging habitat for shorebirds; however, red knots are not expected to occur within the project area, except as occasional transients. They are more likely to forage on the bay beaches of Jamaica Bay. In addition, breeding habitat is not present within the project area because this species breeds in the Canadian arctic region. Therefore, this issue was dismissed from further analysis.
- The New York State Department of Environmental Conservation Natural Heritage Program indicated that Schweinitz’s flatsedge (*Cyperus schweinitzii*), listed as rare in New York State, and peregrine falcon (*Falco peregrinus*), listed as endangered in New York State, have been documented within the vicinity of Fort Tilden (NYSDEC NHP 2015). However, suitable habitat and occurrences of Schweinitz’s flatsedge in Fort Tilden are documented outside of the project area, and peregrine falcon are not expected to use the project area except as occasional transients. Impacts on habitat for these species are not expected. Therefore, this issue was dismissed from further analysis.
- The public scoping process identified concerns from neighboring communities about providing an alternate east-west access route to Rockaway Point Boulevard as a secondary egress from communities west of Fort Tilden. This issue is addressed in all alternatives, which propose using Range Road as emergency east-west egress before and following a storm event. Because the issue was resolved as a common-to-all action, it is addressed by all relevant impacts topics.
- The Department of the Interior requires its bureaus to explicitly consider effects of its actions on Indian trust resources in environmental documents (NPS 2015). No known Indian Trust resources are located at Fort Tilden, and the lands comprising the national

recreation area are not held in trust by the Secretary of the Interior for the benefit of Indians. Therefore, the issue of Indian Trust resources was dismissed from further analysis.

- The Department of the Interior also requires its bureaus to specifically discuss and evaluate the impacts of their actions on minority and low-income populations and communities, as well as the equity of the distribution of the benefits and risks of the decision (Department of the Interior 1995). While local residents include low-income populations, these populations would not be particularly or disproportionately affected by activities associated with the construction of the alternatives. Therefore, this issue was dismissed from further analysis.
- Nearly the entire study area at Fort Tilden is located in the floodplain, with part of the beach area located in the VE zone, and upland areas located in both the AE zone and 500-year floodplain (FEMA 2013). The National Park Service is prohibited from building in a floodplain if it would impede floodplain values and function. However, because the proposed action includes improvements to floodplain functions and enhances natural processes through the demolition of buildings 15–18 and the reduction of the bulkhead and jetty system, removes risks to human life and infrastructure through the construction of an easily replaceable pervious road, and does not add impediments to the floodplain, this issue was dismissed from further analysis.
- Removal of wooden groins located below mean high water would result in temporary impacts on benthic infaunal forage habitat for essential fish habitat-designated demersal fish species, including winter flounder (*Pseudopleuronectes americanus*), windowpane flounder (*Scophthalmus aquosus*), summer flounder (*Paralichthys dentatus*), scup (*Stenotomus chrysops*) and black seabass (*Centropristis striata*). These temporary impacts would be limited to the immediate area of the groins. Sand is expected to quickly fill in groin excavation depressions and restore natural gradients, and recolonization of benthic infauna prey organisms would occur relatively quickly. Turbidity increases during construction would be temporary and localized because most of the excavation work below the mean high water line would be conducted at low tide, minimizing in-water disturbance. The removal of the groins would result in an increase in natural sandy intertidal and subtidal habitat available to essential fish habitat-designated species and their forage base (NPS 2016). Therefore, this issue was dismissed from further analysis.

CHAPTER 2: ALTERNATIVES

Past park planning documents and NPS policy provide a framework for developing alternatives for this project. Specifically, the 2014 general management plan (NPS 2014) describes the desired future condition for the project area.

The Fort Tilden Beach area is part of the Natural Zone, where the desired conditions include:

- allowing visitors to enjoy the quiet, solitude, and sense of connection inspired by the natural world;
- having opportunities to directly experience the natural resources and solitude; and
- managing open areas to preserve natural resources while allowing for the enjoyment of the outdoors and nature.

Specific recommendations in the Natural Zone for Fort Tilden's coastal area include:

- opportunities for environmental education programming and nature study would be promoted;
- the ocean and bay shorelines would offer a natural coastal experience more than other Gateway beaches; and
- appropriate access points and visitor amenities would be developed to support increased beach use.

Additionally, the historic buildings at Fort Tilden are prioritized in the general management plan to determine the level of future treatment. Some along the Fort Tilden Beach, including Buildings 15–18, were placed in the ruin band. This means that little investment would be made in them, and they would be allowed to decay naturally, be fenced off, or potentially be demolished. Battery Kessler was placed in the stabilization band, and Shore Road, the bulkhead and wooden groins, and Telephone Pit Building were not included in the general management plan prioritization.

Finally, the general management plan provides a framework for future decision making within the park that includes being responsive to sea-level change and finding creative solutions to limit the impact of future flooding, storm surge, and other impacts on existing visitor and operations facilities. This framework was developed from a number of NPS policies and guidance, which are detailed on pages 54–55 of the general management plan.

All of the alternatives developed for this project were required to meet the guidance set forth in the general management plan.

ALTERNATIVE A: NO ACTION

In this environmental assessment, the no-action alternative (figure 2-1) signifies “no project.” Under the no-action alternative, the existing bulkhead system would remain in place and continue to decay.

Under the no-action alternative, current management of the undamaged eastern portion of Shore Road would continue, providing beach access for GATE staff and emergency utility terrain vehicles (UTVs), as well as access for bicyclists and pedestrians. The western portion of Shore Road, destroyed by Hurricane Sandy and subsequently removed, would not be reconstructed. In this area,

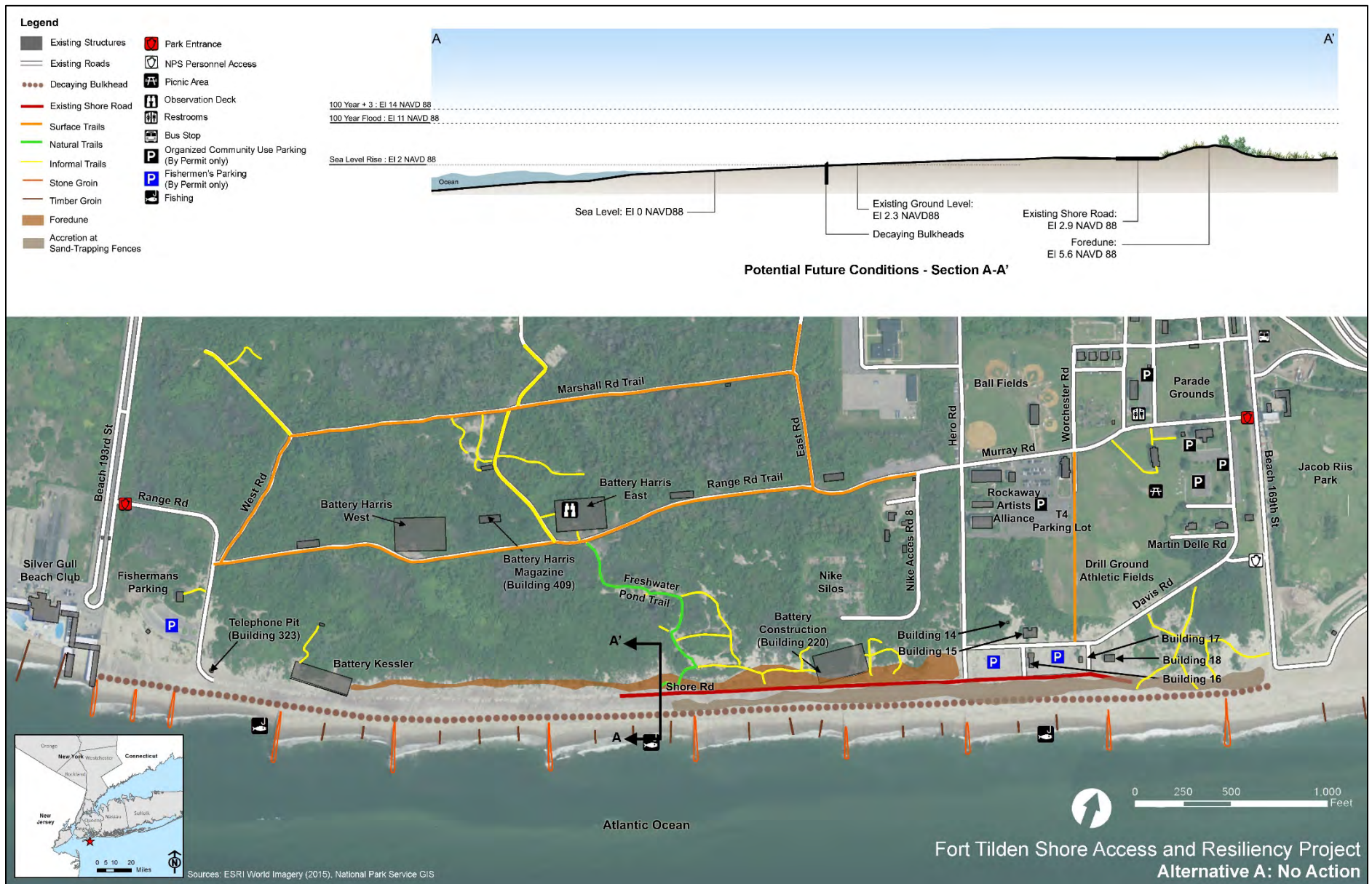


FIGURE 2-1: ALTERNATIVE A: NO ACTION

emergency beach access for GATE staff by UTVs would continue, and visitor access would be for pedestrians only. Range Road would continue to function as an informal (not universally accessible) bicycle and pedestrian trail with access for NPS vehicles and routine maintenance. Range Road could be used by the surrounding community as an alternate east-west emergency egress route, if necessary, prior to or following a future storm event. Visitor vehicular access would continue to be limited to the west with parking at Fisherman's Parking and to the east with parking at the T4 parking lot and Fisherman's Parking near Buildings 15–18.

The park would not invest in major repairs or improvements to Battery Kessler, Buildings 15–18, and the Telephone Pit Building. Minor repairs to secure or stabilize the buildings could be undertaken if funding were available.

ELEMENTS COMMON TO ALL ACTION ALTERNATIVES

The following project components would be included under all action alternatives (B, C, and D):

- Range Road would be rehabilitated as a universally accessible bicycle-pedestrian roadway. Range Road could be used by the surrounding community as an alternate east-west emergency egress route, if necessary, prior to or following a future storm event.
- Visitor parking would be located at Fisherman's Parking to the west and both the T4 parking lot and Fisherman's Parking near Buildings 15–18 to the east. Parking in these lots requires a NPS-issued Fishing-Parking permit, good for one calendar year.
- Wayfinding and signage would be improved, as appropriate, for each action alternative.
- The Telephone Pit Building (Building 323) and Buildings 15–18 would be demolished, and natural habitat would be restored in the location of the former buildings. The potential rehabilitation and adaptive reuse of the most structurally sound of Buildings 15–18 was deemed contrary to NPS policy because of their high flood-risk location and the prohibitive costs associated with stabilizing and making resilient. It is highly unlikely that the adaptive reuse of these buildings would ever be funded under current NPS priorities and budgets.

ALTERNATIVE B

Under alternative B, the existing bulkhead and wooden groins would be removed completely (figure 2-2). Alternative B would remove the undamaged eastern portion of Shore Road, restoring natural habitat. The western portion of Shore Road destroyed by Hurricane Sandy and subsequently removed would not be reconstructed. Beach access would be provided for pedestrians with beach access points at the Fisherman's Parking areas at the eastern and western limits of the beach. Emergency beach access would be provided for GATE staff via UTVs. Battery Kessler would be integrated into the dune system using sand fill and native vegetation.

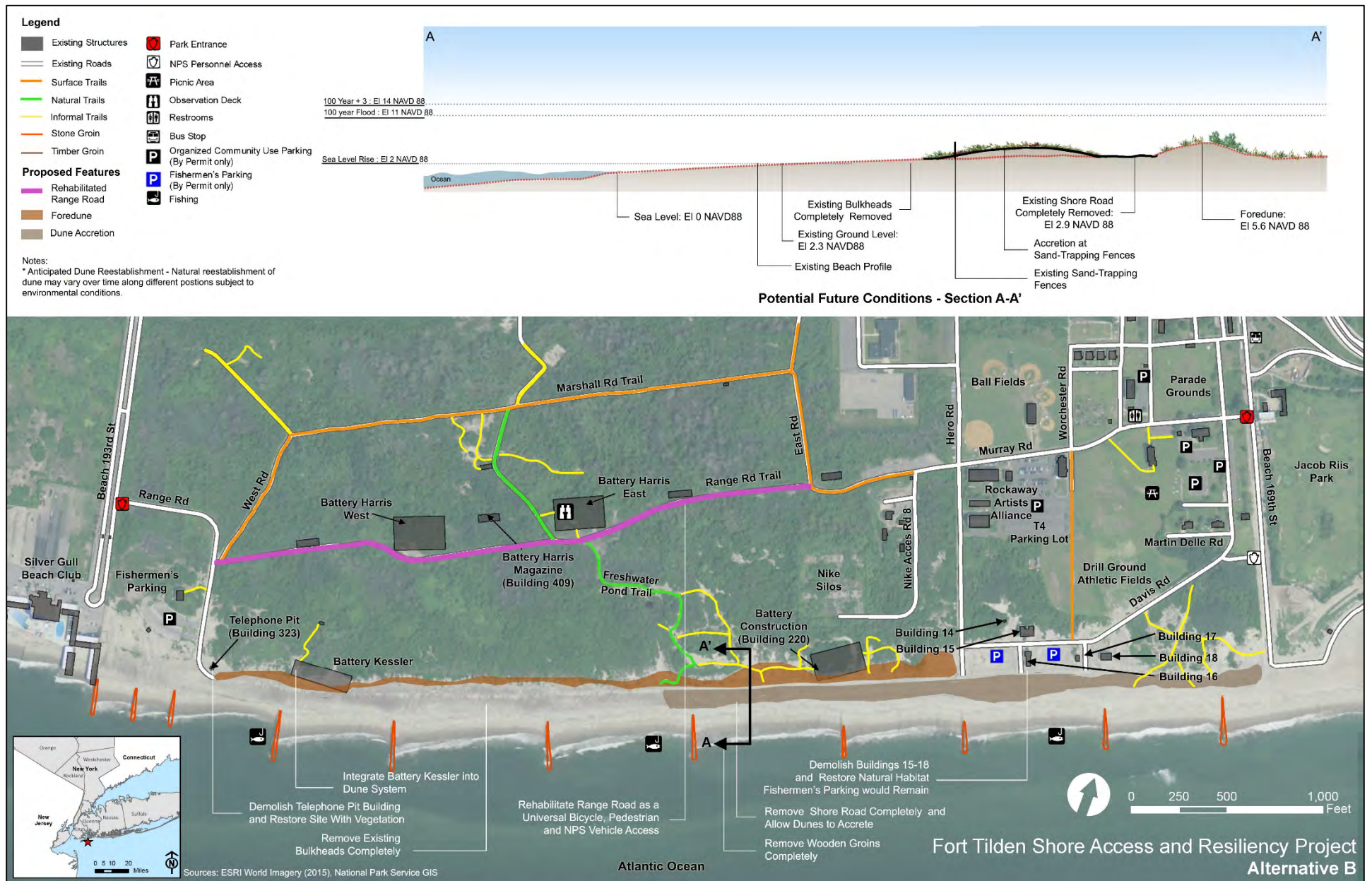


FIGURE 2-2: ALTERNATIVE B

ALTERNATIVE C

Under alternative C, a partially buried stone revetment would be constructed to a vertical elevation of 11 feet North American Vertical Datum of 1988 (NAVD 88) (100-year storm event elevation without freeboard) at the vulnerable western end of the beach near Fisherman's Parking. The revetment would connect to the Silver Gull Beach Club to the west and at higher elevations to the east. The buried portion of the revetment would be planted with native vegetation. The existing bulkhead would be removed to 3 feet below the existing ground line (figure 2-3).

Alternative C would remove the undamaged eastern portion of Shore Road. Beach access would be provided for bicyclists and pedestrians by constructing an elevated pathway approximately 10 feet wide along the vegetation line at a vertical elevation of 5 feet NAVD 88 (ranging from 2 to 4 feet above the existing ground elevation) that extends from Jacob Riis Park at the east to Fisherman's Parking at the west. Materials for the elevated pathway would be determined during design and could include precast concrete, fiberglass, or galvanized structural steel. Universally accessible beach access points would be provided along the elevated pathway. Emergency beach access for GATE staff would be provided for UTVs along the elevated pathway.

Battery Kessler would continue to decay naturally, and its entrances would be secured to improve visitor safety. The elevated pathway would be routed through or around Battery Kessler.

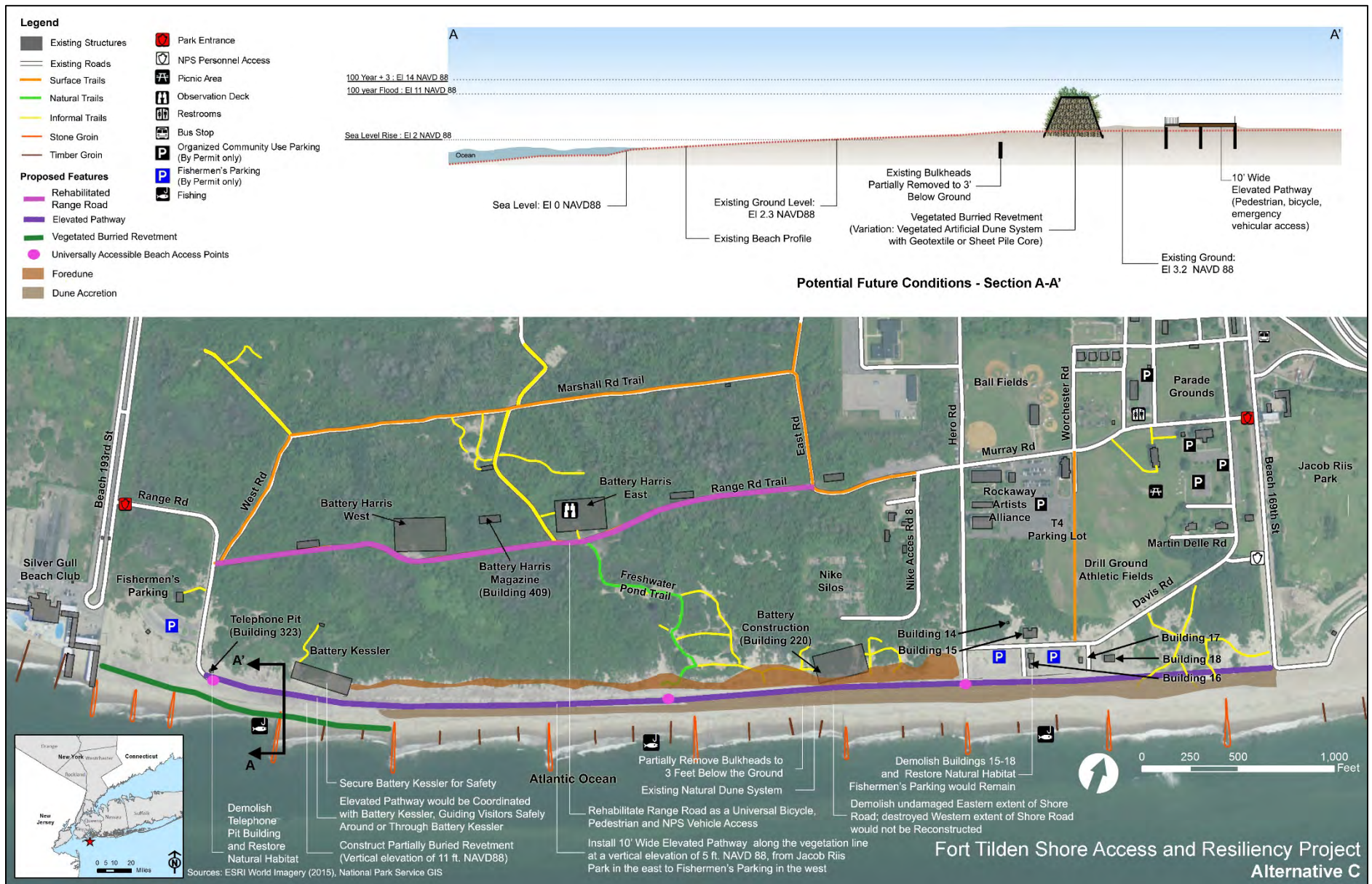


FIGURE 2-3: ALTERNATIVE C

ALTERNATIVE D: PROPOSED ACTION, NPS PREFERRED ALTERNATIVE

Under alternative D, sand-trapping fences would be installed where dunes previously existed to foster sand accumulation in areas parallel to both the existing and former extents of Shore Road, while the existing bulkhead would be removed to 3 feet below the existing ground line and wooden groins would be removed completely (figure 2-4). Reestablished dunes would be planted with native vegetation. New pedestrian beach access paths would be demarcated using sand-trapping fences through the dunes at an angle for beach access and to prevent pedestrians from crossing sensitive habitat.

Under alternative D, current management of the undamaged eastern portion of Shore Road would continue, providing ongoing beach access for GATE staff and emergency vehicles and access for bicyclists and pedestrians. A sustainable pathway made of a clay base with shell aggregate would be constructed in the destroyed western portion of Shore Road to connect the existing Shore Road to Fisherman's Parking, providing contiguous beach access for bicyclists and pedestrians. The clay-shell media would be an environmentally friendly surface that could be efficiently and cost-effectively reconstructed if affected by a future storm event. Emergency beach access for GATE staff would be provided for UTVs along Shore Road and the clay-shell pathway.

Battery Kessler would continue to naturally decay, and its entrances would be secured to improve visitor safety.

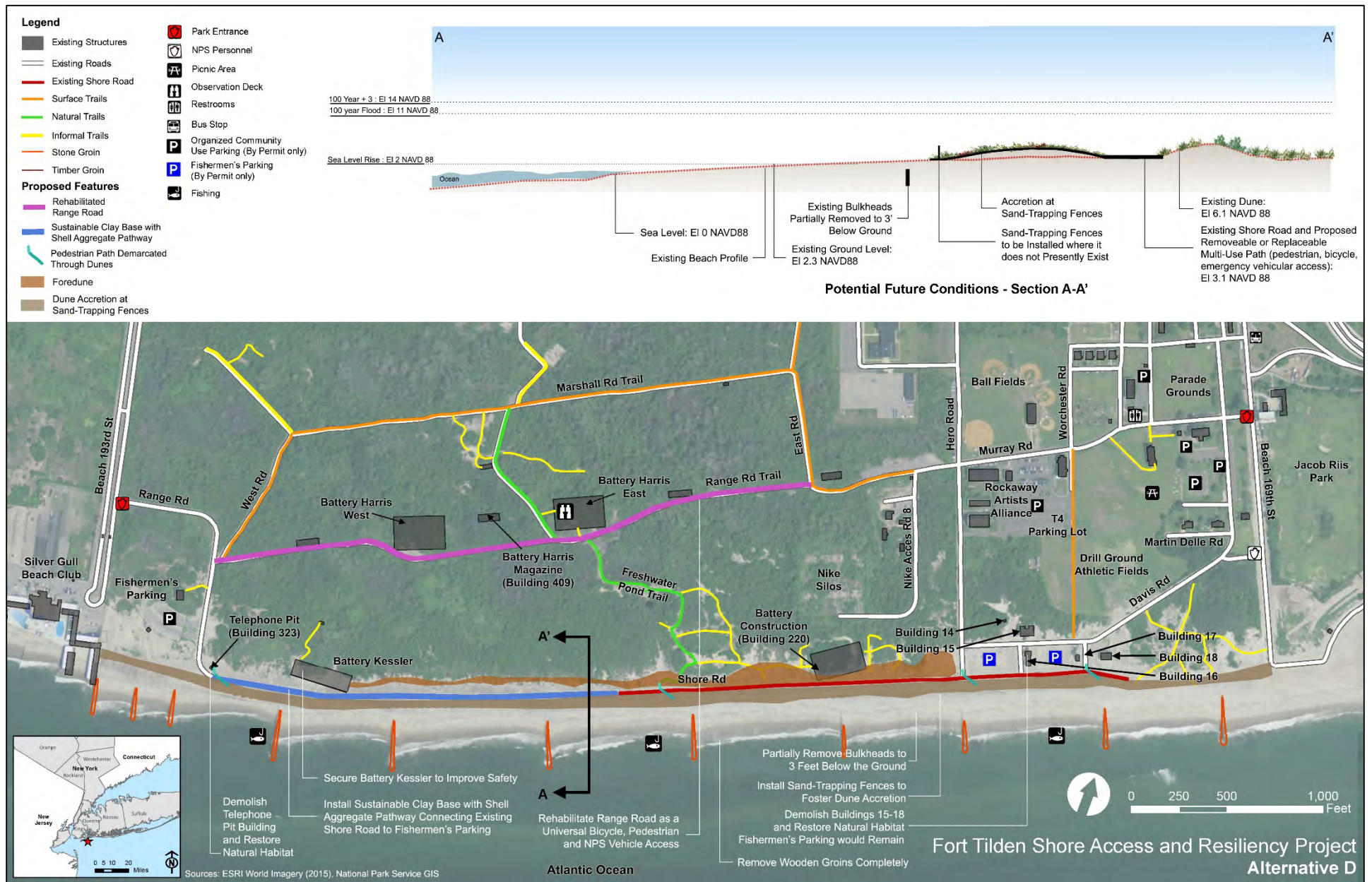


FIGURE 2-4: ALTERNATIVE D

SUMMARY OF PROJECT COMPONENTS BY ALTERNATIVE

The project alternatives are summarized as follows, as detailed in Table 2-1.

- Alternative A: No Action—reflects the future environment if no project occurs at Fort Tilden
- Alternative B—restores coastal habitats and processes to offer a natural coastal experience to visitors at Fort Tilden
- Alternative C—connects Fort Tilden to Jacob Riis Park by constructing an elevated pathway along the vegetation line and providing for erosion mitigation through a vegetated revetment at the western limits of the beach
- Alternative D—improves connections to the western limits of the beach by constructing a pathway of sustainable clay base with shell aggregate in the location of the destroyed portion of Shore Road and facilitating dune accretion using sand-trapping fences

TABLE 2-1. SUMMARY OF PROJECT ALTERNATIVES

Project Component	Alt A	Alt B	Alt C	Alt D
Bulkhead and Beach				
Bulkhead partial demolition and removal			✓	✓
Bulkhead complete demolition and removal		✓		
Wooden groins complete demolition and removal		✓		✓
Partially buried revetment with stone core and native vegetation			✓	
Sand-trapping fences used to demarcate paths through dunes and installed where dunes previously existed, with native vegetation on reestablished dunes				✓
Shore Road				
Maintain existing eastern extent of Shore Road	✓			✓
Demolition and debris removal of existing eastern extent of Shore Road		✓	✓	
Elevated pathway on piles, at 5 feet NAVD 88, 10 feet wide that extends from Jacob Riis Park at the east to Fisherman’s Parking at the west with universally accessible beach access points			✓	
Sustainable pathway made of a clay base with shell aggregate in the location of the former western extent of Shore Road				✓
Range Road				
Rehabilitate Range Road as a universally accessible bicycle-pedestrian roadway		Common to all action alternatives		
Range Road could be utilized by the surrounding community as an alternate east-west emergency egress route	Common to the no-action and all action alternatives			
Battery Kessler				
Battery Kessler integrated into dune with sand fill and native vegetation		✓		
Battery Kessler secured for safety			✓	✓
Telephone Pit Building (323), Buildings 15–18				
Demolition and debris removal, site restoration with native vegetation		Common to all action		

Project Component	Alt A	Alt B	Alt C	Alt D
		alternatives		
Wayfinding and signage				
Improve wayfinding and signage, as appropriate		Common to all action alternatives		
Parking				
Maintain visitor parking by permit only at Fisherman’s Parking to the west and both the T4 parking lot and Fisherman’s Parking the east	Common to the no-action and all action alternatives			

MITIGATION MEASURES FOR THE PROPOSED ACTION

To prevent and minimize potential adverse impacts related to the proposed action, the National Park Service would implement monitoring and best management practices during the construction process to ensure protection measures are properly implemented to protect the public.

Coastal Landscape

Buffers between areas of disturbance and waterways would be planned and maintained. Actions would be taken to minimize effects on site hydrology and fluvial processes including flow, circulation, water level fluctuations and sediment transport. Best management practices and conditions would be adhered to, in accordance with NPS Procedural Manual #77-1: *Wetland Protection*. These best management practices include procedures to limit effects on hydrology, fluvial processes, and fauna; protect water quality; control erosion and siltation; ensure proper maintenance; avoid heavy equipment use, stockpile of material, and temporary construction disturbance in wetlands; and use native plants. A list of these best management practices is provided in appendix B. Actions would be consistent, to the maximum extent practicable, with state coastal zone management programs.

Areas disturbed from and/or during construction would be kept as small as possible to minimize exposed soils and the potential for erosion. Soil erosion best management practices would be used, such as sediment traps, erosion check screen filters and sand trapping. Material to be excavated and replaced during removal of the bulkhead and wooden groin system would be sourced from the nearby littoral area, and is therefore expected to be similar in nature to the existing beach material. Care would be taken to avoid any rutting caused by vehicles or equipment. Temporarily disturbed areas of the beach would be restored to preconstruction conditions.

Specific provisions would be identified in the construction contract(s) to prevent stormwater pollution during construction activities pursuant to the stormwater pollution prevention plan and in accordance with the Clean Water Act and all other federal regulations.

During construction, every effort would be made to appropriately use adjacent excavated soils if the fill source is appropriate. However, sources and types of fill would depend on final project design. Sources of fill would be obtained in accordance with agency approvals and permitting requirements and fill would be certified free of exotic invasive vegetation species or weed free.

Special Status Species

Actions would not jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, including degradation of critical habitat.

Work is proposed to occur in the winter, prior to the warm season that is most conducive to re-colonization of benthic macroinvertebrates. Access to bird nesting areas would be limited during certain times of the year to provide for species protection, as appropriate. Fencing and protection of beach-nesting birds and protection for seabeach amaranth and seabeach knotweed would be implemented where appropriate. Construction would be mindful to avoid/minimize impacts on migrating and nesting birds between April 1 and October 31. This restriction would protect seabeach amaranth and seabeach knotweed, both annual plants that germinate in the spring. A qualified biologist would be onsite prior to any project-related activity begins and would observe the project area for special status species during all project-related activities.

Measures would be implemented to prevent the spread or introduction of invasive vegetation, such as ensuring that construction-related equipment arrives at the site free of mud or seed-bearing materials and certifying that any seeds or straw material are weed free. Tools and machinery would be thoroughly cleaned when moving from an area heavily covered with invasive vegetation to an area without invasive vegetation. The tires or tracks of trucks and equipment entering and leaving project sites would be washed to prevent seed transport.

Historic District

The proposed action likely would result in a finding of Adverse Effect on historic properties under section 106 of the National Historic Preservation Act. The National Park Service will enter into a memorandum of agreement with New York State Historic Preservation Officer. The memorandum of agreement would outline mitigation measures required to offset the adverse effect on the historic properties at Fort Tilden. A draft of the memorandum of agreement can be found in appendix A. If the National Park Service and the New York State Historic Preservation Officer deem it appropriate, monitoring for archeological resources may be conducted at demolition sites.

Visitor Use

Information on upcoming closures, including closure dates and arrangements of alternative access points, would be posted on the Gateway National Recreation Area website, distributed at other visitor centers within the national recreation area, and posted at the project site. When closures are necessary, information on alternative opportunities for visitor use would be publicized on the national recreation area website, in the newsletter, and on signage at the access points.

ALTERNATIVES/ELEMENTS CONSIDERED BUT DISMISSED FROM FURTHER ANALYSIS

The value analysis workshop considered one additional alternative that was dismissed from further analysis. This alternative is similar to Alternative D, but would install a removable multi-use path in the destroyed western portion of Shore Road to connect the existing Shore Road to Fisherman's Parking. It also would demolish only the most structurally unstable buildings among Building 15–18; the structurally stable buildings would be rehabilitated and adaptively reused.

This alternative was considered but dismissed from further analysis for two reasons. In consultation with federal and state permitting agencies, the option of a removable multi-use path (i.e., mat) that

CHAPTER 2: ALTERNATIVES

could be stored during hurricane season was deemed infeasible for permitting. In addition, the potential rehabilitation and adaptive reuse of the most structurally sound of Buildings 15–18 was deemed contrary to NPS policy because of its high flood-risk location and prohibitive costs to stabilize and make resilient. It is highly unlikely that the adaptive reuse of these buildings ever would be funded under current NPS priorities and budgets.

CHAPTER 3: AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

The information in this chapter describes the resources and values that may be changed if an action alternative is implemented. In addition to describing the resources, available data on existing conditions is included.

METHODS AND ASSUMPTIONS

In accordance with the Council on Environmental Quality regulations, direct, indirect, and cumulative impacts are described (40 CFR 1502.16), and the impacts are assessed in terms of context and intensity (40 CFR 1508.27). Where appropriate, mitigating measures for adverse impacts are also described and incorporated into the evaluation of impacts.

Geographic Area Evaluated for Impacts (Area of Analysis)

The geographic project area for this assessment is Fort Tilden (figure 1-2). The specific study area (area of analysis) for each impact topic is defined at the beginning of each “Environmental Consequences” section, following specific methodology and assumptions for each impact topic.

Cumulative Impacts Analysis Method

Cumulative impacts are defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, or reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions” (40 CFR 1508.7). The temporal scale for the cumulative impacts analysis includes past actions since Hurricane Sandy through reasonably foreseeable future actions. Because of long-shore sediment transport patterns affecting Fort Tilden, the geographic scale considered for cumulative impacts is the entire Rockaway Peninsula (figure 1-2).

Cumulative impacts are determined for each impact topic by combining the impacts of the alternative being analyzed and other past, present, and reasonably foreseeable actions that also would result in beneficial or adverse impacts. Because some of these actions are in the early planning stages, the evaluation of cumulative impacts is based on a general description of the projects. Other past, present, and reasonably foreseeable actions located on the Rockaway Peninsula (figure 1-2) to be included in the cumulative impacts analysis were identified through the internal and external project scoping processes and are summarized below.

- **Remove Sand and Damaged Sections of Shore Road.** In 2013 following Hurricane Sandy, the National Park Service removed the damaged former western extent of Shore Road. The project removed uplifted and undercut concrete and associated debris along approximately 0.5 mile of Shore Road, while the undamaged sections of Shore Road were left in place.
- **Remove Partial Exposed Bulkhead for Safety at Fort Tilden.** In 2013 concurrent with removing the damaged section of Shore Road, the National Park Service removed immediate risks to beach goers associated with an historic bulkhead that Hurricane Sandy uncovered and damaged. Debris, including concrete anchors and metal tiebacks that had become dislodged/separated from the Fort Tilden bulkhead, was cleared.
- **Jacob Riis Park Sand Replacement.** Jacob Riis Park is a 220-acre subunit of the Jamaica Bay Unit, adjacent to Fort Tilden to the east. Hurricane Sandy removed much of the sand from

the beach at Jacob Riis Park. As a result, a large portion of the area previously available to users was lost. In 2014, the US Army Corps of Engineers (USACE) replaced the sand that was removed by Hurricane Sandy in-kind.

- **Gateway National Recreation Area General Management Plan/Environmental Impact Statement.** The general management plan evaluates and prioritizes historic structures to guide future management decisions according to eight factors, including fundamental resource, National Register status, National Register level of significance, condition, uniqueness, visibility, potential use, and vulnerability to storm events. Certain areas within the Fort Tilden Historic District are prioritized within the ruin band, within which historic structures are recommended to be allowed to decay naturally, fenced off to limit public access, or demolished. The environmental impact statement assessed the impacts of removing historic structures in the ruin band generally and determined that allowing the properties in the ruin band to decay or be demolished may have an adverse effect on historic properties.
- **Rockaway Beach Restoration.** After Hurricane Sandy, more than \$140 million was invested to repair and restore Rockaway Beach. As part of this work, intact sections of boardwalk were repaired, damaged beach buildings were renovated with new boardwalk islands constructed around them, public restrooms and lifeguard stations were installed to replace destroyed facilities, and interim shoreline stabilization and anti-erosion measures were created. The New York City Department of Parks and Recreation is working with the Rockaway community, New York City Economic Development Corporation, and the US Army Corps of Engineers on a second phase of improvements to construct a new boardwalk from Beach 86th Street to Beach 19th Street. Completed shoreline stabilization and erosion control projects include the installation of a network of sand-filled geotextile bags from Beach 55th to Beach 149th Streets and baffle walls from Beach 126th to Beach 149th Streets (NYC Parks n.d.). The US Army Corps of Engineers also placed 3.7 million cubic yards of sand at Rockaway Beach.
- **Comprehensive Flood Protection System for Breezy Point.** Breezy Point is adjacent to Fort Tilden to the west. In March 2014, New York State submitted an application to the Federal Emergency Management Agency Hazard Mitigation Grant Program for \$58 million to construct a proposed double dune system on the south side (Atlantic Ocean) of Breezy Point Cooperative property, with flood walls and groins on the north side (Jamaica Bay) in Breezy Point and Roxbury (New York State 2014).

While the Atlantic Coast of New York City, East Rockaway Inlet to Rockaway Inlet (Rockaway Beach) and Jamaica Bay Study (also known as the Rockaways Reformulation Study) was identified through project scoping, the results of this study are not yet known, and therefore this ongoing USACE project is not considered reasonably foreseeable. However, the National Park Service has and will continue to consult with the US Army Corps of Engineers to ensure cooperation and compatibility with the plan as it is developed.

Cumulative Impact Terminology

Cumulative impacts are considered for all alternatives and are presented at the end of each impact topic discussion. In defining the contribution of each alternative to cumulative impacts, the following terminology is used:

- **Imperceptible.** The incremental impact contributed by the alternative to the overall cumulative impact is such a small increment that it is impossible or extremely difficult to discern.
- **Noticeable.** The incremental impact contributed by the alternative, while evident and observable, is still relatively small in proportion to the overall cumulative impact.
- **Appreciable.** The incremental impact contributed by the alternative constitutes a large portion of the overall cumulative impact.

COASTAL LANDSCAPE

Affected Environment

The coastal landscape comprises ecological and geomorphological features in the coastal area at Fort Tilden, specifically nonvegetated tidal wetlands and their ecological functions, movement of littoral sediment, and beach formation processes. Fort Tilden is characterized by several zones¹ within the coastal landscape. In sequence from the ocean to the shore, these include the offshore bar (i.e., submarine offshore sand bar), the littoral zone, the beach face (i.e., intertidal beach), beach surface (i.e., beach berm), the foredune (i.e., coastal foredune), back dune, and upland areas (figure 3-1). These zones are not uniform and vary in their dimensions along the shore. They are also subject to temporal change. The foredune, beach, and offshore bar constitute a dynamic beach-dune system in which sediment is exchanged among the foredune, beach, and offshore bar feature. This sediment exchange is affected by wind, wave, and current energies that are subject to seasonal variation. Storage of sand varies between the foredune and the offshore bar. While the foredune tends to store sand high on the profile during *low* energy periods, the offshore bar stores sand offshore during *high* energy periods. These exchanges of sand between the offshore bar and the foredune are most prevalent during storms when energy conditions that drive the transport of sediment are more variable and extreme. During stormy periods large waves and abundant energy move sediment on the beach profile. The waves operate on the offshore as well as on the beach portion. Storm winds add another component of sediment mobilization and tend to move material on the beach berm and foredune (figure 3-2) (Psuty et al. 2010).

Beach Face and Beach Surface

The beach face and beach surface (berm) within Fort Tilden is characterized by quasi-horizontal to gently sloping areas of sand and gravel next to the Atlantic Ocean between the offshore bar zone and foredune, as shown in figure 3-1. The intertidal portion of the beach, the beach face, extends from the high tide line to the low tide line, is flooded twice per day by saltwater, and is frequently re-worked by wave and current action. The upper portion of the beach, the beach berm, extends from above mean high water to include the supratidal area to the base of the foredune. The eastern portion of Fort Tilden has the broadest berm surface, and prior to Hurricane Sandy, had the largest

¹ “Zones” throughout the Coastal Landscape section refer to areas of the coastal landscape, not zones as referred to in the general management plan for Gateway National Recreation Area.



Sources: National Parks Service GIS; National Wetland Inventory (October 2015) by United States Fish and Wildlife Service; New York City Department of City Planning; New York State Department of Environmental Conservation (2013); ESRI World Imagery

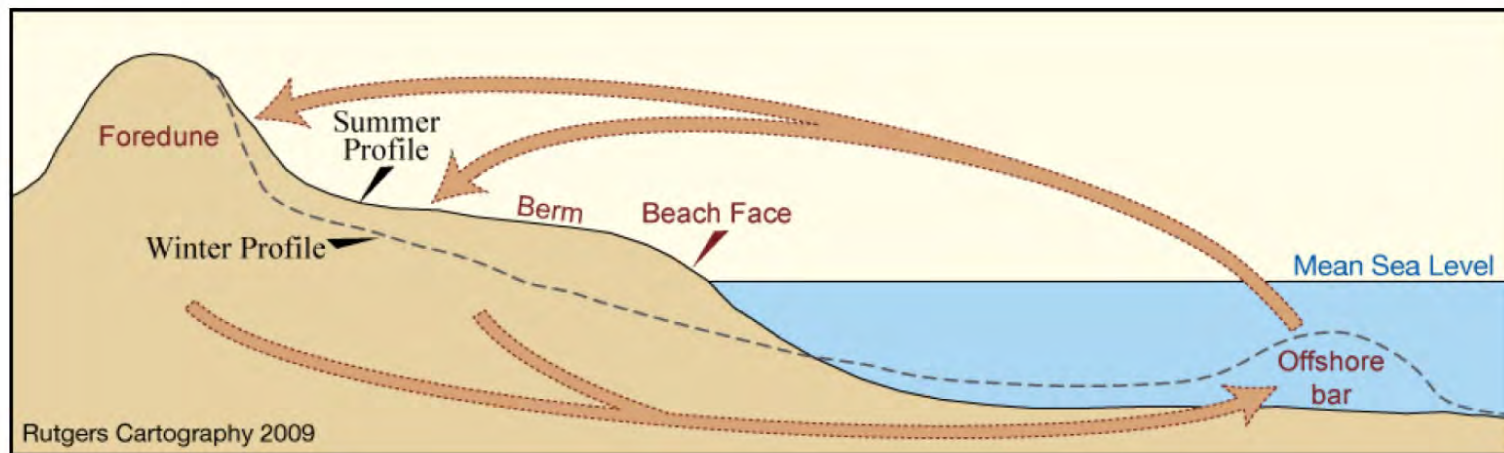


Gateway National Recreation Area

Fort Tilden Shore Road
Shoreline Resiliency

Coastal Landscape Habitats

FIGURE 3-1: COASTAL LANDSCAPE HABITATS



Gateway National Recreation Area

Fort Tilden Shore Road
Shoreline Resiliency

Beach-Dune Exchange System

Sources: Psuty et al. (2010)

FIGURE 3-2: BEACH-DUNE EXCHANGE SYSTEM

and widest foredune zone. The berm surface and foredune zone narrowed toward the west, reaching its minimum dimensions near the Silver Gull Beach Club. Hurricane Sandy eroded much of the active foredune and displaced much of the foredune to a position inland of the position of Shore Road. Although some recovery of the foredune has occurred in the post-Hurricane Sandy period, the net foredune position has been displaced more than 20 meters inland for the length of Fort Tilden (Psuty et al. 2015).

Beaches are formed from sandy and gravelly beach sand and are not classified as prime farmland or hydric soils (USDA-NRCS et al. 2015). Muck and other nonsoil material may lie underneath the sand (USDA-NRCS et al. 2001). Sandy beaches provide many ecosystem services, including sediment storage and transport; wave dissipation and associated buffering against extreme weather events; dynamic response to sea level rise; breakdown of organic materials and pollutants; water filtration; nutrient mineralization and recycling; a nursery area for juvenile fishes; nesting sites or rookeries for shorebirds; prey for birds and other terrestrial wildlife; and functional links between terrestrial and marine environments (Defeo et. al 2009).

The benthic habitat associated with the beach surface typically is inhabited by burrowing organisms such as sand fleas, ghost crabs, and isopods. The beach face has a relatively low diversity community characterized by the benthic invertebrate fauna such as polychaete worms (*Spiophanes bombyx*, *Pygospio elegans*, *Clymenella torquata*, *Scoloplos fragilis*, and *Nephtys incisa*), amphipods (*Protohaustorius deichmannae* and *Acanthohauastorius millsii*), and mole crabs (*Emerita* spp.) (Edinger et. al. 2014).

Foredune

The beach face and beach surface at Fort Tilden is backed by a vegetated foredune as depicted in figure 3-1. Although severely eroded and displaced by Hurricane Sandy, there is some recovery, with the eastern margin showing greater volume gains because of the large bare sand source area in Riis Park. The foredune decreases in overall dimension and volume toward the western margin with low washover sand masses contributing to the dune volume and form at Fisherman's parking lot. The form of foredune systems is influenced by a number of factors, including the shape of the coastline, shape and size of the beach in front of the foredune, currents and swell of the ocean, prevailing wind, frequency of storm events, and particle size of the sand. Coastal dunes protect landward areas from flooding and erosion by acting as a buffer against eroding wave action.

This foredune zone comprises a combination of Hooksan fine sand and the Hooksan-Dune land complex (USDA-NRCS et al. 2015). Hooksan fine sands form from eolian sands that have been transported and reworked by wind action and can include other natural and anthropogenic soils (USDA-NRCS et al. 2001, 2015). The Hooksan-Dune land complex is a formation of Hooksan sand and Dune land, which are so intermingled that it is not practical to map them separately (USDA-NRCS et al. 2001). Areas of the Hooksan sand generally support beach grass and a few shrubs and trees, while areas of Dune land are not vegetated and are subject to wind action (USDA-NRCS et al. 2001). The Dune lands are characterized by sand in hills or ridges and intervening troughs, drifted and piled up by the wind. These features are either actively shifting or are so recently stabilized that no new soil horizons have developed. Neither Hooksan fine sand nor the Hooksan-Dune land complex are classified as prime farmland or hydric soil (USDA-NRCS et al. 2015).

Coastal Dynamics and Coastal Processes

The coastal landscape is dynamic; erosion and sedimentation processes continuously change the beach and dune zones. Storms can cause the erosion or accretion of large quantities of sediment over a relatively short time, and the beach and foredunes may be eroded and displaced inland to form new

dune features by storm surge, and sand can be transported by strong waves. These dynamics are influenced by natural as well as human-made or induced processes.

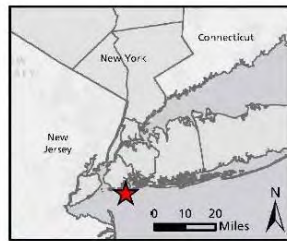
Longshore sediment transport (i.e., movement of sand along the shore) at Fort Tilden occurs naturally from east to west along the Rockaway Peninsula, where the sediment pathway created by dominant currents transports sand along the south shore of Long Island in the direction of Fort Tilden at a rate of about 450,000 cubic yards/year (Hess and Harris 1987, as cited in Psuty et al. 2010).

The natural longshore sediment transport mechanism described above is affected by human intervention in the form of the groins and a jetty system to the east and west at the Breezy Point tip. The jetty at the western most end of Breezy Point serves to maintain the peninsula in a stationary condition, but in doing so, captures and accumulates sediment, preventing it from moving farther westward beyond the peninsula. The jetty does limit the extent of the Breezy Point spit, but sediment does go beyond the jetty to create a landform downdrift and adds sediment into the navigation channel, which requires periodic dredging.

In addition to the typical natural processes described above, extreme natural events such as Hurricane Sandy can substantially affect these processes and can change or even ‘reset’ local coastal dynamics (NPS 2014). In the case of Fort Tilden, Hurricane Sandy scoured away sand that covered the bulkhead, exposing areas of this feature (Psuty and Schmeltz 2015). Although the bulkhead remains intact below ground, the exposed section has deteriorated to an extent that eliminates any residual erosion-reducing effect for which it was originally constructed and which it may have been able to provide under post-Hurricane Sandy conditions.

Human interventions after Hurricane Sandy and/or in response to Hurricane Sandy may continue to affect longshore sediment transport and thus shore conditions at Fort Tilden. It is likely that the beach nourishment project that added almost 3.7 million cubic yards of material on the Rockaway and Jacob Riis Park beaches (immediately east of Fort Tilden) is causing the Fort Tilden shore to expand seaward, generally widening the beach zone. This trend may continue depending on the rate of nourishment at the Rockaway and Jacob Riis Park beaches. Notwithstanding the widening of the Fort Tilden Beach overall, the western portion of the beach has been subject to apparent erosion. With an already limited beach front affected by offshore processes, this western portion of Fort Tilden Beach will continue to be more vulnerable to the erosive effects from more extreme storms, especially if such storms were to occur with greater frequency. Furthermore, in general terms, as sea-level rise accelerates over time, the reduction in the amount of sand available for deposition will become an increasingly important element contributing to the vulnerability of a coastline to increased erosion and loss (NPS 2014).

To better understand this process and document the extent of impacts on sedimentation from Hurricane Sandy, a sediment monitoring program at Fort Tilden was initiated in late 2014. A topographical model of Fort Tilden was developed from data collected in 2010 that was used to represent pre-Hurricane Sandy conditions (figure 3-3), while a model created using a data set obtained in November 2012 (shortly after Hurricane Sandy occurred) was used to represent post-Hurricane Sandy conditions (figure 3-4) (Psuty et al. 2015). The National Park Service has undertaken profile surveys of Fort Tilden to document the beach and foredune recovery or sustained loss. The most noticeable component of the 11 surveyed profiles performed by Dr. Psuty and his team is the destruction of the coastal foredune by the hurricane and its modest recovery in the post-storm period (2012–2015). Every profile had an inland displacement of the dune feature (with a mean displacement of approximately 30 meters) followed by a mean recovery seaward to



Digital Elevation Model of Shore Road area within Fort Tilden prior to Hurricane Sandy, derived from 2010 LiDAR data. Light green elevations are in the flat sandy beach. Dark green elevations are in the upper beach adjacent to the dune and inland of the dune feature. Tan and brown elevations are higher than the sand beach, they characterize the dune feature. Shore Road is the dotted line immediately inland of the beach. Other dotted lines represent locations of existing roads identified on orthophotos. In addition, the figure includes the locations of profile lines that were constructed using LiDAR data sets (from 2010 and from 2012) and field surveys conducted in December, 2014.



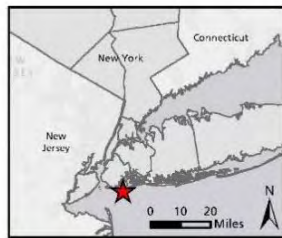
Gateway National Recreation Area

Fort Tilden Shore Road
Shoreline Resiliency

Pre-Hurricane Sandy Elevation
Fort Tilden - 2010

Sources: Psuty et al 2015

FIGURE 3-3: DIGITAL ELEVATION MODEL – FORT TILDEN 2010



Digital Elevation Model of Shore Road area within Fort Tilden after Hurricane Sandy, using post-Sandy 2012 LiDAR data sets. Elevation categories are the same as in Figure 1. Dotted lines represent locations of roads prior to Hurricane Sandy. Black triangles on profile line locations represent the 0.0 distance position incorporated on the profiles. The profiles extend seaward and landward from these starting points.



Gateway National Recreation Area

Fort Tilden Shore Road
Shoreline Resiliency

Post-Hurricane Sandy Elevation
Fort Tilden – 2012

Sources: Pluty et al 2015

FIGURE 3-4: DIGITAL ELEVATION MODEL – FORT TILDEN 2012

October 2015 of about 7 meters (Psuty et al. 2015). In the three years after Hurricane Sandy, the dune system has recovered some of its eroded volume, but it is being reestablished inland of its previous location (Psuty et al. 2015).

Nonvegetated Tidal Wetlands

Figure 3-5 depicts nonvegetated tidal wetlands within the project area. Based on the National Wetlands Inventory mapping, two wetland types are located in the project area—Marine Intertidal Unconsolidated Shore, Sand, Irregularly Flooded (M2US2P) and Marine Intertidal Unconsolidated Shore, Sand, Regularly Flooded (M2US2N). National Wetlands Inventory wetland classifications are based on the system developed for the US Fish and Wildlife Service. Under NPS criteria, unvegetated tidally influenced beaches are considered wetlands, while permanently inundated areas, such as the adjacent Atlantic Ocean, are considered deepwater habitats. Both of these areas would be regulated under New York State Department of Environmental Conservation (NYSDEC) tidal wetland regulations, which consider unvegetated tidally influenced areas (i.e., beaches) as “coastal shoals, bars, or mudflats,” and areas permanently inundated (to a depth of six feet below mean low water) as “littoral zone wetlands. As depicted on figure 3-5, the New York State Department of Environmental Conservation maps the intertidal beach face portion of Fort Tilden Beach as littoral zone wetlands.

Although sandy beaches do not meet the USACE definition of a jurisdictional wetland, all beach areas below the high tide line are considered jurisdictional waters of the United States. Permanently flooded marine habitats in the project area would also be considered jurisdictional waters. These areas would be subject to the USACE regulatory program under the Clean Water Act of 1972, as amended, and the Rivers and Harbors Act of 1899, as amended. Because the action alternatives would not affect wetlands, a Wetlands Statement of Findings would not be required.

Figure 3-5 also depicts the results of the August 2015 wetland delineation within the coastal landscape area of analysis in accordance with USACE procedures (Louis Berger 2015a; Environmental Laboratory 1987; USACE 2012). Within the study area, an approximately 25.8-acre nonvegetated intertidal wetland was delineated along the beach. The upper limit of the nonvegetated intertidal wetland was delineated in the field using visual observations to determine the location of the high tide line (USEPA 2015) as defined in 40 CFR 230.3; therefore, the boundary is slightly different from the boundaries of the NYSDEC and National Wetlands Inventory wetlands, as depicted in figure 3-5. The delineated wetland contains M2US2P and M2US2N zones, as classified by Cowardin et al. (1979). The irregularly flooded zone is sparsely vegetated by American searocket (*Cakile edentula*). The regularly flooded zone does not support vegetation.

Nonvegetated tidal wetlands within the study area provide the following functions: foraging habitat for birds and fish that prey on benthic invertebrates that occur in the wetland; detritus and wrack processing and nutrient recycling; filtration of seawater; and buffering and absorption of wave energy.

Environmental Consequences

Methodology and Assumptions

Impacts on the coastal landscape were evaluated by considering the potential for disturbance of nonvegetated tidal wetlands and coastal processes such as sediment transport, beach and dune formation, erosion, and sedimentation.



- | | | | |
|---|--|---|--|
| <ul style="list-style-type: none"> Existing Roads Existing Structures Park Entrance NPS Personnel Access No Access Picnic Area Fishing | <ul style="list-style-type: none"> Observation Deck Restrooms Kayak Launch Site Bike Route Bus Stop Fishermen's Parking (By Permit Only) Organized Community Use Parking (By Permit Only) | <ul style="list-style-type: none"> Existing Bulkhead Stone Groin Timber Groin <p>Delineated Wetlands</p> <ul style="list-style-type: none"> Marine Intertidal Wetland Line | <p>NYS DEC Wetlands (2013)</p> <ul style="list-style-type: none"> Littoral Zone <p>NWI Wetlands Within the Study Area (2015)</p> <ul style="list-style-type: none"> Marine Intertidal Unconsolidated Shore, Sand, Regularly Flooded (M2US2N) Marine Intertidal Unconsolidated Shore, Sand, Irregularly Flooded (M2US2P) |
|---|--|---|--|



Gateway National Recreation Area

Fort Tilden Shore Road
Shoreline Resiliency

Nonvegetated Tidal Wetlands

Sources: National Parks Service GIS; National Wetland Inventory (October 2015) by United States Fish and Wildlife Service; New York City Department of City Planning; New York State Department of Environmental Conservation (2013); Louis Berger Wetland Delineation (August 2015); ESRI World Imagery

FIGURE 3-5: NONVEGETATED TIDAL WETLANDS

The area and ecological functions of existing nonvegetated tidal wetlands were assessed using a field wetland delineation and federal, state, and NPS documents (Louis Berger 2015a). To determine impacts, changes in the area and the protective and ecological functions provided by the wetlands and lands adjacent to the wetlands were evaluated.

Previous NPS studies and reports for the park were reviewed to assess potential changes in the movement of sediment within the study area as indicators of potential impacts, such as reduction of natural beach accretion or accelerated erosion. To determine impacts, existing soils and sediment transport patterns were considered, along with the potential effects on these processes, beach formation, dune accretion, and erosion resulting from additions and/or modifications to coastal structures associated with the different alternatives.

Based on available data and considering the variability of natural processes, including the potential for extreme events to occur with greater frequency (New York City Panel on Climate Change 2015), the time required for the dunes to accrete to their previous or similar state cannot be accurately predicted. By the same reasoning, changes to dune accretion or the foredune from extreme weather events cannot be accurately predicted.

Study Area

The primary study area for the coastal landscape is the littoral zone, beach face, beach berm, and foredune zone (figure 3-1). The larger study area for analysis of sediment transport focuses on Fort Tilden; however, because downdrift and updrift features affect the deposition and erosion patterns at Fort Tilden, locations farther east (e.g., Jacob Riis Park) also are considered in the discussion.

Impacts of Alternative A: No Action

Analysis. The no-action alternative would not have any adverse impacts on the existing coastal landscape within Fort Tilden. No change in area of nonvegetated tidal wetlands or ecological functions provided by the wetlands and adjacent lands would occur. Natural coastal processes would continue to function as they have since Hurricane Sandy. Over time, the existing dunes would continue to accrete naturally along the eastern end of Fort Tilden where they existed prior to Hurricane Sandy (Psuty et al. 2015). The apparent erosion of the western end of Fort Tilden Beach as a result of offshore processes and limited beach width within this area may continue. Dunes would continue to accrete inland of Shore Road on the eastern section of Fort Tilden and would remain absent on the western end. However, it could take years or up to a decade for the beach and dune system to recover to pre-storm conditions. In addition, under this alternative, some areas of the beach and dune system are likely to be more vulnerable and less resilient to recovery.

Cumulative Impacts. Hurricane Sandy displaced much of the beach present along Rockaway Beach and at Jacob Riis Park. In 2013, through the Rockaway Beach Restoration project, the US Army Corps of Engineers placed 3.7 million cubic yards of sand at Rockaway Beach, and in 2014, the US Army Corps of Engineers replaced the lost sand at Jacob Riis Park to restore the recreational beach to pre-storm conditions. While this sediment would travel west to Fort Tilden as a result of natural sediment transport patterns, the dune accretion at the eastern end of the beach under alternative A would be gradual and long term, thus representing no contribution to cumulative impacts on the movement of littoral sediment.

Conclusion. The no-action alternative would have no additional impact on the coastal landscape and its associated nonvegetated tidal wetlands or ecological functions, the movement of littoral sediment, or beach formation processes at Fort Tilden. Alternative A also would have no contribution to cumulative impacts on the coastal landscape.

Impacts of Alternative B

Analysis. Removal of the bulkhead, wooden groins, and Shore Road would not adversely affect nonvegetated tidal wetlands, the ecological functions provided by the wetlands and adjacent lands, or change the existing long-shore sediment transport patterns or coastal processes within Fort Tilden. Removal of the bulkhead from within the nonvegetated tidal wetlands would have a beneficial impact by increasing wetland area and providing continuous wetland habitat, which would increase the ecological functions provided by these wetlands, including a beneficial effect on benthic habitat. The increase in wetland area would be small because less than 0.3 acre of structures would be removed from a wetland that encompasses greater than 25 acres.

Currently the wooden groins and bulkhead are obsolete and do not provide any impediments to the sediment transport function within Fort Tilden. While the remnants of these structures do not impede the long-shore sediment transport from east to west, the existing functioning stone groins do. Therefore, the removal of the wooden groin and bulkhead structures from within the littoral zone and offshore areas would not impact long-shore sediment transport within the system because they currently do not impede sediment movement.

The removal of Shore Road would have beneficial impacts on the natural coastal and geomorphological features through the release of additional sand (that would otherwise remain inert and contained by concrete pavement) to the naturally occurring sediment exchange, as well as on the beach face and surface and dune formation processes by enabling dune accretion along the eastern end of the beach. The western end of Fort Tilden Beach, which is narrower than the eastern end of the beach, may continue its apparent eroding conditions and the time needed for natural reformation of the dune system in this area is unclear. These beneficial impacts would be minimal because in general, with the absence of man-made obstructions in this area, the dunes that would naturally accrete would need to do so over a larger area, thereby increasing the time needed for reestablishment.

In addition to the exposure of additional sand to the naturally occurring sediment exchange by the removal of Shore Road, the sediment exchange process also would benefit from the addition of approximately 3,000 cubic yards of imported sand fill for the integration of Battery Kessler into the dune system. This increase in sand would be small because it is nearly imperceptible in relationship to the overall volume of sand in the long-shore sediment transport system, which encompasses all of the Rockaway Peninsula.

Cumulative Impacts. Reestablishing the natural sediment transport pathways and landform generation would have a noticeable contribution to the beneficial, cumulative impacts on coastal landscape (offshore zone, beach face and surface, and foredunes) by removing man-made structures within the coastal landscape, increasing the stability of these landscape features, and retaining the natural processes over time. Past, present, and reasonably foreseeable actions, including the 2013 beach restoration project when the US Army Corps of Engineers placed 3.7 million cubic yards of sand at Rockaway Beach, and the 2014 sand replacement project when the US Army Corps of Engineers replaced the lost sand at Jacob Riis Park, would result in substantial, beneficial impacts on the coastal landscape in and around the beach face and surface and foredunes because of the level of historical and continued sources of sediment transport along the coastal system. When the impacts on natural sediment transport under alternative B are combined with the impacts from past, present, and reasonably foreseeable actions, alternative B would contribute a slight, beneficial increment to the overall substantial, beneficial, cumulative impact of natural sediment transport patterns.

Conclusion. Alternative B would have slight, beneficial impacts on nonvegetated tidal wetlands and the functions provided by the wetlands because of the minimal increase in wetland area. Alternative B would not affect the movement of littoral sediment at Fort Tilden, but slight, beneficial impacts on natural beach formation processes would occur because of the slight dune accretion and the minimal contribution of sand to dune and beach recovery related to the removal of Shore Road and integration of Battery Kessler into a dune system. Additionally, alternative B would contribute a slight, beneficial increment to cumulative impacts on elements of the coastal landscape.

Impacts of Alternative C

The vegetated revetment proposed under alternative C would result in an adverse impact on approximately 0.02 acre of tidal wetlands in the western portion of the beach face. This loss of 0.02 acre would be minimal because it is small relative to the approximately 25.8 acres of tidal wetland present within the Fort Tilden study area. The loss of 0.02 acre would result in a minimal adverse impact on ecological functions provided by the nonvegetated tidal wetland, including a slight reduction in benthic habitat, but it is not expected to reduce the overall functional capacity of the wetlands within the study area. Contiguous nonvegetated tidal wetlands within adjacent coastal beaches that would remain as part of this alternative would continue to provide foraging habitat for birds and fish, detritus and wrack processing and nutrient recycling, filtration of seawater, and buffering and absorption of wave energy.

The revetment would protect nearby resources (Battery Kessler, the Silver Gull Beach Club, and Fisherman's Parking) from potential wave forces in the short term. However, the revetment also would be subjected to the erosive processes currently at work on the western end of the beach, potentially resulting in the loss of sand at the foot of the revetment and exposing the revetment core. This process may accelerate erosion seaward of the revetment, causing it to fail. If the revetment were to fail, this would result in greater vulnerability of natural and cultural resources and infrastructure (Battery Kessler, the Silver Gull Beach Club, Fisherman's Parking, and the beach zone). Installation of the revetment at the western portion of Fort Tilden Beach at a vertical elevation of 11 feet NAVD would result in adverse impacts because it would change long-shore sediment transport patterns by forming a man-made barrier dune movement within the beach profile, and limiting the inland movement of sediment within the beach profile from the beach face to the foredune area. This would limit or eliminate the inland movement of sediment to form dunes, as well as the seaward movement of sediment to form the beach face. Sediment would not accumulate along the seaward side of the revetment, which is subject to continual wave action, and there would be no sediment transfer from the foredune to feed the beach, leading to pronounced erosion. These changes in long-shore sediment transport patterns would be considerable because the presence of the revetment (a man-made-obstruction) would inhibit sediment movement and geomorphological features westward at the western end of Fort Tilden Beach.

Partial removal of the bulkhead would not change the long-shore sediment transport patterns because no portion would remain aboveground to inhibit sediment movement.

Removing Shore Road, the only structure in the beach area, and replacing it with an elevated pathway would have an adverse effect on the sediment budget and erosional conditions at the eastern end of the beach. While the elevated pathway would expose sand to the sediment exchange process where the road previously existed, the elevated pathway also would constrain or form a barrier against dune movement within the beach profile and limit the movement of sediment within the beach profile to the foredunes. Dune accretion processes would continue on the eastern end of Fort Tilden where dunes are currently accreting, but the negative effects on sediment budget, geomorphological features, and erosional conditions would be considerable because sand would

accumulate against the piles of the pathway or over the pathway when enough sediment has built up underneath the structure. Long shore sediment movement would be limited because of the man-made obstructions within the system.

Cumulative Impacts. The revetment and elevated pathway would disrupt the sediment pathways and erosional outcomes and have a noticeable contribution to the adverse, cumulative impacts on coastal landscape (offshore zone, beach face and surface, and foredunes). Past, present, and reasonably foreseeable actions, including the 2013 Rockaway Beach Restoration project and 2014 sand replacement at Jacob Riis Park would result in appreciable, beneficial impacts on the coastal landscape in and around the beach face and surface and foredunes because of the level of historical and continued sources of sediment transport along the coastal system. When the impacts on natural sediment transport under alternative C are combined with the impacts from past, present, and reasonably foreseeable actions, alternative C would minimize the overall appreciable, beneficial, cumulative impact of natural sediment transport patterns.

Conclusion. Alternative C would result in a minimal, adverse impact on nonvegetated tidal wetlands as a result of the construction of a vegetated revetment that would permanently replace 0.02 acre of the wetlands. This alternative would have a substantial effect on natural beach and dune formation processes at the eastern end of the beach where the elevated pathway would constrain dune movement and inland sediment transport. It also would result in substantial, adverse impacts at the western end of the beach because the vegetated revetment would inhibit the westward movement of littoral sediment, resulting in reduced interaction with the long-shore sediment movement into the foredune area. These adverse impacts would increase the vulnerability of the beach area to erosion, Silver Gull Beach Club, Battery Kessler, and Fisherman's Parking by limiting beach face and surface growth. Additionally, alternative C would have an overall noticeable, adverse contribution to cumulative impacts on elements of the coastal landscape.

Impacts of Alternative D

Analysis. Alternative D would have no permanent, adverse impact on nonvegetated tidal wetlands within the study area or on the ecological functions provided by the wetlands. The increase in wetland area from the removal of bulkhead and groin structures would be small because less than 0.3 acre of structure would be removed from a wetland that encompasses greater than 25 acres. Impacts on the coastal landscape from the removal of the wooden groins would be the same as those described under alternative B. The removal of sand and materials of the groin and bulkhead would be replaced by sand.

Partial removal of the bulkhead would not change the long-shore sediment transport patterns because no portion would remain aboveground to inhibit sediment movement. The installation of sand-trapping fences would promote dune accretion and result in long-term, beneficial impacts on dune formation by enhancing the existing dune along the eastern end of the beach. Sand-trapping fences are used along dune systems to promote dune accretion and control pedestrian traffic by demarcating off-limit areas along the dune system. Dune accretion processes on the western end of the beach would be considerable because of the sand-trapping fences and would continue on the eastern end of Fort Tilden where dunes are currently accreting minimally inland of the remaining eastern extent of Shore Road.

While the installation of a clay-shell pathway along the western extent of Fort Tilden where Shore Road was removed by the storm would affect natural sediment pathways and landform generation at the western end of the beach, the excavated materials along the clay-shell pathway would be generally distributed alongside the pathway. The sediment exchange process where the road

previously existed would constrain or form a barrier against dune movement within the beach profile and limit the movement of sediment within the beach profile to the foredunes. Whereas some sediment would be able to move over the path and allow for the exchange of coastal processes between the beach and foredune, the sediment underneath the path would not be available for this exchange. This adverse impact would be minimal because the pathway would be at the same elevation as the existing coastal landscape, and the implementation of erosion control and sediment transport measures would avoid adverse impacts on sand displacement.

Similar to the no-action alternative, the loss of beach on the western end of Fort Tilden Beach may continue.

Cumulative Impacts. By not constructing any significant structures within the coastal zone, reestablishing the natural sediment pathways and landform development would contribute significantly to the beneficial, cumulative impacts on coastal landscape (offshore zone, beach face and surface, and foredunes). Past, present, and reasonably foreseeable actions, including the 2013 Rockaway Beach Restoration project and the 2014 sand replacement project at Jacob Riis Park would result in substantial, beneficial impacts on the coastal landscape in and around the beach face and surface and foredunes as a result of the level of historical and continued sources of sediment transport along the coastal system. When the impacts on natural sediment transport under alternative D are combined with the impacts from past, present, and reasonably foreseeable actions, alternative D would contribute a slight, beneficial increment to the overall substantial, beneficial, cumulative impact of natural sediment transport patterns.

Conclusion. Alternative D would have no adverse impact on nonvegetated tidal wetlands within the study area or on the ecological functions provided by those wetlands. Partial removal of the bulkhead and groins from within the nonvegetated tidal wetland would have a beneficial impact by increasing wetland area and providing continuous wetland habitat, increasing the ecological functions provided by these wetlands, including a beneficial effect on benthic habitat. The increase in wetland area would be small because less than 0.3 acre of structures would be removed from a wetland that encompasses greater than 25 acres. Adverse impacts from the installation of the clay-shell pathway would be minimal because it would be at the same elevation as the existing coastal landscape. Beneficial impacts on beach formation processes would result from the installation of sand-trapping fences because of their potential to accelerate the reestablishment of a stable dune system. Additionally, alternative D would contribute a slight, beneficial increment to cumulative impacts on elements of the coastal landscape.

SPECIAL STATUS SPECIES

Affected Environment

Ocean beaches provide foraging habitat for a variety of migratory birds and nesting habitat for shorebirds. Potential habitat within Fort Tilden Beach consist of the supratidal beach face and the intertidal beach surface and are depicted on figure 3-1. While these habitat types are not considered rare in the region and are found throughout the coast of north Atlantic states, they provide habitat for several protected bird and plant species.

The USFWS official species list (USFWS 2015a) indicates that the following federally threatened and endangered species may occur in the area: piping plover (*Charadrius melodus*—threatened), red knot (*Calidris canutus rufa*—threatened), roseate tern (*Sterna dougallii dougallii*—endangered), and seabeach amaranth (*Amaranthus pumilus*—threatened). Red knots are discussed in chapter 1 as an

issue considered but dismissed from further analysis because they are not likely to occur within the project area.

In addition to the federally listed species above, the NYSDEC Natural Heritage Program (NYSDEC NHP) indicated that the following state listed species have also been documented at or near Fort Tilden: common tern (*Sterna hirundo*—threatened); least tern (*Sternula antillarum*—threatened); peregrine falcon (*Falco peregrinus*—endangered); seabeach knotweed (*Polygonum glaucum*—rare); and Schweinitz’s flatsedge (*Cyperus schweinitzii*—rare) (NYSDEC NHP 2015). Schweinitz’s flatsedge and peregrine falcon are discussed in chapter 1 as an issue considered but dismissed from further analysis because these species are not likely to occur within the action area of the project.

Piping plover, roseate tern, common tern, least tern, seabeach amaranth, and seabeach knotweed are described below based on NYSDEC fact sheets (NYSDEC 2015) and USFWS profiles (USFWS 2015b) unless otherwise noted.

- **Piping plover (*Charadrius melodus*).** The piping plover is a small shorebird that is listed as federally threatened and state endangered. Habitat is only found at the shore, on barrier islands, sandy beaches, and dredged material disposal islands. The piping plover diet consists principally of marine worms, insect larvae, beetles, crustaceans, and mollusks and is obtained by foraging on beaches, dunes, and in tidal wrack. In New York, this species breeds on Long Island’s sandy beaches, from Queens to the Hamptons, in the eastern bays and in the harbors of northern Suffolk County. Piping plovers return to the New York area in early to mid-March and establish nesting territories by early April. By early September, most have departed for their wintering areas. Piping plovers breed on dry sandy beaches with little or no beach grass. Nests are usually placed well above the high tide line on beaches, sand flats, sand spits, and gently sloping dunes. Conservation efforts for the piping plover have included reducing development along beach areas to protect nesting sites from intrusion by fencing, limiting beach access by pets and motor vehicles during nesting and fledgling, and protecting tidal wetlands. Population recovery occurs when human-induced mortality is controlled by limiting disturbance. Piping plovers have been previously documented breeding at Fort Tilden (NYNHP 2015); however, breeding piping plovers are more prevalent in other areas of GATE, such as Breezy Point and Sandy Hook (NPS 2014).
- **Roseate tern (*Sterna dougallii dougallii*).** The roseate tern is a waterbird listed as federally and state endangered. Roseate terns feed primarily on the American sand lance, a small marine fish. Open sandy beaches isolated from human activity are its optimal nesting habitat. In the northeastern U.S., roseate tern nest on beaches, barrier islands, and offshore islands. In New York, this species breeds only at a few Long Island colonies and is always found nesting with common terns. Roseate terns arrive on the breeding grounds in late April or early May and begin nesting one month later. The nest is usually placed in dense grass clumps or even under boulders or rip-rap, and may be only a depression in sand, shell, or gravel and may be lined with bits of grass and other debris. Migration to wintering grounds begins in late summer. Roseate terns are known to forage in the nearshore waters off of Fort Tilden Beach and nest at nearby Breezy Point.
- **Common tern (*Sterna hirundo*).** The common tern is a waterbird listed as state threatened. In New York, common terns nest predominantly on Long Island. From late April to mid-May, common terns return to their northern breeding colonies. These colonies may contain several hundred to several thousand birds, including roseate, least and gull-billed terns, and black skimmers on Long Island. Common terns primarily nest in open areas with loose substrate and scattered vegetation. The nest is a simple scrape built above the high tide line in sand, gravel, shells, or windrowed seaweed and is usually lined with vegetation. Common

terns are known to forage in the nearshore waters off Fort Tilden Beach and nest at nearby Breezy Point.

- **Least tern (*Sternula antillarum*).** The least tern is the smallest American tern and is listed as threatened in New York State. The least tern will occupy the same breeding areas as piping plovers and other shore birds, breeding in colonies of up to 200 birds. This tern arrives in the northern breeding grounds by late April to mid-May, earlier than the other terns. Nests are found on broad, level expanses of open sandy beaches, dredge spoils and gravelly beaches. Since least terns generally need open areas largely free of vegetation, above high water levels, and safe from ground predators, islands are commonly favored where available. Nests are scraped in sand, shell, or gravel and may be sparingly lined with small shells or other debris. In late August or early September, the terns begin their migration to winter grounds. Roseate terns are known to forage in the nearshore waters off Fort Tilden Beach and nest at nearby Breezy Point.
- **Seabeach amaranth (*Amaranthus pumilus*).** Seabeach amaranth is an annual plant that is listed as federally endangered and state threatened. The plant grows on a nearly pure sand substrate above the high tide line and is intolerant of even occasional flooding during its growing season. The habitat of seabeach amaranth is sparsely vegetated with annual herbs and, less commonly, perennial herbs, and scattered shrubs. The plant does not compete well in areas of established growth but will potentially stabilize in disturbed areas. In New York, seabeach amaranth is only known from Long Island, ranging from Coney Island to near the east end of the South Fork along the southern shore. Seabeach amaranth was documented as occurring at Fort Tilden Beach in 2006 (NYNHP 2015). Since Hurricane Sandy, no seabeach amaranth plants have been documented within the project area.
- **Seabeach knotweed (*Polygonum glaucum*).** Seabeach knotweed is a state listed rare annual plant found above the wrack line or high spring zone and seaward of dunes. In New York, seabeach knotweed is known only from maritime beaches and the margins of adjacent dunes and salt marshes. It may be the dominant plant in areas of little or no other vegetation. It grows in open conditions on a variety of substrates, including sand, silt, pebbles or cobbles, and dredging spoils. Seabeach knotweed was documented as occurring at Fort Tilden Beach in 1991 (NYNHP 2015). Since Hurricane Sandy, no seabeach knotweed plants have been documented within the project area.

Approximately 13.9 acres of potentially suitable breeding habitat for piping plover exists where dunes are not present within the beach surface. As mentioned above, piping plovers have been previously documented breeding at Fort Tilden. The US Fish and Wildlife Service indicated that critical habitat for the piping plover does not exist within the study area (USFWS 2015b).

Approximately 46.7 acres of potential foraging habitat for piping plover is available within the study area because piping plover will forage throughout the beach surface, including dunes, and the beach face. During the piping plover nesting season (March 15 to September 15), the National Park Service routes visitors around active nest sites to protect the young birds.

Roseate tern, common tern, and least tern breed in colonies, and islands are most frequently used for breeding. However, the beach surface does provide potentially suitable breeding habitat that these species may use for nesting. Therefore, approximately 13.9 acres of potentially suitable breeding habitat for roseate tern, common tern, and least tern exists where dunes are not present within the beach surface. Roseate tern, common tern, and least tern species would not use the study area for foraging because they feed on small fish in coastal waters.

At Fort Tilden Beach, approximately 13.9 acres of potentially suitable habitat exists for seabeach amaranth and seabeach knotweed where dunes are not present within the beach surface. As noted above, seabeach amaranth and seabeach knotweed were previously documented at Fort Tilden Beach; however, since Hurricane Sandy, neither plant has been documented within the project area.

Fort Tilden does not provide optimal habitat for listed species because the beach is relatively narrow, exposed to frequent human activity, and subject to flooding during storms events.

Environmental Consequences

Methodology and Assumptions

This impact analysis assesses the effects of the alternatives on potential habitat for special status species, including piping plover, roseate tern, common tern, least tern, seabeach amaranth, and seabeach knotweed. To determine impacts, available resource mapping was reviewed and the USFWS Information, Planning, and Conservation System was consulted to identify special status species of plants and animals that may occur within the vicinity of the study area. A review of life history and habitat preferences was conducted for the special status species to assess the potential for these species to occur in the study area and be impacted by the realignment of Shore Road or the addition of a flood-resilient bicycle-pedestrian pathway.

Study Area

The study area for analysis of potential impacts on special status species is limited to the beach face and beach surface where potential suitable habitat for special status species may occur (see figure 3-1). For the purpose of this analysis, the delineated wetland line was used as the boundary between the beach face and the beach surface. Approximately 25.8 acres of beach face and approximately 17.7 acres of beach surface are present within the study area. Approximately 3.8 acres of dune habitat are present within the beach surface.

Impacts of Alternative A: No Action

Analysis. The no-action alternative may result in adverse impacts on potential foraging habitat for the piping plover because the beach may continue to erode during high storm events. Alternative A also may result in adverse impacts on potential breeding habitat for special status bird species, and potential habitat for seabeach amaranth and seabeach knotweed. These potential losses of foraging and breeding habitat for special status species would be small in relationship to potential habitat within Fort Tilden Beach and ocean beaches along nearby portions of the shore. Current practices on the beach cause sand to accumulate in sand fences. Frequent human activity may disturb species if people or vehicles accidentally step on or crush nests or plants, and pets may harass or kill birds. Frequent activity may cause birds to avoid foraging within the study area or to abandon their nests, exposing eggs or chicks to the hot sun and predators. Interruptions to feeding as a result of disturbance may stress juvenile birds during critical periods in their life cycle. These impacts would be minimized because seasonal access restrictions would be employed that would route visitors around areas occupied by nests or special status plant species.

Cumulative Impacts. While the Rockaway Beach Restoration and Jacob Riis Park beach fill projects may increase potential habitat for special status species, such habitat would not be proximate to Fort Tilden. Under alternative A the current area of beach face and beach surface would not change; however, potential habitat may be adversely affected by current practices on the beach that could cause sand to accumulate in sand fences. Therefore this alternative would have an imperceptible contribution to cumulative impacts on special status species.

Conclusion. Over time, under Alternative A, erosion may result in the minimal loss of potential beach face foraging habitat for piping plover. Accumulation of sand in sand-trapping fences over time may result in adverse impacts on piping plover, roseate tern, common tern, least tern, seabeach amaranth, and seabeach knotweed as a result of a loss of potential beach surface habitat. However, these impacts would be minimal relative to the available potential habitat within Fort Tilden Beach and ocean beaches along nearby portions of the shore. Therefore, alternative A may affect, but is not likely to adversely affect piping plover, roseate tern, common tern, least tern, seabeach amaranth, and seabeach knotweed. In addition, alternative A would have an imperceptible contribution to cumulative impacts on special status species.

Impacts of Alternative B

Analysis. Removal of the bulkhead and wooden groins would have a beneficial impact on potential beach face foraging habitat as a result of the increase in amount of continuous intertidal beach available to foraging piping plovers. Alternative B may result in adverse impacts on potential foraging habitat for piping plover if the beach continues to erode during high storm events.

The removal of the remaining eastern extent of Shore Road would increase the amount of available beach surface habitat by approximately 1.19 acres, resulting in a beneficial impact on piping plover, roseate tern, common tern, and least tern by providing additional potential habitat for breeding, as well as additional potential areas for the colonization of seabeach amaranth and seabeach knotweed. Alternative B may reduce human disturbance to species and habitat by limiting use in the former area of Shore Road and reducing associated visitor use levels. Beach access would be limited to foot traffic through sand from the parking areas. Seasonal access restrictions would route visitor traffic around any potential breeding bird habitat or established seabeach amaranth or seabeach knotweed, while seasonal work restrictions would avoid adverse impacts on special status species and their available potential habitat during construction.

Cumulative Impacts. The Rockaway Beach Restoration and Jacob Riis Park beach fill projects may increase potential habitat for special status species, but such habitat would not be proximate to Fort Tilden. Because alternative B would increase the amount of potential beach surface habitat available by approximately 1.19 acres, and considering the overall amount of potential beach surface and beach face available within the study area and adjacent beaches, this alternative would have an imperceptible contribution to cumulative impacts on special status species.

Conclusion. Alternative B may result in adverse impacts on potential foraging habitat for piping plover if the beach face continues to erode during high storm events. However, this impact would be minimal relative to the amount of potential foraging habitat available within the study area and within adjacent ocean beaches. The current area of potential beach face foraging habitat would increase as a result of alternative B and have a beneficial impact on piping plover foraging habitat. Alternative B also would increase the amount of potential available beach surface habitat by approximately 1.19 acres, resulting in a beneficial impact on piping plover, roseate tern, least tern, seabeach amaranth, and seabeach knotweed. These increases in potential habitat are small in relationship to potential habitat within Fort Tilden Beach and ocean beaches along nearby portions of the shore. In addition, seasonal access restrictions would protect breeding birds or established seabeach amaranth or seabeach knotweed from visitor disturbance, while seasonal work restrictions would avoid impacts on special status species and their available habitat during construction. Therefore, alternative B would have no effect on seabeach amaranth, seabeach knotweed, roseate tern, common tern, and least tern and may affect, but is not likely to adversely affect potential piping

plover foraging habitat. In addition, alternative B would result in imperceptible, cumulative impacts on special status species.

Impacts of Alternative C

Analysis. Alternative C would result in the loss of approximately 0.02 acre of potential beach face foraging habitat and approximately 1.32 acres of potential beach surface habitat as a result of the placement of the vegetated revetment. The loss of approximately 0.02 acre of potential foraging habitat would be small in relationship to the approximately 25 acres of foraging habitat that would remain within the project area. The loss of approximately 1.32 acres of beach surface habitat would be small in relationship to the beach surface habitat that would still encompass greater than 16 acres within the project area. Additionally, while the affected potential beach surface habitat may be suitable for the breeding piping plover, roseate tern, common tern, least tern, seabeach amaranth, and seabeach knotweed, these breeding special status bird species and listed plants have not been documented within the footprints of the proposed revetment and elevated pathway, so the loss of this potentially suitable habitat would be considered a minimal impact.

The removal of the remaining eastern extent of Shore Road would increase the amount of potential beach surface habitat available for nesting piping plover, roseate tern, common tern, and least tern, and potential habitat for seabeach amaranth and seabeach knotweed by approximately 1.19 acres. Construction of the elevated path would minimize direct human disturbance to the beach surface/dune habitat.

Alternative C would provide visitor access along the entire stretch of the beach, increasing the potential for human disturbance of species and their potential habitats. Seasonal access restrictions would protect breeding special status bird species and established seabeach amaranth or seabeach knotweed.

Seasonal work restrictions would avoid adverse impacts on special status species and their available potential habitat during construction. Therefore, alternative C may affect, but is not likely to adversely affect special status species.

Cumulative Impacts. The Rockaway Beach Restoration and Jacob Riis Park beach fill projects may increase potential habitat for special status species, but such habitat would not be proximate to Fort Tilden. Because alternative C would reduce potential beach face habitat by approximately 0.02 acre and potential beach surface habitat by approximately 0.13 acre, and considering the overall amount of potential beach surface and beach face available within the study area and adjacent beaches, this alternative would result in an imperceptible contribution to cumulative impacts on special status species.

Conclusion. Alternative C would result in an adverse impact on potential beach face foraging habitat for piping plover. The loss of approximately 0.02 acre of potential beach face habitat would have a minimal impact relative to the amount of potential beach face habitat present within the study area and nearby beaches. The loss of approximately 1.32 acres of potential beach surface habitat as a result of the placement of the vegetated revetment would have a minimal impact on potential breeding habitat for piping plover, roseate tern, common tern, and least tern, and potential habitat for seabeach amaranth and seabeach knotweed because none of these species have been documented in the area of impact. Additionally, the removal of the remaining eastern extent of Shore Road would increase the amount of potential beach surface habitat available by approximately 1.19 acres. Alternative C would increase the potential for human disturbance of species and their potential habitats. Seasonal access restrictions would protect breeding special status bird species or

established seabeach amaranth or seabeach knotweed, while seasonal work restrictions would avoid adverse impacts on special status species and their available potential habitat during construction. Therefore, alternative C may affect, but is not likely to adversely affect piping plover, roseate tern, common tern, least tern, seabeach amaranth, or seabeach knotweed. In addition, alternative C would result in imperceptible, cumulative impacts on special status species.

Impacts of Alternative D

Analysis. Removal of the bulkhead and wooden groins would have a beneficial impact on potential beach face foraging habitat as a result of the increase in amount of continuous intertidal beach available to foraging shorebirds. This increase would be minimal relative to the amount of potential foraging habitat available within the study area and within adjacent ocean beaches. Sand would fill in the excavated bulkhead and groin footprints, and natural gradients would be restored.

Construction of the shell aggregate pathway would result in the loss of approximately 0.50 acre of potential beach surface habitat. The loss of approximately 0.50 acre of beach surface is small in relation to the greater than 17 acres of potential beach surface habitat that would remain within the project area. Additionally, breeding special status bird species, seabeach amaranth, and seabeach knotweed have not been documented within the footprint of the shell aggregate pathway, so this change would have a minimal impact because of the loss of this potentially suitable habitat. During construction, excavated materials along the shell aggregate pathway would generally be distributed adjacent to of the pathway. Material would be initially placed above the high tide elevation and small amounts may spread into the intertidal zone during low tide. Implementation of erosion control and sediment transport measures would minimize potential impacts. Because the shell aggregate pathway would be a permeable surface that would allow water to infiltrate beneath the path, adjacent vegetated areas of the dunes would not be affected if rhizomes extend beneath the footprint of the pathway.

Alternative D may increase visitor use, likely similar to pre-Hurricane Sandy levels. Potential disturbance to special status species and their potential habitat would be minimized by seasonal access restrictions that would protect breeding birds or established seabeach amaranth or seabeach knotweed. Demarcation of new pedestrian beach access paths using sand-trapping fences would prevent disturbance of newly established dune habitat. Seasonal work restrictions would avoid direct, adverse impacts on special status species and their available potential habitat during construction.

Cumulative Impacts. The Rockaway Beach Restoration and Jacob Riis Park Sand Replacement projects may increase potential habitat for special status species, but such habitat would not be proximate to Fort Tilden. Because alternative D would reduce potential beach surface habitat by approximately 0.5 acre, and considering the overall amount of potential beach surface and beach face habitat available within the study area and adjacent beaches, this alternative would result in an imperceptible contribution to cumulative impacts on special status species.

Conclusion. Alternative D would result in adverse impacts on potential beach surface habitat; however, the loss of approximately 0.5 acre as a result of the placement of the clay-shell pathway would be minimal because breeding piping plover, roseate tern, common tern, least tern, seabeach amaranth, and seabeach knotweed have not been previously documented in the impact area. Additionally, similar potential habitat will available in the study area and in adjacent ocean beaches. Implementation of erosion control and sediment transport measures during construction would minimize potential impacts. Alternative D would increase the potential for human disturbance of species and their potential habitats. Seasonal access restrictions would protect breeding special

status bird species and established seabeach amaranth and seabeach knotweed from visitor disturbance, while seasonal work restrictions would avoid impacts on special status species and their available potential habitat during construction. Alternative D would result in beneficial impacts on potential beach face habitat for foraging piping plover. Therefore, alternative D may affect, but is not likely to adversely affect piping plover, roseate tern, common tern, least tern, seabeach amaranth, or seabeach knotweed. In addition, alternative D would result in imperceptible, cumulative impacts on special status species.

HISTORIC DISTRICTS

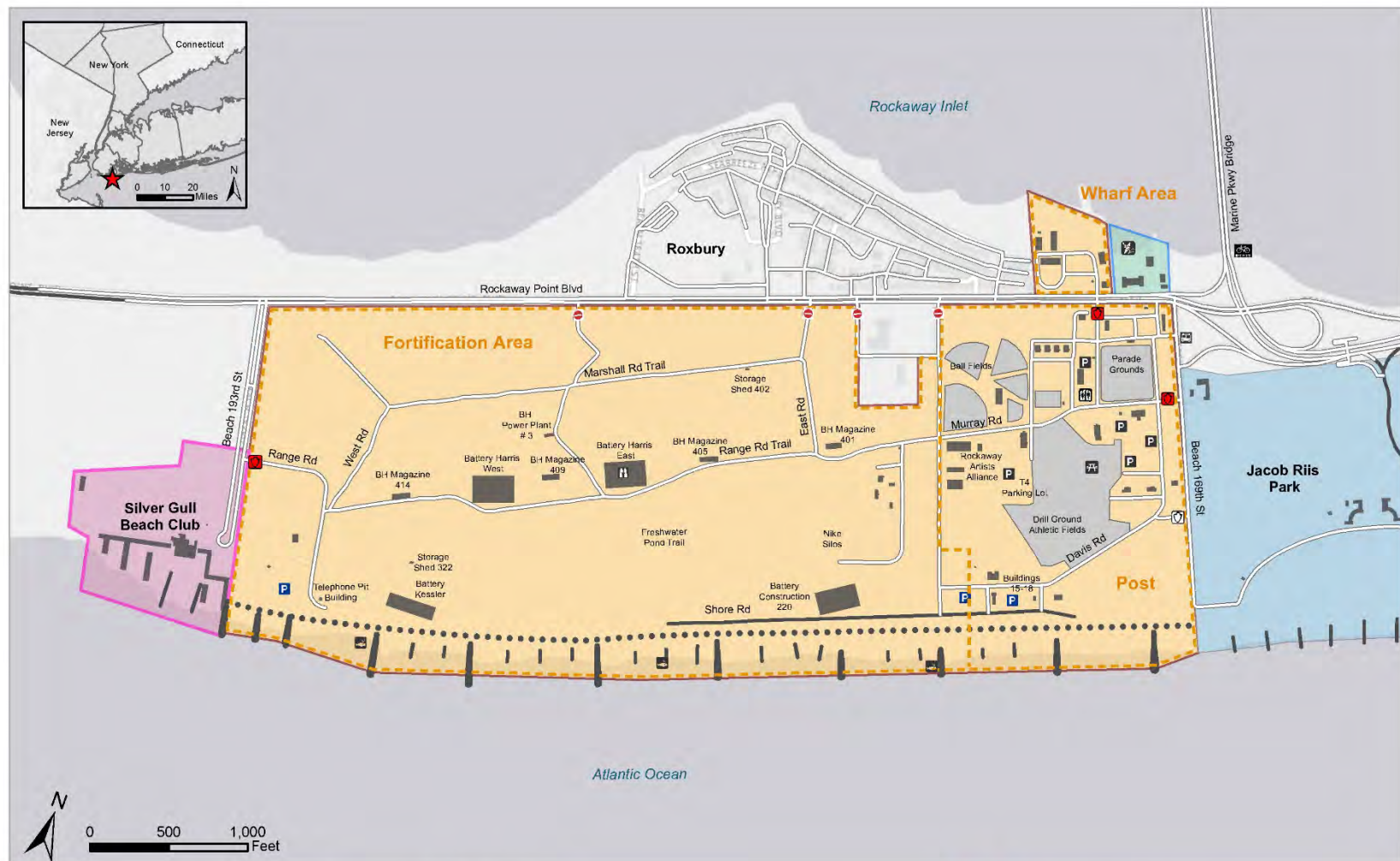
Affected Environment

The Fort Tilden Historic District (figure 3-6) encompasses the project area. The historic resources of Fort Tilden extend across the coastal landscape from the beach face and surface (bulkhead, wooden groins, and Shore Road) to the edge of the foredune (Battery Kessler) to the upland areas containing Battery Harris and the former post buildings and most of the contributing resources in the district (figure 3-1).

A portion of the current Fort Tilden Historic District was first listed on the National Register in 1984 under criterion A for its association with the defense of New York Harbor. The site was deemed significant as an illustration of the technical improvements in coastal artillery post-World War I and a physical manifestation of the complex organization of harbor defenses through World War II. Its boundaries were expanded as the result of a 2009 Determination of Eligibility (Department of the Interior 2009). It identified the entire area under NPS control “including such historic features as roads, circulation patterns, overall plan, waterfront ruins, shoreline beach groins” as contributing elements of a district significant as an integrated 20th-century coastal defense installation under Criterion A.” The Nike missile facilities, then less than 50 years old, were considered eligible under criterion exception G because the missile facilities contribute to a fuller understanding of the “ongoing significance of Fort Tilden as a 20th-century coastal military installation, as well as part of a larger coastal defense system operated well into the 1960s” (Department of the Interior 2009).

Beginning in World War I, Fort Tilden was an integral part of the US Army strategy to protect New York Harbor from sea and air attacks. Through World War II, its gun batteries were used in coordination with three others as part of the Harbor Defense Command of Eastern New York. The guns were removed after World War II when surface ships were no longer considered a threat to New York Harbor. During the Cold War, the major threat to the harbor was from the air; therefore, the fort was repurposed as a Nike missile anti-aircraft site.

Planned in 1917 and initially installed in 1920, the 16-inch guns of Battery Harris (guns were casemated in 1941–1943 and removed in 1948), in conjunction with similarly large guns on Fort Wadsworth on Staten Island and Fort Hancock on Sandy Hook in New Jersey, were the outer defenses of New York Harbor from 1920–1948. Smaller 5- and 6-inch guns, also removed around 1948, were emplaced in 1917 in two batteries near the shore (Batteries Kessler and 220) to fire on smaller targets that could sail closer to the shore and were at too close for the larger guns. Additionally, electric mines blocking approaches to the harbor were controlled from Fort Tilden, and anti-aircraft batteries were dispersed around the site. Toward the end of World War II, radar was installed at Fort Tilden, which then served as the Harbor Entry Command Post to monitor ship traffic in and out of New York Harbor. As the Cold War progressed, heavily-gunned capital ships were no longer considered threats, especially from the Soviets, whose navy had focused on



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|--|-------------------|---|
| Park Entrance | Observation Deck | Existing Roads |
| NPS Personnel Access | Restrooms | Fort Tilden Historic District |
| No Access | Kayak Launch Site | Areas within the Fort Tilden Historic District |
| Picnic Area | Bike Route | Silver Gull Beach Club Historic District |
| Fishing | Bus Stop | U.S. Coast Guard Far Rockaway Historic District |
| Fishermen's Parking (By Permit Only) | Existing Bulkhead | Jacob Riis District District |
| Organized Community Use Parking (By Permit Only) | Stone Groin | Non Contributing Structure |
| | Timber Groin | Contributing Structure |

Sources: New York State Cultural Resource Information System; Salvick, C. and J. Auerwaerter 2013; National Parks Service GIS; New York City Department of City Planning; ESRI World Gray Imagery



Gateway National Recreation Area

Fort Tilden Shore Road
Shoreline Resiliency

Historic District

FIGURE 3-6: HISTORIC DISTRICTS

submarine technology and construction. The new threat to the United States was the Soviets' heavy bombers, which could deliver atomic bombs to the continental United States. In response, the US Army developed a nuclear tipped anti-aircraft missile that could intercept the enemy at long range and high altitudes. Batteries of these missiles along with radar guidance and tracking facilities, assembly buildings, launch pad, and silos were installed throughout greater New York, including Fort Tilden. Given Fort Tilden's long history as part New York Harbor's defense system, its major fortifications were nominated to the National Register as soon as they reached 50 years of age.

The initial nomination for Fort Tilden in 1984 focused on the important structures built from 1917 to 1945, including the massive casemates that once housed 16-inch guns, the batteries with smaller caliber guns (6-inch), as well as magazines, communications infrastructure, a power house, and a few support buildings. The initial National Register boundary covered the fortification area only and did not include the Nike missile site or the supporting buildings, the wharf area, or post proper. Its southern boundary was Shore Road.

The area outside the original National Register boundaries was subsequently reevaluated. The district boundaries were expanded to their current extent in 2009 through a Determination of Eligibility by the Keeper of the National Register (Department of the Interior 2009). The expanded boundary included all of the Fort Tilden property then administered by the National Park Service. The Determination of Eligibility stated that in addition to the resources already listed in the prior nomination, the new district included "surviving features and fabric associated with the district's utilization as a Cold War-era base for both Nike-AJAX and Nike Hercules missile." It expanded the number of contributing buildings to include all those within the boundaries of the original Fort Tilden property with the exception of the area around Buildings 415 and 416; this area was still in use as an Army Reserve Center. This decision was justified by the statement: "the vast majority of surviving historic buildings and structures located in the property's post and wharf areas (including such historic features and roads, circulation patterns, overall plan, waterfront ruins, and bulkhead and groin system) retain sufficient integrity as a whole to contribute to the district's significance as an integrated 20th-century coastal defense installation under Criterion A" (Department of the Interior 2009). Except Buildings 15–18, all of the buildings that would potentially be affected by the alternatives were specifically identified as contributing structures in the 1984 National Register nomination, while Buildings 15–18 are included in the 2009 Determination of Eligibility.

The eight structures or buildings that the action alternatives would directly affect contribute to the significance of the historic district. With the exception of Buildings 15–18 and the bulkhead and wooden groin system, all of the structures and roads that would be affected by the action alternatives were included in the original nomination and are major resources in the historic district. All of the batteries and the Nike missile site have been identified as fundamental resources of the park (NPS 2014). Shore Road, the bulkhead and wooden groin system, Battery Kessler, the Telephone Pit Building, and Buildings 15–18 are described below.

- **Shore Road (1940).** In the 2009, the Keeper of the National Register determined that the surviving features, including roads, "retain sufficient integrity as a whole to contribute to the Fort Tilden Historic District's significance as an integrated 20th-century coastal defense installation under Criterion A" (Department of the Interior 2009; Selvek and Auwaerter 2013). Shore Road was one of the major roads crossing Fort Tilden from east to west. As the southern boundary of the 1984 nomination, Shore Road allowed access across the southern perimeter of the post and was used, among other things, to provide materials to the secondary batteries (Battery Kessler and Construction 220), which were close to the shore. However, as a result of Hurricane Sandy, the western extent of the road was destroyed and subsequently removed, but the eastern extent remains intact. Despite the losses of original

material, the New York State Historic Preservation Officer determined that the road retains sufficient integrity as a contributing resource in the Fort Tilden Historic District (OPRHP 2015).

- **Range Road (1940).** Range Road was installed as part of the US Army's pre-World War II improvements at Fort Tilden. This historic circulation system created a loop road enclosing Battery Harris, the magazines, and power plants and served to supplement the use of standard gauge rail line at Fort Tilden. The road has served as the primary east-west route through the center of Fort Tilden (Selvek and Auwaerter 2013), and it contributes to the Fort Tilden Historic District's significance as an integrated 20th-century coastal defense installation under criterion A (Department of the Interior 2009). While the single-lane road was originally paved in concrete, it was subsequently resurfaced in asphalt during the Cold War era. Nonetheless, it does maintain its general layout within the pre-World War II circulation system.
- **Bulkhead and Wooden Groin System (1917).** The bulkhead and wooden groin system runs the length of the Fort Tilden Historic District beachfront but does not extend into either of the adjoining Jacob Riis Park or the Silver Gull Beach Club Historic Districts. The bulkhead and wooden groin system along the Atlantic Ocean beachfront contributes to the historic district as a significant component of the shoreline stabilization efforts at Fort Tilden, preventing sand shifts or losses that would jeopardize the stability of the fortifications and other structures along the shore. In the 2009 Determination of Eligibility, it was specifically cited as a contributing resource in the district (Department of the Interior 2009) and its eligibility was confirmed by the New York State Historic Preservation Officer in January 2015 (OPRHP 2015). Formerly covered by beach sands, Hurricane Sandy exposed the historic bulkhead and wooden groin system, which contains deteriorated timbers suspended in sand. Although upon investigation it was found to be structurally and functionally obsolete and poses a risk to public safety (Louis Berger 2015b), the system is a contributing resource to the historic district. .
- **Battery Kessler (1917, improved 1943).** Battery Kessler (Building 321), originally known as Battery West from 1917 until 1939, consists of an earthen-covered concrete bunker, concrete walkways, and concrete gun platforms (one of which remains concealed beneath the sand). Battery Kessler is categorized in the stabilize band as described in the general management plan for the GATE. The gun platform/foundation and the magazine of Battery Kessler are remaining components of the World War I batteries built for the defense of New York Harbor. These large structures are typical of those used for 5- and 6-inch harbor guns, and the magazine bunker is typical of those constructed at the end of World War I and improved during World War II. These gun foundations (one is still buried) and the magazine contribute to the district because they convey the sense of the extensive nature of military development and occupation in the fortification area. They are surviving elements of the secondary batteries and essential components of a coastal artillery installation. Battery Kessler, and earthen scarp, was undercut by Hurricane Sandy and is decaying; it is marked by graffiti and overgrown with vegetation.
- **Buildings 15–18 (1937–1945).** Buildings 15–18 were part of a semi-permanent training camp located in the southeastern corner of the post along Davis Road. These deteriorating structures were constructed during the World War II era and consist of the former Enlisted Men's Mess (Building 15), the former Officers' Mess (Building 16), the former Officers' Latrine (Building 17), and the former Officers' Bath House (Building 18). These buildings are in the ruin band as described in the general management plan for the GATE, Buildings 15 and 17 are in poor condition, while Buildings 16 and 18 are extensively deteriorated, and all four

buildings pose a risk to public safety (NPS 2014; Ammann & Whitney 2015). They remain contributing structures in the historic district.

- **Telephone Pit Building (1942).** The Telephone Pit/Cable Hut “R” (Building 323) served as part of the underwater defenses against submarines and warships implemented prior to World War II in the defense of New York Harbor. Used as part of the ranging system to guide, direct, and coordinate the aim of all of New York Harbor’s defensive guns as well as for mine detonation, the Telephone Pit Building is a typical element in the landscape of a harbor defense facility. Although the communications system existed before 1942, this building was built as part of the upgrades to Fort Tilden’s defenses and was partially buried. The pit appears not to have any substantial foundations, and Hurricane Sandy exposed and tilted the structure but did not relocate it (Louis Berger 2014).

Although the action alternatives occur within the Fort Tilden Historic District, the district is adjacent to Jacob Riis Park on the east and to the west by the Silver Gull Beach Club, either listed on the National Register (Jacob Riis Park) or determined eligible as a district (Silver Gull Beach Club). Jacob Riis Park just west of Beach 169th Street was initially listed on the National Register in 1981, and expanded in 1985, for its contributions to entertainment/recreation, architecture, and landscape architecture. Two buildings that are listed as contributing to the significance of the Jacob Riis Park Historic District, Buildings 601A and 601B, are located just across Beach 169th Street from the Fort Tilden Historic District. The Silver Gull Beach Club was listed on the National Register in 2011 as significant under criteria A and C in the areas of entertainment, recreation, social history, community planning and development, and architecture. The period of significance for the district is 1962–1963 spanning the time of its design, construction, and inaugural opening. The club includes a large clubhouse, four court buildings containing cabanas, a pool court, an activity building, and recreational facilities as contributing elements.

The area that would be affected by the proposed alternatives is composed of beach sand and was used for Fort Tilden’s military-related activities. If archeological resources are found in this area, these resources are expected to be associated with the military occupation at Fort Tilden. Furthermore, review of known archeological resources indicates that there are no known Archeological Site Management Information System sites beyond those already identified in the impact area.

Environmental Consequences

Methodology and Assumptions

This analysis assesses the impacts of the alternatives on individual National Register-eligible contributing resources of the Fort Tilden Historic District (i.e., Shore Road, the bulkhead and wooden groin system, Battery Kessler, Buildings 15–18, and the Telephone Pit Building) and on the Fort Tilden Historic District overall. Impact determinations are in part guided by the criteria of adverse effect on historic properties, as defined by the National Historic Preservation Act, as found in 36 CFR 800.5. As part of the general management plan for the GATE, historic buildings and structures were classified in bands. To guide general management plan decisions, a prioritized list of resources was developed to inform future preservation efforts, funding, maintenance and business leasing efforts. Using a variety of information sources, a group of park and NPS staff with expertise in history, historic architecture, conservation, cultural landscapes and business services created a process to evaluate more than 330 structures and associated landscapes that are contributing resources to the park’s nine National Register districts. Eight factors were used to evaluate and prioritize the park’s resources. Numerical points were assigned to each criterion and totaled for a

score. Depending on that score, each resource was placed in one of three bands: preserve, stabilize, or ruin (NPS 2014). They are defined as follows:

- **Preserve.** Actions would be taken to maintain and preserve these structures. Efforts would be made to maintain these structures in their current condition or move these structures into good condition through preservation or rehabilitation by the National Park Service or partners. These structures would be used for operations, visitor services, and interpretation. These structures would be used to support visitor programs, interpretation, operations and appropriate commercial uses.
- **Stabilize.** Structures where actions would be taken to render an unsafe, damaged, or deteriorated property stable, while retaining its present form. Minimal efforts would be made to maintain the structure in its current condition. Unless a use and/or funding is found, the structure may fall into disrepair.
- **Ruin.** Structures are in poor condition where one or more of the basic structural elements has been lost and due to this condition are without viable reuse options. Resources may be removed or fenced off to keep from being a safety hazard; no work will be done to better the condition of the resource (GMP/EIS: 65). The structures in very poor condition that the NPS has placed in the ruin band would remain as ruins and continue to decay naturally by the forces of nature. . . Gateway would prioritize documentation of these structures and, in some cases, use interpretive media to convey information about their significance and former use (NPS 2014).

Study Area

As noted above, the Fort Tilden Historic District is abutted both east and west by National Register-eligible or listed properties. To the west is the National Register-eligible Silver Gull Beach Club and to the east are the maintenance buildings and the golf course of the National Register-listed Jacob Riis Park. Consequently, the study area includes the Fort Tilden Historic District, the Silver Gull Beach Club Historic District, and a portion of the golf course and maintenance facilities in the Jacob Riis Park Historic District.

Impacts of Alternative A: No Action

Under the no-action alternative, the remaining eastern extent of Shore Road would not change. The bulkhead and wooden groin system, Battery Kessler, Buildings 15–18, and the Telephone Pit Building would remain, and the deterioration of these contributing structures would continue. Aboveground, with the exception of the massive structure of the gun platform of Battery Kessler, these contributing resources would structurally decay and likely slowly collapse, diminishing the Fort Tilden Historic District, unless uses and funding are found.

Cumulative Impacts. One of the possible outcomes from the general management plan is for historic structures in the ruin band to decay naturally or be demolished. Over time, this would result in an adverse effect on the Fort Tilden Historic District. Alternative A would allow buildings to continue to decay, including Buildings 15–18 and the Telephone Pit Building in the ruin band, resulting in an imperceptible, adverse contribution to cumulative effects.

Conclusion. While no immediate changes would result under alternative A, existing conditions would persist, and over time, noticeable, adverse impacts would occur from continued natural decay and ultimate collapse of aboveground features. In addition, alternative A would have an imperceptible, adverse contribution to cumulative impacts by allowing contributing resources in the historic district to continue to decay.

Impacts of Alternative B

Analysis. Removal of the undamaged eastern portion of Shore Road, the bulkhead and wooden groin system, and Buildings 15–18 would noticeably diminish the character of the historic district by removing these features that have been identified as contributing structures to the historic district. The removal of Shore Road would alter the historic circulation system that connected buildings and batteries within the historic district. The removal of the Telephone Pit Building would result in an adverse impact on the historic district because the Telephone Pit has been identified as a likely rare survivor from a coastal artillery installation. The integration of Battery Kessler into the foredune system would obscure its role as a visible feature of the historic landscape. Improving the surface of Range Road for bike and pedestrian use would provide a slight benefit to the historic resource by preserving its historic use as part of the circulation system. Dune accretion may provide some slight protection of the remaining historic resources.

Based on the results of previous investigations, the removal of the bulkhead is unlikely to harm other archeological resources. There is the possibility that the remains of underground cabling in the vicinity of the Telephone Pit Building as archeological evidence of the building's former military use may be disturbed by the building's removal. There is also the potential for limited impacts on previously unknown archeological resources near Buildings 15–18. Archeological evidence associated with the use of these buildings is most likely to be represented by refuse deposits located near the doorways.

Cumulative Impacts. In 2013, following Hurricane Sandy, the National Park Service removed the damaged former western extent of Shore Road and the loose fabric and hazards associated with the partially exposed bulkhead. When combined with these past projects, alternative B would have noticeable, adverse cumulative impacts because it would result in the complete loss of Shore Road and the bulkhead and wooden groin system. It also would negatively contribute to cumulative impacts through the adverse impact on the historic district resulting from the loss of the Telephone Pit and Buildings 15–18, as well as the burial of a fundamental historic feature of the historic district.

Conclusion. Alternative B would adversely affect aboveground contributing resources and have a noticeable, adverse impact on the historic character of the Fort Tilden Historic District because the complete removal of the bulkhead and wooden groins, Shore Road, and Buildings 15–18, as well as the burial of Battery Kessler, would remove or obscure contributing resources to the historic district. Alternative B could have a potential impact on unknown archeological resources associated with the Telephone Pit Building and Buildings 15–18. However, all these impacts are expected to be moderate in nature because Shore Road, the bulkhead, groins, and Buildings 15-18 are not either fundamental resources for the park or among the most significant elements of the historic district (i.e., the batteries and Nike site). The Telephone Pit Building, while associated with the more important contributing resources, is not vital to understanding the role of the fort in history or the batteries' function. While this alternative would bury Battery Kessler, a fundamental resource, and obscure its place in the cultural landscape, the resource itself would be preserved. The adverse impacts of alternative B would have a noticeable contribution to cumulative impacts on the historic district.

Impacts of Alternative C

Analysis. Removing the undamaged eastern portion of Shore Road would result in the complete loss of this contributing resource. Not only would the surviving portions of Shore Road be removed but also the rectilinear resource would be replaced with an elevated, meandering pathway and would not reflect the character of the historic circulation system or provide an in-kind feature. The partial removal of the bulkhead and full removal of the wooden groins would remove those resources from the historic district, although the remaining portions of the bulkhead would still serve to mark its

location as an archeological resource. The beneficial impacts related to the improvement of Range Road, as well as the adverse impact on the historic district related to the removal of Buildings 15–18 and the Telephone Pit Building, would be the same as those described for alternative B. While the elevated pathway would connect to the boardwalk at Jacob Riis Park, it would not affect the Jacob Riis Park Historic District because it would connect to the existing boardwalk and would not prevent access to either historic district. However, most of the fundamental resources would remain untouched, including Battery Harris and the Nike site, and Battery Kessler would remain as a visible element of the cultural landscape. As noted in the “Coastal Landscape” section, the partially vegetated revetment included in this alternative would hinder natural beach formation processes at the western end of the beach, which could increase the vulnerability of the Silver Gull Beach Club Historic District.

Cumulative Impacts. Alternative C would have a noticeable contribution to cumulative impacts on the historic district when combined with the 2013 removal of the destroyed western extent of Shore Road and the loose fabric and hazards associated with the partially exposed bulkhead because it would remove the remaining eastern extent of Shore Road, all of the aboveground portion of the bulkhead and the wooden groins, and five other buildings, and the new elevated pathway would not follow the same pattern as Shore Road. The cumulative impacts of this alternative when combined with the recommendations in the general management plan would be the same as those described for alternative B.

Conclusion. Under alternative C, noticeable, adverse impacts on aboveground contributing resources would occur because of the complete removal of the Telephone Pit Building, Buildings 15–18, and the eastern extent of Shore Road and the partial removal of the bulkhead. The introduction of an elevated pathway would alter the character of the southern portion of the historic district by changing the alignment of the historic circulation function provided by the former Shore Road and introducing an element whose design is incompatible with the character of the fortification section of the historic district. Similar to alternative B, all these impacts are expected to be moderate in nature because Shore Road, the bulkhead, groins, and Buildings 15–18 are not either fundamental resources for the park or among the most significant elements of the historic district (i.e., the batteries and Nike site). The Telephone Pit Building, while associated with the more important contributing resources, is not vital to understanding the role of the fort in history or the batteries’ function. This alternative, unlike alternative B, would keep Battery Kessler, a fundamental resource for the park, as a visible element in the historic district. Potential adverse impacts to unknown archeological resources associated with the Telephone Pit Building and Buildings 15–18 would be the same as those described for alternative B. In addition, alternative C would have a noticeable contribution to cumulative impacts on the historic district.

Impacts of Alternative D

Analysis. Impacts related to the complete removal of the wooden groins would be the same as those described for alternative B, while the impacts associated with the partial removal of the bulkhead to below grade would be the same as those described for alternative C. The beneficial impacts related to the improvement of Range Road, as well as the limited adverse impact on the historic district related to the removal of Buildings 15–18 and the Telephone Pit Building would be the same as those described for alternative B. The introduction of a new clay-shell pathway near Battery Kessler would introduce a new feature into the historic district; however, it would be in the same footprint as the destroyed western extent of the historic Shore Road and would exhibit integrity of location and association of the former road as part of the historic district. Battery Kessler would remain a visible element of the historic landscape, and securing the entrances would reduce the potential for damage

from vandalism. The potential for accelerated dune accretion as a result of sand-trapping fences may result in a slight protection of the remaining historic resources.

Cumulative Impacts. Alternative D would have a noticeable contribution to cumulative impacts when combined with the 2013 removal of loose fabric and hazards associated with the partially exposed bulkhead because it would remove the aboveground portion of the remaining bulkhead and all of the wooden groins, as well as the five additional buildings. The cumulative impacts of this alternative when combined with the recommendations in general management plan would be the same as those described under alternative B.

Conclusion. Alternative D would adversely affect aboveground contributing resources in the Fort Tilden Historic District because it would partially remove the bulkhead system and completely remove the wooden groins, Buildings 15–18, and the Telephone Pit Building—all contributing features of the historic district. Similar to alternative B, all these impacts are expected to be moderate in nature because the bulkhead, groins, and Buildings 15–18 are not either fundamental resources for the park or among the most significant elements of the historic district (i.e., the batteries and Nike site). The Telephone Pit Building, while associated with the more important contributing resources, is not vital to understanding the role of the fort in history or the batteries' function. This alternative, unlike alternative B, would keep Battery Kessler, a fundamental resource for the park, as a visible element in the historic district and would reduce the likelihood of damage from vandalism. While the western extent of Shore Road would not be restored to its pre-storm condition, the installation of the clay-shell pathway would memorialize its location and role as an element of the circulation system. The remaining fundamental resources would remain untouched, including Battery Harris and the Nike site. Potential adverse impacts on unknown archeological resources associated the Telephone Pit Building and Buildings 15–18 would be the same as those described for alternatives B and C. In addition, alternative D would have a noticeable contribution to cumulative impacts on the historic districts.

VISITOR USE AND EXPERIENCE

Affected Environment

Fort Tilden offers a sharp contrast to the nearby metropolitan area with abundant opportunities for visitors to experience natural and historic settings. Natural areas; water, beaches, and coastal views; historic coastal defenses; and maritime structures combine to create rich and varied visitor experiences in the study area. The park's trails and natural areas invite self-guided exploration and discovery of the habitats and historic resources, whereas the beach presents opportunities for relaxation and retreat from the more congested urban environs that surround the park.

The general management plan designates management zones throughout the park; these zones are descriptions of desired conditions for park resources and visitor experience in different areas of the park. Within Fort Tilden, management zones include recreation, natural, historic, developed, and marine. The selected management plan alternative, "Discovering Gateway," designates the study area within Fort Tilden as a natural zone. A natural zone is defined as open, undeveloped area managed to preserve natural resources while allowing for the enjoyment of the outdoors and nature; where programs and facilities would facilitate nature study, interpretation, and other passive activities; a place where visitors would enjoy the quiet, solitude, and sense of connection inspired by the natural world; and where low-impact visitor uses are recommended. The general management plan recommends that the unguarded beach at Fort Tilden offer a natural coastal experience more than other Gateway beaches, and that "appropriate access points and visitor amenities would be developed to support increased beach use (NPS 2014).

Visitor vehicular access to Fort Tilden Beach is limited to parking areas at Fisherman's Parking to the west and the T4 parking lot and Fisherman's Parking near Buildings 15–18 to the east; visitor vehicles are prohibited on the beach. Parking in these lots requires a NPS-issued Fishing-Parking permit, good for one calendar year. The remaining eastern extent of Shore Road is the primary walking/bicycling access to the beach, but is located in a special flood hazard area and is at risk for damage from inundation, wave action, and high winds during a future storm event. Hurricane Sandy destroyed the western extent of Shore Road, thereby limiting pedestrian access and access for mobility-impaired visitors and removing previously continuous bicycle access along the beach.

The hurricane also created suitable habitat for piping plover, as discussed in "Special Status Species." During the piping plover nesting season (March 15 to September 15), the National Park Service routes visitors around active nest sites to protect the nests and young birds.

Beach visitation levels are strongly weather-dependent with more use during the warmer summer months and less use during the spring, fall, and winter seasons. In the study area, visitors can enjoy a range of visitor uses and experiences, including walking, biking, hiking, access to the beach, sunbathing, picnicking, fishing, bird watching and nature study, or visiting a historic military community. "Favorite" recreation activities cited during public scoping include fishing, bird watching, biking, walking on the beach, and hiking the trails.

Environmental Consequences

Methodology and Assumptions

This analysis assesses the impacts of the alternatives on visitor use and experience in and around the study area. To determine impacts, current beach access and visitor experience at Fort Tilden were considered along with the potential impacts from the proposed alternatives on access and the conditions of quiet and solitude recommended by the selected general management plan alternative for Fort Tilden Beach.

Study Area

For the purposes of the visitor use and experience impact analysis, the study area is considered to be the area of Shore Road, all of Fort Tilden Beach, and all existing access points between Jacob Riis Park in the east to Fisherman's Parking in the west.

Impacts of Alternative A: No Action

Analysis. Under the no-action alternative, no change in visitor use is expected and the nature-based experience of Fort Tilden Beach would continue. The remaining eastern extent of Shore Road would continue to provide biking/walking access to the beach similar to pre-Hurricane Sandy conditions. The former western extent of Shore Road would continue to exist as a natural surface (sand) route that connects with the existing paved eastern segment, resulting in disjointed access in an area that before Hurricane Sandy, provided a continuous beachfront bicycle route, pedestrian access, and access for mobility impaired visitors. Walking access along the western end of the beach from the existing Shore Road to Fisherman's Parking would remain more arduous for beachgoers than it was prior to Hurricane Sandy because of the longer walk over the sand.

While Fort Tilden Beach is a dynamic coastal environment, no impacts on existing visitor beach access are anticipated because dunes would continue to accrete inland of Shore Road on the eastern section of the beach and would remain absent on the western end. However, the existing eastern

extent of Shore Road is located in a special flood hazard area and could be subject to damage from inundation, wave action, and high winds during a future storm event, resulting in potential adverse effects on beach access and transportation. Piping plover habitat would continue to expand until natural sand dune processes restore dune habitat previously destroyed by Hurricane Sandy, and visitors would continue to be routed away from active plover nest sites during the nesting season; however, these restrictions would be limited in both area and duration.

Cumulative Impacts. The post-Sandy beach restoration, boardwalk reconstruction, and other visitor amenities in the Rockaway Beach Restoration project would improve the visitor experience and increase use levels along Rockaway Beach, resulting in beneficial, cumulative impacts. Alternative A would not contribute to cumulative impacts when considered with the Rockaway Beach Restoration because it would not change visitor use and experience at Fort Tilden.

Conclusion. No changes to visitor use and experience would occur under alternative A. Bicyclists and mobility impaired users would have limited access, while pedestrians would continue to be presented a more arduous access across the sand where Shore Road previously existed. Alternative A also would have no contribution to cumulative impacts on visitor use and experience.

Impacts of Alternative B

Analysis. Under alternative B, the removal of the bulkhead, wooden groins, Buildings 15–18, the Telephone Pit Building, and remaining eastern extent of Shore Road would eliminate bicycle access and access for mobility impaired visitors to the beach. Temporary beach closures may occur during removal of the bulkhead; however, scheduling heavy construction activities during the off season would reduce the overall impact on visitor access to the beach.

Because alternative B would result in slight beach formation processes from minimal dune accretion and the contribution of sand to dune and beach recovery related to the removal of Shore Road, pedestrian access routes along the area historically occupied by Shore Road may occur. Removal of the remaining sections of Shore Road would extend the amount of time it takes pedestrians to access the beach because walking over sand is more arduous than walking over a hardened surface. This longer walk may dissuade some visitors from using the beach and negatively affect visitor use levels. This change in access likely would result in a reduction in visitor use compared to pre-Hurricane Sandy levels as a result of the loss of the bicycling and pedestrian friendly opportunities provided by Shore Road.

This alternative would result in changes to visitor use levels and patterns because it would limit access to the beach to those capable and inclined to traverse the sand from the parking areas. Removal of the remaining portion of Shore Road also could change the type of visitor using the beach to one more focused on the natural setting of the area rather than the bicycling, running, walking type uses associated with hardened surfaces and popular along Shore Road prior to Hurricane Sandy. This reduction in visitor use level would increase the desired quiet, solitude, and sense of connection inspired by the natural world and offered by the natural coastal environment.

Alternative B would enhance the nature-based experience along the beach in the study area. The removal of bulkhead, groins, buildings, and eastern extent of Shore Road combined with the integration of Battery Kessler into a dune would enhance the natural landscape and vistas.

The dynamic beach environment would result in increased habitat for piping plover likely resulting in seasonal access restrictions that would route visitors around plover habitat to protect any

breeding piping plovers. However, these restrictions would be limited in area and duration and are unlikely to result in beach closures.

Cumulative Impacts. Alternative B would result in noticeable adverse and beneficial contributions to cumulative impacts on visitor use and experience when combined with two past projects, the post-Hurricane Sandy removal of damaged sections of Shore Road and removal of the partially exposed bulkhead. These two past projects would result in beneficial impacts on visitor use and experience because they would remove visitor obstructions in the beach area. When combined with alternative B, these actions would remove the entire length of Shore Road, resulting in a noticeable adverse contribution to cumulative impacts because it would limit access to the beach and negatively affect visitor use levels. However, alternative B would also result in a noticeable beneficial contribution to cumulative impacts because it would remove all exposed bulkheads and Shore Road, which would increase the beach area that could be used by visitors and create a more nature-based visitor experience.

Conclusion. By removing the remainder of Shore Road, alternative B would result in considerable, adverse impacts on visitor use levels and opportunities along the beach because it would remove bicycle access from the beach and make pedestrian access more difficult. However, alternative B would also result in slight, beneficial impacts to the visitor experience because it would preserve the sense of quiet and solitude, while removing the deteriorating historic structures would enhance natural vistas. Temporary, adverse impacts on visitor use would result from beach access restrictions during bulkhead removal, but scheduling heavy construction activities during the off season would reduce potential impacts. Restoration of the beach under alternative B would result in both noticeable adverse and beneficial contributions to cumulative impacts on visitor use and experience.

Impacts of Alternative C

Analysis. Under alternative C, the elevated pathway and vegetated revetment would adversely affect natural beach formation processes, reducing the available beach area for visitor use over time. Construction of the revetment would result in disturbances along the beach during the construction period and affect beach access from Fisherman's Parking to the west. Enjoyment of the beach in areas near the construction could be compromised as a result of the presence and sounds of heavy machinery associated with the installation. Construction activities would last less than a year with the majority of the construction lasting only a few months. Temporary beach closures may occur during partial removal of the bulkhead; however, scheduling heavy construction activities during the off season would reduce the overall impact. Additionally, this alternative would minimally reduce suitable piping plover habitat and the associated area for visitor seasonal access restrictions to protect breeding piping plovers.

Overall, visitor use levels are expected to increase to pre-Hurricane Sandy use levels or higher because the proposed elevated pathway connecting to Jacob Riis Park would restore connectivity and access and likely result in an increase in the number of visitors along the beachfront. Given the nature of the structure, the increase in users likely would include more walkers, runners or bicycle riders on the elevated pathway instead of on the beach itself. Access points along the elevated pathway would provide users access to the beach, which likely would concentrate users near the access points. Improved access would be consistent with the general management plan's recommendation to support increased beach use.

The 10-foot-wide pathway with universally accessible access points would provide walking/biking and universal access along the beach within the footprint of Shore Road prior to Hurricane Sandy. Providing a dedicated walking/biking and universal access pathway would restore these activities

along the beach frontage to pre-Sandy conditions and enable easier access to the central locations of Fort Tilden Beach. This would enhance the visitor experience by providing users with direct access to the beach from the eastern to western end, reestablishing the continuous connection destroyed by Hurricane Sandy and improving connectivity for bicycle, pedestrian, and mobility impaired visitors. Like the former Shore Road, the elevated pathway would be located in a special flood hazard area and, at a vertical elevation of 5 feet NAVD 88, would still be subject to inundation and wave action during a future storm event. However, the pathway would be designed to withstand inundation, wave action, and high winds, limiting the potential adverse effects to beach access and transportation.

Under this alternative, the increased number of visitors along the pathway would not diminish the peace and solitude offered on the beach and near the dunes because the uses on the pathway would be different and separated. Visitors would continue to experience the wide open spaces along the beach or hidden solitude near the dunes. The partial removal of the bulkhead and complete removal of Buildings 15–18 and the Telephone Pit Building would restore natural landscapes and vistas and enhance the nature-based experience within the study area. In addition, removal of these structures would improve the aesthetics and enhance the sense of solitude and connection inspired by the natural world and offered by the natural coastal environment.

Cumulative Impacts. Alternative C would result in a noticeable, beneficial contribution to cumulative impacts on visitor use and experience when combined with the past post-Hurricane Sandy removal of damaged sections of Shore Road and removal of partial exposed bulkhead. These two past projects would result in beneficial impacts to visitor use and experience because they would remove visitor obstructions in the beach area. When combined with alternative C, these actions would remove the entire length of Shore Road, but would replace it with an elevated pathway that would have noticeable, beneficial contributions to cumulative impacts because visitor access along the western end of Fort Tilden Beach would improve and positively affect visitor use levels. Alternative C would also noticeably contribute to cumulative impacts by removing all exposed bulkheads, which would increase the beach area that could be used by visitors.

Conclusion. Alternative C would result in considerable, beneficial impacts on visitor use and experience because the elevated pathway would provide continuous walking/biking and universal access along Fort Tilden Beach, while the connection to Jacob Riis Park would increase visitor use levels that would result in a more active visitor experience. Temporary, adverse impacts on visitor use would result from access restrictions lasting up to one year during construction of the revetment, with a shorter duration for partial bulkhead removal during the off-season to reduce impacts. In addition, alternative C would have a noticeable contribution to cumulative impacts on visitor use and experience.

Impacts of Alternative D

Analysis. Impacts on visitor experience associated with the partial removal of the bulkhead, Buildings 15–18, and the Telephone Pit Building would be the same as those described under alternative C. Construction of the proposed pathway would require heavy machinery resulting in partial closures and access restrictions during the active construction period. Construction would not likely last more than one year with fully restored access allowed upon completion. The construction schedule would likely be shorter than alternative C above due to the shorter length of pathway construction. Temporary beach closures may occur during partial removal of the bulkhead. Scheduling heavy construction activities during the off season would reduce the overall impact. Under alternative D, impacts on visitor use from the dynamic beach environment and associated seasonal access restrictions as a result of piping plover habitat would be the same as those described

under alternative A. The addition of sand-trapping fences to guide pedestrians through the dunes would provide established pedestrian access paths, improving the pedestrian experience and preventing pedestrians from crossing established dunes.

Restoration of access under this alternative would increase the number of visitors similar to pre-Hurricane Sandy levels because the bicycle and pedestrian access offered by the clay-shell pathway would be similar to the type and modes of access provided by the western extent of Shore Road prior to Hurricane Sandy. However, both the existing eastern extent of Shore Road and newly constructed clay-shell pathway would be located in a special flood hazard area and could be subject to damage from inundation, wave action, and high winds during a future storm event, resulting in potential adverse effects on beach access and transportation.

The construction of a clay-shell pathway in the former western extent of Shore Road would fit within the natural landscape and provide for interpretation of the former Shore Road, enhancing the visitor experience. It would improve walking/biking access parallel to the beach, enabling easier access to the central locations of Fort Tilden Beach. This would enhance the visitor experience by providing nonvehicular users with direct access to the beach along the entire former extent of Shore Road, restoring full connectivity between the east and west parking areas and reestablishing the continuous connection destroyed by Hurricane Sandy. Improved surface conditions would be positive for all visitors by providing an easier walking, jogging, or bicycling surface than the sand, which likely would result in more visitors as a result of the improved access. New pedestrian beach access paths demarcated through the dunes at an angle would route visitors through preferred beach access points likely concentrating visitors near these access paths. Improved access is consistent with the general management plan's recommendation to support increased beach use.

The partial removal of the bulkhead and complete removal of Buildings 15–18 and the Telephone Pit Building would restore natural landscapes and vistas and enhance the nature-based experience within the study area. In addition, removal of these structures would improve the aesthetics and enhance the sense of solitude and connection inspired by the natural world and offered by the natural coastal environment.

Cumulative Impacts. Alternative D would result in a noticeable, beneficial contribution to cumulative impacts on visitor use and experience when combined with the past post-Hurricane Sandy removal of damaged sections of Shore Road and removal of the partially exposed bulkhead. These two past projects would result in beneficial impacts to visitor use and experience because they would remove visitor obstructions in the beach area. Alternative D would have a noticeable, beneficial contribution to cumulative impacts because it would replace the former location of Shore Road with a clay-shell pathway that would enhance the nature-based experience, improve visitor access along the western end of Fort Tilden Beach, and positively affect visitor use levels. Alternative C would also noticeably contribute to cumulative impacts by removing the exposed bulkhead, which would increase the beach area that could be used by visitors.

Conclusion. Alternative D would have considerable, beneficial impacts on both visitor use and experience because the installation of a clay-shell pathway to replace the destroyed and removed western extent of Shore Road would reestablish biking/walking connectivity along Fort Tilden Beach, while providing historic interpretation of the former road and increasing access to the beach, thereby enhancing the visitor experience and resulting in an increase in visitor use. Temporary adverse impacts on visitor use would result from access restrictions during partial bulkhead and complete wooden groin removal, but scheduling heavy construction activities during the off season would reduce potential impacts. In addition, alternative D would have a noticeable, beneficial contribution to cumulative impacts to visitor use and experience.

PUBLIC HEALTH AND SAFETY

Affected Environment

Fort Tilden features several historic structures from its early to mid-20th century military occupation that are presently deteriorating or have fallen into disrepair. Wooden groins and the decaying bulkhead uncovered by the forces of Hurricane Sandy are now exposed along the beach and pose a risk to beach users and swimmers in the near shore area. Buried and exposed remnants of decayed and rotting bulkhead project vertically from the beach with metal tiebacks that may become detached and present a safety risk for tripping and injury. Decaying wooden groins extend into the water and present a risk to safety for swimmers. Buildings 15–18 are missing windows and doors, filled with sand, and overgrown with vegetation. Some walls have collapsed, and roofs are collapsing or have holes. In their present state, these buildings pose a risk to public safety for anyone who might enter or be in proximity to the structures (Ammann & Whitney 2015). The buildings do not have warning signage, security, or other barriers to prevent entry. Battery Kessler also is unsecured, with no lighting and open pits that present a risk to public safety. These structures are located in a special flood hazard area and could be subject to damage from inundation, wave action, and high winds during a future storm event, potentially increasing their risk to public safety. To address public safety emergencies on Fort Tilden Beach, GATE staff use emergency UTVs. The remaining eastern extent of Shore Road facilitates emergency access to the eastern half of the beach.

Environmental Consequences

Methodology and Assumptions

This analysis assesses the impacts of the alternatives on public health and safety in and around the study area. To determine impacts, current safety issues were considered, including the risk to visitors and GATE staff posed by the exposed bulkhead and timber groins, Buildings 15–18, the Telephone Pit Building, and Battery Kessler, along with the potential impacts from the proposed alternatives on resolving these safety concerns. The resource-specific context for determining the significance of the impacts of the alternatives on public health and safety involves activities that the National Park Service undertakes to create and maintain conditions in which visitors can enjoy a safe experience within the national recreation area.

Study Area

For the purposes of the public health and safety impact analysis, the study area is considered to be the Fort Tilden Beach and the areas in and around Buildings 15–18, the Telephone Pit Building and Battery Kessler.

Impacts of Alternative A: No Action

Analysis. Under alternative A, the bulkhead and wooden groins exposed by Hurricane Sandy would remain, and the risk they pose to public safety would persist. Buildings 15–18, the Telephone Pit Building, and Battery Kessler would continue to deteriorate and remain accessible to the public, presenting a risk to public safety for anyone who might enter or be near the structures. Because of their high risk for damage from inundation, wave action, and high winds during a future storm event, these structures may become an increased risk to public safety. Access for GATE staff to address public safety emergencies at Fort Tilden Beach would continue to be easier on the eastern half of the beach because of the remaining portion of Shore Road. On the western half of the beach, GATE staff would continue to use UTVs to traverse the sand.

Cumulative Impacts. Other post-Hurricane Sandy improvements to the existing roads, parking lots, pathways, and boardwalks help ensure continued safe access to GATE resources. However, the no-action alternative would negatively contribute to public health and safety when combined with these otherwise beneficial actions. Therefore, alternative A would have a noticeable, adverse contribution to the overall beneficial, cumulative impact.

Conclusion. While no changes would result under alternative A, existing conditions would persist and the bulkhead system, Buildings 15–18, the Telephone Pit Building, and Battery Kessler would continue to deteriorate. Over time, this would present an adverse impact on public health and safety from the presence of exposed bulkhead and decaying wooden groins, the ability of the public to access the deteriorating structures, and the risks associated with entering these structures. In addition, alternative A would have a noticeable, adverse contribution to cumulative impacts.

Impacts of Alternative B

Analysis. Under alternative B, the deteriorating bulkhead and wooden groins would be removed entirely; therefore, the safety risk for beachgoers and swimmers associated with these structures also would be removed. Buildings 15–18 and the Telephone Pit Building would be demolished, and Battery Kessler would be integrated into the dune system using sand fill. As a result, the risk to public safety presented by these structures would be removed. Access for GATE staff to address public safety emergencies at Fort Tilden Beach would become more challenging on the eastern half of the beach with the demolition of Shore Road because UTVs would need to cross sand for the entire length of the beach.

Cumulative Impacts. Alternative B would have a noticeable, beneficial contribution to cumulative impacts when considered with the 2013 removal of the partially exposed bulkhead that was uncovered by Hurricane Sandy, because together the complete removal of the bulkhead and wooden groins would mitigate the public safety risks posed by these structures.

Conclusion. Alternative B would result in adverse impacts because GATE staff would be required to cross sand in UTVs for the entire length of the beach; however, these impacts would be minimal considering GATE staff currently use emergency UTVs on sand to address public safety emergencies on the western portion of the beach. Alternative B would result in beneficial impacts because it would remove the risk to public safety associated with the exposed bulkhead and wooden groins through complete removal of these structures. It also would mitigate the safety risks associated with entering deteriorating historic buildings by removing Buildings 15–18 and the Telephone Pit Building, while limiting the ability for public access to Battery Kessler through integration into a dune. In addition, alternative B would have a noticeable, beneficial contribution to cumulative impacts.

Impacts of Alternative C

Analysis. Under alternative C, the risk to public safety associated with the exposed bulkhead would be diminished because the upper portions of the deteriorating bulkhead would be removed to approximately 3 feet below the surface. However, the wooden groins would continue to present a risk to safety for swimmers, which could increase if the groins were damaged by future storm events. The safety risk presented by Buildings 15–18 and the Telephone Pit Building would be removed because these buildings would be demolished, and natural habitat would be restored. Battery Kessler would be secured to no longer present a risk to public safety. Access for GATE staff to address public safety emergencies at Fort Tilden Beach would become easier because emergency beach access would be provided for UTVs along the elevated pathway.

Cumulative Impacts. Alternative C would have a noticeable, beneficial contribution to cumulative impacts when considered with the 2013 removal of the partially exposed bulkhead that was uncovered by Hurricane Sandy. Considered together, they would remove aboveground risks associated with the exposed bulkhead, which would mitigate the public safety risks currently posed by these structures.

Conclusion. Alternative C would result in beneficial impacts because it would diminish the risk to public safety associated with the exposed bulkhead through partial removal, mitigate the risks associated with entering deteriorating historic structures through removal of Buildings 15–18 and the Telephone Pit Building, and limit the ability for public access to Battery Kessler through secured entrances. However, the safety risk to swimmers associated with the wooden groins would persist under alternative C because the groins would continue to deteriorate, resulting in adverse impacts on public health and safety over time. This alternative would improve UTV access for GATE staff to respond to public safety emergencies. Additionally, alternative C would have a noticeable, beneficial contribution to cumulative impacts.

Impacts of Alternative D

Analysis. Under alternative D, impacts on public health and safety largely would be the same as those described under alternative C. However, alternative D also would mitigate the safety risk for swimmers associated with the wooden groins by entirely removing these structures. Access for GATE staff to address public safety emergencies at Fort Tilden Beach would become easier because continuous emergency beach access would be provided for UTVs from the remaining eastern portion of Shore Road to the clay-shell pathway.

Cumulative Impacts. Alternative D would have the same noticeable, beneficial impacts as alternative C.

Conclusion. Alternative D would result in beneficial impacts because it would diminish the risk to public safety associated with the exposed bulkhead through partial removal and with the wooden groins through complete removal. It also would mitigate the risk associated with entering deteriorating historic structures through removal of Buildings 15–18 and the Telephone Pit Building and limit the ability for public access to Battery Kessler through secured entrances. This alternative would improve UTV access for GATE staff to respond to public safety emergencies. In addition, alternative D would have a noticeable, beneficial contribution to cumulative impacts.

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CHAPTER 4: CONSULTATION AND COORDINATION

This “Consultation and Coordination” chapter describes the public involvement and agency consultation used during the preparation of the environmental assessment. A combination of activities, including public scoping, internal workshops, and agency briefings has helped to guide the National Park Service in developing this environmental assessment.

PUBLIC INVOLVEMENT

NEPA regulations require an “early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action” (40 CFR 1501.7). A public scoping meeting was held at the Ryan Visitor’s Center at Floyd Bennett Field in Brooklyn, New York, on February 25, 2015, from 6:00 p.m. to 8:00 p.m. The notice for the meeting was sent to the park’s mailing list and posted on the NPS Planning, Environment, and Public Comment (PEPC) website. The public scoping meeting also was announced through local media outlets and the park’s website. The meeting was designed to obtain information from the public on how storm damage has impacted use of the beach, solicit suggestions for new access points, and gather ideas on how to improve resiliency while maintaining natural and cultural resources. At the meeting, GATE staff displayed posters describing the EA process and the preliminary purpose, need, and objectives, as well as posters showing pre- and post-Hurricane Sandy conditions of the beach and issues of concern. The meeting was held in an open house format. GATE staff were on hand to answer questions, provide additional information about the environmental assessment, and describe how to submit comments.

The public scoping comment period was open from February 11, 2015, to March 20, 2015. The public could comment on comment sheets provided at the public meeting via the NPS PEPC website at <http://parkplanning.nps.gov/gate/> or by sending written comments to the Superintendent at Gateway National Recreation Area. During the public scoping comment period, 73 pieces of correspondence were received. These comments informed the issues considered in this environmental assessment.

AGENCY CONSULTATION

Agency consultation began early in the environmental assessment process, and is ongoing, to ensure that all relevant agencies are informed of any NPS planning actions. Table 4-1 provides a list of potential permits, reviews, and consultations that would be required for project implementation.

The National Park Service has determined that the proposed action likely would result in a finding of adverse effect on historic properties under section 106 of the National Historic Preservation Act. It is using this environmental assessment to coordinate public review of a draft memorandum of agreement developed with New York State Historic Preservation Officer. The memorandum of agreement outlines mitigation measures required to offset the adverse effect on the historic properties at Fort Tilden. A draft of the memorandum of agreement can be found in appendix A. Comments regarding the memorandum of agreement can be submitted along with comments on the environmental assessment.

TABLE 4-1: REQUIRED AGENCY CONSULTATION

Law, Statute, or Authority	Agency	Permit, Review, or Consultation
Section 106 of the National Historic Preservation Act	New York State Office of Parks, Recreation, and Historic Preservation; Stockbridge-Munsee Community, Delaware Tribe, and Delaware Nation	Section 106 of the National Historic Preservation Act requires federal agencies to consider the impacts of their undertakings on historic properties and archeological resources. Consultation with the New York State Office of Parks, Recreation, and Historic Preservation is required.
Section 7 of the Endangered Species Act	US Fish and Wildlife Service, National Marine Fisheries Service, New York State Department of Environmental Conservation	Section 7 of the Endangered Species Act requires federal agencies to consult with the US Fish and Wildlife Service regarding the potential for proposed actions to ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of critical habitat. Consultation with US Fish and Wildlife Service, National Marine Fisheries Service, and New York State Department of Environmental Conservation is required.
Sections 401 and 404 of the Clean Water Act	US Army Corps of Engineers	Under sections 401 and 404 of the Clean Water Act, the US Army Corps of Engineers regulates the tidal waters and wetlands contiguous to tidally flowed waterways within the study area.
Coastal Zone Management, Federal Coastal Zone Management Act of 1972 Consistency Determination	New York City Department of City Planning, New York State Department of State	The Coastal Zone Management Act of 1972 requires that the activities of federal agencies occurring within or outside the state's coastal zone must be consistent with New York State's Coastal Management Program. Because the project is located within the coastal zone, an individual Coastal Management Program consistency determination is required from the New York City Department of City Planning, and concurrence is required from the New York State Department of State.
Coastal Barrier Resources Act of 1982 Consistency Determination	US Fish and Wildlife Service	Federal agencies are required to consult with the US Fish and Wildlife Service prior to committing funds for projects or actions within or affecting the Coastal Barrier Resources System. Because the project is located within the Coastal Barrier Resources System, the National Park Service must consult with the US Fish and Wildlife Service to determine whether or not any of the section 6 exceptions under the Coastal Barrier Resources Act (16 U.S.C. § 3505) are applicable.
6 New York Codes, Rules and Regulations Part 661, Tidal Wetlands Land Use Regulations	New York State Department of Environmental Conservation	Under the Tidal Wetlands Act, the New York State Department of Environmental Conservation regulates activities in tidal wetlands and their adjacent areas. Adjacent areas extend up to 300 feet inland from the tidal wetland boundary. An Article 25 Tidal Wetlands Permit is required as project activities would occur above the tidal wetland boundary, but within the adjacent area.

Law, Statute, or Authority	Agency	Permit, Review, or Consultation
6 New York Codes, Rules and Regulations (NYCRR) Part 505, Coastal Erosion Management Regulations	New York State Department of Environmental Conservation	A Coastal Erosion Management Permit is required pursuant to 6 NYCRR Part 505 to undertake any regulated activity within Coastal Erosion Hazard Areas.
State Pollution Discharge Elimination System	New York State Department of Environmental Conservation	A State Pollutant Discharge Elimination System Permit is required for construction projects disturbing more than 5,000 square feet of soil. A stormwater pollution prevention plan would be prepared to minimize impacts of stormwater during construction.
Although not required by any specific law, statute or authority, the National Park Service also consulted with three agencies: Federal Emergency Management Agency, New York City Department of Environmental Protection, and New York City Department of Parks and Recreation.		

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CHAPTER 5: ACRONYMS

CFR	Code of Federal Regulations
EA	environmental assessment
GATE	Gateway National Recreation Area
National Register	National Register of Historic Places
NAVD 88	North American Vertical Datum of 1988
NEPA	National Environmental Policy Act of 1969
NPS	National Park Service
NYSDEC	New York State Department of Environmental Conservation
Park	Gateway National Recreation Area
PEPC	Planning, Environment, and Public Comment
USACE	US Army Corps of Engineers
UTV	utility terrain vehicle

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**Appendix A: Draft Memorandum of Agreement with New York State
Historic Preservation Officer**

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MEMORANDUM OF AGREEMENT

BETWEEN

GATEWAY NATIONAL RECREATION AREA, NATIONAL PARK SERVICE AND

NEW YORK STATE HISTORIC PRESERVATION OFFICER,

FOR SHORE ACCESS AND RESILIENCY AT FORT TILDEN

WHEREAS, Gateway National Recreation Area (the park) proposes to improve access, safety, and resiliency at the shoreline of Fort Tilden, Queens, New York, in response to Hurricane Sandy damage; and

WHEREAS, the Fort Tilden Historic District was listed on the National Register of Historic Places in 1984, and the boundaries of the district were expanded by a Determination of Eligibility from the Keeper of the National Register in 2009; and

WHEREAS, in October 2012, Hurricane Sandy caused extensive damage to the park, particularly Shore Road and Buildings 15-18, and uncovered a decaying bulkhead and wooden groins, the Telephone Pit Building, and a gun emplacement associated with Battery Kessler, as well as causing erosion around the Battery; and

WHEREAS, the National Park Service (NPS) proposes to replace the destroyed and subsequently removed western half of Shore Road with a shell/clay-based road, partially demolish the bulkhead, and completely demolish Buildings 15-18, the Telephone Pit Building, and the wooden groins; and

WHEREAS, the NPS has determined that the Area of Potential Effect (APE) includes the entire Fort Tilden historic district; and

WHEREAS, Shore Road, Buildings 15-18, the bulkhead and groin field, the Telephone Pit Building, and Battery Kessler are all contributing elements to the Fort Tilden Historic District; and

WHEREAS, the NPS has consulted with the New York State Historic Preservation Officer (NYSHPO), in accordance with 36 C.F.R. part 800, the regulations implementing Section 106 of the National Historic Preservation Act (16 U.S.C. § 470f), and the NYSHPO agrees that the undertaking is an adverse effect; and

WHEREAS, the NPS has informed the ACHP of the adverse effect; and

WHEREAS, the NPS has invited the Delaware Nation, Delaware Tribe, and Stockbridge-Munsee Band of Mohican Indians to be concurring parties to this agreement, and none chose to do so; and

WHEREAS, the park has provided the public an opportunity to comment on this undertaking by including a copy of this agreement in the environmental assessment for the project and posting it prior to signature on the NPS Planning, Environment, and Public Comment (PEPC) website; and

NOW, THEREFORE, the NPS and NYSHPO agree that the project shall be implemented in accordance with the following stipulations:

STIPULATIONS

A. Mitigation of Adverse Effects

1. 3D scanning and recordation of Batteries Kessler and 220.
2. Digital photos of Batteries Kessler and 220 and the structures at the Nike Site for the New York Cultural Resource Information System (CRIS), if they do not currently exist in the system.
3. Development of text and images on the World War II history of Fort Tilden for the GATE mobile application (app), including the role of the Telephone Pit Building.
4. Archeological monitoring of demolition activities at Buildings 15-18 and the Telephone Pit Building.

B. Inadvertent Resource Discoveries

If during construction or demolition activities previously unknown archeological resources are discovered, all work in the immediate vicinity of the discovery will be halted and the procedures of 36 CFR Part 800.13(c) followed. In the unlikely event that Native American human remains, funerary objects, sacred objects and objects of cultural patrimony are discovered, all work in the immediate vicinity of the discovery will be halted and the procedures of 43 CFR § 10.3 will be carried out including taking immediate steps to protect the discoveries in situ, notification of the three affiliated tribes, tribal consultation, and the development and execution of a Plan of Action.

C. Dispute Resolution

Disputes regarding the completion of the terms of this Agreement shall be resolved by the signatories. If the signatories cannot agree regarding a dispute, the NPS or SHPO may request the participation of ACHP to assist in resolving the dispute. Any recommendation or comment provided by the ACHP will be understood to pertain only to the subject of the dispute. The NPS's responsibility to carry out all actions under this Agreement that are not the subjects of dispute will remain unchanged.

At any time during implementation of the measures stipulated in this Agreement, should an objection to any such measure be raised by a member of the public, the NPS shall take the objection into account and consult as needed with the SHPO.

D. Amendment of Agreement

The Agreement may be modified by amendment at any time by mutual concurrence of all parties. Amendment of the Agreement as necessary shall be accomplished in the same manner as the original agreement. Amendments will be in writing and approved by the original signatories or their designated official.

E. Termination of Agreement

Either party to this Agreement may terminate it by providing thirty (30) calendar days notice to the other party, provided that the parties will consult during the period prior to termination to seek agreements on amendments or other actions that would avoid termination. In the event of termination by the SHPO, the NPS will request the comments of the ACHP, in accordance with 36 CFR Part 800.7(a).

F. Anti-Deficiency Act

All actions taken by the park in accordance with this MOA are subject to the availability of funds, and nothing in this MOA shall be interpreted as constituting a violation of the Anti-Deficiency Act.

G. Term of Agreement

This Agreement shall become effective after the date of the last signatory. The Agreement shall be null and void if its terms are not carried out within five (5) years from the date of its approval by the Park and SHPO, unless the signatories agree in writing to an extension for carrying out its terms. Otherwise, this Agreement shall become null and void when the project is complete, and all of the above stipulations are fulfilled. The Agreement and any amendments shall be binding upon the parties, their successors, and assigns.

Execution of this Agreement by the NPS and SHPO, and implementation of its terms, evidences that the NPS has taken into the account the effects of the project on historic properties and afforded the ACHP the opportunity to comment.

AUTHORIZING SIGNATURES

National Park Service

By: _____ Date: _____
Jennifer Nersesian
Superintendent, Gateway National Recreation Area

New York State Historic Preservation Office

By: _____ Date: _____
Ruth Pierpont
Deputy Commissioner/Deputy SHPO

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**Appendix B: Best Management Practices and Conditions for Proposed
Actions with the Potential to have Adverse Impacts on Wetlands from
Procedural Manual #77-1: *Wetland Protection* (NPS 2012)**

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Best Management Practices and Conditions for Proposed Actions with the Potential to Have Adverse Impacts on Wetlands

The following serve as Best Management Practices (BMPs) for NPS actions that may have adverse impacts on wetlands. Additional BMPs may be appropriate depending on local conditions or special circumstances. These also serve as "conditions" that must be met for the actions listed in Section 4.2.1 of these procedures to qualify as "excepted."

1. **Effects on hydrology and fluvial processes:** Action must have only negligible to minor, new adverse effects on site hydrology and fluvial processes, including flow, circulation, velocities, hydroperiods, water level fluctuations, sediment transport, channel morphology, and so on. Care must be taken to avoid any rutting caused by vehicles or equipment.
2. **Effects on fauna:** Action must have only negligible to minor, new adverse effects on normal movement, migration, reproduction, or health of aquatic or terrestrial fauna, including at low flow conditions.
3. **Water quality protection and certification:** Action is conducted so as to avoid degrading water quality to the maximum extent practicable. Measures must be employed to prevent or control spills of fuels, lubricants, or other contaminants from entering the waterway or wetland. Action is consistent with state water quality standards and Clean Water Act Section 401 certification requirements (check with appropriate state agency).
4. **Erosion and siltation controls:** Appropriate erosion and siltation controls must be maintained during construction, and all exposed soil or fill material must be permanently stabilized at the earliest practicable date.
5. **Proper maintenance:** Structure or fill must be properly maintained so as to avoid adverse impacts on aquatic environments or public safety.
6. **Heavy equipment use:** Heavy equipment use in wetlands must be avoided if at all possible. Heavy equipment used in wetlands must be placed on mats, or other measures must be taken to minimize soil and plant root disturbance and to preserve preconstruction elevations.
7. **Stockpiling material:** Whenever possible, excavated material must be placed on an upland site. However, when this is not feasible, temporary stockpiling of excavated material in wetlands must be placed on filter cloth, mats, or some other semipermeable surface, or comparable measures must be taken to ensure that underlying wetland habitat is protected. The material must be stabilized with straw bales, filter cloth, or other appropriate means to prevent reentry into the waterway or wetland.

8. **Removal of stockpiles and other temporary disturbances during construction:** Temporary stockpiles in wetlands must be removed in their entirety as soon as practicable. Wetland areas temporarily disturbed by stockpiling or other activities during construction must be returned to their pre-existing elevations, and soil, hydrology, and native vegetation communities must be restored as soon as practicable.
9. **Topsoil storage and reuse:** Revegetation of disturbed soil areas should be facilitated by salvaging and storing existing topsoil and reusing it in restoration efforts in accordance with NPS policies and guidance. Topsoil storage must be for as short a time as possible to prevent loss of seed and root viability, loss of organic matter, and degradation of the soil microbial community.
10. **Native plants:** Where plantings or seeding are required, native plant material must be obtained and used in accordance with NPS policies and guidance. Management techniques must be implemented to foster rapid development of target native plant communities and to eliminate invasion by exotic or other undesirable species.
11. **Boardwalk elevations:** Minimizing shade impacts, to the extent practicable, should be a consideration in designing boardwalks and similar structures. (Placing a boardwalk at an elevation above the vegetation surface at least equal to the width of the boardwalk is one way to minimize shading.)
12. **Wild and Scenic Rivers:** If the action qualifies as a water resources project pursuant to Section 7(a) of the Wild and Scenic Rivers Act, then appropriate project review and documentation requirements under Section 7(a) are required.
13. **Coastal zone management:** Action must be consistent, to the maximum extent practicable, with state coastal zone management programs.
14. **Endangered species:** Action must not jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, including degradation of critical habitat (see *NPS Management Policies 2006* and guidance on threatened and endangered species).
15. **Historic properties:** Action must not have adverse effects on historic properties listed or eligible for listing in the National Register of Historic Places.



As the nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering wise use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historic places, and providing for the enjoyment of life through outdoor recreation. The department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people. The department also promotes the goals of the Take Pride in America campaign by encouraging stewardship and citizen responsibility for the public lands and promoting citizen participation in their care. The department also has major responsibility for American Indian reservation communities and for people who live in island territories under U.S. administration.

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United States Department of the Interior – National Park Service