Chapter 20: Construction

A. INTRODUCTION

OVERVIEW

This chapter describes a preliminary construction and phasing plan for the proposed park, presents a description of associated construction activities during those phases and assesses potential construction-related impacts for the proposed Fresh Kills Park project. Where possible, the discussion has been organized into the two key components of project construction, that being the construction of park elements such as recreational and cultural facilities and landscapes, and the construction of road elements, including park roads, bridges, and viaducts. Both have separate construction phases and require different construction techniques.

The proposed project involves construction activities that would occur over an extended period of approximately thirty years. The long-term nature of the project is due, in part, to the complexity of the construction program, the need to coordinate with DSNY's closure construction for Landfill Sections 6/7 and 1/9, the long-term monitoring and maintenance program, and the capital costs of implementation. As would be expected, intensity of construction activity varies over time and depends on the particular construction phase. However, while the construction period is lengthy, this extended construction phasing over many years also has the effect of limiting construction impacts for individual capital projects, e.g., North Park Phase A. In addition, the size of the project site and its access to regional highways allows this project to stage the major construction activities within the site and provides significant buffers between the project site and the surrounding neighborhoods. A description of the construction period and potential impacts of the proposed project follows.

CEQR TECHNICAL MANUAL GUIDELINES

The *CEQR Technical Manual* states that construction impacts, although temporary, can include noticeable impacts, such as traffic and noise. The degree of the impact is generally dependent on the duration and magnitude of construction. The predominant concerns relative to construction impacts are traffic-related impacts from construction employees and truck traffic or due to street or lane closings for utility installations that may be occupied by cranes or other heavy equipment; air quality that may be affected by mobile source emissions from trucks and vehicular traffic as well as dust due to earth moving operations (i.e., clearing, grading, excavatory filling) or on-site operations (e.g., a concrete batching plant or soil making operation); noise associated with blasting, pile driving, or other construction activities; and disturbance of soils or groundwater that may contain hazardous materials or impact natural resources.

While the proposed project would have a long construction period, the proposed park would largely be constructed in smaller individual components over time and the proposed roads would be constructed within a two- to three-year window.

Because of the extended construction period, this chapter is comprehensive and includes impact analyses in the areas with the greatest potential for adverse impacts during construction, including:

- Land use and neighborhood character, which is a construction period analysis that is typically prepared when a construction activity is going to affect a property for an extended period of time. This analysis will determine whether the type and duration of affect could affect local land uses and neighborhoods.
- Historic resources that may be potentially affected because of the presence of any historic architectural resources in the area that could be affected by vibration as well as the potential impacts to archaeological resources.
- Natural resources and water quality for activities that would be occurring in wetlands and along water bodies as well as runoff from sediments and the activities that generate sediments such as excavation, grading and exposed soils areas.
- Hazardous materials issues as they relate to soil and groundwater conditions as well as demolition of existing structures.
- Traffic and parking, particularly along major truck routes and vehicle corridors serving the project site as well the potential to impact any street or lane closings. A quantified or detailed study of traffic is usually only undertaken for projects with long construction periods and where traffic during construction could have measurable impacts that are comparable or greater than a project impact for an extended duration. Additional considerations are street or lane closures for cranes and other types of construction activity that may occur in a built City street; also possible are temporary diversions or full or partial street closings.
- Air quality from mobile sources such as increased vehicle and truck traffic, on-site construction equipment and fugitive dust emissions caused by demolition, excavation, and other construction activities as well as stationary sources such as concrete batching plants.
- Noise from mobile sources and heavy equipment operations on the site (e.g., compressors, pile drivers, and gas- and diesel-powered engines).
- Solid waste and the disposal of construction debris.
- Public health.

The determination of impact significance for construction impacts is based on the same criteria as the technical analyses prepared for each of these EIS technical areas (see the preceding chapters). However, since construction impacts are often short-term, the impacts can be described as temporary and, for that reason, not significant.

With respect to other EIS technical areas not cited above, the proposed project would provide significant construction jobs, but would not adversely impact local businesses, nor would it adversely impact any local community facilities or services, or local open spaces. Few transit or pedestrian trips are expected and therefore these technical areas are not analyzed. In addition, while the proposed project would require connections to infrastructure, these connections are expected to be standard utility connections to provide site service extensions or upgrade water, sewer, and electrical service to the site and therefore no significant impacts on infrastructure are expected during construction.

A construction impact analysis typically begins with a description of the anticipated construction activities and phasing, where construction staging would occur, and for multiple phase projects the equipment and activities associated with each phase. This information serves as the basis for describing and analyzing construction impacts. The phasing analysis for this project can also be

broken down both temporally and geographically. Measures necessary to address potential impacts during construction are discussed in Chapter 23, "Impact Avoidance Measures and Mitigation."

As discussed in Chapter 1, "Project Description," there are two analysis years in this GEIS, 2016 and 2036. The following sections focus on the potential for adverse impacts during construction for those periods, as appropriate.

B. DESCRIPTION OF PROPOSED CONSTRUCTION PROGRAM

PROJECT IMPLEMENTATION AND PHASING

As described above, Landfill Sections 3/4 and 2/8 at Fresh Kills have already completed final closure construction and Landfill Sections 6/7 and 1/9 are in the process of final closure construction by DSNY. Closure of Landfill Section 6/7 is expected to be completed by 2011 and closure of Landfill Section 1/9 is expected to be completed by 2012. Closure of all landfill sections is therefore the site condition by the EIS 2016 analysis year. Since closure activities on the site are expected to overlap with park and roadway construction activities, implementation of the proposed park must be coordinated with the obligations of the City (through DSNY) to also complete final closure construction at Fresh Kills Landfill in accordance with the schedule established with DEC and to continue with the landfill post-closure monitoring and maintenance program. To that end, the proposed park phasing plan must therefore account for the phased opening of the project site for park users in some locations, while final closure continues in other areas. The park construction and implementation plan must also allow for the continued maintenance of those components of the project site dedicated to landfill post-closure operations.

Therefore, in the short term, park construction is proposed primarily in the North and South Parks which encompass closed Landfill Sections 3/4 and 2/8. Construction of these parks in the initial project phases minimizes the potential for conflicting constructing activities between DPR and DSNY. However, in order to provide vehicular access to and across the site, the proposed project must include a road construction program that provides connections to Richmond Avenue. This construction requires the crossing of East Park, which is currently undergoing closure construction which will continue through 2011. Since there is the potential overlap in this construction activity the City, DSNY and DPR are coordinating to ensure that, assuming this proposed project is approved, the closure construction activity currently undertaken at East Park would minimize conflicts with construction of the East Park roads, in particular the Forest Hill Road connection which is expected to be a short term element of the proposed project, as well as proposed end uses at Landfill Section 6/7, which are park and roadways. Long-term activities in East Park, including the construction of the park and the connection to Richmond Hill Road, should have no conflicts with DSNY closure construction activities during this phase of park construction, but would need to respect the ongoing monitoring and maintenance program. Likewise, construction of West Park and the Point are long-term elements of the project and are not expected to occur until after 2016, and well after closure construction activities are completed at Landfill Section 1/9, although maintenance would be ongoing.

As stated above, this GEIS analyzes the environmental impacts of the proposed Fresh Kills Park Plan in two analysis years, 2016 and 2036. The interim year, 2016, is the year by which a number of specific park projects are expected to be completed. A list of those projects is provided in Table 20-1. The year 2036 is selected as the year for full implementation of the park, and the remainder of the park projects to be completed by this analysis year are presented in Table 20-2. The latter year projects, although they would coincide with the completion of landfill post-closure monitoring and maintenance, would not be expected to conflict with closure construction activities.

Table 20-1
Park Projects for Analysis: 2016

Project Phase	Estimated Completion Date
"Digger" signage project for Fresh Kills 2009	**2009**
North Park (Phase A) Travis Neighborhood Park—arc trail to Main Creek, bird observation tower, plant nursery, seed farm overlook deck, off-mound upland landscape enhancement (about 20 acres), parking, signage, and lighting.	**2010**
North Park Multi-Use Path and Wetland Enhancement—parade grounds (lawn, softball field and picnic area) 2 tennis courts, grassy play mounds, picnic woods (about 12 acres), freshwater wetland enhancement, stormwater basin enhancement (about 4 acres), outdoor eco-classroom, visitor center, 3 comfort stations, café, recreational multi-use path (about two miles) around landfill section 3/4, tidal wetland enhancement along Main Creek, fishing pier, parking, signage and lighting, flare station fence/enclosure, DPR maintenance and operations (secondary).	**2013**
North Park Landfill Section 3/4 Landscape Enhancement and Public Access—enhancements of existing landfill cover for landscape improvements, public access on footpath trails and hilltop field (about 10 acres), parking.	**2014/2015**
South Park Arden Heights Neighborhood Park and Wetland Enhancement—entrance and parking, information center, enhancement of freshwater wetland (about 2 acres), playground, berm overlooks, picnic area (about 4 acres), berm overlook and footpaths (about 1.4 acres), signage, lighting, DPR maintenance and operations (secondary), plant nursery/seed farm., comfort stations, and recreational fields	**2010**
South Park Multi-use Paths and Recreation Facilities— recreational multi-use path (about eight miles) around landfill section 2/8, including pedestrian and high-speed bikeways, equestrian center and stable (about 5 acres), open meadow (about 15 acres), horseback riding trails, indoor track and field facility and sports barn, tennis center and associated facilities (about 12 acres), café, comfort stations, entrance and parking, signage and lighting.	**2010/2014**
South Park Landfill Section 2/8 Enhancement—enhancement of existing landfill cover for landscape improvements and public access on top landfill section 2/8, hilltop meadow (about 7 acres) with mountain biking, and pedestrian trails, hilltop overlook deck.	**2010/2011**
Confluence—the Marsh, Terrace, and Sunken Forest—freshwater wetland improvements and possible tidal wetland enhancement within two stormwater basins at the Marsh—the Sunken Forest (2 acres) with boardwalk pedestrian and bike paths; and a freshwater pond/emergent wetland (2 acres), and freshwater wetlands developed within a stormwater basin at the Terrace (1 acre).	**2012**
Confluence—Creek Landing—activities on existing built surfaces and reuse of existing bulkhead for market roof area of private concessions including boathouse, kayak and canoe rental, café, and cultural space; lawn; possible tidal wetland creation in areas of bulkhead deterioration (about 1 acre of enhancement), parking, DPR maintenance and operations (secondary), and lighting.	**2016**
Commercial Wind Turbine Systems—concrete pads with wind turbines on landfill sections within North, South and East Parks.	2016
Proposed Park Roads and West Shore Expressway Connections—Forest Hill Road connection extending from Forest Hill Road/Richmond Avenue to Confluence Loop Park Road; the south, east, and north legs of Confluence Loop Park Road, including modifications to Richmond Creek Bridge and Main Creek Bridge and access improvements along the West Shore Expressway, including extensions of the service roads.	**2016**

Sources: Fresh Kills Park Final Scope of Work to Prepare a GEIS, New York City Department of City Planning and New York City Department of Parks and Recreation, August 2006; Fresh Kills Park: Lifescape, Staten Island New York, Draft Master Plan, prepared by Field Operations for the City of New York, March 2006; Fresh Kill Park development team, March 2009.

As specific park capital projects are designed, it is expected that the City's Department of Parks and Recreation (DPR) and DSNY would create a "development plan" for the proposed project that would address coordination and levels of construction activity through the completion of overlapping construction activities to ensure that any conflicts between landfill closure and park construction are avoided or minimized. In addition, this plan would address long-term coordination needs with respect to avoiding conflicts between construction activities and the Fresh Kills Landfill monitoring and maintenance program, which DSNY must continue long past the completion of construction and at least until 2036.

Table 20-2
Proposed Park Projects for Analysis: 2036

Proposed Park Projects for Analysis: 2036
East Park—hilltop field (23 acres), recreational fields or golf course within a successional meadow (187 acres), mixed woodland community (187 acres), freshwater wetland enhancement and boardwalk (13 acres), freshwater wetland enhancement (21 acres), with a nature education center (outdoor classroom, 600 square feet), and nature education center (4,000 square feet), tidal marsh enhancement (28 acres), multi-use recreational path (12 miles), picnic lawn (2 acres), a flare station screen, parking along the east stormwater basin and additional parking along the Loop Road.
West Park—hilltop monument (12 acres), successional grassland (173 acres), woodlands (200 acres), recreational loop path (3 miles), Arthur Kill dock (450 square feet) and Isle of Meadows overlook (450 square feet). West Park, North Section—hilltop field (3 acres), earthwork art feature (2 acres) with an overlook (about 450 square feet), meadow (5 acres), meadow seating (2,000 persons), woodland buffer (20 acres).
The Confluence–The Point—central multi-use field area (14 acres, 1,000 seats), created swamp forest exhibit and basin (2 acres). Arthur Kill tidal wetland enhancement (3 acres), exhibition hall (8,590 square feet), family fishing and picnic pier (4,100 square feet), pier overlook (3,500 square feet), fishing pier (4,900 square feet), esplanade (37,300 square feet), market roof (32,700 square feet), restaurant row (20,000 square feet), barge garden (43,500 square feet), marina/boating center (50 slips, 2 acres), boat launch (6,750 square feet), banquet hall with maintenance facilities (13,750 square feet), event lawn (10 acres), discovery center (32,700 square feet), ferry landing (6,000 square feet) and parking.
The Confluence–Creek Landing—visitor center (5,200 square feet), fishing pier (about 1,350 square feet), waterfront esplanade (22,850 square feet), boating lawn and terrace (2 acres), restaurant (1,000 square feet), DPR greenhouses (25,500 square feet).
Sources: Fresh Kills Project Team, March 2009.

COORDINDATION WITH DSNY CLOSURE ACTIVITIES AT LANDFILL SECTIONS 6/7 AND 1/9

As stated above, the design of the proposed park has been, and will continue to be, planned to minimize disruption to the closure construction activities at both Landfill Section 6/7 and Landfill Section 1/9. It is expected that mobilization of construction equipment for the proposed project would begin in the third quarter of 2009 and would overlap with some of the closure construction. For example, DSNY has a closure phasing plan for Landfill Section 6/7 (see Figure 20-1). It is expected that this closure construction would occur in four phases and that closure construction would be completed at Landfill Section 6/7 by 2011. Mass grading (i.e., placement of fill soil) is underway at Landfill Section 1/9 and it is expected that closure construction at Landfill Section 1/9 would be completed by 2012, completing closure construction at the project site. The Fresh Kills Landfill Plant 2 area of the project site (see Figure 20-2) will serve as the principal contractor support area for landfill closure construction of Section 6/7. It is expected that use of this area for staging would be substantially completed by 2012. During this time, there would be considerable truck traffic delivering soils and materials to the site for the purposes of closure construction. It is estimated that up to 200 truck trips per day are accessing the project site for the purposes of delivering soil for final closure construction. (This is the equivalent of about 20 to 30 trucks per hour that are averaging a delivery of about 2,000 cubic yards of soil per day to the site). This truck traffic currently accesses the site via the West Shore Expressway and then uses the Fresh Kills Landfill service roads within the project site to transport soils and materials to either Landfill Section 6/7 or 1/9 (see Figures 20-3a, 3b, and 3c). To reach the Fresh Kills Landfill, trucks are using the West Shore Expressway/Victory Boulevard ramps (in the northbound or southbound directions). Trucks destined to the Landfill Section 6/7 construction site then travel the southbound service road (which also serves the Staten Island Waste Transfer Station) through a controlled access at which point internal circulation is provided on Fresh Kills Landfill service roads. Exiting trucks take the service road northbound to Wild Avenue, pass through a control gate, and then reach Victory Boulevard at which point they could travel north to reach the West Shore Expressway northbound or circle around to the southbound entrance. Trucks also enter the site via Muldoon Avenue. A controlled access point located approximately 1,200 feet from the southbound West Shore Expressway Service Road at this location provides ample space to stage trucks prior to entering the site. Figures 20-3a, 20-3b and 20-3c show the current truck access routes that are in use.

PROJECT PHASING AND TYPICAL CONSTRUCTION ACTIVITIES FOR THE 2016 AND 2036 ANALYSIS YEARS

INTRODUCTION

As stated above, the proposed project is a major capital project that would be developed in multiple phases over several decades. It involves the construction of park facilities, landscapes, and extensive new park roads, ramps and service roads connecting with the West Shore Expressway, and road connections and intersections with Richmond Avenue at both Forest Hill Road and Richmond Hill Road. In total, about 7 miles of new roadways are proposed with the project. However, as described in greater detail in Chapter 1 “Project Description” the proposed project is a multi-year, multi-phase initiative that is not expected to be fully completed until 2036. For the purposes of this GEIS, the elements of the project have been grouped into two analysis years, with the first set of projects to be completed by 2016 and the balance of the park completed by 2036. A summary description of the park elements to be completed by these two

analysis years is presented in Tables 20-1 and 20-2. Figure 20-4 presents a preliminary anticipated phasing for a number of major park elements as currently being considered.

The proposed activities and their locations during each stage, including storage areas, staging and parking areas, and sequencing are described below. Because construction of the proposed project would overlap, in the near term with the closure construction at Landfill Sections 6/7 and 1/9, these construction activities are summarized for the 2016 condition. Staging for the 2036 elements of the proposed project is more long-term and therefore not described in any detail below. However, such construction for long-term projects would need to meet a number of construction impact minimizing techniques that are similar to those for the 2016 program including minimizing conflicts with the DSNY monitoring and maintenance programs, minimizing impacts on surrounding communities by siting central construction staging and activities on the project site in areas where impacts could be avoided, and also avoiding impacts on natural resources by avoiding natural areas and utilizing areas previously disturbed or to be disturbed as part of the project for the purposes of siting construction staging activities. A more detailed description of construction activities follows.

PROPOSED PARK PROJECTS AND TYPICAL CONSTRUCTION ACTIVITIES

Construction activities associated with the proposed park elements would involve the importation of soil for landscape enhancement and landscaping, new building construction, and marine construction for infrastructure that would create access to the water (e.g., small docks and piers). Elements of the proposed Fresh Kills Park that are expected to be completed by the 2016 analysis year are listed on Table 20-1. As shown in that table, North Park is the first phase of construction, starting with Phase A. Other park designs and Build years for the 2016 projects are in the early stages. It is expected that Phase A of North Park would be followed by construction of an area of South Park.

Park projects planned for the 2017 to 2036 period are long term and many years away from final design. For these projects, a development sequence and more detailed Build years are yet to be determined. The projects expected to be completed by 2036 are presented in Table 20-2.

Typical construction activities associated with these park projects are presented in Tables 20-3 and 20-4 for the two analysis periods.

Table 20-3
Typical Park Construction Activities: 2016

Project Phase	Typical Construction Activities
"Digger"	Very limited clearing and grading to install "digger" signage
North Park (Phase A) Travis Neighborhood Park	Clearing and grading and soil fill for trails and to Main Creek and public open spaces Excavation and foundation construction for entry kiosk Install supports for deck overlook Clearing and grading for construction of parking, excavation and installation of utilities for water supply, lighting, sanitary systems, final landscaping and planting fencing
North Park Multi-Use Path and Wetland Enhancement	Clearing and grading and soil fill with final cover surface material for multi-use path around landfill section Excavation and install foundation for visitor/information center, eco-classroom, comfort stations (3), café and DPR maintenance facility, construction of frame and finishes for structures, Install piles supports and decking for kayak launch and short bridge over wetland pier, clearing, grading and fill for off-mound upland landscape enhancement (about 20 acres), Clearing grading and imported fill for parade grounds (lawn, softball field and picnic area) (about 12 acres), 2 tennis courts, grassy play mounds, picnic woods (about 1 acre) and installation of final cover on play surfaces Clearing, grading and planting for freshwater wetland enhancement (about 2 acres), clearing, grading and planting for tidal wetland enhancement along Main Creek, infrastructure modifications, grading and landscaping for stormwater basin enhancement Clearing and grading for construction of parking area, excavation and installation of utilities for water supply, lighting, sanitary systems, final landscaping and planting including fencing and flare station fence/enclosure.
North Park Landfill Section 3/4 Landscape Enhancement and Public Access	Import soil for final cover over Landfill Section 3/4 in 60-acre plots, commence seeding and plantings, grade and construct footpath trails
South Park Arden Heights Neighborhood Park and wetland enhancement	Excavation and install foundation for information center, comfort stations, and DPR maintenance facility, construction of frame and finishes for structures Clearing, grading and planting for freshwater wetland enhancement (about 2 acres) Clearing and grading for construction of parking area, excavation and installation of utilities for water supply, lighting, sanitary systems, final landscaping and planting including fencing and signage Clearing, grading and imported fill for playground and installation of final cover for play surfaces
South Park Multi-Use Paths and Recreation Facilities	Clearing, grading and soil fill with installed final cover surface material for multi-use path around landfill section Excavation and install foundation for eguestrian center, sports barn and tennis facilities and comfort stations, construct frame and exterior finishes for structures Clearing and grading for construction parking, excavation and installation of utilities for water supply, lighting, sanitary systems, final landscaping and planting including fencing and signage
South Park Landfill Section 2/8 Enhancement and Public Access	Import soil for final cover over Landfill Section 3/4 in 60-acre plots, commence seeding and plantings, grade and construct footpath trails and mountain biking trails
Confluence—the Marsh, Terrace, and Sunken Forest	Clearing, grading and planting for freshwater wetland enhancement at the Marsh (about 20 acres) with final planting and maintenance Clearing, grading and planting for tidal wetland enhancement at the Confluence of Richmond Creek and Main Creek for the Terrace (about 10 acres) with final planting freshwater wetlands enhancement at the Sunken Forest (about 4 acres) with boardwalk, Modifications to stormwatwer basin infrastructure, clearing, grading and planting for freshwater wetland enhancement at the stormwater basin location of the Sunken Forest, installation of piles and decking for boardwalk
Confluence—Creek Landing	Demolition of existing structures and site preparation including rehabilitation/stabilization of bulkhead Grading and imported fill for lawn overlook Excavation and install foundation for market roof, boathouse, kayak and canoe rental, café DPR maintenance facility and comfort stations, construct frame and exterior finishes for structures Clearing, grading and planting for tidal wetland enhancement Clearing and grading for construction of parking area, excavation and installation of utilities for water supply, lighting, sanitary systems, final landscaping and planting including fencing and signage
Commercial Wind Turbine Systems	Construct concrete pads on landfill sections within North, South and East Parks. Excavation, install transmission lines and final cover along transmission corridors

Source: Fresh Kills project team, February 2008.

Table 20-4
Typical Park Construction Activities: 2036

Project Phase	Typical Construction Activities
East Park	Import soil for final cover over Landfill Section 6/7 in about 60-acre plots, commence seeding and plantings, grade and construct footpath trails and recreational fields (about 187 acres) and planting for mixed woodland community (about 187 acres), and picnic lawn Clearing, grading and planting for freshwater wetland enhancement (about 13 acres in north basin and 21 acres in south basin), and installation of piles and decking for boardwalk Clearing, grading and planting for tidal wetland enhancement (about 28 acres in the south wetlands area), and installation of piles and decking for boardwalk clearing, grading and planting for tidal wetland enhancement along Main Creek, infrastructure modifications, grading and landscaping for stormwater basin enhancement Excavation and installation of foundation for small outdoor classroom and nature center (about 4,000 square feet), equestrian center, sports barn and tennis facilities and comfort stations, construct frame and exterior finishes for structures Clearing, grading and soil fill with installed final cover surface material for multi-use path around landfill section Clearing and grading for construction of overflow parking and small areas of permanent parking, excavation and installation of utilities for water supply, lighting, sanitary systems, final landscaping and planting including fencing and signage Installation of landscaping and fencing for flare station
West Park	Import soil for final cover over Landfill Section 1/9 in about 60-acre plots, commence seeding and plantings, grade and construct footpath trails, create meadows and recreational fields (about 173 acres) successional grassland (173 acres), and plant for woodlands (200 acres), and hilltop monument (about 12 acres) as well as hilltop field and earthwork features with final landscaping and woodland buffer along Clearing, grading and soil fill with installed final cover surface material for multi-use path around landfill section Install piles and supports for Arthur Kill and Isle of Meadows deck overlook and kayak launch and installation of decking
The Confluence-the Marsh, Terrace and Sunken Forest	Demolition of existing structures and site preparation including rehabilitation/stabilization of bulkhead (as necessary) Excavation and installation of foundation for cultural facilities (e.g. discovery center), restaurants, market roof, banquet hall, exhibition hall, athletic arena, DPR maintenance facilities and comfort stations, construct frame and exterior finishes for structures Infrastructure improvements, clearing, grading, and planting for freshwater wetland enhancement at the swamp forest (about 2 acres) Installation of piles and decking for fishing and picnic pier (4,100 square feet), pier overlook (3,500 square feet), fishing pier (4,900 square feet), marina/boating center (50 slips, 2 acres), boat launch (6,750 square feet), ferry landing (6,000 square feet) and anchoring system for barge garden (43,500 square feet),. Clearing, grading, and planting for tidal wetland enhancement along the Arthur Kill (about 3 acres) Clearing and grading for construction of central athletic field parking, excavation and installation of utilities for water supply, lighting, sanitary systems, final landscaping and planting including fencing and signage Grading and imported fill for lawn overlook and construction of amphitheater as well as esplanade along the waterfront
The Confluence-Creek Landing	Finalize demolition of existing structures and site preparation including rehabilitation/stabilization of bulkhead Grading and imported fill for waterfront esplanade lawn and boating lawn and terrace (2 acres) with final landscaping Excavation and installation of foundation for visitor center, and restaurant construct frame and exterior finishes for structures Install piles and supports for fishing pier and install decking and deck finishes

Source: Fresh Kills project team, February 2008.

In addition, Tables 20-5 and 20-6 describe the proposed road projects by the 2016 and 2036 analysis years. Tables 20-7 and 20-8 present the typical construction activities associated with developing the proposed roads.

Table 20-5
Proposed Road Elements: 2016

Proposed Park Roads and West Shore Expressway Connections	Estimated Construction Period
Forest Hill Road Connection—roadway connection between the Loop Park Road and Richmond Avenue at Forest Hill Road totaling approximately 4,600 linear feet including a roadway segment over the south portion of Landfill Section 6/7, a viaduct crossing of wetlands, and a new intersection at Richmond Avenue and Forest Hill Road.	**2009-2012**
Confluence Loop Park Road —internal Loop Park Road generally following existing DSNY service roads with widened roadway and bulkhead expansion under the West Shore Expressway.	**2013/2014**
Confluence Loop Park Road Bridges—modifications to the existing service road bridges across Richmond and Main Creeks and new pedestrian/bikeway bridges to be constructed parallel to existing Main and Richmond Creek vehicular roads (four lane roadway)	**2013/2014**
West Shore Expressway Southbound Service Road Connection and associated ramps— new service road between Loop Park Road and to the existing southbound service road (approximately 3,100 linear feet), one relocated exit ramp, one reconstructed exit ramp, one new entrance ramp.	**2013/2014**
West Shore Expressway Northbound Service Road (Arden Avenue to Loop Park Road) and associated ramps—a new service road between Arden Avenue and Loop Park Road (approximately 6,600 linear feet), one new exit ramp and one new entrance ramp to the expressway	**2013/2014**
West Shore Expressway Northbound Service Road (Loop Park Road to Wild Avenue)— reconstructed service road (about 2,500 linear feet) and relocated (about 600 linear feet) northbound service road connecting from proposed Loop Park Road to the existing northbound service road at Wild Avenue.	**2014/2015**
Source: Fresh Kills Park Development Team, 2009.	

Table 20-6
Proposed Road Elements: 2036

Roadway Element	Estimated Construction Duration
Richmond Hill Road Connection—roadway connection between the Loop Park Road on the south and Richmond Avenue at Richmond Hill Road on the north totaling approximately 12,600 linear feet and including a crossing of Landfill Section 6/7 (along the Yukon Saddle), a bridge over landfill facilities on the east face of the mound, embankments across drainage basins and adjacent to wetlands, and a new intersection at Richmond Avenue and Richmond Hill Road	**2 years**
Loop Park Road (West) and Signature Bridge—completion of internal roadway with a Signature Bridge over the Fresh Kills waterway along the west leg of Loop Park Road	**3 years**
Source: Fresh Kills Park Development Team, February 2008.	

Table 20-7
Typical Road and Highway Construction Activities: 2016

Road Segment	Typical Construction Activities
Forest Hill Road Connection	Site preparation and relocation of landfill infrastructure (as necessary), heavy equipment to import engineered fill for subgrade and grading, installation of utilities, grading for stormwater swales, construction of road base and asphalt surface, installation of lighting, road and landscaped edge finishes, signage, and striping. Viaduct construction involves excavation, drilling or driving of piles, construction of piles caps and piers, forming and placement of the concrete superstructure or erection of steel framing and concrete decking, surfacing with asphalt, installation of barriers and railings, and installation of finishes, lighting, signage and striping. Heavy equipment is utilized to deliver materials, for excavation and pile drilling/driving, erection of steel elements and for lifting construction materials.
South Loop Park Road (South Segment)	Heavy equipment to remove existing pavement and import engineered fill for subgrade and grading, form drainage swales, extend an existing outfall, install utilities, construct road base and asphalt surface, and install lighting, road and landscaped edge finishes, signage, and striping. Concentrated use of equipment is anticipated under the West Shore Expressway to replace an existing crib wall, stockpile and place fill and rip-rap material and/or construct new bulkhead, and construct new roadway, new paths, safety barriers and railings.
East Loop Park Road (East Segment)	Heavy equipment to remove existing pavement and import engineered fill for subgrade and grading, form drainage swales, extend an existing outfall, install utilities, construct road base and asphalt surface, and install lighting, road and landscaped edge finishes, signage, and striping. Concentration of heavy equipment to add and modify major drainage facilities along the eastern and northern shores of basin C2 if an option to split East Loop Road around the basin is selected.
North Loop Park Road (North Segment)	Heavy equipment to salvage and relocate reusable landfill support building(s), demolish and remove superfluous landfill support buildings, remove existing pavement, excavate to replace drainage basin Q, import engineered fill for roadway embankment, grading and for roadway subgrade form drainage swales, extend and relocate existing outfalls, install utilities, construct road base and asphalt surface, and install lighting, road and landscaped edge finishes, signage and striping. Concentrated use of equipment is anticipated under the West Shore Expressway to stockpile and place fill and rip-rap material and/or construct new bulkhead, and construct new roadway, new paths, safety barriers and railings.
Loop Park Road Bridges	Heavy equipment to modify the existing bridges: demolish and remove existing concrete parapets and fences, remove and replace the existing roadway above the deck, construct new parapets and/or railings, relocate landfill utilities along the fascias and restore lighting. Install water main on bridge. Heavy equipment to construct new pedestrian/bike bridges (across both Creeks for four lane alternative, only Richmond Creek under the hybrid alternative, omitted under the two lane alternative): construction involves excavation, drilling or driving of piles, construction of pile caps and piers, forming and placement of the concrete superstructure or erection of steel framing and concrete decking, surfacing with asphalt, installation of barriers and railings, and installation of finishes and lighting. Heavy and waterborne equipment is utilized to deliver materials for excavation and pile drilling/driving, erection of steel elements and for lifting construction materials.
West Shore Expressway Southbound Service Road Connection and associated ramps	Heavy equipment to remove existing ramp pavement, import engineered fill for subgrade and grading, installation of utilities, grading for stormwater swales, addition of drainage culverts or closed drainage system, construction of road base and asphalt surface, installation of lighting, road and landscaping , signage and striping
West Shore Expressway Northbound Service Road—Northbound (Arden Avenue to Loop Park Road) and associated ramps	Heavy equipment to import engineered fill for subgrade and grading, installation of utilities, grading for stormwater swales, addition of drainage culverts or closed drainage system, construction of road base and asphalt surface, installation of lighting, road and landscaping , signage, and striping
West Shore Expressway Service Road—Northbound (Loop Park Road to Wild Avenue)	Heavy equipment to remove existing pavement, import engineered fill for subgrade and grading, installation of utilities, grading for stormwater swales, addition of drainage culverts or closed drainage systems, construction of road base and asphalt surface, installation of lighting, road and landscaping, signage, striping

Source: Fresh Kills Park Development Team, February 2008.

Table 20-8
Typical Park Road Construction Activities: 2036

Roadway Segment	Typical Construction Activities
Richmond Hill Road Connection	Site preparation and relocation of landfill infrastructure (as necessary), heavy equipment to import engineering fill for sub-base and grading, installation of utilities, grading for stormwater swales, Viaduct construction involves excavation, drilling or driving of piles, construction of piles caps and piers, forming and placement of the concrete superstructure or erection of steel framing and concrete decking, surfacing with asphalt, installation of barriers and railings, and installation of finishes, lighting, signage and striping. Heavy equipment is utilized to deliver materials, for excavation and pile drilling/driving, erection of steel elements and for lifting construction materials. Construction of road base and asphalt surface, installation of lighting, road and landscaped edge finishes, signage, striping.
Signature Bridge and Loop Park Road (West Segment)	Bridge construction involves excavation for landside piers and abutments, installation of temporary cofferdams for piers within the creek (one or two, depending on the choice of structure) drilling or driving piles, construction of piles caps and piers, forming and placement of the concrete superstructure or erection of steel framing and concrete decking, surfacing with asphalt, installation of barriers and railings, and installation of finishes, lighting, signage and striping. Heavy equipment is utilized to deliver materials for excavation and pile drilling/driving, erection of steel elements and for lifting construction materials. Barges and barge mounted cranes are used for waterborne construction.
Source: Fresh Kills Park Development Team, February 2008.	

TYPICAL CONSTRUCTION EQUIPMENT

Typical construction equipment expected to be used over the duration of park construction is listed in Table 20-9. Because the level of construction activities would vary from month to month and by location, the use of each type of equipment over the many capital phases of construction would vary through the course of construction.

Table 20-9
Typical Construction Equipment

Equipment for Peak Stages	Engine Size (hp)
Backhoes	87.17
Excavators	137.6
Loaders	87.17
Dozers	136.1
Cranes	237.7
Compressors	83.9
Pile Driver	237.7
Concrete Pumps	137.7
Water Pumps	8.5
Generators	33.4
Graders	231.2
Pavers	134.6
Rollers	84.7
Heavy Trucks	N/A
Source: *Hunt's Point WPCP FEIS*, July 12, 2007.	

During construction, various types of construction equipment would be used at different locations throughout the site. Some of the equipment is mobile and would operate throughout the site while some would remain stationary on-site at distinct locations. Stationary emission sources include the crane, compressor, concrete pump, water pumps, generator and pile driving, depending on the particular period of construction. The excavators, loaders, backhoes, dozers, graders, pavers, rollers, trucks, and heavy trucks would also operate throughout the site at the particular areas of park construction or would follow the road alignment during road construction.

CONSTRUCTION TRUCK ROUTES AND ACCESS MANAGEMENT

It is anticipated that truck movements for the proposed park could, to a large degree, follow the routes currently used by DSNY. This maximizes use of regional roads and minimizes use of local roads. Exceptions would be local park projects, such as North Park Phase A and South Park, where use of local roads and access is necessary. For example, the Arden Heights Neighborhood Park would require direct access from Arthur Kill Road. Likewise, construction activities in areas like North Park (Phase A) would be accessed via the local streets. However, these local park construction phases are of a limited duration (about 1 to 1.5 years), and use of local roads for truck access for delivery of soils, materials, and equipment is necessary, but limited.

Use of truck routes currently used also provides the opportunity for controlled access for deliveries of soil and materials. As the park project develops, additional access points may also be used at Muldoon Avenue, for example, where direct access to the Point and West Park construction sites would be available. Use of this access would also avoid the newly developed park roads and, by then, park activities and uses in North and South Parks.

Flaggers, temporary dividers, and traffic controls to manage the access and movements of trucks would be used for construction activities along the West Shore Expressway, as necessary. These construction activities would all be subject to the review and approval of the New York State Department of Transportation (NYSDOT) as part of a construction access permit that would be necessary to construct the proposed ramps and service roads that are within the jurisdiction of NYSDOT.

Some of the site deliveries would also occur along the perimeters of the project site (e.g. landscape materials, fencing). For projects that require work along or in City streets, as with any other street construction projects, these activities would take place in accordance with NYCDOT-approved traffic maintenance plans, as appropriate. However, the need for such traffic management plans is expected to be limited since little project construction is proposed within existing City streets. An exception would include activities associated with the construction of the Forest Hill Road connection, which would require work at the intersection of the existing intersections of Forest Hill Road/Richmond Avenue intersection. (This is a 2016 analysis year project.) A traffic management plan would be necessary for these activities, particularly since this is a major intersection along a major traffic corridor (Richmond Avenue) that carries heavy traffic volumes. As project design proceeds, a plan for maintaining traffic at this intersection would be developed and subject to NYCDOT approval. A similar plan and NYCDOT approvals would be necessary for the intersection of Richmond Avenue with Richmond Hill Road although construction at this intersection is not expected until after 2016.

Because of the size of the Fresh Kills Park construction site, vehicles are not likely to have to undertake disruptive back-in maneuvers and would be able to enter all project locations head on.

This would also limit backing up into City streets, which can cause temporary disruptions to traffic.

MARINE CONSTRUCTION

Park Elements

As stated above, an important element of the proposed project is to provide public access to the water. In addition, certain project road elements include crossings at Richmond and Main Creeks, activities in or along tidal wetlands and waterbodies, or structures in or over water, such as the pedestrian/bicycle bridge. Over water construction activities for the proposed park elements are expected to be limited since the majority of structures are small docks that would provide public access to the water for the purposes of providing new viewing opportunities or to launch a kayak, for example. To construct these waterfront recreation elements, it is typically expected that narrow over water pile supported structures, ranging from 10 feet to 30 feet in width would be used in several park areas. This would also include floating structures at the proposed marina and possibly a ferry landing, although both these project elements are long-term (2036).

It is expected that pile driving (or drilling) would be required for pile-supported structures and for anchor piles to secure floating docks at the barge garden. In most cases it is expected that marine work would be staged from land (e.g., waterfront recreation facilities at Main Creek) as access from land would be more directly accessible. A pile driver can drive one or two steel or concrete piles per day, or four to five wooden piles. The total duration of pile driving would vary for each capital project; however, for the small docks and piers this work should not extend beyond 1-2 weeks. In addition to the marine recreational facilities, pile driving (or drilling) would be necessary for the proposed viaducts at the Forest Hill Road and Richmond Hill Road connections.

Barges may be used for in-water construction and for the delivery of soils to the site and staging of waterfront activities. In this event, hopper barges (barges with sides) would be used to hold the bulk materials. If barges are used to deliver soils, it is expected that they would utilize the existing maritime infrastructure in the Plant 1 area which is where DSNY used to unload its solid waste barges.

Road Elements

As described in Chapter 1, "Project Description," the segments of proposed park roads under the West Shore Expressway require enlargement and improvement to shoreline protection structures and the extension of marine infrastructure into the water. Here, the existing shoreline infrastructure would be reconstructed. There is also the proposed construction of the new pedestrian/bicycle bridges over Richmond and Main Creeks, parallel to the existing bridges.

Although a construction development program is yet to be prepared for these elements of the proposed project, the construction of larger maritime infrastructure such as this typically requires cranes, often mounted on barges, to install waterfront stabilization infrastructure. Barges could also be used for much of the delivery and storage of construction materials, and for the staging of waterfront construction activities. As stated above, to prevent the potential spillage of bulk items into the water, hopper barges (barges with sides) would be used. To address any potential spillage of fuel from the refueling of equipment on barges, construction contracts would specify

fuel sumps under the fill valves of equipment during refueling. Containment booms could also be used to control and collect floating materials.

For the Richmond and Main Creek Bridges, reuse of these bridges as vehicular bridges is proposed as part of the Loop Park Road. Under this proposal the structural decking and finishes of the bridges would be upgraded to park standards; however, little in-water activity is expected to be necessary with respect to the structural supports. It is recognized that all construction activities occurring within or over the waters of Fresh Kills or the wetlands would require permits from the State of New York Department of Environmental Conservation (DEC), including tidal wetlands and protection of water permits, as well as permits from the U.S. Army Corps of Engineers (ACOE) and the U.S. Coast Guard for new structures over navigable waterways. The proposed project would also need to comply with the requirements of these permits with respect to minimizing environmental impacts during construction and it is expected that the permits would have conditions with respect to implementing any necessary mitigation measures.

PROPOSED PARK STRUCTURES

INTRODUCTION

Construction of proposed park structures, including DPR accessory structures, concessions, and cultural and educational facilities (e.g., restaurants, banquet facility, recreational center) is principally proposed in the Point, which is a long-term (2036) element of the proposed Park. Some structures are also proposed in Creek Landing, which has both short-term (2016) and long-term (2036) project elements. Smaller DPR support structures would be located throughout the park, with visitor centers at the main entrances. Construction of these facilities would vary. Most would be constructed in areas that are cleared or previously disturbed, and all would be off the landfill sections to avoid conflicts with landfill infrastructure. However, construction of the large facilities in the main activity area of the park, at the Point, would require demolition or removal of existing facilities and site preparation. Construction in areas of sites of extent structures would involve demolition (in areas like Plants 1 and 2). Construction of structures at all areas would involve excavation for foundations and utilities, construction of frame, exterior finishes, interior fill out, and final finishes including landscaping and parking. A more detailed description of these construction activities follows.

DEMOLITION AND SITE PREPARATION

In order to construct the proposed park there are a number of DSNY buildings, particularly in the Plant 1 and 2 areas, that would need to be demolished. Prior to demolition, asbestos abatement and lead based paint removal would be performed, as necessary. In addition, construction in areas like the Point would require decommissioning any existing utilities prior to demolition. A New York City-certified asbestos investigator would inspect the buildings for asbestos-containing materials (ACMs). If ACMs are found, these materials must be removed by a New York State Department of Labor (DOL)-licensed asbestos abatement contractor prior to building demolition. Asbestos abatement is strictly regulated by DEP, DOL, EPA, and the U. S. Occupational Safety and Health Administration (OSHA) to protect the health and safety of construction workers and nearby residents and workers. Depending on the extent and type of ACMs, these agencies would be notified of the asbestos removal project and may inspect the abatement site to ensure that work is being performed in accordance with applicable regulations.

These regulations specify abatement methods, including wet removal of ACMs that minimize asbestos fibers from becoming airborne.

Depending on the volume of ACMs to be removed and project phasing, 10 to 20 workers could be on site during this construction phase, and about one or two truckloads of material may be removed per day. Since the structures on the project site are small, this phase of activity is not expected to last more than one month.

The next step in general demolition would be to remove any economically salvageable materials and large equipment. After buildings are demolished, bulldozers and front-end loaders would be used to load materials into dump trucks. The demolition debris would be sorted prior to being disposed at landfills to maximize recycling opportunities. Depending on the size of the building demolished, about 10 to 20 workers are expected to be on site during this period, and typically two to four truckloads of debris would be removed per hour. Again, given that the buildings in this area are generally small, demolition and site preparation is not expected to take more than 2-3 months.

Graders, bulldozers, and backhoes would likely be utilized for removal of asphalt, concrete, or earth. Areas of concrete may require removal by jackhammers and air compressors. Concrete spreaders, mixers, and vibrators would be required for pavement bases, retaining walls, and footings throughout the park. Excavators, backhoes, front-end loaders, dump trucks, and flatbed transport trucks with boom cranes would be utilized for the planted areas of the park.

EXCAVATION, FOUNDATIONS, AND BELOW GRADE CONSTRUCTION

As part of the proposed project, there is approximately 100,000 to 150,000 square feet of building program that includes DPR facilities, cultural facilities, and small commercial facilities including the proposed market roofs, restaurants, and a banquet facility. This is a limited amount of building construction given the size of the project site and it would be primarily located in the Point and Creek Landing and primarily part of the 2036 Build program. It is expected that excavation for these structures would be at shallow depths since no below grade parking is proposed. Some excavation may be required for foundations and utility installations.

Excavation for below-grade foundations or footings would be the first phase of the work. It is expected that the foundations would be constructed using conventional techniques. While limited piles may be necessary in some cases, no blasting is expected since the depth to bedrock in this area is substantial. For the larger buildings, foundation work may include the limited use of cranes, drill rigs, excavators, backhoes, rockbreakers, loaders, pumps, motorized concrete buggies, concrete pumps, jackhammers, and pneumatic compressors, a variety of small tools, and dump trucks and concrete trucks.

With the limited below-grade excavation, significant dewatering is not expected to be necessary for the proposed project. When below-grade structures extend into groundwater, and because of the shallow groundwater typically encountered at coastal locations, some excavation for buildings (and utilities) may require dewatering. In that event, the pumped out water would be held in an on-site sedimentation tank so that the suspended solids could settle out. Depending on the location of the construction activity, the decanted water could only then be discharged into either the New York City sewer system or the local waterways, and the settled sediment is collected and trucked to a licensed disposal area. Discharge to the sewer system requires approvals from the DEP, and discharge into any waterways requires approvals from the DEC. Any approvals for these activities would therefore have to be obtained prior to construction.

Typical construction stages for buildings do not vary greatly and, given the small to moderate sizes of the proposed building construction, is expected to range between 6 to 15 months (depending on the size of the structure). Building construction would generally involve three phases: foundation; frame construction, and fit-out and finishing.

In general, framing would take an estimated 3 to 12 months. Construction of the frame would include installation of beams and columns, floor decks, façade (exterior walls and cladding), and roof construction. For the larger park structures, these activities may require the use of small cranes, compressors, personnel and material hoists, concrete pumps, on-site reinforcing bar bending jigs, welding equipment, and a variety of hand-held tools, in addition to the delivery trucks that would bring construction materials to the site. During the more intense periods of construction on the larger buildings about 10-40 construction workers are expected to frame buildings.

The next stage of construction is the construction of interior partitions, installation of lighting fixtures, interior finishes (flooring, painting, etc.), mechanical and electrical work, such as the installation of elevators, and exterior finishes and lighting. Mechanical and other interior work would take about 2 to 6 months and would employ 10 to 40 workers per building during the active periods. Equipment used during interior construction could include exterior hoists, pneumatic equipment, delivery trucks, and a variety of small hand-held tools. However, this stage of construction is generally the least intensive and would occur within buildings. The final stage of construction would be exterior landscaping and finishes for parking areas.

GENERAL CONSTRUCTION PRACTICES

OVERVIEW

It is expected that DPR would have field representatives on-site throughout the entire construction period. Once construction commences, there would also be security provided at the site by both DSNY and DPR.

DELIVERIES AND ACCESS CONTROLS

Because of site constraints, the presence of large equipment, and the type of construction activities, access to the construction sites would be secured. The work areas would be fenced off, with access limited to workers and construction vehicles. Typically, construction worker private vehicles would not be allowed into the construction area. Security guards and flaggers would be posted, and all persons and trucks would have to pass through security points. Workers or trucks without a need to be on site would not be allowed entry. After work hours, the gates would be closed and locked.

As is the case with almost all large urban construction sites, material deliveries to the site would be highly scheduled. Soils would be necessary for landscape and landscape cover. Materials are expected to include framing, drywall, electrical wiring, mechanical piping, ductwork, and other mechanical equipment are but some of the materials that must be delivered and moved at the site.

CONSTRUCTION HOURS

Construction activities generally take place Monday through Friday, with some exceptions. In accordance with City laws and regulations, construction work would generally begin at 7:00 AM

on weekdays, with workers typically arriving to prepare work areas between 6:00 AM and 7:00 AM. Typically work ends at 3:30 PM, but some work days may be extended to complete specific tasks beyond normal work hours. In these cases an extended workday would generally not go beyond 6:00 PM and would not include all construction workers on-site, but just those involved in the specific task requiring additional work time.

At limited times over the course of construction weekend or nighttime work may also be required. For example, nighttime work may be necessary for the purposes of performing work in City streets (such as Richmond Avenue) or along the West Shore Expressway. However, it would be the purpose of performing this work at night to minimize impacts on traffic patterns. Again, the numbers of workers and pieces of equipment in operation would be limited to those needed to complete the particular task at hand. For extended weekday and weekend work, the level of activity would be reduced from the normal workday. The typical weekend workday would be on a Saturday starting from 7:00 AM with worker arrival and site preparation and continuing to 5:00 PM. Nighttime work is expected to be limited to street or highway work and would also be performed in accordance with street and highway access permits from NYCDOT and NYSDOT, respectively, and it is expected that a traffic management plan would be required. For the nighttime work it would be the objective to complete the tasks as soon as possible in order to minimize costs, nighttime construction activity, and disruptions to traffic.

For all work occurring outside the normal construction work day, the necessary approvals would be obtained from City and State agencies. In addition, in accordance with City regulations, a noise control plan would be developed and implemented to minimize intrusive noise emanating into nearby areas and affecting sensitive receptors. The noise control plan would include such restrictions as locations of generators and avoiding unnecessary loud construction activities at night. A copy of the noise mitigation plan would be kept on-site for compliance review by the New York City Department of Environmental Protection (DEP) and the New York City Department of Buildings (DOB) (see also the discussion below under “Noise”).

STREET CLOSURES

STREET CLOSURES (SIDEWALKS AND TRAVEL LANES)

During the course of construction, since the majority of work would be the construction of new streets within the project site, limited closure of traffic lanes and sidewalks is expected. There would be some closures for some construction phases that require connections to streets at the periphery of the site, such as the entrances along Arthur Kill Road, Richmond Avenue, and North Park. However none of these activities are expected to require extended periods of time. This work would be coordinated with and approved by the appropriate City and State agencies, as appropriate.

STORMWATER POLLUTION PREVENTION PLAN

As described above, the project site is large and requires grading and a substantial importation of fill soils. As a result, an important element in the construction plan is that a stormwater pollution prevention plan (SWPPP) that would be developed in accordance with the requirements of DEC’s State Pollutant Discharge Elimination System (SPDES) General Permit for Stormwater Discharges from Construction Activity. The SWPPP would include fully designed and engineered stormwater management practices with all necessary maps, plans, and construction drawings, providing the site-specific erosion and sediment control plan and best management

practices. It would designate responsible parties and personnel who would have a role in management of construction stormwater runoff and would outline a routine site inspection and reporting program for identification and prompt repair of any deficiencies for the erosion and sediment control structures or practices.

For each capital park and road project, stormwater management during construction would then be performed in accordance with a site-specific erosion and sedimentation control plan. A SWPPP contains both structural and non-structural components. The structural components are expected to consist of hay-bale barriers/silt fencing, inlet protection, and installation of a stabilized construction entrance or other appropriate means to limit potential off-site transport of sediment. The non-structural "best management practices" would include routine inspection, dust control, cleaning, and maintenance programs; instruction on the proper management, storage, and handling of potentially hazardous materials; and identification of parties responsible for implementation and ongoing maintenance programs. All temporary control measures would be maintained until disturbed areas of the site are stabilized. A general description of the practices that could be applied to each capital project is presented below under "Natural Resources."

CONSTRUCTION STAGING AND OPERATIONS

CONSTRUCTION STAGING

As stated above, this is a multi-year, multi-phased construction project. It is an objective of the proposed construction program to provide a centralized staging area within the project site and away from sensitive uses from which construction operations could be based, soils and plantings could be stockpiled and stored, equipment could be safely parked, construction worker parking could be provided, and construction period offices and trailers could be placed. This staging area would both minimize the need to conduct major construction preparation and staging activities at the periphery of the site where it could be more intrusive to local neighborhoods and would also allow construction workers to park within the site rather than using local street parking. It is assumed that this centralized staging area would occupy 5-10 acres depending on the intensity of construction activity. For example, one opportunity for providing centralized staging areas is in the wide service road between Landfill Section 2/8 and the West Shore Expressway (see Figure 20-4). Additionally, over time, localized staging areas could be provided in other locations around the site as construction progresses, such as the Point. Road construction staging areas are expected to follow the corridors for the proposed roads. However, given the size of the project site, it is not expected that construction staging areas would need to be cited near sensitive receptors, such as local neighborhoods, nor would sensitive areas on the site, such as wetlands or woodland landscapes, be necessary.

CONSTRUCTION IMPACT AVOIDANCE OBJECTIVES

Figure 20-5 shows a land use map that identifies the residential uses and communities nearest the project site. As shown in that figure, there are limited residential uses at the periphery of the site. The uses immediately surrounding the site are predominantly parkland, commercial, industrial, and some residential uses. The two neighborhoods nearest the project site are Travis to the north and Arden Heights to the south. It is expected that individual capital projects, such as North Park (Phase A), for example, would have satellite construction staging areas for site-specific construction activities that are proposed in any given capital project and the particular requirements of individual contractors. But overall, major construction operations would occur

away from local neighborhoods. Some of the general construction principles that would be apply to the proposed project are:

- Prepare staging plans that site construction activities and carefully stage construction internal to the project site for the larger projects thereby minimizing impacts on local neighborhoods and roads at the periphery;
- Locate heavier construction operations, such as soil making (if proposed) in an area central to the project site and away from local residential uses;
- Site individual capital project staging areas in areas that were previously disturbed or that would be disturbed as part of project development and thereby avoiding impacts to wetlands and natural features;
- Locate road construction staging and storage areas in the proposed road corridor, clear of wetlands and landfill infrastructure;
- Use existing truck access routes for construction since these allow for direct access to and from the regional highway while internalizing truck traffic and minimizing the use of neighborhood streets around the project site;
- Evaluate the potential for the use of barging particularly for the delivery of soils;
- Prepare a noise control plan in accordance with City regulations;
- Reuse of existing maritime infrastructure, such as bulkheads in the Plant 1 area;
- Protect wetlands and natural resources through flagging and signage to protect areas adjacent to construction activities;
- Undertake landscape enhancement during periods that would not conflict with existing wildlife and avian species use of the site;
- Perform field inspections and provide barriers to protect rare and endangered species and their landscapes or nesting areas during the construction period;
- Use best management strategies to control soil erosion and sedimentation;
- Avoid excavation activities that would compromise the existing landfill cover functions;
- Incorporate enhancement measures that would minimize disturbance and removal of desirable existing native vegetation where possible;
- Perform invasive species management as part of construction and use appropriate, regulated herbicide compounds suitable for use in natural areas, including herbicides approved for aquatic/wetland uses, to be applied to targeted invasive species using the lowest effective concentrations and to be used in accordance with all permits and regulations;
- Minimize the closing of existing streets by performing nighttime work along major corridors (e.g., to implement modifications at the two intersections with Richmond Avenue, at Richmond Hill and Forest Hill Roads, and the connecting ramps to the West Shore Expressway);
- Control worker access to the site by stipulating entry and exit points within each contract; and
- Provide for construction worker parking and offices on-site.

The above descriptions are general operational objectives of the construction plan. As the project moves forward, additional site-specific construction measures would be implemented to

minimize the impacts of each project and to implement the general operational objectives presented above.

CONSTRUCTION ACTIVTIES

PARK CONSTRUCTION

Park construction assumptions include the following:

- Approximately 10-20 workers on-site during the soil importation/site preparation phase utilizing heavy equipment such as haul trucks, bulldozers, backhoes, plows, and collers;
- Approximately 5-15 workers on-site during the vegetation planting phase of construction utilizing equipment such as small equipment, vehicles, and hand-held equipment;
- Approximately 30-60 workers at the Point, and to a lesser extent at Creek Landing, for the purposes of performing any asbestos and lead paint abatement, demolishing existing structures and doing site preparation including installation of utilities;
- Approximately 30-60 workers at the Point in the construction of the larger commercial, cultural, and recreational facilities.

Since the proposed project is largely a park development project comprised of landscape enhancement and the installation of recreational facilities and multi-purpose surfaces (both structural and natural) the construction program for park facilities and landscape enhancements is generally expected to proceed as follows:

- Install stabilized construction entrances/exits and construction entrance postings;
- Flag or identify any nearby wetlands or natural areas not to be disturbed;
- Install appropriate inlet and outlet protection in areas that have the potential to be impacted by ground disturbance activities;
- Install perimeter controls in areas to be disturbed during grading activities;
- Install stormwater conveyances (i.e., channels, swales, diversion berms, etc.) as necessary;
- Conduct earth disturbing activities with soil disturbance in a manner that minimizes the extent of exposed soil at any given time;
- Stabilize all disturbed areas with either temporary seeding or permanent cover (as is appropriate for the current phase of construction) if the area is to remain inactive for 14 or more days;
- Perform building construction and/or landscape enhancement construction projects; and
- Following final stabilization of all areas, remove any temporary stormwater management best practices.

Based on these assumptions, Table 20-10 presents quantified data relative to the proposed park construction. It is assumed in the tables above (20-1 through 20-6) that the City would proceed with park construction at a pace that would achieve the 2016 and 2036 build programs as presented in this GEIS and that the rate of park construction would occur at about equal intensity through the 30-year construction period.

Table 20-10
Preliminary Assessment of Construction Activity:
Park Enhancement and Landscaping Elements

Park Element	Estimated Volume of Soil (per year)	Total Truck Loads (per year)	Truck Load Per Day (assumes 220 delivery days)	Truck Deliveries per hour (assumes average 8-hour work day)
Soils				
Landfill section landscape enhancement (at 60 acres per project, one landfill landscape enhancement project per year)	162,500 cubic yards	6,500	20-30	4-6
Site preparation and landscaping at recreational areas of landfill sections (at 20 acres per project)	55,000 cubic yards	2,160	10-15	1-3
Landscaping and planting materials				
Landfill section landscape enhancement (at 60 acres per project, one landfill landscape enhancement project per year)	N.A.	N.A.	N.A.	8-10
Site preparation and landscaping at recreational areas of landfill sections (at 20 acres per project)	N.A.	N.A.	N.A.	8-10

Notes: Assumes up to 2 feet of cover soil in all areas of North and South Parks; assumes 25-cubic-yard trucks. Does not assume barging. Woodland and meadow planting crews are assumed to have 8-person labor crews per acre/per day. Invasive species management with limited physical cutting/herbicide spraying is assumed to have crews of 4-6 persons per acre/per day.
Source: Fresh Kills Park Development Team, February 2008.

Road Construction

Road construction assumptions include the following:

- Most road construction would be primarily within the landfill site and areas closed to public traffic, thereby limiting conflicts with existing traffic and pedestrians, and infrastructure with a plan to minimize impacts to landfill infrastructure;
- Approximately 10-20 workers are expected on-site during road subgrade preparation, utilizing heavy equipment such as haul trucks, bulldozers, plows, backhoes, and rollers;
- Limited grading and engineered subgrade fill is expected along most Loop Park Road segments as these road segments would primarily reuse existing DSNY landfill access roads;
- Approximately 10-20 workers are expected to be on-site during installation of water mains, sanitary sewers, storm sewers and lighting infrastructure (where necessary), utilizing heavy equipment such as haul trucks, backhoe and rollers;
- Approximately 10-20 workers are expected on-site during road subbase preparation utilizing heavy equipment such as haul trucks, bulldozers, and rollers;
- Approximately 20-30 workers on-site during the asphalt cover phase utilizing haul trucks, pavers and rollers;
- Viaduct construction along the Forest Hill Road Connection is expected to take approximately 2 years with about 10-15 workers involved during the average construction day which would include pile driving (or drilling) during the first year and with the assumption that construction of the viaduct occurs concurrently with construction of the Forest Hill Road Connection roadway over the landfill;

- Modification of the existing bridges would be expected to take a year each, involving 10-15 workers and it is assumed that these construction activities would occur sequentially;
- Construction of the new pedestrian/bicycle bridges across the Creek would be expected to take a year each, involving 10-15 workers and it is also assumed that this bridge construction would occur sequentially, but may overlap with the above-described bridge modification activities;
- Construction of the West Shore Expressway service roads would occur at a clear distance from the highway;
- West Shore Expressway ramp construction would be separated from the highway mainline by protective safety barriers with minimal disruptions to traffic flows;
- Construction of the new west legs at the intersections of Forest Hill Road and Richmond Avenue (2016) and Richmond Hill Road and Richmond Avenue (2036) would be separated from Richmond Avenue by protective safety barriers placed along the western curbline. Modifications within Richmond Avenue include installation of new traffic signals, adjusting drainage and modifying striping, and are expected to take from 1-2 months at each location, with work disruptive to traffic operations undertaken at night;
- Pedestrian bridges across the West Shore Expressway and Richmond Avenue, both proposed for 2036, would take about 1 year each, with the work occurring both on-site (ramp construction) and offsite (bridge fabrication). Work over the expressway and Richmond Boulevard would be performed at night to avoid impacts to traffic. Construction employment estimates are an average of 10-15 persons per day for each pedestrian bridge (this is a 2036 analysis year program).
- The Signature Bridge across the Fresh Kills proposed would take about 2 years to construct. No vehicular traffic would be affected as it would add a new connector at a new location. Since the supporting piers would be sited outside the navigation channel, maritime traffic on the Creek (which is minimal) would be only be affected during placement of the main span over the channel. It is estimated that on average, 20-30 persons per day will be working on the signature bridge (construction of the proposed Signature Bridge is a 2036 analysis year project).

It is assumed in the above discussion that the City would proceed with road construction in a way that constructs road segments at a pace that would achieve the 2016 and 2036 build programs as presented in this GEIS. Table 20-11 presents quantified data on project construction for the various segments of road construction based on that assumption.

CUMULATIVE TOTAL ACTIVITY

Based on the above projections of activity, Table 20-12 presents the cumulative totals for construction truck and employee activity during the park and road construction periods. These are averages and reflect the projected build program through the 2016 Build year, which assumes that North and South Parks, and the majority of the road system, are completed.

Table 20-11
Preliminary Assessment of Construction Activity: Roads

Road Element (Assumes 4-lane park road and up to two miles of road construction per year)	Estimated Volume of Material (Cubic Yards) Per Year	Total Truckloads Per Year	Truck Loads/Deliveries Per Day	Truck Deliveries Per Hour (Assumes average 8-hour work day)
Subgrade				
Engineered soils beneath road (Assumes 3-4 feet on landfill and WSE service roads; most of Loop Road requires less)	60,000-100,000	3,000-5,000 (Assumes 20 CY per truck)	20-35 (Assumes 160 delivery days per year)	3-5
Subbase and Asphalt Courses				
Gravel subbase (Assumes 1 foot thick throughout)	24,000 cubic yards	1,000-1,500 (Assumes 20 CY per truck)	15-25 (Assumes concentrated 60 delivery days per year)	2-4
Asphalt Courses	20,000 cubic yards	1,000-1,200 (Assumes 20 CY per truck)	30-40 (Assumes concentrated 30 delivery days per year)	4-5
Bridge and Viaduct Construction				
2016 Forest Hill Viaduct (Assumes 2 years of construction)	N.A.	120-150	8-10	1-2
2016 Vehicular and Pedestrian Creek Bridges (Assumes 2 years of construction, total)	N.A.	100-120	8-10	1-2
2036 Richmond Hill Bridge (Assumes 1 year of construction)	N.A.	80-90	8-10	1-2
2036 Pedestrian Bridges (Assumes 1 year each, sequential)	N.A.	100-120	8-10	1-2
2036 Signature Bridge (Assumes 2 years of construction)	N.A.	250-300	10-12	2-3

Notes: Work progression would be generally scheduled to have sequential rather than concurrent deliveries of subgrade, subbase and asphalt course materials. Delivery of bridge construction materials would be sporadic.
Source: Fresh Kills Park Development Team, February 2008.

Table 20-12
Average Daily Construction Activity: 2016 Projects

Project Element	Total Average Workers per Day	Total Average Trucks per Day
Park Roads	20-40	50-70
Park Elements	30-50	20-30
Totals	50-90	70-100

Note: Assumptions for park roads and park features are for the more intensive periods of construction.
Source: Fresh Kills Park Development Team, February 2008.

PROTECTION OF DSNY INFRASTRUCTURE DURING CONSTRUCTION

The proposed park and roads would be built on a site that was once the world's largest landfill and which contains extensive infrastructure that is in-place to protect the landfill and the surrounding environment and public health. As a result, during construction of both the park and road elements, the protection of landfill infrastructure is essential and would be accomplished through multiple means, including training and, as necessary, use of physical barriers or protections. Among the general principles that would be part of the project plan for protecting landfill infrastructure are the following:

- Protection of landfill infrastructure from vibration impacts;
- Pre-construction contractor education and training that addresses protecting and avoiding impacts to landfill infrastructures for contractors;
- Flagging or marking of infrastructure;
- Posting of signs, such as "Buried Utility" or "Overhead Lines;"
- Review of construction procedures to identify whether alternative, less disruptive construction techniques, are applicable to a given activity;
- For critical landfill infrastructure, trained personnel would provide field monitoring of the construction activities and potentially affected infrastructure; and
- Observations of the construction activities and any monitoring results will be recorded.

As project design moves forward, it is expected that additional measures would become part of the project's construction protection program and contained within the capital project design drawings. All designs would also be subject to the review and approval of DSNY and DEC prior to construction.

C. POTENTIAL CONSTRUCTION PERIOD IMPACTS OF THE PROPOSED PROJECT

LAND USE, NEIGHBORHOOD CHARACTER AND OPEN SPACE

The project site is large and is currently bounded by industrial uses to the west, other park properties to the north, east, and south, commercial uses to the east, and residential neighborhoods such as Travis to the north and Arden Heights to the south. As shown in Figure 20-5, the majority of the project site is not bordered by residential uses. As described above, in order to minimize impacts on these neighborhoods, construction activities (e.g. staging, storage, operations) would be concentrated in the central portion of the site. These areas allow for centralized access and re-use of areas previously disturbed that are located away from local communities and existing open spaces and natural areas. Construction staging would not need any off-site locations and construction activities near these neighborhoods would therefore be limited to constructing the local parks and would be short in duration.

Certain types of construction activities at the periphery of the park (e.g. North Park, Phase A) would be potentially noisy for local residents and current parks users at places such as Schmul Park and some short-term construction activities would also be audible and visible from the local community and park. As described in greater detail later in this chapter, there are likely to be temporary and localized construction impacts due to construction noise, operation of heavy equipment, construction workers traveling to and from the site, and trucks delivering materials to

and removing construction waste from the site. However, the intensity of the off-site impact decreases with the distance from the site and construction access and traffic corridors would primarily use the West Shore Expressway and internal project site roads to avoid impacts to neighborhoods. Neighborhood park construction projects would be short in duration and the intensity of construction would not be a great. In addition, as discussed below (see "Noise"), pursuant to the New York City Noise Control Code, as amended December 2005 and effective July 1, 2007, the adoption and implementation of noise mitigation plans would be required for project construction. Construction activities typically occur between the periods of 7 AM to 4 PM on weekdays, and not on weekends when the local parks would likely be more fully utilized. As described below under "Traffic and Parking," during construction of the proposed project, no off-site queuing of trucks is expected, and all construction staging would take place within the project site.

Worker vehicles would also use local roads only to access the project area, while construction trucks would use local truck routes and the designated truck entrances to reach the site.

In sum, the local neighborhoods would be sufficiently buffered from construction activity, with the exception of those capital projects that would be creating new neighborhood parks, which would be limited in both duration and extent. For these reasons, it is concluded that no potential significant adverse construction period impacts on land use or community character would occur with the proposed project.

HISTORIC RESOURCES

ARCHAEOLOGY

Construction excavation may potentially impact subsurface archaeological resources that have been identified at particular locations as part of the Phase 1A Archaeology Study of the site (see Appendix B). Mitigation for these potential impacts is described in Chapter 23, "Impact Avoidance Measures and Mitigation." These mitigation measures are to be instituted prior to construction, but can also be incorporated into the construction bid documents, as long as the work is undertaken before construction proceeds.

HISTORIC RESOURCES

There are limited sensitive historic resources in the study area, although the Sleight Family Cemetary is located at the south end of the site. There are also some resources in the surrounding area. Some construction activity would involve heavy construction activities associated with road construction. Table 20-13 presents vibration-induced risk criteria for construction activities. If necessary to protect historic structures, following would be performed:

- Inspection of and reporting on the current foundation and structural condition of any historic buildings that are within 60 feet of any proposed street work;
- A vibration monitoring program to measure vertical and lateral movement and vibration of the historic structure;
- Monitoring construction methods to limit vibrations to levels that do not cause structural damage to the historic structures, as determined by the conditions survey; and
- "Stop work" orders to the contractors to prevent damage to the designated structures. Work would not begin again until the steps proposed to stabilize and/or prevent further damage to the designated buildings are approved by a professional engineer.

Table 20-13
Vibration-Induced Risk Criteria for Buildings

Activity	Perceptible Distance (feet)	Damage Potential Distance (feet)		
		Architectural		
		Historic	Residential	Structural
Pavement Breaking	150	60	40	8
Excavating	60	30	20	3
Heavy Truck Traffic	50	20	15	3
Jackhammers	30	15	10	2

Sources:
Wiss, John F. Construction Vibrations: State-of-the-Art. Journal of the Geotechnical Engineering Division, Proceedings of the American Society of Civil Engineering Division, Proceedings of the American Society of Civil Engineers, Volume 107, No. GT2, February 1981.
Standard Recommended Practice for Evaluation of Transportation Related Earthborne Vibrations. AASHTO Designation: R8-81 (1986).

In addition, the contractor would carry insurance to cover the expense of repairs or enhancement due to any damage that might occur to the structures.

NATURAL RESOURCES

WATER QUALITY AND SEDIMENT CONTROL PRACTICES[1]

The project site contains substantial freshwater and tidal wetlands comprised of creeks, ponds, and stormwater basins. It is a critical component of the project construction practices to avoid impacts to these natural systems, not only for the purposes of avoiding impacts to natural resources and water quality, but also for the purposes of avoiding siltation impacts to the existing stormwater basins site. In order to avoid these impacts, the proposed project includes a "Conceptual Site-Wide Erosion and Sediment Control Plan." This plan, which is described below, establishes the guidelines by which each phase of project construction, though implementation of the proposed techniques, would avoid impacts to natural features and in-place stormwater management systems. Implementation of these techniques would be ensured not only by DPR, but through the SPDES General Permit requirements (see description above), since most capital projects are expected to cover at least 1 acre. The overall objectives of the plan are as follows:

- No increase in turbidity that would cause a substantial visible contrast to natural conditions;
- No increase in suspended colloidal and settleable solids that would cause "deposition or impair waters for their designated best use"; and
- No residue from oil and floating substances.

Each proposed stormwater management plan would be designed to meet the requirements of the SPDES General Permit for stormwater construction from construction activities and on subsequent amendments as well as Article 17 of the New York State Environmental Conservation Law and the Federal Clean Water Act. The Plan has also been designed to meet the standards of the *New York State Stormwater Design Manual* (DEC, 2003) and the New York State Standards and Specifications for Erosion and Sediment Control (DEC, 2005).

[1] Conceptual Site Wide Erosion and Sediment Control Plan (ESCP), Fresh Kills Park, Geosyntec Consultants, September 28, 2007.

CONCEPTUAL EROSION AND SEDIMENT CONTROLS

Project-specific erosion and sedimentation control procedures would be developed for each of the proposed park capital projects. Erosion and sediment controls would be designed for each specific construction projects based on a number of considerations, including degree and length of slope, runoff characteristics, land cover type, maintenance requirements, and site accessibility. Additional factors would include:

- Existing infrastructure (e.g., landfill gas and leachate collection systems);
- Proximity to and protection of landfill cover;
- Areas sensitive to infiltration;
- Maintaining positive drainage in channels on landfill surface; and
- Differential settling.

Among the structural or system best management practices that are under consideration are the following:

Stone and Block Inlet Protection. Inlet protection consists of stone and block inlet protection. This technique uses a berm of stone or stone and cement blocks to filter water prior to entering the outlet. This system should have a drainage area of no more than one acre.

Turbidity Barrier. A series of turbidity barriers may be installed in the stormwater basins for the purposes of providing interior settling pools that trap and store accumulated sediment. With this system, accumulated sediment must be removed from the upgradient end of the barrier, as necessary.

Riprap Inlet Filter Ring. A riprap filter ring or berm may be installed around a sediment basin inlet during construction. This filter ring would function to reduce the amount of sediment entering into the sediment basin outlet pipe and ultimately into the receiving water. With this system, sediment must also be removed and the impoundment restored to its original dimensions when sediment has accumulated to one-half the height of the stone berm. The inlet filter ring can be removed after construction, but not before all upslope areas have been permanently stabilized.

Rock Outlet Protection. Rock outlet energy dissipation and protection can be utilized to reduce scour and erosion in the downstream receiving waters. Rock outlet protection commonly is constructed using rip-rap and woven geotextiles. In instances where significant stormwater flows are expected, gabion baskets may provide a more appropriate stabilization technique.

Silt Fence. Standard erosion control practices consisting of silt fence are expected to be used to define the limits of work around soil stockpiles and to prevent downstream sedimentation. With this system, sediment deposits typically must be removed after each rainfall or when the level of disposition reaches approximately one-half the height of the silt fence.

Compost Sock. Compost socks are used as an alternative method of perimeter control to silt fences.

Perimeter Dike/Swale. Perimeter dikes and swales may be used as an alternative method of perimeter control/stormwater conveyance for drainage areas less than two acres. Dikes/swales shall be constructed by excavating a swale and creating a dike on the downstream side with the cut material. Grades of the dikes/swales would be steep enough for positive drainage, but not exceeding 8 percent and would be stabilized within seven days.

DSNY Sediment Basins. There are eighteen stormwater basins currently on-site. Subject to approval of DSNY and DEC, these basins could be used as sediment basins during park

construction. Under this proposal, existing stormwater flows would be routed to the basins through a series of down chutes. The basins would then remain in operation throughout the duration of construction. The sediment basins would retain sediment before it is discharged to the receiving water and all proposed activities need to be in conformance with DSNY monitoring and maintenance obligations for the closure and post-closure of Fresh Kills Landfill. Inlet and outlet structures in some basins may require maintenance prior to the start of construction. Under this proposal, the basins would be inspected for signs of erosion around the rim. Any locations where rills are found would be routinely inspected. In addition, it is expected that sediment must be removed from the basin.

Sediment Trap. Sediment traps are used to collect and temporarily retain stormwater runoff from drainage ways, storm drain inlets, or other points of collection within a disturbed area. They can also be used to subdivide a drainage area into smaller areas where a larger system such as a sediment basin may otherwise be necessary. Maintenance removal of sediment is typically necessary when sediment accumulates to a depth of 50 percent of the total sediment trap depth.

Construction Entrances/Exits. A temporary construction entrance, comprised of 1.5-inch crushed stone, would be installed at all construction vehicle entrances and exits and would be used to reduce the tracking of sediment off-site onto public streets. The typical construction entrance is a minimum of 50 feet in width. At this location, all sediment spilled, dropped, or washed onto public streets would be removed. A vacuum street sweeper or other acceptable means of collecting tracked sediment may also be used.

In addition to the structural techniques, discussed above, the following non-structural erosion and sediment controls and best management practices are likely to be used during park construction (see also Table 20-14).

Table 20-14
Construction Period Water Quality Protection Measures

Concrete Washout
Contaminated Soil Management
Debris/Waste Management
Dewatering
Dust Control
Hazardous Waste Management
Long Term Pollutant Control
Material Storage Areas
Material Use
Pesticides and Fertilizers
Portable Toilets
Secondary Containment
Spill Prevention
Stockpile Management
Vehicle and Equipment Cleaning
Vehicle and Equipment Fueling and Maintenance
Water Management
Source: Geosyntec, December 2007.

Dust Control. During site grading activities, measures would be implemented to control fugitive dust. Typical dust control measures include seeding, wet suppression, application of soil stabilization agents, or other measures to control dust generated by construction activities.

Wet suppression consists of applying water or a wetting agent in solution with water to the exposed soil to control dust. Wet suppression equipment includes sprinkler pipelines, tanks, tank trucks, or other methods of providing uniform spray, and positive shut-off. Several applications per day may be necessary, depending upon meteorological conditions and work activity.

Additional Stabilization Practices. Additional stabilization practices may also be used in addition to the erosion and sediment control methods described above. These added measures would reduce erosion by creating a protective cover over the soil. This would include the vegetation cover that provides soil in addition to the protection offered by the surface vegetation. All denuded areas that would not have final cover for a period of more than 14 working days could be temporarily stabilized with temporary stabilization practices. Temporary stabilization practices may include seed, mulch, track-walking, and erosion control blankets. Temporary seed may include types of seed described below (see Table 20-15), which describes a customized seed mixture that could be potentially used by the project.

Table 20-15
Temporary Seeding/Mulching Options

Time	Seed Type	Application Rate (lbs/acre)	Application Rate (lbs/1000 ft^2)
Spring, Summer, Early Fall	Rye Grass (annual or perennial)	30	0.7–1.0
Late Fall, Early Winter	Aroostook Winter Rye (cereal rye)	100	2.5
All Year	Mulch with Hay or Straw	4000	90 (2 bales)
Source: Geosyntec, December 2007.			

The above seed specifications are those specified by DEC as construction period protection measures. Additional alternatives that may be considered would also be subject to DEC under the permit approval process.

Mulch may also be used as temporary stabilization and applied to disturbed soils to reduce erosion. Temporary mulch can be applied to areas that have been seeded to facilitate vegetative establishment. Mulch may also be used to temporarily stabilize areas that cannot be seeded because of the season of the year and need for soil protection.

Once construction is complete, these areas would be permanently stabilized as part of the proposed park. In most cases, efficient implementation of permanent vegetation or cover is the preferred method of stabilization.

Another element of the SWPPP is to channel protections. Stormwater conveyances such as channels and swales ultimately receive the runoff from the site. In certain cases, it may be prudent to line channels and swales with erosion-resistant materials. For example, channels with anticipated low velocities and flow rates may be lined with vegetation and temporary erosion control blankets. Channels with anticipated high velocities and flow rates may be lined with a permanent erosion-resistant lining such as rip-rap, rock, or permanent erosion control blanket. Among the potential channel protection measures are the following:

Rip-rap Lining. Rip-rap may be used to permanently stabilize channels where the establishment of vegetation is not feasible or appropriate (e.g., high anticipated velocities and shear stresses).

In rip-rap lining, a filter fabric may be used with rip-rap to reduce sediment transport from the channel bed.

Vegetative Lining. The same methods used for establishing temporary or permanent stabilization with vegetation on slopes and flat pad areas may be applied to channel stabilization. Additional stabilization in the form of erosion and sediment control blanket may also be required for successful vegetative establishment in channels.

Erosion Control Blanket. Erosion control blankets may be used to reduce the potential for erosion in channels during the period when vegetation establishes. Erosion control blankets need to be properly trenched in and secured to the slope to prevent undermining.

Turf Reinforced Mat. Turf reinforced mat may be used to stabilize channels where high flow velocities and shear stresses are anticipated.

Check Dams. Check dams may be temporarily installed in channels and diversions where additional energy dissipation and sediment retention are needed. Check dams should also be lined with a geotextile. Sediment should be removed upstream of the check dam when it exceeds 50 percent of the height of the check dam.

In addition to developing appropriate soil erosion and sediment control practices for each site the SWPPP for each capital project would include the following::

Pre-Construction Meeting. A qualified professional would conduct an assessment of the construction site prior to the start of construction and certify that the appropriate erosion and sediment controls described in the SWPPP have been adequately installed or implemented to ensure overall preparedness of the site for the commencement of construction.

Site Inspections. Inspections of stormwater management measures would be conducted by a qualified professional at least every 7 days and within 24 hours of the end of a storm event of 0.5 inches or greater.

Progress Map. A progress map (site map) would be maintained on-site, showing the extent of disturbed site areas and drainage pathways, areas expected to undergo initial disturbance or significant site work within the next 14-day period, areas that have undergone temporary or permanent stabilization, and all areas that have not undergone active site work during the previous 14-day period.

Site Stabilization. All disturbed areas would be stabilized no more than fourteen days following disturbance unless construction has only temporarily ceased on a portion of the site and earth disturbing activities will resume within 21 days.

Maintenance. Sediment would be removed from sediment traps or ponds whenever their capacity has been reduced by fifty percent from the design capacity.

Permit Extension. If construction is not completed within 6 months of the current permit, an extension would be obtained.

NATURAL RESOURCES PROTECTIONS

Overview

As summarized above and described in greater detail in Chapter 1 " Project Description," the proposed project would create a large new open space with significant cultural, recreational and environmental amenities while at the same time protecting and enhancing aquatic and terrestrial

landscapes as well as the proposed park roads. The landscape enhancement elements include the following general construction activities:

- Enhancement and expansion of the existing freshwater wetlands, with possible creation of additional wetland landscapes within certain existing stormwater management basins;
- Enhancement and expansion of the existing tidal wetlands through removal of invasive species such as Phragmites and enhancement of the native intertidal and high marsh plant communities;
- Development of native grassland and meadow landscapes on the landfill sections; and
- Expansion of woodlands within the project site to provide a buffer for the site perimeter and provide an ecological connection with woodlands adjacent to the project site.

This analysis examines the potential construction period impacts of the proposed project with respect to natural resources through 2016 and 2036.

Land Disturbing Activities

Construction would result in the following land disturbance activities:

- Land clearing—removal of existing vegetation or other existing cover material;
- Temporary stockpiling of fill to be used as final cover material;
- Grading and construction of surface drainage systems;
- Installation of infrastructure.

These activities have the potential to impact terrestrial and aquatic resources through:

- Discharge of stormwater to tidal and freshwater wetlands present within the project site;
- Deposition of fugitive dust resulting from grading activities into terrestrial and aquatic landscapes;
- Physical damage to vegetation outside a project area (i.e., above ground portion of the plants and the below ground portion of the tree protection zone for trees identified for retention);
- Direct (i.e., physical removal of plant community or grading of soil, loss of individual wildlife due to collision with or as a result of operation of construction equipment) and indirect (avoidance of landscape due to noise, vehicle traffic, or other human disturbance) loss of landscape; and
- Potential impacts to natural resources as a result of these activities would be minimized through the implementation of measures and guidelines discussed in the following sections.

Measures to Reduce Potential Wildlife Impacts During Construction

In typical construction activities, short-term construction impacts to wildlife can include loss of landscape from staging areas for construction equipment and work sites, landscape degradation due to partial removal of landscape or necessary substrate for wildlife activity (i.e., non-permanent removal or damage of vegetation as a result of a temporary project, such as tree trimming or temporary blocking of a drainageway to limit stormwater runoff), wildlife avoidance of construction sites due to noise, human disturbance, lighting, and other factors that cause landscape to be unsuitable. Wildlife use of a particular area would be expected to return upon completion of construction and enhancement activities. Moreover, in the long term, the restored and enhanced landscapes proposed for Fresh Kills Park would be expected to benefit

wildlife through the introduction of vegetative cover of higher quality and diversity than currently present within much of the project site.

Strategies to limit wildlife impacts as a result of the above construction activities would depend on the duration and extent of the disturbance. The use of physical barriers at construction and staging areas, such as drift fencing, would be useful to restrict movement of ground-dwelling wildlife (i.e., small mammals, reptiles and amphibians). Direct impacts to wildlife would also be reduced by limiting the speed of construction vehicles, and avoiding nighttime construction operations. Additionally, the phasing of the park development activities over a 30 year period would limit the extent of land disturbance and area of in-water construction activities at a given time, increasing the potential that suitable landscapes may be available to wildlife affected by development of a certain elements of the park and reducing the potential for significant adverse impacts.

Site-Specific Erosion and Sediment Control Plan (ESCP)

As described above, a conceptual site-wide erosion and sediment control plan has been prepared and would be implemented on a project-by-project basis through 2036. An individual SWPPP would comply with the project's conceptual plan (see the discussion above) and would meet DEC's technical standard for erosion and sediment control as presented in "New York Standards and Specifications for Erosion and Sediment Control," and DEC's technical standard for the design of post-construction stormwater control practices presented in New York State Stormwater Management Design Manual. The site-specific plan would include design controls and describe practices to be implemented during construction to minimize the release of pollutants in stormwater runoff, and would take into account special constraints such location of landfill environmental control systems, landfill final cover considerations, slope and proximity of sensitive natural resources. These measures would also include the following:

- Flagging and staking to define the limits of disturbance and locations to install controls—this would include identification of the tree protection zone by a certified/registered arborist for trees that are to be preserved.
- Installation of stockpile management controls.
- Stabilized construction entrances/exits and construction entrance postings,
- Appropriate inlet and outlet protection areas that have the potential to be affected by land disturbing activities—Stormwater runoff within the project site is currently managed through final grading, swales, downchutes and culverts that discharge to the existing eighteen stormwater basins that moderate peak flows and allow suspended sediments to settle out of suspension within the basins prior to discharge to the receiving surface waters. It is anticipated that during construction, site drainage will remain similar to the existing configuration of directing stormwater to the stormwater basins. Basin outlet structures would be equipped with appropriate outlet protection devices and maintained as specified in the SWPPP. Specific details for inlet and outlet protection devices will be included in the site-specific ESCPS but would likely include sediment barriers such as drop inlet protection and inlet filter berms.
- Perimeter controls in areas to be disturbed during grading activities (i.e., sediment barriers such as compost socks, gravel bag/sand bag berms).
- Stormwater conveyances (i.e., channels, swales, diversion berms, etc) to direct runoff to one of the existing stormwater basins, as is appropriate for the site-specific ESCP.

- Fugitive dust control measures (e.g., seeding or wet suppression), including minimizing the amount of exposed soil at any given time.
- Stabilization of disturbed areas with temporary seeding or permanent cover—seeding should be consistent with landscaping plan and enhancement plans developed for the portion of the park under construction.
- Removal of temporary BMPs following final stabilization.

Natural Resources Protection Plan

In addition to the above, a natural resources protection plan would be prepared for each construction project. This plan would identify landscapes, trees, sensitive plant communities such as wetlands, and any other communities that have been identified for preservation and protection under the proposed project and establishes the necessary protection zones around these resources so as to minimize the potential for adverse direct or indirect impacts to these resources. These protection zones would be flagged and staked in the field by a professional (i.e., certified/registered arborist for trees, and by a horticulturist or botantist for wetlands and other sensitive plant communities), and identified on all construction drawings along with notes indicating activities allowed and prohibited within each protection zone.

Clearing of staging areas for roadway construction, as well as construction of other park elements, would also conducted in a manner consistent with minimizing impacts to large trees (e.g. trees greater than 12-inches in diameter at breast height) that are outside of adjacent to areas proposed for construction disturbance. Maintaining existing mature trees provides benefits in temperature reduction (via shading, evapotranspiration potential, air quality improvements) and aesthetic value to park visitors that could take decades to restore through reforestation programs.

Construction Monitoring Program

A construction monitoring program would be implemented during construction to document that construction is consistent with the design and intent of the projects construction management plan including protection of the environmental monitoring control systems at Fresh Kills Landfill (i.e., landfill final cover gas and leachate collection systems) and to ensure that those systems remain intact and functioning during and after construction activities.

In-Water Construction Activities

Certain elements of park construction would require activities in the water (see Tables 20-1 through 20-8).[1] As summarized below this construction activity is expected to include:

- Construction of stormwater outfalls and aprons.
- Placement of fill material, culverts, and other structural elements within the existing surface waters or wetlands as required for the construction of the proposed park roads, viaducts, and bridges; the West Shore Expressway service roads and ramps, and pedestrian/bicycle bridges and paths.

[1] Given that the ferry/water taxi landing at the Point is proposed for a location with existing bulkhead and waterfront infrastructure, it is assumed that it could be developed with limited improvements and nor dredging. Because the marina is to be used by small craft with shallow drafts, it is also assumed that the development of the 50-slip marina at the Point would not require dredging.

- Removal of sediment and grading of shoreline required as part of the proposed wetland enhancement activities.
- Installation of piles within surface waters and tidal wetlands required for proposed kayak launch, wildlife observation decks, boardwalks, fishing piers, barge garden, a small 50-slip craft marina, and ferry/water taxi landing.
- Repair of existing shoreline stabilization features.
- Removal of in-water debris.
- Installation of underground utilities.
- These activities have the potential to impact aquatic resources and wetlands through:
- Temporary increases in suspended sediment and resuspension and redeposition of sediment contaminants during sediment disturbing activities such as piling installation, bulkhead repair/replacement, and removal of sediment and grading as a result of wetlands enhancement efforts.
- Temporary loss of fish landscape (i.e., breeding or nursery landscape, foraging, or EFH identified by the NMFS) from temporary water quality changes and noise impacts associated with pile driving.
- Temporary loss of wetland landscape due to installation of underground utilities.
- Direct loss of wetlands, or bottom landscape and associated benthic invertebrates within the footprint of piles, fill material, culverts, and other structural elements associated with the proposed park road and bridge network, and waterfront amenities.

Given the high degree of mixing and relatively quick flushing in the Fresh Kills waterways, any temporary increase in suspended sediment resulting from in-water construction activities would be localized and dissipate within a short distance of the project activity. In the majority of cases these activities are also quite limited in duration (1-2 weeks) and impacts would cease upon completion of the in-water (sediment disturbing) activity. Therefore, although temporary short-term disturbances to aquatic landscape and suspended materials in the water column may occur, in-water construction activities would not be expected to result in significant adverse impacts on water quality or aquatic biota during construction. Similarly, any contaminants released to the water column as a result of sediment disturbance would not be expected to result in significant short-term or long-term impacts on water quality. While Arthur Kill and Fresh Kills Creek system sediments have been found to contain contaminants at concentrations that may pose a risk to some benthic macroinvertebrates, the relatively rapid flushing of the Fresh Kills Creek system and large influence from the Arthur Kill suggests that these sediments would dissipate such that redeposition within or outside the project area would not be expected to significantly adversely affect benthic macroinvertebrates or bottom fish.

Life stages of estuarine-dependent and anadromous fish species, bivalves and other macroinvertebrates are fairly tolerant of elevated suspended sediment concentrations and have developed behavioral and physiological mechanisms for dealing with variable concentrations of suspended sediment (Birtwell et al. 1987, Dunford 1975, Levy and Northcote 1982 and Gregory 1990 in Nightingale and Simenstad 2001a, LaSalle et al. 1991). Fish are mobile and generally avoid unsuitable conditions in the vicinity such as increases in suspended sediment and noise (Clarke and Wilber 2000). While localized increase in suspended sediment may cause fish to temporarily avoid the area around where piles or other in-water structures are being installed, the affected area would be expected to be small. Similar suitable landscapes would be available for

use by fish to avoid the area of in-water construction. Fish also have the ability to expel materials that may clog their gills when they return to cleaner, less sediment laden waters. Most shellfish are adapted to naturally turbid estuarine conditions and can tolerate short-term exposures by closing valves or reducing pumping activity. More mobile benthic invertebrates that occur in estuaries have been found to be tolerant of elevated suspended sediment concentrations. In studies of the tolerance of crustaceans to suspended sediments that lasted up to two weeks, nearly all mortality was caused by extremely high suspended sediment concentrations (greater than 10,000 mg/L) (Clarke and Wilber 2000) which would not occur from the in-water work associated with the proposed project.

Installation of piles by driving (or other means such as drilling) can produce underwater sound pressure waves that can affect fish, with the type and intensity of sounds varying with factors such as the type and size of the pile, firmness of the substrate, depth of water, and the type and size of the pile driver. Larger piles and firmer substrate require greater energy to drive the pile resulting in higher sound pressure levels. Hollow steel piles appear to produce higher sound pressure levels than similarly sized wood or concrete piles (Hanson et al. 2003). Sound attenuates more rapidly in shallow waters than in deep waters (Rogers and Cox 1988 in Hanson et al. 2003). Sound pressure levels generated by the driving of hollow steel piles with impact hammers can reach levels that injure fish (Hanson et al. 2003), and may not cause an avoidance behavior in fish. Impact hammers generate short pulses of sound with little of the sound energy occurring in the infrasound frequencies; the sound frequencies that have been shown to elicit an avoidance response in fish (Enger et al. 1993, Knudsen et al. 1997, and Sand et al. 2000 in Hanson et al. 2003). Therefore, fish have been observed exhibiting an initial startled response to the first few strikes of an impact hammer, after which fish may remain in an area with potentially harmful sound levels (Dolat 1997, NMFS 2001 in Hanson et al. 2003).

While there is little data available on the sound pressure levels required to injure fish, fish with swim bladders and smaller fish have been shown to be more vulnerable (Hanson et al. 2003). Because the area where pile driving would occur for each proposed in-water element is small when compared the amount of open water area available, fish would have sufficient available landscape to avoid pile driving activity. Additionally because the length of time for driving each pile is expected to be short, individual fish would not be expected to be exposed to potentially dangerous SPLs long enough to result in mortality. Therefore, the pile driving that would occur for the development of proposed in-water elements of the proposed project would not be expected to result in significant adverse impacts on aquatic biota.

The installation of the piles, boat ramps, outfall structures, or bulkhead, would result in temporary disturbances to landscapes during construction.

Potential impacts to natural resources as a result of construction activities could be minimized through implementation of the following:.

- Measures to minimize increases in turbidity and suspended sediment in the water column, and to capture floating debris during sediment removal and grading activities, and installation of in-water structures. Examples of measures to be considered include silt curtains and coffer dams. Measures would be selected on the basis of on-site conditions and consultation with DEC and the USACE.
- Implementation of measures to stabilize the wetlands enhancement areas as necessary during planting, such as the use of biodegradable/geosynthetic erosion control mats or revegetation mats.

- If necessary, implementation of measures that may restrict or limit the construction activities in water or sensitive landscapes during certain seasons.

In addition, it is recognized that all construction activities within open waters or other wetlands are subject to the review and approval of DEC and ACOE and federal natural resource agencies through the permitting process that would further identify and implement these and other protection measures necessary to protect water quality and sensitive landscapes.

Geology, Soils, and Groundwater

Development of the proposed park and roadways is not expected to result in significant impacts with respect to geology, soils and groundwater. The majority of the project elements would be built at or above grade and therefore would not affect local geology. In addition, it is proposed to place approximately 2 feet of new soil on top of the landfill sections and publicly accessible areas of the park. Thus, the proposed project would largely be bringing fill to the site, although there would also be areas of some limited grading of existing soils to achieve level grades for parking areas, structures and recreational facilities and also excavation for the installation of utilities. The placement of this soil would be performed in a way that would not compromise the existing environmental monitoring systems, and not be expected to result in significant adverse impacts to groundwater. In addition, few elements of the proposed project are expected to reach into groundwater or require any dewatering during construction since most project elements would be constructed at or above the existing grade.

In addition, development of the park roads and West Shore Expressway Service Roads and ramps would not result in significant adverse impacts to geology, soils or groundwater. Certain features of the proposed bridge construction, in particular supports for the Signature Bridge, would be expected to reach into the deeper geologic strata. However, there are already bridges on the project site and no major impacts on geology are expected as a result of this construction. With respect to the landfill systems, a construction monitoring plan would be implemented to ensure that the construction of the roadway elements for 2016 is consistent with the protection of the existing environmental monitoring control systems (i.e., the landfill gas and leachate collection systems) and all landfill cover would remain intact and functioning during road construction to minimize the potential for adverse impacts to terrestrial and aquatic resources.

As discussed above, a construction monitoring plan would be implemented to ensure that the construction of the 2036 roadway elements would protect the existing environmental control and monitoring systems at Fresh Kills (i.e., landfill gas and leachate collection systems). This construction monitoring plan would also ensure that the integrity of the landfill cover remains and that all systems are functioning during road construction, thereby minimizing the potential for adverse impacts to the environment.

Construction of certain park elements proposed for the Point, where the more intensive construction program is proposed, may require activities into groundwater. While this would depend on site-specific designs, in this event the project would secure all the regulatory approvals from DEC and NYCDEP and take all the steps for environmental control and protection in order to ensure that local waterways are not adversely impacted by dewatering activities.

Significant Coastal Fish and Wildlife Habitat

Construction of the proposed park and roadways would not be expected to conflict with the Fresh Kills Significant Coastal Fish and Wildlife Habitat. During construction, with the

proposed construction protection measures in place, the tidal creeks of this designated landscape would continue to provide spawning and nursery opportunities for anadromous, estuarine, and resident fish, and would continue to be used by wading birds, waterfowl, shorebirds, raptors and passerines. In addition, all proposed in-water activities would be subject to permitting by the DEC and USCOE for the purposes of protecting wetlands and water quality and would require the input of the DOS with respect to coastal policies and protection of significant coastal fish and wildlife landscape. Each capital project would be reviewed on an individual basis. For these reasons, it is concluded that the proposed project would not conflict with this landscape designation during construction.

During construction, the tidal creek systems at Fresh Kills would continue to provide spawning and nursery landscape for anadromous, estuarine, and resident fish, and would continue to be used by wading birds, waterfowl, shorebirds, raptors and passerines. To the extent that any construction periods may need to be restricted to avoid impacts to fish spawning or avian nesting, it is expected that these restrictions would be addressed by the permits that are necessary for the proposed projects, and would be implemented by DPR.

FLOODPLAIN IMPACTS

Construction at the proposed park elements would require activities in the floodplains of the waterways at Fresh Kills. Construction activities within the floodplain would include clearing vegetation, possible placement of fill, and construction of other park and roadway elements as well as the installation and the repair (as necessary) of waterfront infrastructure for boat launches and overlooks. Construction in the floodplain would not be expected to result in any significant increases in surface runoff that would affect local flooding, nor would the increase in elevation from filling activities be expected to exacerbate flooding conditions within or adjacent to project site. The project site, like all of New York City, is affected by local flooding (e.g., flooding of streets and roads typically from short-term, high-intensity rain events in areas with poor drainage), fluvial flooding (e.g., storm conditions where runoff leads to rivers and streams overflowing their banks), and coastal flooding (e.g., long and short surges in sea level often accompanied by wave actions that influence tidal rivers, streams and inlets). The Arthur Kill, Fresh Kill, Main and Richmond Creeks floodplains are based on coastal (tidal) flooding. As a result, water levels in storm conditions are controlled by tidal conditions at the mouth of these waterways, with little or no influence from the fluvial runoff into the creeks. Since the floodplain at the project site is affected by coastal flooding, which is influenced by astronomic tides and meteorological forces (e.g., northeasters and hurricanes), it would not be affected by the construction activities that are proposed in the floodplain. In addition, the majority of the current coverages are either natural wetland plant communities or grassland areas that would be enhanced. Thus, the related construction activities would not adversely impact the floodplain during construction.

Development of the proposed park roads and West Shore Expressway connections would generally be outside the 100-year floodplain, with the exception of the proposed activities at the Marsh, in the vicinity of the existing Main Creek and Richmond Creek bridges, where the Loop Park Roads cross under the West Shore Expressway on either side of the Fresh Kills and the approached to the proposed Signature Bridge. Construction of these roadways would require activities in the floodplain that include vegetation clearing, possible placement of fill and construction of road surface, and construction of stormwater outfalls associated with the management of stormwater runoff from the roads. As discussed above the flooding of the tidal

creeks within the project site is influenced by coastal flooding. Flow into these creeks from upland areas has little of no influence on the floodplain.

WATERWAYS AND WETLANDS

Implementation of erosion and sediment control measures described above for each park and road element would minimize the potential for significant adverse impacts to both water quality and aquatic resources during construction.

In addition, it is expected that all activities in wetlands (both tidal and freshwater) would require permits for activities in wetlands. This would include permits for tidal wetlands and protection of water, as well as permits from the ACOE for activities in waterways and wetlands. Permit applications for these would require site specific design data and would be accompanied by site specific impact analyses relative to natural resources. Applications for these permits would be reviewable by both Federal and State agencies to ensure that impacts to landscapes and wildlife are minimized or avoided to the extent feasible and that mitigation of impacts is also part of each capital project, as necessary.

A description of construction period impacts for the 2016 and 2036 analysis years follows.

CONSTRUCTION PERIOD IMPACT ANALYSIS: 2016

Introduction

Table 20-1 lists the park projects anticipated to be completed by the 2016 analysis year. These near-term projects are located primarily in the North and South Park, and the Confluence, with some activities proposed for the East Park such as the wind turbines and Park Roads, as summarized below and described in detail in Chapter 1, "Project Description."

North Park

Description of Construction Activities. By 2016, it is assumed that North Park would be completed including the following: Travis Neighborhood Park (located along the northwest and northern section of the North Park), and the associated parking and supporting structures, with park entrances and a pedestrian bridge across a freshwater wetland stream, footpaths leading to Main Creek, an overlook at Main Creek with a kayak dock, about 20 acres of off-mound upland landscape enhancement, and about 2 acres of tidal wetlands enhancement along Main Creek; a multi-use path around the base on the landfill section and landscape enhancement on the landfill section and additional recreational facilities including a 12-acre field surface, a 1-acre wooded picnic grove, enhancement of freshwater wetlands, enhancement of an existing stormwater basin, an outdoor classroom, a visitor center/comfort station, a café/comfort station, tidal wetland enhancement along Main Creek, a fishing pier on Main Creek, a flare station exhibit, and DPR maintenance facility. The following presents the potential impacts to natural resources during the construction period for the above program.

Wetlands. Construction of North Park would not result in significant adverse impacts to freshwater or tidal wetlands. A field survey performed by Geosyntec in September 2003 identified the limit of freshwater wetlands in this area based on ACOE methodologies. Construction activities in and near wetlands would be limited to the placement of a pedestrian foot bridge at the stream crossing, placement of platforms with small footprints within tidal wetlands and adjacent areas(kayak launches, bird observation platform, fishing platform) and a tidal wetland enhancement project (about 1 acre) along Main Creek along with an overlook and waterfront access. The proposed North Park project would also include the enhancement of about 2 acres of freshwater wetlands in a corridor located along the northwest border of the

North Park. Wetland enhancement would include grading, invasive species control, and replanting with native wetland plants.

While the proposed structures would have the potential to affect wetland landscape during construction, the footprint of these structures is generally small (e.g. 900 square feet each) and would not result in significant adverse impacts to wetlands. The minimal short-term construction period impacts to tidal wetlands associated with the installation of these structures and activities to restore the wetlands themselves would be more than offset by the proposed tidal wetlands enhancement project in the longer term. As discussed above, implementation of erosion and sediment control practices as part of the SWPPP prepared for construction of various portions of the North Park would greatly minimize the potential for adverse impacts to wetlands during construction activities.

Aquatic Resources. In-water construction activities for the North Park would be minimal. These activities would include driving of piles for proposed structures such as the floating kayak launches, bird observation platform, and fishing platform. The installation of piles for these structures would result in a loss of bottom landscape within the footprint of the piles. However, these structures have a small footprint and would require a limited number of piles. Therefore, the impacts on bottom landscape and any temporary increase in suspended sediment resulting from pile installation would be localized and is expected to dissipate shortly after the completion of the sediment disturbing activity. Therefore, in-water construction activities associated with the North Park would not be expected to result in significant adverse impacts on water quality or aquatic biota.

Terrestrial Resources. Construction of the North Park would result in the clearing of the existing vegetation (i.e., clearing and grubbing to remove trees and other woody vegetation, and herbicide application, mowing and other physical/mechanical removal for the treatment of invasive plant species such as Phragmites) and placement of fill. Soil stabilization measures would be specified for the earthwork components of the project in compliance with the erosion and sediment control measures specified in a SWPPP prepared for each park project (see the general description above).

Land clearing and construction activities associated with the development of the upland portions of the North Park have the potential to disturb wildlife individuals currently using this portion of the project site. During construction, adverse impacts could occur to individual birds and other wildlife currently using these wildlife landscapes, if construction activities cause them to leave the project vicinity and there are no suitable landscapes nearby. However, current upland areas within North Park are approximately 70 percent covered by Phragmites and mugwort, two invasive, non-native species that are prevalent throughout the project site and the secondary study area and in urban ecosystems in general. These vegetation types have limited wildlife value beyond shelter, nesting substrate for some passerines (i.e, sparrows and marsh-dwelling birds (i.e., marsh wren, possibly rail species), and various native and non-native rodents. Loss of this landscape until the proposed 130 acres of meadow landscape is restored at North Park would not represent a long-term significant adverse impact to these species, as similar landscape exists in close proximity to North Park (i.e., along Main Creek's east shore, on Landfill Section 3/4, etc.).

Approximately 13 small, isolated pockets of native vegetation (i.e., various grasses and sedges, young to maturing canopy of sweetgum, red maple and green ash, and an understory of elderberry, blackberry, and arrow-wood) presently exist in the central and northern sections of North Park. With the exception of a band of these landscape patches that could be incorporated

into the western portion of the woodland enhancement, most patches would likely be cleared during construction activities at North Park. These small communities are non-contiguous, and are well represented in palustrine emergent/forested wetlands along the western border of North Park and throughout the project area. The loss of some of these landscape patches, although potentially valuable for cover, nesting substrate, and food for a variety of relatively common songbirds (i.e., gray catbird, white-eyed vireo, yellow warbler, black-capped chickadee), woodpeckers, mammals, and other wildlife species, would not be expected to result in a significant adverse impact as a result of the proposed enhancement.

Threatened or Endangered Species. Construction of North Park would not be expected to result in significant adverse impacts to colonial waterbird nesting activity on the Isle of Meadows which is situated at a considerable distance from the North Park. Thus, construction activities would not be expected to have any indirect impact on the use of the landscape. Any disturbance to colonial wading bird nesting (e.g., along Main Creek) would be expected through direct disturbance at a construction site. As similar estuarine landscape exists along both Main and Richmond creeks for foraging wading birds, the limited amount of salt-marsh enhancement proposed for North Park would not be expected to result in significant construction-period adverse impacts to foraging areas for wading birds or local non-breeding wading birds.

Development of North Park would also not be expected to result in significant, long term adverse impacts to barn owls or northern harriers during the construction period. These birds may use the field areas of North Park for foraging, but have not been observed nesting at the site. Adequate foraging areas would exist on the balance of the project site and in the immediately surrounding areas during the period of construction.

The state-threatened Northern diamondback terrapin has been captured and observed in Main Creek in the vicinity of William T. Davis Refuge in 1995, and again in 2005 (Johnson and Matarazzo 2006). Therefore, any low shoreline areas adjacent to open sand or other unvegetated soils could potentially support nesting diamondback terrapins, and would also be expected to support foraging adults (Feinberg and Burke 2003). Construction of North Park could impact terrapin nesting or foraging activity. To avoid this impact, prior to any construction activity in potential terrapin nesting landscape, barriers would be constructed to prevent nest building within work sites. Also, a site walk-through to identify and rescue adults or emerging hatchlings (as necessary) prior to construction activity would be appropriate actions. These activities would be conducted by an experienced biologist, and any permits required for handling terrapins would be acquired prior to this activity.

South Park

Description of Construction Activities. The proposed South Park would have active recreational uses (e.g., soccer fields, equestrian facility, and mountain biking venue) and a neighborhood park. The more intensive active recreational uses would be concentrated in the dry lowland area and on the landfill sections. It is also proposed that South Park be comprised of the Arden Heights Neighborhood Park and wetland enhancement, multi-use paths and recreation facilities, landscape enhancement on Landfill Section 2/8 along with approximately 12 miles of mountain biking trails and footpaths. The following summarizes the potential construction period impacts to natural resources from this program.

Wetlands. Construction of South Park would not result in significant adverse impacts to freshwater or tidal wetlands. Construction activities near or in wetlands would generally be limited to the proposed picnic area and playground facilities in the Arden Heights Neighborhood Park (near existing freshwater wetlands) and wetland enhancement activities that would restore

in 12 acres of wet woods and 2 acres of forested wetlands within an existing stormwater management basin. These activities would require limited grading and ground disturbance of existing wetlands and therefore impacts during construction would be limited.

Aquatic Resources. As presented above under the general discussion of potential impacts from upland construction and wetland enhancement activities, implementation of erosion and sediment control measures included in the SWPPP to be prepared for development of the South Park capital projects would minimize the potential for significant adverse impacts to water quality and aquatic resources during construction. Implementation of post-construction stormwater management measures included in the site specific SWPPPs would minimize the potential for significant adverse impacts to water quality and aquatic biota of Richmond Creek, and the tributary stream to Richmond Creek that parallels the West Shore Expressway.

Limited in-water activities would occur as a result of the development of the South Park in 2016. These activities could include installation of drainage culverts for the West Shore Expressway northbound service road. No marine infrastructure is proposed as part of South Park

Terrestrial Resources. Construction of South Park would result in the clearing of the existing vegetation (i.e., clearing and grubbing to remove trees and other woody vegetation, and herbicide application, mowing and other physical/mechanical removal for the treatment of invasive plant species such as Phragmites) on the two landfill sections and within upland areas at the base of the landfill sections, as well as regrading, and placement of fill. Soil stabilization measures would be specified for the earthwork components of the project in compliance with site-specific erosion and sediment control measures specified in the SWPPP.

Construction of the South Park recreation facilities (i.e., tennis courts, bosque parking, equestrian center and stable, indoor track and field facility and sports barn) would result in the clearing of approximately 21 acres of upland landscape. The recreational and parking facilities developed within this area would result in the permanent loss of wildlife landscape of marginal value, consisting primarily of Phragmites/mugwort dominated fields with a small area of maturing woodland. Another 15 acres of upland landscape, primarily Phragmites/mugwort dominated field would be cleared and revegetated with species similar to those described for the meadow landscape to be developed in the North Park. Construction of the Arden Heights Neighborhood Park would result in the clearing and permanent loss of primarily grass/forb dominated uplands within the bosque parking area (3 acres) and within the footprint of the proposed 600-square-foot information center.

Land clearing and construction activities associated with the development of the upland portions of the South Park have the potential to disturb wildlife individuals currently using this portion of the project site. Adverse impacts could occur to some individual birds and other wildlife currently using these wildlife landscapes if construction activities cause them to leave the project vicinity and there are no suitable landscapes that are available nearby.

Landfill Section 2/8 is predominantly dominated by invasive species, including switchgrass, fescue, asters, hopclover, and Phragmites, although the latter is not as dominant on Landfill Section 2/8 slopes as it is in low lying areas. Loss of invasive, non-native species that are prevalent in South Park would not be expected to result in significant adverse impacts to wildlife. These vegetation types have limited wildlife value beyond shelter, nesting substrate for some passerines (i.e, sparrows and songbirds, some non-obligate grassland birds such as ring-necked pheasant) and native and non-native rodents, and as foraging landscape for raptors (i.e., red-tailed hawk). Loss of this landscape until the proposed establishment of grassland landscape

on the mound and forested landscape along the base of the mound, would not represent a long-term significant adverse impact to these species, as similar landscape exists throughout the project site.

Threatened or Endangered Species. Construction of South Park would not be expected to result in significant adverse impacts to colonial waterbird nesting activity at Isle of Meadows. In addition, although barn owls have nested north and east of South Park in recent years, no barn owls or northern harriers are known to, or would be expected to nest in the vicinity of the proposed South Park projects, and the proposed project would not result in construction-period impacts on nesting or breeding barn owls or northern harriers. Although it is likely that both barn owls and northern harriers feed in the vicinity of South Park, suitable foraging landscape exists for these species in other areas of the project site and in the surrounding area.

Confluence

Description of Construction Activities. As described above, the Confluence encompasses the center of the proposed park and is defined by the Loop Park Road that would provide access to all five park areas. It is comprised of two distinct areas of development, the Point (i.e., The Marsh, Terrace, and Sunken Forest), and Creek Landing. Both of these areas are large, flat, paved, bulkheaded and structured surfaces formerly used for receiving municipal solid waste at Fresh Kills Landfill. These areas are currently being used as staging areas for part of the ongoing landfill closure activities at Landfill Sections 6/7 and 1/9.

By 2016, the Marsh, Terrace, and Sunken Forest are expected to be constructed. These project phases include freshwater wetland improvements at Sunken Forest and the Terrace as well as tidal wetland enhancement at the Marsh on the north bank of Richmond Creek and the Terrace at the confluence of Main and Richmond Creeks. In addition, a portion of Creek Landing would be developed with a market roof for private concessions, a boathouse/kayak/canoe rental and café an event lawn possible tidal wetland enhancement in a former barge slip, lighted bosque parking, and a visitor center/DPR maintenance and operations center. The following sections summarizes the potential natural resources impacts from these project elements.

Wetlands. Construction of the 2016 program in the Confluence would not result in adverse impacts to freshwater or tidal wetlands. Instead, the proposed project elements to be completed by 2016 would benefit wetlands resources through the enhancement of at least 4 acres of freshwater wetlands within two stormwater basins (sunken forest at The Marsh, and within stormwater basin in the Terrace), as well as enhancement of tidal wetlands. Construction within an existing stormwater management basin would require limited grading and ground disturbance of the existing basin and therefore impacts during this construction would be limited.

Construction within existing tidal wetlands at the Terrace would include the enhancement of about 21 acres of tidal wetlands. Wetland enhancement would include grading, invasive species control, and replanting with native wetland plants. The minimal short-term construction period impacts to tidal wetlands associated with the installation of these structures and activities to restore the wetlands themselves would be more than offset by the proposed tidal wetlands enhancement project in the longer term. As discussed above, implementation of erosion and sediment control practices as part of the SWPPP prepared for construction of various portions of the North Park would greatly minimize the potential for adverse impacts to wetlands during construction activities.

Aquatic Resources. In-water construction activities for the 2016 Confluence elements would be minimal, and be associated with wetlands enhancement activities. As presented above under the discussion of in-water construction activities, any temporary increase in suspended sediment

resulting from modifications to the shoreline to facilitate tidal wetlands enhancement would be localized and therefore expected to dissipate shortly after the completion of the sediment disturbing activity. As a result, in-water construction activities associated with the Confluence would not be expected to have significant adverse impacts on water quality or aquatic biota. Similarly, any contaminants released to the water column as a result of sediment disturbance would be expected to dissipate rapidly and would not be expected to result in significant long-term impacts on water quality.

Terrestrial Resources. Construction of the project elements proposed for completion by 2016 in the Confluence would benefit terrestrial resources by establishing freshwater forested wetlands within two stormwater basins that are currently sparsely vegetated. However, land clearing and construction activities associated with the upland development would have limited potential to disturb vegetative landscapes or wildlife since this area is largely already developed with little vegetation or landscape of value.

Threatened or Endangered Species. Construction of the 2016 Confluence Program would occur in a largely disturbed area (including the area of the Plant 2 facilities) and would not be expected to result in significant adverse impacts to colonial waterbird nesting activity on Isle of Meadows, or preclude the re-establishment of such activity in the future. The site is some distance from the Isle of Meadows and neither direct nor indirect construction impacts would be expected with respect to the Isle of Meadows or any threatened or endangered species that may be at the site.

Proposed Park Roads and West Shore Expressway Connections

Description of Construction Activities. As discussed above, the proposed park roads and West Shore Expressway connections to be constructed as part of the Fresh Kills Park project are intended to provide new east-west connections between Richmond Avenue and the West Shore Expressway, and to provide park visitors with access to park facilities. For the 2016 analysis year, the proposed park roads include a park road connection extending to the intersection of the Forest Hill Road/Richmond Avenue intersection, with a viaduct that spans a wetland complex in this segment; service roads and ramp connections along the West Shore Expressway, and the Loop Park Road with the exception of the Signature Bridge. What follows is a summary of the potential natural resources impacts resulting from the operation of these project elements.

Wetlands. Construction of the proposed park roads would result in adverse impacts to both freshwater and tidal wetlands. By 2016, the proposed park roads and West Shore Expressway service roads would result in the filling of approximately 0.65 acres of tidal wetlands and 0.22 acres of freshwater wetlands. Although many of the wetland areas that would be lost to filling are small, the cumulative loss would result in significant adverse impacts to wetlands resources that would be offset through implementation of mitigation (e.g., wetlands creation, enhancement or enhancement). A description of these wetland impacts by segments follows.

- *Forest Hill Road Connection.* The Forest Hill Road Connection crosses over a portion of the freshwater wetland system on the east side of Section 6/7. It is anticipated that the crossing of this wetland would be accomplished with a viaduct structure. As currently contemplated, this viaduct would be approximately 665 feet long and about 60 feet wide in its crossing of the wetland. These emergent wetlands are currently dominated by Phragmites. Construction of the viaduct has the potential to result in temporary impacts to wetlands within the viaduct alignment due to activities of construction vehicles and the direct impact of structures within the wetlands. Construction techniques to minimize damage to wetlands would be implemented as part of the construction management plan and in coordination with the DEC

and the ACOE requirements. (An analysis of potential shading impacts is also presented in Chapter 10 "Natural Resources.")

- *Loop Park Road (West Shore Expressway Underpasses)* The proposed project would require construction activities and filling of a portion of the Fresh Kills in the road segments that pass beneath the West Shore Expressway on both the North and South shorelines of the water body. In addition, construction of the northern segment of the Loop Park Road would result in the permanent loss of approximately 2,182 square feet (0.05 acres) of tidal wetlands due to the placement of fill. Construction of the segment of the north Loop Park Road under the West Shore Expressway would cause the permanent loss of approximately 8,534 square feet (0.2 acres) of tidal wetlands due to bulkhead construction and placement of fill to expand the existing DSNY service road into a park road. In addition, construction of the south segment of the Loop Park Road under the West Shore Expressway would result in the permanent loss of approximately 16,167 square feet (0.4 acres) of tidal wetlands due to bulkhead construction and placement of fill behind the bulkhead needed to expand the existing DSNY service road into a park road.
- *Northbound West Shore Expressway Service Road .(West Side of North Park).* Construction of the north bound West Shore Expressway Service Road on the west side of North Park would result in the filling of a very limited area (approximately 784 square feet, or 0.02 acres) of freshwater wetlands associated with the runoff swales from the existing highway.
- *Northbound West Shore Expressway Service Road (West Side of South Park).* Construction of the northbound West Shore Expressway Service Road on the west side of South Park would also result in the filling of a very limited area (approximately 8,959 square feet , or 0.2 acres) of freshwater emergent/scrub-shrub wetlands. The freshwater wetlands that would be impacted are drainage swales along the West Shore Expressway right-of-way. The loss of landscape would be small and would not be expected to result in significant adverse impacts to plant or wildlife resources within or adjacent to the project site. It is anticipated that the service road would maintain the hydrologic connection of the three tributaries to the linear freshwater wetland.

For all of these freshwater and tidal wetland areas, the loss of wetland acreage would be mitigated by the creation of wetland acreage elsewhere in the park. A description of this wetland mitigation is provided in Chapter 23 "Impact Avoidance Measures and Mitigation."

Aquatic Resources. As presented above under the general discussion of potential impacts from upland construction and wetland enhancement activities, implementation of erosion and sediment control measures included in the SWPPP, as well as the use of silt curtains and other techniques that would minimize sediment suspension in the water column during in-water construction activities (e.g., installation of sheet pile) would minimize the potential for significant adverse impacts to water quality and aquatic resources during construction.

Spanning the freshwater wetlands within the Forest Hill Road Connection using a viaduct would minimize potential adverse impacts to surface water resources and aquatic biota. The hydrologic connection below the viaduct would be maintained and disturbance of any stream channels under the viaduct would be minimized. The viaduct would however, result in impacts during construction activities that are described above.

Terrestrial Resources. Construction of the park roads and West Shore Expressway service roads proposed by 2016 has the potential to result in direct impacts (i.e., physical removal of plant community or grading of soil within the roadway alignments, loss of individual wildlife due to

collision with or as a result of operation of construction equipment) and indirect impacts (avoidance of landscape due to noise, vehicle traffic, or other human disturbance) to wildlife. The proposed project has minimized direct losses of landscape due to the proposed roadways by using the existing landfill road network to the extent possible, thereby limiting landscape loss to areas on either side of the existing roads. The Forest Hill Road Extension west of the Richmond Avenue berm and east of Phragmites-dominated wetlands includes a linear wooded area along and west of the Richmond Avenue berm containing planted white pine, Douglas fir, and Norway spruce and an approximately 0.5 acres area of coastal swamp forest containing swamp white oak, pin oak, sweetgum and gray birch. The Forest Hill Road Extension viaduct would span an area of mixed upland and freshwater wetlands of native and non-native scrub-shrub and Phragmites, and the roadway would be directed through woodlands along the berm and in the southern end of the 0.5 acre forested area, resulting in removal of few large trees (i.e., greater than 12 inches diameter at breast height) in this vicinity. The small loss of landscape associated with the roadway construction would not result in significant adverse impacts to wildlife resources.

While certain wildlife individuals may avoid undisturbed landscapes in the vicinity of road construction due to noise, vehicle traffic or increased human activity, the phased approach to development of the proposed park roads would be expected to allow sufficient suitable landscape to be available to wildlife individuals impacted by decreases in landscape quality near roadway construction.

Threatened or Endangered Species. Construction of the Loop Park Roads and West Shore Expressway service roads in 2016 would not be expected to result in significant adverse impacts to colonial waterbird nesting activity on Isle of Meadows, or preclude the re-establishment of such activity in the future. Barn owls have nested on bridges in the vicinity of Richmond Creek in recent years. A description of these potential impacts is presented below.

Pedestrian/Bicycle Bridges

The 2016 analysis year includes the construction of two pedestrian/bicycle bridges, one over Main Creek and one over Richmond Creek. Both bridges would be constructed adjacent to the existing Main and Richmond creek bridges and would be part of the Loop Park Road circulation system. The current width of the two existing bridges is not sufficient to allow operation of four vehicle lanes and a pedestrian/bicycle lane, thus these two pedestrian/bicycle bridges are proposed alongside the existing bridges. Both of the pedestrian/bicycle bridges would be pile-supported structures. The Richmond Creek pedestrian/bicycle bridge would be located to the north of the existing bridge, with an approximately 8-foot separation between the two bridges. The pedestrian/bicycle bridge would be about 18 feet wide and 572 feet long. The bottom of this bridge would be about 26 feet above mean high water.

The Main Creek pedestrian/bicycle bridge would be located on the south side of the existing bridge, with an approximately 2.5-foot separation between the outer edges of the two bridges. This pedestrian/bicycle bridge would be about 18 feet wide and 588 feet long. The bottom of the bridge would be about 12 feet above mean high water.

Construction of these bridges would include driving piles within the two tidal creeks, and installing the bridge supports. Installation of piles would result in disturbance to the creek bottom. As presented above under the discussion of in-water construction activities, any temporary increase in suspended sediment resulting from pile installation would be localized and is expected to dissipate within a short distance of the in-water (sediment disturbing) construction activity. Therefore, in-water construction activities would not be expected to result in significant

adverse impacts on water quality or aquatic biota. There would also be measures in place to protect water quality such as containment structures to avoid impacts on water quality (see the discussion above). All construction activities would also be subject to permits and site specific designs as well as use specific measures that may be necessary to avoid or minimize impacts to waterways and wetlands.

To avoid impacts to any barn owls, to the extent possible, any bridge structures known to support nesting barn owls (i.e., bridges, abandoned structures) would be fully searched by an experienced ornithologist or biologist for the presence of roosting or nesting owls. If any nests are present, a consultation with NYCDEC would occur to discuss construction-related impacts of the project, and determine the appropriate course of action (i.e., delaying construction until young birds have fledged, removal of an inactive nest, etc.). In addition, pre-construction measures could include netting or other techniques that would prohibit or discourage barn owl nesting prior to construction. Signage could also be used to alert contractors to barn owl nesting in these areas for purposes of avoiding indirect impacts.

CONSTRUCTION PROJECTS: 2036

Introduction

Table 20-2 lists the park projects anticipated to be completed by the 2036 analysis year, as summarized below and described in detail in Chapter 1, "Project Description." These long-term projects are located primarily in the East and West Park, and the Confluence.

East Park

Wetlands. Construction activities for East Park would not result in significant adverse impacts to freshwater or tidal wetlands. Although there would be construction period activity in wetlands, these construction activities would result in up to 31 acres of restored freshwater wetlands within the existing wetland complex on the east side of the park, and up to 28 acres of restored tidal wetlands. This is a long term proposal for the proposed park. In addition, as discussed above, implementation of erosion and sediment control measures as part of the SWPPP prepared for construction of various portions of the East Park would minimize the potential for adverse impacts to wetlands during upland construction activities. In addition, natural resources protection measures (also described above) would need to be implemented during construction in order to avoid impacts to wildlife.

Aquatic Resources. As presented above under the general discussion of potential impacts from upland construction and wetland enhancement activities, implementation of erosion and sediment control measures included in the SWPPP prepared for development of the East Park project elements would minimize the potential for significant adverse impacts to water quality and aquatic resources during construction.

Terrestrial Resources. Construction of the East Park would result in the clearing of some existing vegetation (i.e., clearing and grubbing to remove trees and other woody vegetation, and herbicide application, mowing and other physical/mechanical means for the removal of invasive plant species (such as Phragmites) for wetland and landscape enhancement at the base of Landfill Section 6/7. For these activities, soil stabilization measures would be specified for the earthwork components of the project in compliance with the erosion and sediment control measures specified in the SWPPP prepared for each park section (see the discussion above).

Land clearing and construction activities associated with the development of the East Park would also have the potential to disturb wildlife currently using this portion of the project site.

Adverse impacts would be expected with respect to some individual birds and other wildlife currently using these landscapes if construction activities result in displacing wildlife species and there are no suitable landscapes nearby on the project site or in the surrounding study areas. These potential indirect impacts include adverse impacts to wildlife species using the areas of the proposed East Park that would be cleared and re-graded for landscape enhancement and the construction-period loss of landscape as well as noise associated with construction activities. However, because these activities would be phased in over time, it is expected that sufficient suitable landscape would be available in other parts of the park and the secondary study area to support individuals displaced by construction and enhancement activities.

Threatened or Endangered Species. Construction of East Park would not be expected to result in significant adverse construction period impacts to colonial waterbird nesting activity on Isle of Meadows. In addition, barn owls and northern harriers are not known (or expected to) nest in the vicinity of the proposed East Park projects and the proposed project. Although it is likely that both northern harriers and barn owls feed in the vicinity of East Park, suitable foraging landscape exists for these species in other areas of the project site and these areas would be available during the construction period. This would include the restored landscapes at North and South Parks which are proposed to be completed by 2016.

West Park

Description of Construction Activities. As shown in Table 20-2, by 2036, West Park would include the construction of a mix of landscape projects on Landfill Section 1/9 along with cultural and passive recreational opportunities and waterfront facilities along both the Arthur Kill and the Fresh Kill.

The following discussed the potential construction period impacts to natural resources of these proposed park elements.

Wetlands. Construction activities in the wetlands of West Park would generally be limited to the installation of piles to support the two proposed overlook structures. While these structures would have the potential to affect wetland landscapes, the footprint of the structures is small (about 450 square feet (0.01 acres each) and construction is expected to occur in both limited direction and extent such that no significant impacts would be expected on tidal wetlands during construction.

Aquatic Resources. As discussed above, implementation of erosion and sediment control measures included in the SWPPP would minimize the potential for significant adverse impacts to water quality and aquatic resources during construction of the West Park elements.

Limited in-water construction activities are proposed for West Park. The limited installation of piles would result in some limited loss of bottom landscape within the footprint of the piles. However, similar to the structures proposed for the North Park, these structures are expected to have a small footprint and require a small number of piles such that the loss of bottom landscape is expected to be small and not result in significant adverse impacts to aquatic resources. Any temporary increase in suspended sediment resulting from pile installation during construction would be localized and is expected to dissipate within a short distance of the project site and immediately after the completion of the pile installation activity. Therefore, in-water construction activities associated with the West Park would not be expected to result in significant adverse impacts on water quality or aquatic biota. Similarly, any contaminants released to the water column as a result of sediment disturbance are expected to be minimal, dissipate rapidly, and not result in any significant impacts on water quality.

Terrestrial Resources. Construction of the West Park upland projects would result in the clearing of some existing vegetation (i.e., clearing and grubbing to remove trees and other woody vegetation, and herbicide application, mowing and other physical/mechanical removal for the treatment of invasive plant species such as Phragmites) for landscape enhancement at the base of the Section 1/9 mound. Soil stabilization measures would be specified for the earthwork components of the project in compliance with the erosion and sediment control measures specified for each capital project.

Land clearing and construction activities associated with the development of the West Park have the potential to disturb wildlife individuals currently using this portion of the project site. This, adverse impacts could occur with respect to some to some birds and other wildlife individuals currently using these wildlife landscapes if construction activities displace them from the project vicinity and there are no suitable landscapes in the surrounding area. Thus, potential impacts to natural resources associated with the construction of West Park include adverse impacts to individual wildlife using the areas of the West Park that would be cleared and re-graded for enhancement and noise impacts associated with construction activities. However, because these activities would be phased in over time, sufficient suitable landscape should be available to support individuals displaced due to construction and enhancement activities. There would also be the nearby restored landscapes of North and South Parks as well as the landscapes of the secondary study area and the Staten Island Greenbelt that would be available to the displaced wildlife. During the construction period

Threatened or Endangered Species. Construction of West Park would not be expected to result in significant adverse impacts to colonial waterbird nesting activity on Isle of Meadows since the proposed construction activities along the Arthur Kill and Great Fresh Kill are limited. Barn owls and northern harriers are not known or expected to nest on or in the vicinity of the proposed West Park project site. Although both are known to forage in the vicinity of West Park, suitable foraging landscape exists for these species in other areas of the proposed park and in the surrounding area. Overall landscape improvements at North and South Parks, including an increase in high quality grasslands through landscape enhancement efforts, would be expected to provide additional foraging landscape for barn owls and northern harriers (which feed predominantly on small mammals in grassland landscapes) during the construction period for West Park.

Confluence (The Point)

Description of Construction Activities. As described above in Table 20-2, and in Chapter 1, "Project Description," the 50-acre Point would serve as the central cultural, recreational and administrative center for the park. It is proposed to contain the most intensive active recreational field sports (indoor and outdoor on constructed surfaces) as well as indoor commercial facilities and concessions, arts and entertainment, and event space as well as the more intensive waterfront recreational facilities.

The majority of the park program in the Point would occur in an area previously disturbed by the DSNY Plant 1 facilities of Fresh Kills Landfill. It was here that DSNY received and handled the solid waste once brought to Fresh Kills. Thus, it has extensive in-place infrastructure, both on the upland and along the waterfront. As a result, it is the objective of the proposed Fresh Kills Park to reuse this area for the more intensive programming. The following sections discuss the potential impacts to natural resources during construction of these project elements.

Wetlands. Construction of the Point in 2036 would not result in adverse impacts to freshwater or tidal wetlands. While the proposed small piers, overlooks, and marina and ferry landing have the

potential to affect tidal wetlands through the installation of piles into the benthic substrate, the number of piles needed to support these structures would be limited and any adverse impacts to tidal wetlands would be small and more than offset by the proposed tidal wetlands enhancement. As discussed above, the implementation of erosion and sediment control measures as part of the SWPPP prepared for construction of various portions of the Point would minimize the potential for adverse impacts to wetlands during construction activities. In addition, as stated above all in-water elements of the project would be subject to permitting and review by State and Federal resource agencies. It would be the objective of this permitting process to minimize impacts during construction to the extents feasible. Long-term impacts, particularly with respect to shading, are described in Chapter 10 "Natural Resources."

Aquatic Resources. In-water construction activities for the Point would include installing piles for the piers and overlooks, facilities for the ferry landing, anchor piles for the marina floating docks, construction of a boat launch, wetlands enhancement activities, and possible anchoring systems for the barge garden. Any temporary increase in suspended sediment from these activities would be localized and is expected to dissipate within a short distance of the activity and would cease upon completion of the sediment disturbing construction activity which is expected to be limited (i.e., 1-2 months) at each of the sites. In-water construction activities associated with the Point would not be expected to result in significant adverse impacts on water quality or aquatic biota. Similarly, any contaminants released to the water column as a result of sediment disturbance would not be expected to result in significant long-term impacts on water quality. In addition, these elements of the proposed park are proposed in the long term and are also subject to detailed further design as well as State and Federal permitting for activities in wetlands and waterways. As stated above, it is expected that these permitting requirements would minimize impacts to the extent feasible.

Terrestrial Resources. Construction of the Point project elements not adversely impact terrestrial resources. Land clearing and construction activities would occur in a an area that is already largely developed. Typical construction activities would not clear existing terrestrial landscapes nor would it be expected to disturb wildlife.

Threatened or Endangered Species. Construction of the Point would not be expected to result in significant adverse impacts to colonial waterbird nesting activity on Isle of Meadows, or any landscapes for threatened or endangered species. Any measures necessary to minimize impacts during construction due to noise, or other potential indirect impacts, could be developed for each specific project element as the in-water phases move forward. It is recognized that the landscapes of the Isle of Meadows existed through the many years of DSNY barging activities at the site. The comparative activities of construction for the Point are quite limited and are therefore not expected to significantly adversely impact the landscapes and species associated with the Isle of Meadows.

Confluence (Creek Landing)

Description of Construction Activities. Project elements for 2036 proposed for the Creek Landing include an overlook (about 1,000 square feet), a visitor center (about 5,200 square feet), fishing pier (about 1,350 square feet); waterfront esplanade (22,850 square feet), a market roof (about 13,750 square feet); a waterfront lawn and terrace (2 acres) and boat launch (about 4,750 square feet) to be located next to a boathouse for canoe rentals and a café (both structures about 900 square feet). The following described the potential impacts to natural resources during construction of these parks elements.

Wetlands. Construction of the additional 2036 project elements in Creek Landing for 2036 would not result in significant adverse impacts to wetlands. The proposed overlook would have the potential for a limited affect on tidal wetlands with the installation of piles. However the number of piles necessary for this small structure would be very limited. In addition, as discussed above, implementation of erosion and sediment control measures as part of the project's SWPPP for the construction period would minimize the potential for adverse impacts to wetlands during construction.

Aquatic Resources. Implementation of erosion and sediment control measures included in the SWPPP for the additional 2036 project elements at Creek Landing would minimize the potential for significant adverse impacts to water quality and aquatic resources during construction.

In-water activities for the construction of Creek Landing by 2036 would include installation of piles for the overlook and the boat launch structure. Any temporary increase in suspended sediment resulting from these in-water construction activities would be localized and is expected to dissipate with a short distance of the construction site and would also cease shortly after the completion of the in-water construction activity. Therefore, in-water construction activities associated with 2036 Creek Landing projects would not be expected to result in significant adverse impacts on water quality or aquatic biota. Similarly, any contaminants released to the water column as a result of sediment disturbance would not be expected to result in significant short-term or long-term impacts on water quality.

Terrestrial Resources. Given the limited activities and distance from the Isle of Meadows, construction of the 2036 Creek Landing projects would not be expected to result in significant adverse impacts to colonial waterbird nesting activity on Isle of Meadows, or any landscapes for threatened or endangered species or individuals.

Threatened or Endangered Species. Construction and operation of the Creek Landing in 2036 would not be expected to result in significant adverse impacts to colonial waterbird nesting activity on Isle of Meadows, or inhibit the re-establishment of such activity in the future.

Proposed Park Roads (2036)

Description of Construction Activities. The elements of the proposed park roads that would be completed by 2036 include the park road connection on the north to Richmond Hill Road (at the intersection with Richmond Avenue) and the proposed Signature Bridge over the Fresh Kills which would complete the Loop Park Road (see also Table 20-6, above). The following presents the potential impacts during construction of these project elements.

Wetlands. Road construction activities across the freshwater wetlands east of Landfill Section 6/7 would directly disturb about 4.25 acres of freshwater wetlands. In addition to this direct construction impact, there would be the potential for additional impact due to construction activities within the wetlands themselves.

Construction of the Signature Bridge would also result in the placement of structure within the tidal wetlands of Fresh Kill including the pier supports for the proposed bridge. In order to avoid these indirect impacts during construction, the proposed project's environmental protection measures during construction would be implemented (see the discussion above) In addition, these construction activities are proposed in the long term (2036), but would be subject to the permitting .review of the ACOE and DEC which would minimize the impacts and require the implementation of the project's freshwater wetland improvement program and wetland mitigation.

Aquatic Resources. As presented above, implementation of erosion and sediment control measures proposed in the SWPPP as well as the use of silt curtains and other measures in open water areas to minimize sediment suspension during in-water construction activities (e.g., installation of bridge supports) would minimize the potential for significant adverse impacts to water quality and aquatic resources during construction of the 2036 roadway segments. Additional protection measures would need to be implemented during the construction activities within the freshwater wetlands east of Landfill Section 6/7 to ensure that in addition to the 4.25 acres that would be directly impacted by construction of the proposed roadway, additional areas of freshwater wetland are not indirectly impacted during construction. These protection measures are described above.

Installation of the support piers for the Signature Bridge would also result in the permanent loss of bottom landscape within the footprint of the bridge supports. As presented above under the discussion of in-water construction activities, any temporary increase in suspended sediment resulting from construction of these supports would be localized and controlled through the use of silt curtains and other measures. With these proposed protections in-place, in-water construction activities associated with the Signature Bridge would not be expected to result in significant adverse impacts on water quality or aquatic biota. Similarly, any contaminants released to the water column as a result of sediment disturbance would not be expected to result in any significant short-term or long-term impacts on water quality.

As stated above, in order to avoid these indirect impacts during construction, the proposed project's environmental protection measures during construction would be implemented (see the discussion above). In addition, these long-term construction activities would be subject to the permitting review of the ACOE and DEC. It would be the objective of the permitting process to minimize the impacts and require the implementation of the projects freshwater wetland improvement program.

Terrestrial Resources. Construction of the Richmond Hill Road Connection has the potential to result in direct impacts (i.e., physical removal of plant community or grading of soil within the roadway alignments, loss of individual wildlife due to collision with or as a result of operation of construction equipment) and indirect impacts (avoidance of landscape due to noise, vehicle traffic, or other human disturbance) to wildlife. The proposed project has minimized direct losses of landscape due to the proposed roadways by revising the existing landfill service roads to the extent possible, thereby limiting landscape loss to areas on either side of the existing roads. The construction of the Richmond Hill Road Connection would require the removal of conifers and deciduous trees along the Richmond Avenue berm, and along a southerly route west of the berm and east of Landfill Section 6/7 identified as palustrine emergent/forested, containing swamp white oak, shagbark hickory, sweetgum and green ash, before heading west through a wooded area at the south end of Basin B1. The present roadway design would require the removal of large trees along the route. However, the small loss of landscape associated with the roadway construction would not result in significant adverse impacts to wildlife resources.

Threatened or Endangered Species. Construction and operation of the Park Road North and Signature Bridge would not be expected to result in significant adverse impacts to colonial waterbird nesting activity on Isle of Meadows, or inhibit the re-establishment of such activity in the future, or adversely affect other threatened or endangered species for the reasons identified above for the 2016 Park Roads discussion..

Pedestrian/Bicycle Overpassess

Two pedestrian/bicycle overpasses have been proposed for 2036; one is the Muldoon Avenue overpass across the West Shore Expressway (this would have a base of about 7,850 square feet

on each side of the Expressway) and the other is the Forest Hill Road overpass, which would cross over Richmond Avenue to the East Park, near the Forest Hill Road intersection with Richmond Avenue. With respect to construction period impacts on natural resources, both overpasses would require limited clearing of vegetation within the 100-foot diameter footprint of each overpass support. The Muldoon Avenue overpass has the potential to result in adverse impacts to a small area of freshwater wetlands and aquatic resources if it cannot be sited outside a stream channel located in the vicinity of the east support. The design approach here would be to avoid the wetlands and retain the hydrologic connectivity of the stream system. Thus, the potential for direct and indirect adverse impacts to freshwater wetlands would be limited or avoided. Neither bridge would be located within the 100-year floodplain.

HAZARDOUS MATERIALS

Development of the proposed park would involve excavation and disturbance of the existing on-site soils as part of construction activities, which may result in temporary increases in exposure pathways for workers and nearby residents. To avoid this impact, preventative measures would be undertaken to protect the safety of the workers and local residents as well as the larger environment for areas where construction activity has the potential to encounter areas of contamination. To this end, the environmental conditions identified at the project site during the current and previous environmental studies would be remediated prior to initiating operation of the proposed park and providing public access to the project area.

Prior to construction on a site, site investigations for hazardous materials would be performed (as necessary) and a site-specific Construction Health and Safety Plan would be prepared. It would include health and safety procedures to minimize exposure to workers and the public, including possible dust monitoring and/or volatile organic compound (VOC) monitoring, if applicable, and provisions for the identification and management of known and unexpected buried tanks or contaminated materials that might be encountered during the soil disturbance activities associated with construction. Such a plan would ensure that the construction workers, the surrounding community, and the environment are not adversely affected by environmental conditions exposed by or encountered during the construction activities. In addition, existing fill remaining on-site would be either covered with 2 feet of certified clean fill or covered by structures such as concrete or asphalt pavement, or building structures. With these proposed measures in place, the health and safety of construction workers and the visiting public would be protected from adverse environmental conditions during construction.

SOLID WASTE

The proposed project would require demolition as well as new construction. It is not expected that significant solid waste would be generated from construction activities. It is expected that this solid waste would consist primarily of construction debris and packaging from new construction materials brought onto the site. All demolition and construction waste from construction activities on the project sites would continue to be handled by private carters who would haul the materials and dispose of the materials in full accordance with the applicable regulatory requirements. In addition there would be the recycling of cut trees and vegetation for use as park mulch. The City has an active program to reduce solid waste generated by construction sites. Table 20-16 identifies some of the construction activity products that are potentially recyclable.

Table 20-16
Principal Recyclable Materials for New York City Construction Projects

The principal materials present in the NYC C& D waste stream that are currently recyclable in the New York City area include: Asphalt Brick Cardboard Corrugated Cardboard Carpet Concrete Film Plastic Fluorescent Lamps Glass Land Clearing Debris Metal Pallets Roofing (asphalt) Wood
Materials that manufacturers will take back if they are installing new material include: Carpet Ceiling Tile
Materials common in the C&D waste stream that could be recovered, but for which there is currently no local market/outlet include: Gypsum/Dry Wall (Current Outlet in Montgomery, NY) Rigid Foam Insulation (Current Outlet in Florida)
Materials that may be salvageable before renovation or demolition begins include: Appliances Architectural Features Circuit Breakers Office Furniture Windows/Doors Wood Timbers
Source: New York City Department of Design and Construction, 2005.

ENERGY IMPACTS

Energy impacts from construction are primarily a result of the energy required to manufacture, deliver, and install the materials at the construction site. This type of energy is known as the embodied energy of the material. Embodied energy is expended extracting the raw materials, manufacturing and fabricating the product, handling and transporting them to the site, and placing the materials in the roadway. Approximately 70 percent of the energy embodied in new construction is attributable to the manufacture of the basic construction materials and components. The remaining embodied energy is divided among direct fuel purchases, wholesale and retail trade, business and professional services, transportation of materials furnishings, and construction machinery and equipment. Almost all (approximately 99.5 percent) of the embodied energy is consumed before the material reaches the construction site. Construction of the proposed project over the course of 30 years is not expected to have a significant impact on energy demands for the City or region.

TRAFFIC AND PARKING

INTRODUCTION

This section of the construction impacts anaylsis evaluates whether construction-related traffic from the proposed project would significantly impact local traffic and parking conditions. The project site is located in southwest Staten Island and has direct access to a regional highway, the

West Shore Expressway, and local access via Arthur Kill Road, Richmond Avenue and other local streets surrounding the project site. Construction of the proposed project is scheduled to begin in the mid 2009. Construction of the proposed park and roadways would generate traffic in the study area, including construction workers commuting by car and construction trucks making deliveries to and from the project site and the delivery and removal of soil with the greatest volumes of delivery occurring with the enhancement of the landfill sections and also the construction of the proposed roads.

Project-generated construction trips would occur due to construction trucks delivering soils and equipment, delivery of materials, and construction workers commuting to the job site. The truck activities are expected to be distributed evenly throughout the day, while the construction worker trips would likely be concentrated in two peak time periods—the early morning arrival period between 6:00 and 7:00 AM and the early afternoon departure period between 3:00 and 4:00 PM. During the work day, some discretionary travel may also take place (e.g., lunch), but the number of trips is likely to be substantially lower than the peak hour levels. The principal means of access to the site are expected to be:

1. The West Shore Expressway (regional), including the mainline and service roads which would be used to then access the project's internal service roadways;
2. Victory Boulevard (local) ;
3. Arden Avenue (local);
4. Arthur Kill Road (local); and
5. Landfill Service Roads/Muldoon Avenue (internal).

PROJECTED TRAVEL PATTERNS OF CONSTRUCTION-RELATED TRAFFIC

Construction workers are expected to access the site primarily from the West Shore Expressway although some may reach the site by local roads. However, it is noted that for the 2016 program, other than the park projects at the site periphery, the site would not be accessible to vehicles from the local roads (i.e., there would not be any access from Richmond Avenue).

Given the site's access and egress opportunities to the regional highway network, most construction-related traffic would not be expected to use local streets. Arriving and departing autos would primarily reach and exit the site via the West Shore Expressway connections to the project site and then use landfill service roads within the site. For any off-site locations where service conditions might be affected by project-generated construction traffic, the impact would be temporary and short-term. Details of site access would be coordinated between DPR and the contractors with the assistance of NYSDOT and NYCDOT.

WORKER AND TRUCK TRIPS

Construction activities would generate a modest amount of traffic during the peak hours during both the construction of the proposed park elements and the proposed roads. In addition, construction workers generally arrive before the peak morning commuter peak traffic period and depart before the peak afternoon commuter peak traffic period, with limited weekend work. Therefore, these vehicle trips generally do not affect the local traffic network. In addition to the worker commutes, there would also be trucking activity associated with the delivery and removal of soils (particularly the delivery of soils), and there would also be the delivery and removal of materials during the demolition of buildings, the construction of buildings, and the construction of

the proposed bridges and viaducts. Tables 20-10 and 20-11, above, project the potential truck traffic during construction. As also described above, given the size of the project site, it is expected that the delivery of all soils and materials that are expected to be necessary for the proposed project could reach the site via the West Shore Expressway and once on site could reach the work location for that particular phase of construction via the internal roadways, thus minimizing impacts on the surrounding neighborhood. Truck deliveries are expected to include:

- Soils for park construction;
- Engineered fill and asphalt for road construction;
- Landscape materials for park construction;
- Structural materials for buildings; and
- Removal of demolition debris.

These truck movements would be spread throughout the day and would vary depending upon the period of construction. However, as described above, it is expected 70 to 100 trucks per day, or about 10 per hour, would be providing deliveries to the site during the more intense periods of construction, particularly with respect to the importation of soil. Truck deliveries would be dispersed over the day with few occurring in the peak hours.

Regarding worker vehicles, conservatively assuming that all workers would travel to the site via automobile as single occupants, the daily trip generation would be about 50 to 100 vehicles during the more intensive periods of construction. With the proposed direct access to the West Shore Expressway that would provide access to central parking facilities, these trips would require limited use of local roads during peak periods. It is therefore expected that construction vehicle traffic from the proposed park would not significantly impact local roads. As stated above, most of the trips associated with construction would not coincide with the traditional commuter peak travel hours. Construction workers typically arrive between 6:00 and 7:00 AM and leave between 3:00 and 4:00 PM. This minimizes the likelihood of any significant increase in peak period traffic congestion due to construction.

TRAFFIC MAINTENANCE DURING CONSTRUCTION

With the proposed construction program, access to the project site would be gate-controlled and some streets may be temporarily closed or have lane closures at the periphery of the site for the construction of new intersections (e.g., the re-construction of the intersection of Forest Hill Road and Richmond Avenue in 2016 and the reconstruction of the intersection of Richmond Hill Road and Richmond Avenue by 2036), as well as the installation of utility connections (e.g., water, sewer, gas, electric) at the periphery of the site. During these limited periods of construction impact, major roads, such as Arthur Kill Road, would have at least one lane open to traffic at all times. The temporary and limited closure of travel lanes is an unavoidable temporary impact on the local traffic network.

In addition, nighttime construction may be considered at high traffic locations along Richmond Avenue as well as along the West Shore Expressway in order to minimize disruption to traffic. This would be a consideration at final design and proposed (if appropriate) as part of the construction approval process with NYCDOT and NYSDOT.

PARKING

The surrounding area contains primarily open spaces and low-density residential uses that generate little on-street parking demand traffic throughout the day. However, it is expected that parking would be provided on the project site in order to avoid any impacts on local on-street parking conditions. Thus, during the proposed construction period, parking demand in the vicinity of the project site would be similar to existing levels. As discussed above, with limited exceptions such as the construction of the small neighborhood parks, all construction worker vehicle parking is expected to be accommodated in the central staging areas.

AIR QUALITY

INTRODUCTION

Construction activities have the potential to impact local air quality as a consequence of emissions from stationary on-site equipment, emissions from construction vehicles on site and traveling to and from the site, as well as emissions from worker vehicles. For example, most construction engines are diesel powered, and produce relatively high levels of particulate matter. As a result, air quality impacts could occur on the surrounding area due to on-site sources as well as traffic that could also increase mobile source-related emissions. In addition, construction activities also emit fugitive dust

The construction of the proposed project would be subject to Local Law 77 of 2003; thus the potential for particulate emissions would be controlled by required emission controls and ultra-low sulfur diesel (ULSD). In addition, it is acknowledged that as a longer-term construction project there will continue to be advances in air pollution control for construction equipment, as well as turnover and replacement with newer vehicles and equipment, that would further reduce emissions from construction vehicles.

City regulations would require all project contractors to reduce particulate matter emissions to the extent practicable by employing relatively new equipment including diesel oxidation catalysts (DOCs). As stated above, the construction activities would all be subject to New York City Local Law 77, which requires the use of Best Available Technology (BAT) for equipment at the time of construction.[1]

FUGITIVE EMISSION SOURCES

Fugitive emissions can result from land clearing operations, such as excavation, hauling, dumping, spreading, grading, compaction or wind erosion and traffic over unpaved areas. Actual quantities of emission depend on the extent and nature of the clearing operations, the type of equipment employed, physical characteristics of the underlying soils, speed at which construction vehicles are operated and the fugitive dust control methods that are employed. The EPA suggests a general overall emission rate of about 1.2 tons of particulate matter per month

[1] New York City Administrative Code § 24-163.3, adopted December 22, 2003, also known as Local Law 77, requires that any diesel-powered non-road engine with a power output of 50 hp or greater that is owned by, operated by or on behalf of, or leased by a city agency shall be powered by ultra low sulfur diesel fuel (ULSD), and utilize the best available technology (BAT) for reducing the emission of pollutants, primarily particulate matter and secondarily nitrogen oxides. NYCDEP is charged with defining and periodically updating the definition of BAT.

per acre for construction sites with significant land clearing operations and no fugitive dust control measures. However, this is a national estimate and actual emissions vary widely depending on many factors. In addition, the proposed project would include techniques to reduce fugitive emissions during construction.

The proposed project would require soil importation and filling, excavation, site grading, and repaving. Some, but not the majority, of this activity would occur adjacent to residential areas. However, the majority of this activity would occur at some distance from local neighborhoods (e.g., the ecological enhancement projects on Landfill Sections 3/4 and 2/8 within North and South Parks) which are largely separated from nearby residences and sensitive receptors. There are also buffers between the landfill sections and these uses, and recognizing that fugitive dust generated by construction activities consists of relatively large-size particles that settle on the ground within a short distance from the construction activity, fugitive dust emissions on the surrounding community should not be significant.

Moreover, because fugitive dust is a common impact of construction, it is also regulated under New York City's code. During construction, all appropriate fugitive dust control measures—including watering exposed areas and using dust covers for trucks—must be used to satisfy Section 1402.2-9.11 of the New York City Air Pollution Code. To prevent fugitive dust from becoming airborne, those measures include:

- Use of water to control dust in the construction operations and during the clearing and grading of land;
- Application of water to dirt paths, materials, stockpiles, and other surfaces that can generate airborne dust over extended periods;
- Construction of temporary roads would be built with properly sized stone or concrete equivalent over filtering material;
- Covering of open-body trucks transporting materials likely to generate airborne dust at all times when in motion;
- Paving and management of access roads to control dust; and
- Prompt removal of earth or other material from paved streets where earth or other material has been deposited by trucking or earth-moving equipment, erosion by water, or other means.

Increases in concentrations of particulate matter are difficult to quantify accurately because of the difficulty in determining total emissions and the wide range of size of the particles emitted. However, since much of the fugitive dust generated by construction activities consists of relatively large-size particles, that dust would settle to the ground within a short distance of the construction site and would not adversely affect nearby residential areas or community facilities. In addition, dust-control procedures cited above, including stabilization of exposed areas, the frequent watering of affected areas, and the use of dust covers for trucks, would be required as part of the construction contract documents so that only minimal increases in ambient concentrations of particulate matter would occur.

Because contaminated materials exist in some project areas, more extensive dust control measures and perhaps monitoring would be employed when contaminants in soils are identified. When construction occurs in these areas, it expected that a health and safety plan would be developed specifically designed to reduce the risk to the public and construction workers at

particular sites where contaminated materials may be present (see also the description above under "Hazardous Materials") and may also include a monitoring plan, where necessary.

MOBILE SOURCE EMISSIONS

Gaseous hydrocarbon and NO_x emissions from construction equipment, private vehicles on construction workers, and delivery vehicles at the construction sites would not be expected to impact local air quality. The small localized increases in hydrocarbon and NO_x emissions during the construction process caused by these sources would be insignificant when compared with total regional levels of these pollutants. Thus, these increases are expected to have a negligible effect on regionwide concentrations of photochemical oxidants.

Concentrations of NO_x tend to be localized phenomena. Some small increase in ambient concentrations can be expected from construction delivery vehicles in the vicinity of the construction site, emissions from the construction worker vehicles, and from construction vehicles at the site. Construction workers tend to start work early (before the AM peak hour) and finish work early (before the PM peak hour). Consequently, these vehicles should cause only a relatively small increase in the traffic and air pollutant concentrations in the area. Emissions from construction vehicles would not be a major source of CO since most equipment is diesel powered and emits relatively low amounts of CO. No violations of National Ambient Air Quality Standards (NAAQS) would occur as a result of the proposed project.

SUMMARY

During construction of the proposed project, emissions from on-site construction equipment and on-road construction-related vehicles, and their effect on background traffic congestion could have short-term impacts on air quality. In general, most construction engines are diesel-powered, and produce relatively high levels of nitrogen oxides (NO_x) and particulate matter (PM). Construction activities also emit fugitive dust. Although diesel engines emit much lower levels of CO than gasoline engines, the stationary nature of construction emissions and the large quantity of engines could lead to elevated CO concentrations, and impacts on traffic could increase mobile source-related emissions of CO as well, although these increases are not expected to be significant. Potential measures that could be implemented to reduce short-term impacts of the proposed project include the following:

1. *Diesel Equipment Reduction.* Individual capital projects could minimize the use of diesel engines and use electric engines by operating from grid power instead, to the extent possible. This would allow the use of electric engines where practicable and could potentially eliminate some generators that would normally be needed for construction equipment.
2. *Clean Fuel.* ULSD would be used exclusively for all diesel engines throughout the project duration.
3. *Newer Equipment.* The use of newer engine models with cleaner emissions standards would reduce air emissions particularly with respect to particulate matter. While all engines undergo some decline in performance over time, newer as well as better maintained engines emit less particulate matter than their older, unregulated counterparts. Therefore, requiring the use of new equipment as well as the anticipated turnover and technological advances in construction equipment through the life of the project would reduce emissions for future projects. Use of cleaner small engines and gasoline engines would further reduce emissions.

4. *Point Source Site Selection.* In addition, to reduce the resulting concentration increments at sensitive receptors, large emissions sources and activities, such as concrete trucks and pumps, would be located away from residential buildings, schools, and playgrounds.
5. *Dust Control/Soil Erosion and Sediment Control Practices.* Each contractor should be required to implement a dust control plan that includes strict fugitive dust control plans as part of contract specifications. For example, stabilized truck exit areas would be established for washing off the wheels of all trucks that exit the project site. In addition, truck access points would be either watered as needed or, in cases where such routes would remain in the same place for an extended duration, the routes would be stabilized, covered with gravel, or temporarily paved to minimize dust. All trucks hauling loose material could also be equipped with tight fitting tailgates and covered prior to leaving the site. In addition to regular cleaning by the City, area roads adjacent to the sites should be cleaned as frequently as needed. Water sprays could be used for all excavation, demolition, and transfer of spoils to ensure that materials are dampened as necessary to avoid the suspension of dust into the air. Loose materials could be watered, stabilized with a biodegradable suppressing agent, or covered. By implementing the above, an aggressive fugitive emissions reduction program could reduce fugitive dust emissions by at least 50 percent. In addition, the soil erosion and sediment control practices presented above would have the dual benefit of providing dust suppression.
6. *Construction Vehicle Speeds and Idling.* Limiting on-site travel speeds to 5 miles per hour would control particulate emissions. In addition, idling of trucks or other equipment would not be permitted during periods when they are being unloaded or are not in use.

NOISE

Impacts on community noise levels during construction can result due to noise from construction equipment operation and from construction vehicles and delivery vehicles traveling to and from the site. Construction activity generates noise from the construction equipment, construction vehicles, worker traffic, and deliveries of soils and materials to and from the construction site. Noise and vibration levels at a given location would depend on the number and types of construction equipment being operated, the acoustical utilization factor of the equipment (i.e., the percentage of time a piece of equipment is operating), the distance from the construction site, and any shielding effects (shielding due to structures, elevated topography, or natural barriers). Noise levels caused by construction activities would vary widely, depending on the phase of construction and the location of the construction relative to receptor locations. Typically, the most significant noise associated with construction is jackhammers and pile driving (see Table 20-17). The impact of noise would be based the result of individual project construction phases and sequences and the location of each phase of construction relative to the project site boundaries; the particular construction tasks with in each phase, including the types and number of construction equipment specific to each task, recognizing that the construction of the road would progress geographically. For example, the use of jackhammers is expected to be very limited, perhaps for the breaking of pavement to provide utility connections at select locations. In addition, pile driving (or drilling) would occur, but also at select locations for the construction of the viaducts and crossings for the Forest Hill Road and Richmond Hill Road connections; however, these activities are well removed from the local neighborhoods. Pile activity nearer local neighborhoods would be limited to lighter and shorter duration activity, such as the construction of a small dock in North Park.

Table 20-17
Noise Levels for Typical Construction Equipment

Equipment	FTA (or FHWA) Typical Noise Level (dBA) at 50 feet
Arc Welder	73
Asphalt Pavers	85
Asphalt laying equipment	85
Backhoe	80
Bulldozer	85
Compactor	80
Compressors	80
Cement Mixer	85
Concrete Pumps	82
Concrete Trucks	85
Delivery Trucks	84
Dual Hoist	85
Crane (Crawler Crane)	85
Crane (Hydraulic Crane)	85
Crane (Tower Crane)	85
Crane (Rubber Tire Crane)	83
Drill Rigs	85
Dump Trucks	84
Excavators	85
Forklift	85
Generators	82
Impact Wrenches	85
Jackhammers	85
Pavers Cutter	85
Pile driving rig	95
Rebar Bender	80
Roller	85
Saw (Chain Saw)	85
Saw (Circular Saw)	76
Saw (Table Saw)	76
Scissor Lift	85
Slurry supply system	85
Tamper	85
Trailers	85
Toweling Machine	85
Water Pumps	77

Sources: Transit Noise and Vibration Impacts Assessment, Federal Transit Administration, May 2006; and Federal Highway Administration Roadway Construction Noise Model (FHWA RCNM), 2006.

Noise levels associated with the construction of the proposed project would be subject to the noise emission source controls of the recently revised New York City Noise Control Code. This code specifies maximum sound pressure levels at receiving properties (designated by octave band levels). The *CEQR Technical Manual* also provides guidance for examining the incremental noise impacts, and comparisons with NYCDEP's external Noise Exposure Guidelines. Finally, the City of New York's Zoning Resolution sets octave band limits for the lot line of a property. Construction equipment is also regulated by the Noise Control Act of 1972.

The New York City Noise Control Code, as amended December 2005 and effective July 1, 2007, requires the adoption and implementation of a noise mitigation plan for each construction site, limits construction (absent special circumstances as described below) to weekdays between the hours of 7 AM and 6 PM, and sets noise limits for certain specific pieces of construction equipment. Construction activities occurring after hours (weekdays between 6 PM and 7 AM and

on weekends) may be authorized in the following circumstances: (i) emergency conditions; (ii) public safety; (iii) construction projects by or on behalf of city agencies; (iv) construction activities with minimal noise impacts; and (v) where there is a claim of undue hardship resulting from unique site characteristics, unforeseen conditions, scheduling conflicts and/or financial considerations. It is not anticipated that extended hours (7:00 AM through 6:00 PM) would be needed for construction of the proposed project on a regular basis.

Noise from construction activities and some construction equipment is regulated by not only the New York City Noise Control Code but also by the EPA. The EPA requirements mandate that certain classifications of construction equipment meet specified noise emissions standards. These federal requirements mandate that: 1) certain classifications of construction equipment and motor vehicles meet specified noise emission standards; and 2) construction material be handled and transported in a manner that does not create unnecessary noise.

CONSTRUCTION NOISE IMPACT ASSESSMENT

The *CEQR Technical Manual* states that significant noise impacts due to construction would occur "only at sensitive receptors that would be subjected to high construction noise levels for an extensive period of time." In addition, the *CEQR Technical Manual* states that impact criteria for vehicular sources, using existing noise levels as the baseline, should be used for assessing construction impacts (see Chapter 19, "Noise," for a description of noise measurement and sound levels).

Construction activities for the proposed project would be expected to result in increased noise levels as a result of: (1) the operation of construction equipment on-site; and (2) the movement of construction-related vehicles (i.e., worker trips, and material and equipment trips) on the surrounding roadways. The degree of potential construction noise includes:

- Noise emission level of the equipment;
- A usage factor, or percentage of time the equipment is operating;
- Distance between the equipment and the receptor;
- Topography and ground effects; and
- Shielding.

Similarly, noise levels due to construction-related traffic are a function of:

- Noise emission levels generated by the type of vehicle (e.g., auto, light-duty truck, heavy-duty truck, bus, etc.);
- Vehicle speed;
- Distance between the roadway and the receptor;
- Topography and ground effects; and
- Shielding.

As discussed above, the City has recently updated its Noise Control Code (effective July 1, 2007). Thus, the construction associated with the proposed project would be subject to the requirements of the new City Noise Control Code. Outlined below is a list of source controls noise reduction measures that may be proposed to meet those noise reduction requirements.

While the level of construction noise associated with the type of construction activity depends on the numbers and type of equipment employed at any time, noise levels associated with

construction may occasionally be noticeable to nearby residents, particularly during the times when jackhammers and/or other pavement-breaking equipment are used. Significant ambient noise level increases along streets where construction activities are taking place can reach up to 98 A-weighted decibels (dBA) under worst-case conditions (pavement breaking at 50 feet). However, given the type of construction that is expected with the proposed project, limited use of higher noise generating equipment is expected since most activities would occur in areas not previously covered by paved surfaces. In most cases these types of impacts would be related to the installation of utility connections, or street connections at Richmond Avenue or Arthur Kill Road, for example.

Temporary noise increases from more significant noise generating equipment can be intrusive to nearby residents as distances of up to about 400 feet from the activity. However, there are no cost-effective measures that can be implemented to effectively eliminate temporary noise increases of this type which occur throughout the city as part of the construction process. In addition, construction of the road, for example, would largely take place on the interior of the site and would not require any substantial use of jackhammers or pavement breaking equipment.

Noise levels also increase/decrease exponentially over distance; thus, they drop off an estimated 2–4 dB with each doubling of distance from the source. Thus, sound pressure levels after peaking at the front of a residential unit or park would drop by 2–4 dB (it is likely to be 4 dB, given the relatively open nature of the physical environment in this area). Once the construction has moved to 200 feet away, the sound pressure levels would decrease by 4–8 dB. While this level would continue to affect the ambient noise levels of the generally quiet neighborhoods, the decreasing noise levels and distance from the receptors would limit impacts. Therefore, although elevated noise levels are considered a nuisance and would be intrusive at times to local residents, these impacts would be short-term and are not considered a significant adverse impact.

As described above, all construction equipment and vehicles must also meet the City, State, and Federal regulatory requirements regarding noise emissions, and construction activities would be limited to weekdays between the hours of 7:00 AM and 6:00 PM.

In terms of potential source controls (e.g., reducing noise levels at the source or during most sensitive time periods), the following types of measures could be implemented as part of a noise control plan:

- NYCDEP, in its review of the noise control plan, would require all contractors and subcontractors to properly maintain their equipment.
- DPR could require all contractors and subcontractors to properly maintain their equipment and have quality mufflers installed;
- Noisy equipment, such as generators, cranes, concrete pumps, concrete trucks, and dump trucks, should be located away from and shielded (as necessary) from local neighborhoods which are the only existing sensitive receptor immediately adjacent to the construction site and used to the least extent possible; and
- Noise curtains and equipment enclosures could be utilized to provide shielding to sensitive receptor locations as necessary.

Based on the above, it is concluded that construction period noise emissions would be limited to the extent practicable and performed in accordance with all local, State and Federal laws and practices. The proposed project would also make use of the project site to avoid impacts on the surrounding neighborhoods and sensitive receptors. Thus, it is concluded that although short-

term noise impacts would be selected for certain capital projects, the overall construction noise impact of the proposed project should not be significant.

VIBRATION

Vibrations generated by construction activities, generally within one thousand feet of existing buildings, may be perceptible or potentially damaging to structures. Table 20-18 shows the vibration source levels for typical construction equipment. Table 20-19 shows typical vibration induced risk criteria. No blasting would be performed as part of the proposed project; however, pile driving, or drilling, may be performed. In general, vibratory levels at a receptor are a function of the source strength (which in turn is dependent upon the construction equipment and construction methods utilized), the distance between the equipment and the receiver, the characteristics of the transmitting medium, and the receiver building construction. Construction equipment operation causes ground vibrations which spread through the ground and decrease in strength with distance. Vehicle traffic, even in locations close to major roadways, typically does not result in perceptible vibration levels, unless there are irregular road surfaces. With the exception of the case of fragile, historically significant structures or buildings, generally construction activities do not reach the levels that can cause architectural or structural damage, but they can achieve levels that may be perceptible and annoying in building very close to a construction site. Since no blasting is proposed the greatest vibration activity is expected to travel a distance at no more than two hundred feet (pile driving). Thus, vibrations are not expected to affect local residences**.** As necessary, impact avoidance and pre-construction inspection would be made for the protection of landfill infrastructure and where necessary, alternative means of installing support piles, including drilling, may be preferred (see also the discussion above under "Landfill Protections During Construction). If pile driving is employed, monitoring would be used to determine if vibration levels are approaching potentially damaging limits. If conditions or monitoring indicate that pile driving could result in damages, alternative construction measures would be employed in order to avoid any significant impacts.

In terms of potential vibration levels that could either impact landfill infrastructure or be perceptible at local sensitive receptors, pile driving using hydraulic pile drivers would produce the highest levels (see Table 20-19). However, hydraulic pile driving would only occur for limited periods of time (i.e., about 2 weeks) and away from sensitive receptors. Thus, the greatest concern for pile driving would be the protection of landfill infrastructure (see discussion above).

Table 20-18
Vibration Source Levels for Construction Equipment

Equipment	PPV_{ref} (in/sec)	Approximate L_v (ref) (VdB)
Pile Driver (impact)	0.644	104
Pile Driver (sonic)	0.170	93
Clam Shovel drop (slurry wall)	0.202	94
Hydromill (slurry wall in rock)	0.017	75
Vibratory Roller	0.210	94
Hoe Ram	0.089	87
Large bulldozer	0.089	87
Caisson drilling	0.089	87
Loaded trucks	0.076	86
Jackhammer	0.035	79
Small bulldozer	0.003	58

Source: *Transit Noise and Vibration Impact Assessment*, FTA-VA-90-1003-06, May 2006.

Table 20-19
Typical Vibration Induced Risk Criteria for Residential Buildings*,**

Activity	Perceptible Distance (feet)	Damage Risk Distance (Feet)
Pile Driving	200	50
Pavement Breaking	150	40
Bulldozing	60	20
Heavy Truck Traffic	50	15
Jackhammers	30	10

Notes:

* Wiss, John F. Construction Vibrations: State-of-the-Art. Journal of the Geotechnical Engineering Division, Proceedings of the American Society of Civil Engineering Division, Proceedings of the American Society of Civil Engineers, Volume 107, No. GT2, February, 1981.

** Standard Recommended Practice for Evaluation of Transportation Related Earthborne Vibrations, ASSHTO Designation R8-81(1986).

PUBLIC HEALTH

During construction, potential health impacts due to air and noise pollutant emissions can stem from construction equipment and construction vehicles. Of particular concern is the potential for diesel emissions with particulate matter from construction-related activities to impact public health (such as increasing asthma rates). In response to those concerns, as described above, the City has adopted Local Law 77, which would result in significant reductions in air pollution from construction equipment throughout New York City and including the proposed project.

It is also expected that construction contracts would include provisions for a rodent (e.g., mouse and rat) control program as appropriate. Before the start of construction, the contractor would survey and bait the appropriate areas and provide for proper site sanitation. During the construction phase, as necessary, the contractor would carry out a maintenance program. Coordination would be maintained with appropriate public agencies. Only EPA- and DEC-registered rodenticides would be permitted, and the contractor would be required to perform rodent control programs in a manner that avoids hazards to persons, domestic animals, and non-target wildlife. Public health issues related to hazardous materials are discussed above. With all of the proposed measures in place, no impacts are expected on public health during the construction period. ✷