

A. INTRODUCTION

The preceding chapters of the DEIS discuss the potential for significant adverse impacts to result from the proposed project. Potential significant adverse impacts have been identified in the area of natural resources, based on reasonable worst-case development scenarios that were used for the purposes of programmatic impact analyses in this DGEIS. Provided below are programmatic mitigation measures that would minimize or eliminate the anticipated impacts. As lead agency, DEP will ensure that this mitigation is incorporated into capital projects as the amended drainage plans are implemented, including the additional information and studies that are needed to develop final designs.

B. NATURAL RESOURCES**VEGETATION AND TREES**

Under the proposed amended drainage plans, BMPs are designed to preserve important upland wooded forested areas as well as high quality wetland habitats (i.e., wetlands predominantly comprised of contiguous stands of native vegetation) to the extent possible. In the New Creek watershed, the footprint of proposed BMP NC-11: Last Chance Pond was shifted toward stands of *Phragmites* (common reed) and away from valuable woodlands and wet wooded habitat. Downstream proposed BMPs, such as NC-13 and NC-14, were expanded for increased storage volume to limit the clearing and grading areas of proposed BMP NC-11. Despite design modifications and other measures to preserve and enhance natural resources, significant tree removal is expected as a result of the proposed project at proposed BMP NC-6: Boundary Avenue and proposed BMP NC-11: Last Chance Pond site. Respectively, 2,100 and 4,600 trees were estimated for removal at these sites based on a conservative methodology typically used for much larger forested areas. (See Chapter 3.9, “Natural Resources of the New Creek Watershed,” and Chapter 2.1, “Methodology,” for additional information about tree removal and the methodology used to estimate tree losses.)

Given the large comprehensive program for stormwater management proposed for the Mid-Island Region, detailed surveys and designs would need to be developed. A detailed tree survey would be conducted for proposed BMP sites to determine the actual number of trees to be removed and the area of affected habitat. Survey results and other collected natural resources data would be reviewed with DPR for the purposes of identifying opportunities to further avoid particular large trees, dense stands, and important wooded and wetland habitats.

Proposed final BMP designs at all sites would maintain perimeter trees and include tree plantings to recreate and preserve wooded habitat and woodlands that may need to be cleared or graded to create the proposed BMP. All plantings would be coordinated with DPR and be consistent with DPR’s planting guidelines. The Bluebelt Program includes monitoring to ensure tree and plant establishment and growth. Final design of the proposed BMPs would preserve

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these natural resources, to the extent possible, and impacts to trees or high quality woodland or wetland habitats would be minimized. In addition, several measures would be implemented as part of the proposed project during construction to protect existing and remaining trees such as installation of construction-limiting fencing and tree barrier protections. (See Chapter 6.1, “Impacts During Construction,” for additional information on construction-related measures of the proposed project.)

The large-scale nature of proposed BMPs NC-6 and NC-11 would allow for the restoration and creation of diverse habitat including open waters and emergent marsh wetlands. The capital projects for the Mid-Island watersheds would include grading, debris clean-ups and installation of diverse wetland flora that may attract equally diverse fauna. In addition to the planting program, habitat value would be increased by the design of the proposed BMPs which would include a variety of irregularly shaped and sized wetland pools, coves and islands at the different sites. This would increase wetland edge area preferred by many waterfowl species. Located along the Atlantic flyway, these large proposed wetlands would add significant habitat for migratory birds within the New York City area.

ENDANGERED, THREATENED, AND SPECIAL CONCERN SPECIES AND COMMUNITIES

Rare, threatened, endangered, or special concern species have been reported within each of the Mid-Island watersheds, as per NYSDEC’s Natural Heritage Program and other sources (see Chapters 3.9, 4.9, and 5.9, “Natural Resources of the Oakwood Beach, New Creek and South Beach Watershed,” respectively. See also Appendix C, “Natural Resources Data Inventory”). Based on current conditions, some species have been observed during field investigations, others have been recently reported in the watershed, and some are suspected of being in the watershed. Observations to date of wildlife (avian) species have been identified only as flyover species which does not involve any site-specific use of a BMP proposed site. Given the 2043 build year of the proposed project, some identified species may appear at certain proposed project sites over time, or could be present in adjacent areas. **Table 8.1.-1** lists all special concern species and the proposed BMP locations where they may exist, within all three watersheds.

Table 8.1-1
Endangered, Threatened and Special Concern Species
Potentially within Proposed BMP Sites

1. Oakwood Beach		
Vegetation		
Species	Habitats	BMP Sites
Slender blue iris (threatened)	Fresh, brackish and salt marshes	OB-1 (a)
Turks-cap-lily (exploitably vulnerable)	Wet meadows and woods	OB-1 (a)
Northern gamma grass (threatened)	Ditches, depressions swales and salt marshes	OB-1, OB-2 and OB-3 (a)
Cinnamon fern (exploitably vulnerable)	Streambanks	OB-1, OB-2 and OB-3 (a)
Royal fern (exploitably vulnerable)	Streambanks	OB-1(a), OB-2 and OB-3 (b)
Wildlife		
Osprey (special concern)	Dead trees, platform and perches along the coast	OB-1 through OB-3 (d)
Northern Harrier (threatened)	Fields , meadows marshes and grasslands	OB-1 through OB-3 (d)
Coopers Hawk (special concern)	Woodlands and fields	OB-1 through OB-3 (b)

Table 8.1-1, cont'd
Endangered, Threatened and Special Concern Species
Potentially within Proposed BMP Sites

2. New Creek		
Vegetation		
Species	Habitats	Sites
Purple milkweed (special concern)	Dry to moist woods	NC-9, NC-11 (d)
Green milkweed (threatened)	Multiple habitats	NC-9, NC-11 (d)
Lowland fragile fern (endangered)	Moist wooded slopes	NC-1 through NC-3 (d)
Jacob's Ladder (endangered)	Moist woods	NC-1, NC-2 NC-3, NC-9, NC-11(d)
Marsh fern (exploitably vulnerable)	Coastal marshes	NC--17 (b)
Royal fern (exploitably vulnerable)	Streambanks and wet meadows	NC-1 through NC-3, N-6 through NC-17 (b)
Cinnamon fern (exploitably vulnerable)	Streambanks	NC-1 through NC-3, N-6 through NC-17 (b)
Spinulose wood fern (exploitably vulnerable)	Streambanks and wet meadows	NC-1 through NC-3, N-6 through NC-17 (b)
Wildlife		
Peregrine Falcon (endangered)	Nest on ledges or cliffs or human tall human structures (1) use coastal marshes for foraging	NC-7 through NC-19 (b)
3. South Beach		
Vegetation		
Species	Habitats	Sites
Green milkweed (threatened)	Multiple habitats	SBE-1A, 1B-1C(d)
Hop sedge (threatened)	Coastal sands and meadows	SBE-1A, 1B-1C(d)
Fringed Bonset (threatened)	Coastal sands and meadows	SBE-1A, 1B-1C(d)
Seaside knotweed (threatened)	Sandy beaches and shores	SBE-1A, 1B-1C(d)
Globose flatsedge (endangered)	Sandy coastal plains	SBE-1A, 1B-1C(d)
Butterfly milkweed (exploitably vulnerable)	Coastal plains	SBE-1A, 1B-1C (a)
Slender rose gentian (endangered)	Brackish marshes	SBE-1A, 1B-1C (a)
Nodding ladies tresses (exploitably vulnerable)	Coastal bogs	SBE-1A, 1B-1C (a)
Needlepod rush (endangered)	Shallow pools damp sandy soils	SBE-1A, 1B-1C
Cinnamon fern (exploitably vulnerable)	Streambanks	SBE-1A, 1B-1C (a)
Royal fern (exploitably vulnerable)	Streambanks	SBE-1A, 1B-1C (b)
Wildlife		
Osprey (special concern)	Coastal marshes and islands	SBE-1A, 1B-1C (b)
Northern Harrier (special concern)	Coastal marshes and islands	SBE-1A, 1B-1C (d)
Peregrine Falcon (endangered)	Nest on ledges or cliffs or human tall human structures (1) use coastal marshes for foraging	SBE-1A, 1B-1C (c)
Notes:		
(a) Observed by DPR in 2008/2009; (b) Field observations 2009/2010; (c) NYSDEC, August 2011; (d) recorded evidence from NYSDEC Natural Heritage Program, USFWS, NMFS, Breeding Bird Atlas or other sources.		
(1) Reported at Verrazano-Narrows Bridge		
See also Appendix C.2 for a description of the species and their potential to be present in each watershed or at a BMP site.		

To mitigate the potential for impacts on these species, pre-construction investigations would be completed at each proposed BMP site in Table 8.1-1. These investigations would be performed during the appropriate season (see Appendix C.2 for the general habitats, foraging, and nesting characteristics of protected species) or time of year and designed specific to the spawning, nesting, foraging and breeding characteristics of each plant or animal species. The investigations would inform final BMP designs to support wildlife and wetland permitting and construction. If any of the endangered, threatened, or special concern species are observed, design

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modifications, construction controls and other protective measures would be implemented as part of the proposed project to avoid these species and minimize impacts. In addition, DEP will coordinate with NYSDEC to obtain necessary incidental take permits for endangered and threatened species of fish and wildlife and species of special concern in accordance with Environmental Conservation Law 11-0535 Part 182 if mitigation measures are not sufficient to avoid incidental takings.

For vegetation, avoidance of habitat or plant salvage and species rescue would be performed, as necessary. Plant salvage activities include harvesting or storing plants or seeds for replanting after construction completion. Bluebelt planting plans have routinely reintroduced plant species that have been extirpated from specific locations of Staten Island. Consistent with this objective, DPR employs an active plant salvage operation and relocates plants to protect them from construction or other impacts. DEP and DPR would coordinate during this process to maintain habitat within the Mid-Island watershed in addition to the tree preservation and planting measures described above.

TIDAL WETLAND RESTORATION

As described in the three natural resources chapters of this DGEIS (Chapters 3.9, 4.9 and 5.9), three new outfalls are proposed as part of the amended drainage plans and five existing outfalls may need to be expanded. The added and expanded outfalls would extend these structures out into Lower Bay and a portion of these outfalls would occupy what is currently tidal wetlands. A preliminary, planning-level analysis assuming a reasonable worst case scenario (i.e., all new and expanded outfalls are built as per the proposed drainage plans) indicates that approximately 1.22 acres of tidal wetland creation is necessary to compensate for the tidal wetland area that would be occupied by the proposed outfall structures (i.e., the footprint of the proposed outfall). This area does not include temporary and adjacent area impacts associated with construction, which would be addressed separately and restored onsite as part of the proposed construction.

Under the proposed project, these affected wetland areas are assumed to be restored at a 2:1 ratio (i.e., restoration at twice the size of the wetland area affected by the proposed outfall structure). DEP would minimize structural impacts as much as possible during final design by reducing or eliminating outfall expansions, where feasible. Therefore, a smaller wetland restoration area may be identified.

DEP, working together with DPR and the New York City Department of Design and Construction (DDC), identified tidal wetland opportunities at Crescent Beach Park in conjunction with proposed park enhancements and drainage improvements including the proposed Robinson Avenue Sewer Improvement Project. Crescent Beach Park, a 68-acre park (with about 10 land acres and 58 acres in the water), is located in the Great Kills section of Staten Island, just southwest of the Oakwood Beach watershed and west of Great Kills Park. DPR is proposing an enhancement of the park, with footpaths, areas for active recreation, and wet meadow and emergent woodland natural areas. In addition, the Department of Design and Construction (DDC) is proposing an expansion of the DEP outfall at Robinson Avenue, which would also require wetland mitigation.

Preliminary coordination between DEP and DPR has identified areas for potential tidal wetland creation at this site that could provide the restoration opportunities for the proposed outfall and would also support the DPR-proposed natural resources restoration and enhancements at Crescent Beach Park. Currently there is an existing low-lying area that is experiencing tidal influence due to a deteriorated concrete bulkhead. There is also a deteriorated road surface and

fill materials are present. A conceptual restoration for this area would involve excavation to create approximately 0.6 acres of intertidal wetland, regrading of the tidal edge and stabilizing it with the planting of *Spartina alterniflora* in an area of the site that is protected from wave action and situated between the mean high water line and mean sea level (0.2 and -2.4 ft Staten Island Datum, respectively).

With this conceptual cumulative restoration plan, DEP, working with other City agencies, would maximize wetland creation and habitat diversity in a larger area rather than smaller isolated patches. Given the large area of City-owned land available at Crescent Beach Park and multiple proposed projects in the area, this site provides significant opportunities for tidal wetland mitigation as part of the implementation of the amended drainage plans for the Mid-Island watersheds.

DEP will further develop this concept of wetland creation at Crescent Beach Park by continuing to coordinate with DPR and DDC. DEP will also continue coordination with NYSDEC and USACE to obtain the necessary permits and approvals, and ensure consistency with related programs such as USACE's shoreline protection program. In addition, other wetland mitigation sites will be identified to supplement or replace the Crescent Beach Park sites if additional mitigation requirements are identified during permitting.

C. PRE-DESIGN PROTOCOL FOR MITIGATION IMPLEMENTATION

As described in the preceding chapters of this DGEIS, the proposed project could potentially result in impacts to natural resources and DEP has incorporated several mitigation measures into the proposed project. Detailed final designs of the proposed BMPs for capital projects initiated through the 2043 build year will incorporate these mitigation measures.

Table 8.1-2 identifies natural resource data that will be collected and analyses that will be done before the proposed BMP design process starts. The data collection and subsequent analyses will be completed based on related guidance documents and coordination with respective agencies, and prior to the initiation of the capital project so that assessments will be timely, relevant, and meaningful. The table is a checklist of natural resource technical areas that will be further evaluated and is a pre-design protocol for the development and implementation of appropriate mitigation measures.

The pre-design protocol was developed based on coordination with NYSDEC and USACE. Further strategies may be developed during required permitting processes for the proposed action. Every effort was made to fully mitigate potential significant adverse impacts. However, in order to strike a balance between the objectives and purpose of the proposed project and preserving natural resources, unavoidable impacts may result.

Table 8.1-2

Pre-Design Protocol for Mitigation Implementation

Technical Area	BMPs	Mitigating Protocol
Groundwater	All lower watershed BMPs	Perform additional groundwater monitoring and submit results to NYSDEC as seasonal averages for spring (March 1 to June 1), summer (June 1 to August 31) and fall (September 1 to November 30) periods. Verify water levels prior to construction. Utilize data in refining BMP designs.
Trees	All BMPs	Develop site-specific tree and topographic survey maps as the first step in the final design process for the purposes of further minimizing potential clearing impacts, protecting large trees, and determining the minimum necessary tree clearing. Develop a tree replacement plan for trees that could not be avoided and would need to be cleared. Coordinate final designs with DPR and NYSDEC for BMPs sited on City or State parklands. Coordinate with NYSDEC on tree clearing as part of the freshwater wetland permit process.
Key Habitats	Last Chance Pond and Boundary Avenue	Gather additional natural resources data (e.g., fish or avian habitat, reptile and amphibians, macroinvertebrate surveys) that would inform the final design process. Using this data and site-specific survey maps with tree, water line, and topographic information, delineate habitats and refine BMP designs to further minimize impacts and to identify areas for habitat enhancement at Last Chance Pond and Boundary Avenue. Coordinate with DPR and NYSDEC in developing the final design.
Fisheries	Lower Watershed BMPs	Perform supplemental fisheries surveys as part of the final design process to determine if fish may be present at BMP sites. Determine any needs for fish passage along the channel. Create BMP design details for in-stream structures that would be necessary to allow continued fish movement along the channel and between the BMPs. Identify construction period protection measures and include them in project design specifications with respect to fish rescue or seasonal restrictions on construction.
Rare, Threatened, and Endangered Wildlife	See Table 8.1-1 for species potentially at BMP sites	Perform site investigations in the appropriate season to determine nesting or foraging at BMP sites as the initial step in the final design process. Perform the work within approximately one year of finalizing the capital project design in order to make a final determination about the potential use of a BMP site by protected species. Provide inventory data to DPR and NYSDEC as appropriate. If species protected under Environmental Conservation Law 11-0535, Part 182 are identified, apply to NYSDEC for incidental takings permit. Implementation of mitigation measures could involve modifications to BMP design or seasonal restrictions on construction.
Rare, Threatened, Endangered, and Exploitably Vulnerable Plants	See Table 8.1-1 for species potentially at BMP sites	Perform a site investigation in sensitive areas (e.g., wooded hummocks) in the appropriate season for confirming the presence or absence of plants as the initial step in final design. Perform this work within one year of capital project final design. Provide inventory data to NYSDEC and DPR as appropriate. Incorporate information into the final BMP design to avoid sensitive areas and plant locations, and/or incorporate additional impact avoidance measures into the proposed capital project, including plant salvage, in order to mitigate impacts.

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