

A. INTRODUCTION

This chapter examines alternatives to the proposed project and includes in the analysis those alternatives required under *CEQR* as well as alternatives that evolved during the impact analyses performed for the proposed project. This alternatives analysis presents reasonable options for reducing or eliminating project impacts, while substantively meeting project goals and objectives; demonstrating a reasonable range of options to the proposed action; and comparing potential impacts under alternative approaches for meeting project objectives. The range of alternatives to be considered was determined by the nature, goals, and objectives of the specific action and its potential impacts, as disclosed by the technical impact assessments for each of the three watersheds.

The purpose of this analysis is to compare conditions under the proposed project with these alternatives. In addition to the required alternatives under *CEQR/SEQRA* (e.g., the “No Action” Alternative), the alternatives examined in this chapter include alternative approaches for stormwater management. Specifically, the following five alternatives are examined in this chapter:

- No Action Alternative, which assumes none of the three proposed amended drainage plans for the Mid-Island area of Staten Island are approved and no capital projects move forward;
- Conventional Piped Sewer System Alternative, which assumes full implementation of the current drainage plan (the Potter Plan);
- An amended drainage plan with modified designs for BMPs NC-6 and NC-11 that eliminates upstream extended detention at these two proposed BMPs;
- An amended drainage plan that includes green infrastructure techniques or supplemental stormwater management design features that would reduce the size of BMPs NC-6 and NC-11 or other BMPs; and
- Alternative drainage plans with less stormwater flow to BMP NC-11: Last Chance Pond.

B. NO ACTION ALTERNATIVE**DESCRIPTION**

The No Action Alternative assumes that none of the proposed projects are approved and no infrastructure improvements or BMPs are installed. Under this alternative, the proposed amended drainage plan to reduce street flooding through a comprehensive system of pipes, BMPs and wetlands would not be implemented in the three Mid-Island watersheds.

LAND USE, ZONING AND PUBLIC POLICY

The No Action Alternative would not result in any changes to land use at proposed BMPs or outfall locations. Open space would continue to be managed as parkland under the jurisdiction of DPR or NYSDEC. Bluebelt properties would continue to be City-owned vacant land managed by DEP and would remain unused for drainage purposes, thus the wetlands would not be improved. Adjacent to the proposed BMP sites, residential and commercial uses would remain unchanged under the No Action Alternative. Similar to the proposed project, this alternative would not result in potential significant adverse land use impacts.

Under this No Action Alternative, no streets would need to be demapped and no other authorizations or certifications from the City Planning Commission (CPC) for clearing and grading activities in the Special South Richmond Development District (SSRDD) or the Staten Island Special Natural Area District (SNAD) would be needed. The proposed project would comply with these approvals and would not be in conflict with the City's zoning regulations.

In addition, under this alternative, consistency with the policies of the City's Waterfront Revitalization Program (WRP) would be achieved. However, the goals advanced by the three proposed amended drainage plans—such as improved water quality and reduced flooding and erosion—would be foregone. The No Action Alternative would not result in potential significant adverse public policy impacts.

OPEN SPACE

Under the No Action Alternative, several proposed BMPs (OB-1, OB-2, NC-1 through NC-5, NC-6, NC-11, SBE-1A and SBE-1C) and the Lower Bay outfalls would not be installed on City and State parkland. Additionally, under this alternative, tree clearing at the proposed BMPs sites would not occur. Under the proposed project this clearing is expected to be limited with the exception of the proposed BMP NC-6: Boundary Avenue and proposed BMP NC-11: Last Chance Pond sites. Under the No Action Alternative, stream banks would continue to erode without the proposed velocity attenuators and stabilization techniques under the proposed project and downstream sedimentation and surface water quality degradation would continue. In addition, there would be no wetland expansion or enhancements in natural area parklands or Bluebelt properties under the No Action Alternative. In the lower watershed, without a formal and expanded maintenance program as is proposed with this Bluebelt project, *Phragmites* or common reed would continue to dominate the landscape and brush fires would remain an issue for the proposed BMP sites and adjacent properties. At some sites (e.g., OB-1), trash and debris would remain uncollected which may affect public access, use and views along existing open spaces. Diversification of habitat and wildlife species, and ongoing maintenance associated with the proposed action would also not occur under this alternative.

HISTORIC AND CULTURAL RESOURCES

Under the proposed project, there would be no impacts on historic architectural resources and additional field investigations, testing and data recovery at potentially archaeologically sensitive sites would be completed. These types of investigations are common for this area of Staten Island and all work would be performed in accordance with a reviews and approvals by the New York City Landmarks Preservation Commission (LPC) and the New York State Historic Preservation Officer (SHPO), as necessary. Under the No Action Alternative, these lands would remain undisturbed and there would be no potential impact on archeological resources. Thus, the additional archaeological work of the proposed project would not be necessary under this

alternative. Therefore, neither the proposed project nor this alternative would have potential significant adverse impacts on archaeological resources.

URBAN DESIGN AND VISUAL CHARACTER

Under the No Action condition, the larger extended detention wetland BMPs in the three lower watersheds (e.g., OB-1, OB-2, NC-6, NC-11, SBE-1A, SBE-1B) would remain as primarily large stands of common reed marshes that provide no unique or valuable visual landscapes or views. With the proposed project, the dense common reed that currently limits public views into these wetlands would be removed and views from local streets into the landscaping of the proposed BMPs would be opened. The proposed BMPs are designed to provide diverse plantings and the Bluebelt program provides ongoing maintenance to ensure plant diversity, establishment, and growth. Thus, under the No Action condition, this benefit would not occur.

Certain proposed BMPs require the removal of larger stands of woodlands and trees, including some mature woodlands on parklands, including BMPs NC-6 and NC-11 in the New Creek watershed. Although different visually from the existing wooded sites, the proposed planting program would create natural, diverse wetland landscapes at these sites with expanded open water and emergent wetlands. In addition, the proposed project would maintain wooded borders at these sites and preserve large trees for the purposes of minimizing changes in the visual context as viewed from the local public streets and private views from nearby residences. The proposed BMP designs would also protect existing trees on Bluebelt property and the adjacent public streets to the greatest extent possible. DEP would also coordinate with DPR and NYSDEC on the final design for all BMPs proposed to be located in City or state parkland. Therefore, under both the proposed project and No Action Alternative, views along tree lined public streets and from private properties would remain largely unchanged. While there would be visual resource impacts as the proposed BMP landscaping becomes established, these impacts would be temporary and not significant. In contrast, the No Action Alternative would not provide any comprehensive wetland and visual resource enhancements for the local community and park users.

The proposed project would also require the raising of some local street grades which would not occur under this No Action Alternative. However, the street raisings associated with the proposed project would not result in any significant adverse impacts on urban design or visual character.

NATURAL RESOURCES

SURFACE AND GROUNDWATER HYDROLOGY

Under the proposed amended drainage plans, pipes and hydraulic structures would be installed to provide a comprehensive stormwater management system. The primary objective of the amended drainage plans is to reduce flooding throughout each watershed and to control unmanaged runoff. Under the No Action Alternative, the same volume of stormwater would be generated in the Mid-Island watersheds as under existing conditions, but there would not be the comprehensive stormwater collection system or the BMPs with velocity attenuators, outlet stilling basins, and extended detention wetlands that would better manage stormwater flows. Rather, under the No Action Alternative, street runoff would remain uncontrolled and stream banks would continue to erode without the proposed BMPs and associated bank stabilization techniques.

Mid-Island Bluebelt EIS

No potential significant adverse impacts to hydrology would occur under the proposed project. Conversely, under this No Action Alternative, the benefits of the proposed project on local surface water hydrology, including reduced local street and property flooding, would not be realized.

WATER QUALITY

The proposed BMPs would reduce sediment and other pollutant loadings thereby providing water quality benefits in stream channels and receiving waterbodies, including the Lower Bay. Under the No Action Alternative, uncontrolled and unfiltered stormwater runoff would continue to flow into streams and wetlands throughout the watershed. This alternative would therefore continue to contribute to degraded local water quality, erosion, and sedimentation impacts on wetlands. Thus, the water quality benefits of the proposed project would be foregone under this alternative.

WETLANDS

Under the No Action Alternative, the net increase in wetland acreage that would result from the proposed project would not be achieved. In addition, the removal of fill and regrading of existing wetlands would be foregone, as would the benefits associated with these activities, including increased open water habitat and expanded native plantings. The No Action Alternative would not impact tidal wetlands. Under the proposed project, any potential temporary or permanent wetland impacts from the proposed outfalls would be addressed with a compensatory wetland replacement plan as part of the proposed project and coordinated with NYSDEC such that no adverse impacts would occur.

VEGETATION AND TREES

Under the proposed project, removal of woodland stands and tree loss is generally limited with the exception of BMPs NC-6: Boundary Avenue and NC-11: Last Chance Pond in the New Creek watershed. Under the proposed project, trees and woodlands would be cleared to create or expand and diversify wetlands (e.g., open water and emergent marsh). This clearing would occur within the interior of smaller wooded sites, in the uplands and within wet woods. In addition, the proposed project would include a tree replacement plan that would be implemented for the removal of trees (this plan would be based on final site surveys and the proposed BMP designs). In addition, the final design of these two BMPs would be based on additional data to be gathered as part of the final design (e.g., site topography, survey of trees, natural resources investigations, opportunities for plant rescue), that would be used to further minimize impacts to habitats. In the No Action scenario, this clearing and the need for tree replacement would not occur under the. these sites would not be provided with stormwater management or the diverse habitats of the proposed BMPs, nor would the BMP sites be disturbed by clearing and grading (see also the alternative below, “Alternative Drainage Plan Design: Elimination of Upstream Detention at BMPs NC-6 and NC-11”).

WILDLIFE

The proposed project would benefit wildlife including avian and water-dependent species through expanded wetlands and improved habitats associated with the proposed BMPs. Under the No Action Alternative, this benefit would not occur. While the proposed BMPs may

potentially disturb sites of protected wildlife or plant species, mitigation measures would be implemented to avoid potential impacts.

The proposed project would also provide a greater variety of aquatic habitats, including extended shorelines and deep pools, that would benefit fish, aquatic wildlife, and wading birds that may feed upon these resources. Under the No Action Alternative this benefit would not occur. Rather, aquatic habitats would be expected to further decline due to continued uncontrolled runoff and the associated erosion, sedimentation and water quality impacts. This alternative would also not have any BMP impacts on fish passage along the lower watershed streams, but it is assumed the existing streams of the lower Mid-Island watersheds would remain tide gate controlled through the existing outfalls. The proposed project includes mitigation measures that would avoid BMP impacts on fish passage.

The proposed project would also reduce the potential for brush fires and provide firebreaks against brushfires that currently occur and affect wildlife habitat. This benefit would also be foregone under the No Action Alternative.

TIDAL WETLANDS

This alternative would not have impacts on tidal wetlands. The proposed project would have impacts on tidal wetlands due to the proposed outfalls. However, the proposed project includes a tidal wetland restoration plan that would fully mitigate these impacts.

HAZARDOUS MATERIALS

Under this No Action Alternative, areas determined to have the potential to contain hazardous materials would not be disturbed. Under the proposed project, these locations would be tested in accordance with DEP protocols prior to construction. All testing would be approved by DEP and performed in accordance with a DEP-approved Health and Safety Plan. If contaminated materials are found, they would be removed and disposed of in accordance with all City, State, and Federal regulations. In addition, the proposed project would handle contaminated groundwater in accordance with all regulations. Implementation of these measures as part of the proposed project would fully address any potential for significant adverse impacts due to hazardous materials. Thus, while no potentially contaminated areas would be disturbed under the No Action Alternative, any potential impacts under the proposed project would be avoided.

CONSTRUCTION IMPACTS

Under the proposed project, there would be phased construction activity with multiple capital projects to be implemented throughout the three watersheds. Erosion and sediment control, noise and air quality controls, and protection of wetlands and adjacent areas would be included as part of the proposed project to avoid construction period impacts. Under the No Action Alternative, no construction would occur, the sites of the proposed BMPs would remain undisturbed and there would not be any construction period impacts. However, with the proposed project, all construction controls would be in place to minimize or avoid construction-period impacts such that no significant impacts would occur.

C. CONVENTIONAL PIPED STORM SEWER SYSTEM (THE POTTER PLAN ALTERNATIVE)

DESCRIPTION

This alternative compares impacts under the proposed project to those with a conventional piped storm sewer system, assuming it was installed in accordance with the current drainage plan for the Mid-Island area from the 1960s. That plan, drafted by Alexander Potter and referred to as the “Potter Plan,” calls for storm and sanitary sewers in all streets, and the piping of streams and watercourses. The Potter Plan was designed without regard to existing natural resources. This conventional drainage plan design would directly impact natural resources by draining and filling wetlands and eliminating the associated wildlife habitat on a large scale throughout each of the Mid-Island watersheds. Given current regulatory controls at the City, State, and Federal levels intended to protect wetlands and watercourses, it is unlikely that such a proposal would move forward. However, this alternative is presented for comparison with the proposed project.

LAND USE, ZONING, AND PUBLIC POLICY

While the Potter Plan would relieve flooding and erosion through stream connections and subsurface pipes, it would do so by substantially diminishing the remaining wetlands and woodlands, due to the installation of infrastructure in all mapped streets. Without the loss of these natural features, drainage would also be altered and adjacent lots could be cleared and developed for residential or commercial uses. Therefore, this alternative could also reduce additional wetlands as a secondary impact in the Mid-Island watersheds with added residential and commercial development. The Potter Plan alternative would be inconsistent with zoning and public policy because the special districts that comprise the Mid-Island area and the WRP both encourage the protection of natural resources, open space and water quality. In contrast, the proposed amended drainage plans are consistent with these policies. The proposed project would build upon DEP’s Bluebelt Program by preserving and restoring wetlands and watercourses for the conveyance of stormwater and natural resource values.

OPEN SPACE

Completion of the street grid under the Potter Plan would be expected to alter the watershed open spaces given the extent of mapped streets and infrastructure that would be constructed. This alternative would not enhance and preserve natural features such as wetlands, but would pipe stormwater through parkland, without the drainage, velocity control, or filtering benefits of BMPs. Thus, impacts on woodlands and trees would occur as mapped streets are built-out—the extent of impact would depend on the length of mapped streets through designated open spaces.

The proposed project generally has limited impacts on trees in open spaces with the exception of BMPs NC-6: Boundary Avenue and NC-11: Last Chance Pond. The proposed project would also would preserve and restore existing wetlands and watercourses in existing natural areas and open spaces while reducing flooding and erosion in the watershed. While the proposed project would require construction of stormwater facilities in certain natural area parks, all BMPs would be integrated into the existing ecological setting to the greatest extent possible. Moreover, the proposed project would add hundreds of acres of protected wetlands in the watersheds, thereby supporting and enhancing existing protected natural area open spaces.

HISTORIC AND CULTURAL RESOURCES

Under the proposed project, there would be no impacts on historic architectural resources. However, there would be limited potential impacts to archaeological resources at several locations under the proposed project. Under the Potter Plan Alternative, more extensive subsurface disturbance would occur as compared to the proposed project with the potential for more extensive impacts. However, similar to the proposed project, the Potter Plan would be expected to include the necessary archaeological investigations and all work would be performed in accordance with reviews and approvals by LPC and SHPO, as necessary. Therefore, neither the proposed action nor the Potter Plan Alternative would result in potential significant adverse impacts historic and cultural resources.

URBAN DESIGN VISUAL CHARACTER

Under this alternative, the widespread construction of streets, sewers, and other hydraulic structures would result in substantial losses of wetlands, woodlands, and trees and would substantially alter the visual character of the Mid-Island area. The proposed project would clear vegetation and trees, both in early successional woodlands and in some mature woodlands. However, the proposed amended drainage plans would generally limit this clearing to the proposed BMP sites and would provide enhanced and expanded wetlands, rather than streets, which would occur under this alternative. At proposed BMP NC-6: Boundary Avenue and proposed BMP NC-11: Last Chance Pond, the proposed project would include the conversion of the mature interior woodlands to open water or high and low marsh wetlands. Visually and ecologically, these sites would be graded and planted as natural yet diverse landscapes and perimeter trees would be preserved, to the greatest extent feasible, under the proposed project. In addition, the proposed BMP plantings and debris removal would enhance and improve the visual character of the area. Under the Potter Plan Alternative, sewers and streets would replace such landscapes and this benefit would be foregone under this alternative

The Potter Plan also calls for many streets to be raised substantially above the current street grade. In many instances, these street raisings would be as much as seven feet above existing street elevations. These widespread street grade raisings would leave many existing houses and yards at elevations well below the street elevation and significantly alter views along the streetscape and from adjacent properties. Thus, this alternative would have a potential significant adverse impact on visual character and urban design, whereas the proposed project would not.

NATURAL RESOURCES

HYDROLOGY

The Potter Plan Alternative would reduce flooding in the watersheds, but through a piped system rather than through BMPs and wetlands. Moreover, the Potter Plan, with only standard outfalls discharging into the Lower Bay, would not relieve flooding to the same extent as the proposed project because each of the proposed outfalls would be equipped with tide gates to prevent tidal influences. Therefore, during high tide events, stormwater runoff would continue to collect in the system and surcharge during storm events with the associated flooding of local streets and private properties. Under this alternative, only during low tide would upstream stormwater drain into the Lower Bay. In contrast, under the proposed amended drainage plans, stormwater would be stored in the lower watershed extended detention BMPs until such time as the tide recedes and the tide gates open. Therefore, the proposed project would relieve flooding throughout the

watershed in comparison to the more limited flood control capabilities of the Potter Plan design. Thus, under a conventional sewer system, these benefits would be foregone.

The Potter Plan would also significantly alter natural hydrology and wetland systems. Under this alternative, runoff to streams is replaced by storm sewers and associated wetlands would be impacted with extensive landfilling and excavation for sewer installation. Under the proposed amended drainage plans, improvements would be consolidated on specific sites and implemented in conjunction with a wetland planting program. Moreover, stormwater flows would be attenuated to within acceptable velocities through outlet stilling basins, extended detention basins and velocity attenuators. Overall, the same volume of stormwater would reach the streams. However, with the proposed amended drainage plans, this volume would be controlled with a regulated release, such that flooding and erosion impacts would be reduced. As compared to the Potter Plan, the proposed project would not have potential significant adverse impacts on hydrology.

In addition, as stated above, the Potter Plan would require many street raisings, as much as seven feet above existing street elevations in some cases. These widespread street raisings would leave many existing houses in depressions that would be subject to continued localized yard flooding.

WATER QUALITY

The Potter Plan Alternative would eliminate most existing streams and ponds and would directly discharge unfiltered stormwater into Lower Bay. This alternative would therefore forego eliminate all pollutant removal features and the associated water quality benefits of the proposed project.

WETLANDS

The Potter Plan Alternative would result in a substantial loss of freshwater wetlands as compared with the increases in wetland acreage and the qualitative enhancements of the proposed project. Under this alternative, wetlands within all mapped streets would be filled with storm sewers for the full build –out of mapped streets. Wetland resource values throughout Mid-island would therefore be eliminated. Thus, the loss of freshwater wetlands under this alternative would be a significant adverse impact to natural resources that would not occur under the proposed project. For wetlands not directly impacted, the Potter Plan would severely reduce surface water flow to the wetlands that would also indirectly impact additional acres of wetlands by draining them and eliminating hydrologic inputs. Overall, the natural resource impacts of this alternative would be significantly adverse. In contrast, the proposed amended drainage plans protect, enhance, and expand freshwater wetlands. Both this alternative and the proposed project would have temporary and permanent impacts on tidal wetlands that would need to be addressed with a compensatory wetland restoration plan.

VEGETATION AND TREES

Under the proposed project, clearing and tree loss is generally limited with the exception of woodland areas, at BMPs NC-6: Boundary Avenue and NC-11: Last Chance Pond in the New Creek watershed. With the proposed project, this clearing would be for the purposes of creating diverse and enhanced wetlands at the proposed BMP sites (e.g., creating open water and emergent marsh). In contrast, the Potter Plan Alternative would need to undertake similar clearing measures but to complete the sewer grid and the affected areas would be replaced by streets or cleared corridors that would not provide any replacement vegetation or trees. Thus, the

impacts of this alternative with respect to vegetation and trees are significantly greater and more adverse than the impacts of the proposed project.

WILDLIFE

The proposed project would benefit wildlife including avian and water-dependent species through the expanded wetlands and improved habitats associated with the proposed BMPs. Under the Potter Plan, this habitat would be eliminated and the benefits of the proposed project would not occur. While the proposed BMPs may potentially disturb sites of protected wildlife or plant species, mitigation measures would be implemented to avoid potential impacts. The Potter Plan would eliminate habitat and would not provide this mitigation.

The proposed project would also provide a greater variety of aquatic habitats, including extended shorelines and deep pools, that would benefit fish, aquatic wildlife, and wading birds that may feed upon these resources. Under the Potter Plan, no such features would be provided and this alternative would have a significant unmitigated adverse impact on wildlife, particularly aquatic wildlife.

TIDAL WETLANDS

Both this alternative and the proposed project would have impacts on tidal wetlands due to the proposed outfalls. However, the proposed project includes a tidal wetland restoration plan that would fully mitigate these impacts.

HAZARDOUS MATERIALS

The Potter Plan Alternative, similar to the proposed project, would require construction in areas of potential hazardous materials. With both the proposed project and this alternative, soil and groundwater testing as well as removal and disposal of contaminated soils would comply with Federal, State and City rules and regulations. With these measures in place, neither the proposed project nor this alternative would be expected to have potential significant adverse impacts on hazardous materials.

IMPACTS DURING CONSTRUCTION

Under the proposed project, there would be phased construction activity throughout the three watersheds, in addition to the surrounding areas. Erosion and sediment control, noise and air quality controls, and protection of wetlands and adjacent areas would be implemented. Under the proposed project, all construction controls would be in place to minimize any impacts such that no significant impacts would occur.

Under the Potter Plan Alternative, considerably widespread infrastructure installation in streets and open spaces would be required. In addition, extensive construction activities would be necessary to implement the Potter Plan in full. For example, this alternative would require construction in all mapped streets throughout Mid-Island with widespread filling of waterbodies and streams that would result in significant water quality impacts during construction and loss of habitat without the replacement of equal or improved ecological values.

D. ALTERNATIVE DRAINAGE PLAN DESIGN: ELIMINATION OF UPSTREAM DETENTION AT PROPOSED BMPS NC-6: BOUNDARY AVENUE AND NC-11: LAST CHANCE POND

DESCRIPTION OF THE PROPOSED ALTERNATIVE

Under this alternative, the extended detention wetlands at BMPs NC-6: Boundary Avenue and NC-11: Last Chance Pond would not be included in the proposed amended drainage plans which would reduce related tree clearing and grading at these two sites. This alternative includes the necessary storm sewer outlets for the upstream piped systems at these locations (see Figures 4.1-8 and 4.1-11 of Chapter 4.1 “New Creek Drainage Plan Project Description”). However, the area of impact would be reduced to that shown on **Figure 7.1-1** and the BMPs would provide conveyance only.

BMPs NC-6 and NC-11 are located at the head of the West Branch and Main Channel of the New Creek system, respectively, and handle a combined drainage area of 286 acres. Thus, about 40 percent of the total drainage area for the West Branch and Main Channel flows through these two locations. Under the proposed project, proposed BMPs NC-6 and NC-11 would provide about 20 percent of the required stormwater storage for the lower watershed. Both sites are located at higher elevations than the lower watershed where the downstream topography is flat with elevations generally within two feet of mean high tide and opportunities to provide significant stormwater storage are limited. Under this alternative—with no detention assumed at these two sites—the resulting downstream hydrology would be significantly modified without flood prevention. A comparative assessment of this alternative with the proposed project with respect to natural resources impacts is presented below.

NATURAL RESOURCES IMPACTS

HYDROLOGY

Figure 7.1-2 shows the areas in the lower watershed along the West Branch and Main Channel that are at the lowest elevations in the watershed and thus have the greatest potential to be flooded under the proposed project and this alternative. Under existing conditions, all areas—containing a total of 115 homes (**Table 7.1-1**)—are subject to flooding during the 10-year storm event. Under the proposed project, flooding of these properties is reduced or eliminated because peak water surface elevations are reduced. Under the alternative, the loss of upstream stormwater detention at BMPs NC-6 and NC-11 would increase peak stage water elevations by 12-20 percent, thereby moderately to significantly increasing the risk of flooding in Area A (51 homes), as well as slightly increasing the risk of flooding in Area B (64 homes) based on existing conditions.

Berms would be necessary downstream to address the increased flood risk and would have to be higher and longer with lengthened periods of ponding in adjacent properties as compared to the proposed project.

At both locations, the delay in peak flow provided by the BMPs would be significantly reduced. With no extended detention at proposed BMP NC-6, storm flows would reach Midland Avenue with almost no delay, rather than a 3-hour delay provided by the proposed project. For NC-11, the travel time for flows reaching Hylan Boulevard would be reduced to about 1.5 hours rather than the 6.5 hours provided by the proposed project. This would result in peak flows reaching the downstream reaches of the West Branch and Main Channel much faster, thereby increasing the likelihood of downstream surges, erosion and flooding.

**Table 7.1-1
Homes Located within Areas of Flooding Concern along the
West Branch and Main Channel of New Creek**

Location	Description	# of Homes
Area A	Below El. 0	51
Area B	Below El. 0-El.1	64
<p>Note: All elevations are Staten Island datum. Zones do not include the areas within existing stream banks or within proposed BMP areas.</p> <p>Source: Hazen and Sawyer, March 2011.</p>		

An additional impact would be that flows from the proposed BMP would have higher velocities and, therefore, carry greater sediment loads than under the proposed project. This would contribute to streambank scour and erosion along the downstream channels. This is a particular concern for the West Branch, where directly downstream from proposed BMP NC-6 there are recreational fields and 11 homes located in close proximity to the stream channel. These uses are currently outside of the flood concern areas during the design storm, but could be at risk if the stream banks were destabilized and widened due to faster flows and scouring under this alternative. The increased sediment load downstream of NC-6 and NC-11 would also trigger additional maintenance along the West Branch and Main Channel.

Assuming that the elevations of the drainage pipes are as high as possible given existing topography and similar to the proposed project, this alternative would increase peak water surface elevations in the BMPs downstream. As a consequence, the downstream outlets for the proposed BMPs would be further submerged and those peak elevations would back up into the sewers, reducing the capacity of the tributary piping and potentially resulting in street flooding. To restore this lost capacity, pipes and streets would need to be raised. (Street raising impacts on hydrology are discussed in Chapters 3.9, 4.9, and 5.9.)

WATER QUALITY

Under this alternative, the proposed BMPs in the lower watershed would not be large enough to offset the elimination of upstream stormwater detention. This would reduce the overall settling time in the BMPs, potentially impacting downstream water quality and diminishing the quality of the water discharged to the Lower Bay from the New Creek watershed.

WETLANDS

Under the proposed project, wetlands are expanded at proposed BMP NC-6: Boundary Avenue with no net change in wetland acreage at proposed BMP NC-11: Last Chance Pond. At proposed BMP NC-6, NYSDEC wetlands are expanded by about 3 acres (no NYSDEC wetlands are currently mapped at this site) and NWI wetlands would be expanded by about 1.6 acres (based on the current NWI wetland limits and adding in the expanded wetlands of the proposed BMP). Under the alternative, the wetland addition at proposed BMP NC-6 would be limited with only the channelized streams from the proposed stormwater outlets across the Boundary Avenue site. Under this alternative there would also be the disturbance of wetlands at Last Chance Pond, although the area of disturbance would be less.

VEGETATION AND TREES

With respect to vegetation and trees, the tables below present a comparison in the cover types and tree removal under the proposed project and with this alternative. As shown in these tables, the extent of the proposed clearing would be reduced to about 1.1 acres at NC-6 (about 1.8 fewer acres of clearing than the proposed project) and about 2.2 acres at NC-11 (about 7.8 fewer acres). As would be expected, this reduction in clearing would have a corresponding reduction in estimated tree clearing compared to the proposed project (see **Tables 7.1-2** through **7.1-5**). However, in both this alternative and in the proposed project, tree clearing would be necessary at both sites, and DEP would coordinate with DPR in both the final design of the proposed BMP as well as a tree mitigation plan.

Table 7.1-2

Comparative Changes in Vegetative Cover--BMP NC-6: Boundary Avenue (Proposed Project and No Upstream Detention Alternative)

Vegetative Cover	Estimated Total Acres	Estimated Impact Acreages (proposed project)	Estimated Impact Acreages (no extended detention alternative)	Net Change
Freshwater watercourse	0.18	0.18	0.18	0.00
Successional southern hardwood (with red maple)	0.74	0.58	0.28	-0.30
Successional southern hardwood	0.94	0.47	0	-0.47
Red maple/hardwood swamp	1.37	0.65	0.31	-0.34
Terrestrial (successional woodland of street edge an vacant lot)	0.84	0.74	0.34	-0.40
Coastal oak/hickory woodland	1.79	0.33	0	-0.33
Totals	5.86	2.95	1.11	-1.84
Notes: Estimates were calculated using ArcMap Version 9.3.1 and were based on aerial photographs, field observations, <u>site surveys</u> , and the proposed BMP NC-6 <u>schematic design (July 2013)</u> .				
Sources: AKRF, Inc., and Hazen and Sawyer, July 2013.				

Table 7.1-3
Comparative Tree Clearing Estimates--Proposed BMP NC-6 Boundary Avenue
(Proposed Project and No Upstream Detention Alternative)

Ecological Community	Estimated Total Trees (proposed project)	Estimated Total Trees (no extended detention alternative)	Net Change
<u>Coastal oak/hickory forest</u>	35	0	-35
<u>Terrestrial (successional woodland of street edge and vacant lot)</u>	78	43	-35
<u>Successional southern hardwood</u>	43	0	-43
<u>Successional southern hardwood (with red maple)</u>	51	23	-28
<u>Red maple/hardwood swamp</u>	32	15	-17
<u>Watercourse</u>	0	0	0
Total	239	81	-158
Notes: <u>Estimates were calculated using based on site surveys (May 2012), and the proposed BMP NC-6 schematic design (July 2013).</u>			
Sources: <u>AKRF, Inc., and Hazen and Sawyer, July 2013.</u>			

Table 7.1-4
Comparative Changes in Vegetative Cover--Proposed BMP NC-11:Last Chance Pond (Proposed Project
and No Upstream Detention Alternative)

Ecological Community	Estimated Acreages (existing)	Estimated Proposed Impact Acreages (proposed project clearing and grading)	Estimated Impacted Acreages (no extended detention alternative)	Net Change
<u>Red maple/hardwood swamp (red maple/sweet gum dominated)</u>	6.64	4.80	1.10	-3.70
<u>Terrestrial (modified street edge and successional fields)</u>	3.37	1.14	0.16	-0.98
<u>Red maple/hardwood swamp (silver maple dominated)</u>	0.88	0.17	0	-0.17
<u>Shallow emergent marsh (common reed dominated)</u>	2.85	2.56	0.38	-2.18
<u>Shallow emergent marsh (arrow arum dominated)</u>	0.67	0.67	0.08	-0.59
<u>Terrestrial (successional old field)</u>	0.17	0.06	0	-0.06
<u>Riverine (marsh headwater stream, modified)</u>	0.65	0.64	0.49	-0.15
<u>Total</u>	15.23	10.04	2.21	-7.83
Notes: <u>Estimates were calculated using ArcMap Version 9.3.1 and were based on aerial photographs, field observations, site surveys, and the proposed BMP NC-11 schematic design (July 2013).</u>				
Sources: <u>AKRF, Inc., and Hazen and Sawyer, July, 2013.</u>				

Table 7.1-5

Comparative Tree Clearing: Proposed BMP NC-11 Last Chance Pond (Proposed Project and No Upstream Detention Alternative)

Ecological Community	Estimated Total Trees (proposed project)	Estimated Total Trees (no extended detention alternative)	Net Change
Red maple/hardwood swamp (red maple/sweet gum dominated)	448	127	-321
Terrestrial (modified street edge and successional fields)	108	23	-85
Red maple/hardwood swamp (silver maple dominated)	28	0	-28
Shallow emergent marsh (common reed dominated)	22	0	-22
Shallow emergent marsh (arrow arum dominated)	0	0	0
Terrestrial (successional old field)	1	0	-1
Riverine (marsh headwater stream, modified)	10	8	-2
Total	617	158	459
Notes: Tree clearing estimates are based on survey data (June 2012) and BMP schematic design (July 2013). Source: Hazen and Sawyer, July, 2013.			

Compared to the proposed project, this alternative would not provide the expanded aquatic habitats of the proposed BMPs. At the same time, however, this alternative would not require the clearing of trees and woodland stands that would result in loss of habitat for avian species. This alternative would also not submerge and replace wooded groundcover and the current habitat that is provided at these sites for amphibians and birds.

In sum, under this alternative, there would be increased risk of flooding and downstream bank destabilization, both of which put property at risk, along with a decrease in water quality, as compared with the proposed project. Additionally, contemporary stormwater design practice dictates that detention should be distributed throughout the watershed to the greatest extent possible, which would not be achieved under this alternative. Removing the upstream storage would overburden the downstream stream channels and BMPs, increasing risk to homeowners, properties, roadways and stream banks if failure occurs at any point within the New Creek stormwater management system. Disturbance of woodlands and trees at BMPs NC-6 and NC-11 would still be necessary in order to accommodate stormwater conveyance from the upstream drainage area. Finally, with minimal wetland creation, habitat diversity would not be achieved.

E. EXPANDED GREEN INFRASTRUCTURE ALTERNATIVE

In September 2010, New York City released the NYC Green Infrastructure Plan which presents an alternative approach for improving harbor water quality by integrating green infrastructure practices (such as rain gardens and green roofs) with investments that optimize existing sewer systems by building targeted cost-effective “gray” or traditional infrastructure.

With respect to stormwater management, a critical goal of the NYC Green Infrastructure Plan is to capture and manage the first inch of rainfall on 10 percent of the impervious surfaces in combined sewer watersheds. The City seeks to achieve this goal through the implementation of detention and retention green infrastructure practices or BMPs. These include Right-of-way Bioswales, Stormwater Greenstreets, green roofs, rain gardens, and permeable pavers that are designed and constructed to collect and manage stormwater runoff from impervious surfaces such as streets, sidewalks, and parking lots. DEP is building green infrastructure in compliance

with NYSDEC requirements to reduce combined sewer overflow (CSO) discharges into New York City waterways.

Green infrastructure can store and slow the runoff contribution to the combined sewer, thereby freeing up capacity in the system during rain events. After the peak of the storm has passed, stored water is released to the combined sewer system and conveyed to wastewater treatment plants for pollutant removal prior to discharge into receiving waters. Under the City's plan, green infrastructure has been utilized as a CSO reduction tool and thus would not be suitable for Staten Island, which is largely separately sewerred. In addition, Bluebelt BMPs would achieve similar benefits as the BMPs installed under the *NYC Green Infrastructure Plan* while also reducing flooding and erosive velocities, and improving water quality. Finally, green infrastructure would not be a suitable replacement for Bluebelt BMPs because green infrastructure practices are not large enough to store the volume of water necessary to prevent downstream flooding. Therefore, incorporating elements of the *NYC Green Infrastructure Plan* would not be a viable alternative to the proposed project.

F. BMP NC-11: LAST CHANCE POND FLOW DIVERSION ALTERNATIVES

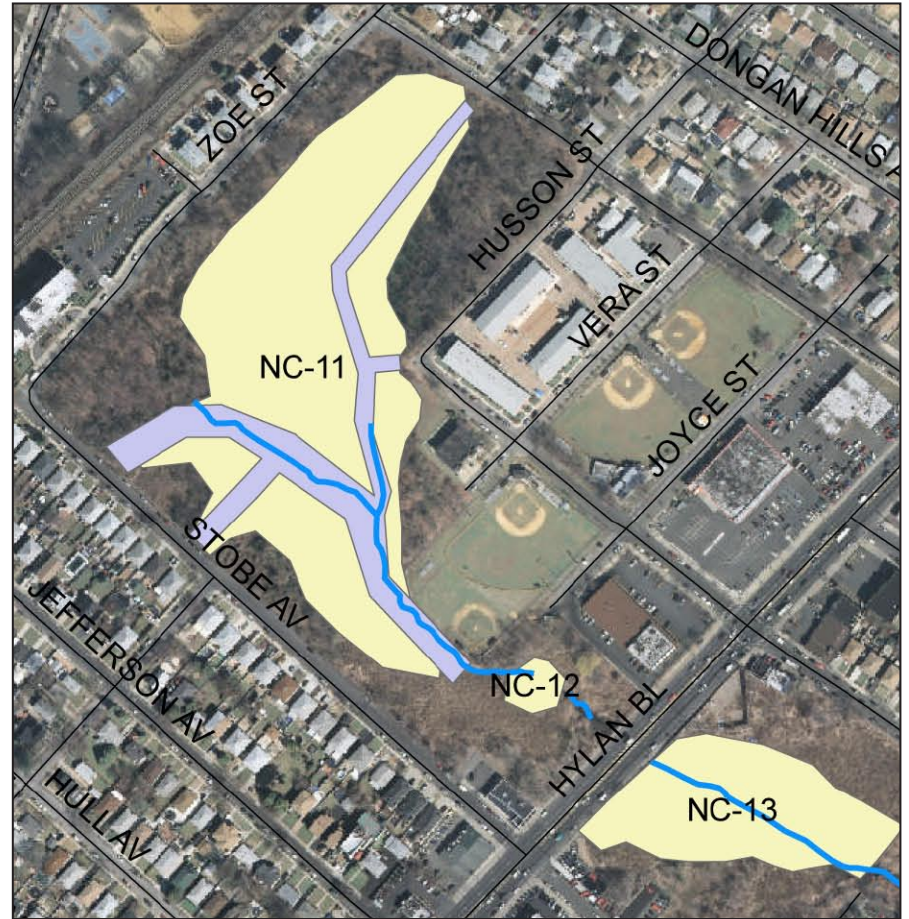
Two flow diversion alternatives were examined for the subdrainage area of BMP NC-11: Last Chance Pond. Both alternatives were developed with the assumption that the storm sewer designs or the proposed drainage plan could be modified with the objective of diverting some portion of the storm flow away from proposed BMP NC-11, thereby achieving a smaller BMP footprint and reducing wetland disturbance. Hydrologic modeling of both alternatives was used to determine potential changes in watershed hydrology and potential natural resources impacts in the watershed with these alternatives.

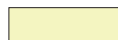


Under the first alternative, it is assumed that a flow splitter would be installed at the intersection of Zoe Street and Stobe Avenue to reduce flow into the proposed outfall on Stobe Avenue and redirect that flow towards Naughton Avenue. Additionally, the outfall at Cletus Street and Naughton Avenue would be eliminated. Together, these modifications would divert approximately 30 percent of the flow towards the East Branch of the New Creek watershed, which would have entered Last Chance Pond under the proposed project. This alternative maximizes the flow into the existing Naughton Avenue storm sewer downstream of Husson Street so that no new storm sewer would be needed on Naughton Avenue below Husson Street. In order to accommodate the flow from Zoe Street, the existing storm sewer at Buel Avenue and Husson Street could not be directed towards the Naughton Avenue storm sewer via Dongan Hills Avenue, and instead would have to continue down Buel Avenue. Therefore, this alternative requires upsizing the existing storm sewers to a 6-foot by 4-foot box sewer along Zoe Street and Naughton Avenue upstream of Husson Street, as well as upsizing the sewers along Buel Avenue, and downsizing pipes along Dongan Hills Avenue between Husson Street and Hylan Boulevard. Moreover, hydrologic modeling indicates that with this alternative there would only be a minor reduction in the peak surface water elevation with this alternative (a 2-inch reduction at BMP NC-11 and an approximately 1-inch reduction at other locations along the West Branch and Main Channel) with a 1-inch increase in the peak water surface elevation along the East Branch. Therefore, given this minimal reduction in surface water elevation, the footprint of BMP NC-11 would not be reduced and would be nearly identical to the proposed BMP footprint; thus, the natural resource impacts would be the same under this alternative as with the proposed project.

Mid-Island Bluebelt EIS

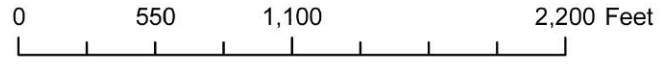
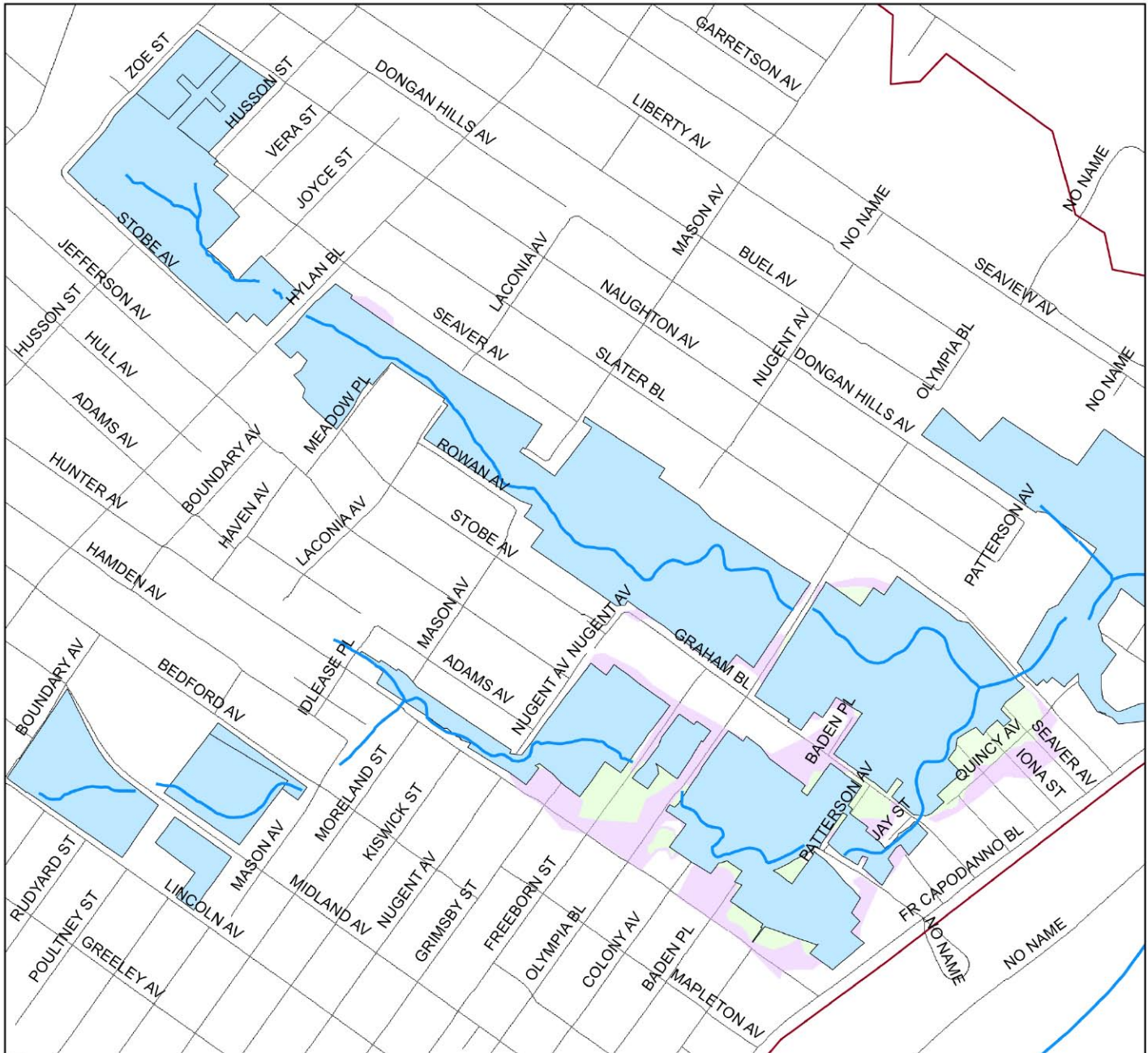
The second alternative would divert the majority of the storm flow from the proposed BMP NC-11 Stobe Avenue outfall south of Zoe Street to the East Branch. Under this alternative, the majority of storm flow would be rerouted along Zoe Street to Dongan Hills Avenue into BMP NC-18: Patterson Avenue. The hydrologic model indicates that under this alternative, the peak vertical water surface elevation would be reduced by approximately one foot at BMP NC-11 and would slightly increase by approximately two inches at BMP NC-18 in the East Branch. This alternative both reduces the extended detention volume at BMP NC-11 and the footprint by approximately one acre, which is approximately 11 percent less than the proposed 8.8 acre design. This design alternative would potentially reduce impacts to existing red maple swamp habitat in the northwest portion of the proposed BMP site. However, this alternative would require the clearing and grading of the remaining 7.8 acres including the wetlands in the central portion of the site. In addition, this alternative would require an expansion of BMP NC-18 to incorporate the wetlands north of Olympia Boulevard, thereby increasing that BMP footprint by approximately two acres. Moreover, the flow diversion under this alternative would require over 4,600 linear feet of double-barrel 8-foot by 6-foot box sewer along Dongan Hills Avenue, an additional siphon under an existing water main in Hylan Boulevard, and the excavation of approximately two additional acres at BMP NC-18, which would add considerable costs. In addition to the costs, there would be constructability issues with the proposed sewer routing on Dongan Hills Avenue. Foremost, Dongan Hills Avenue is a narrow street which may preclude installation of a large double-barrel storm sewer. The existing street elevations may also not allow the required street cover over the pipe. Installation of the large 8-foot-wide double barrel storm sewer may also necessitate installation of a parallel sanitary sewer and increase potential conflicts with other utilities, such as water, gas and electric lines, all of which decrease the engineering feasibility of this alternative while substantially increasing the costs.

In sum, these two alternatives represent efforts to reduce the footprint and natural resource impacts at the proposed BMP NC-11: Last Chance Pond by reconfiguring the drainage plan. The first alternative would divert 30 percent of the stormwater flow out of Last Chance Pond while the second alternative would divert a majority of the flow. Neither alternative, however, would allow for a sizable reduction in the size of the proposed BMP. In addition, the second alternative is not viable from an engineering or cost perspective. *



-  *BMP Footprint with Proposed Project*
-  *Area Impacted Under this Alternative*
-  *Existing Stream Channel*

Alternative for BMPs N-6 and NC-11
without Extended Detention
Figure 7.1-1



Legend

- DEP-DPR Bluebelt Properties
- Area A (below EI 0): Primary Flooding Risk
- Area B (EI 0 to EI 1): Secondary Flooding Risk

Areas in Lower Watershed of New Creek Where Flood Risk Will Increase From Proposed Project to Alternative of Extended Detention Without BMPs NC-6 and NC-11