

A. PROJECT IDENTIFICATION

The City of New York, with the New York City Department of Parks and Recreation (DPR) as lead agency, is proposing the mapping and development of Fresh Kills Park. The project site is an approximately 2,163-acre property, the majority of which is Fresh Kills Landfill. The property is City-owned and under the jurisdiction of the New York City Department of Sanitation (DSNY) and the New York City Department of Parks and Recreation (DPR), and includes a small portion under the jurisdiction of the New York City Department of Environmental Protection (DEP). The project site is located in the southwest portion of Staten Island and within both Staten Island Community Boards 2 and 3 (see Figures 1-1 and 1-2). The boundaries of the project site are defined by parkland and residential uses, waterways, and both City and State roadways. The eastern boundary is Richmond Avenue, which is under the jurisdiction of the New York City Department of Transportation (NYCDOT). Along the eastern side of Richmond Avenue is the City's LaTourette Park which is hydrologically connected with the project site by Richmond Creek. In addition to Main Creek, Richmond Creek, the Great Fresh Kills, and the Little Fresh Kills waterways cross the project site. The Arthur Kill shoreline forms the site's western boundary. The southern boundary is Arthur Kill Road, a City street. The West Shore Expressway (New York State Highway Route 440), which is under the jurisdiction of the New York State Department of Transportation (NYSDOT), bisects the project site.

For over four decades, Fresh Kills Landfill operated as the City's principal municipal solid waste landfill, receiving household and municipal solid waste between 1948 and 2001. A state law passed in 1996 mandated that solid waste landfill operations cease at Fresh Kills by December 31, 2001; landfilling subsequently ended on March 22, 2001. The Fresh Kills Landfill was temporarily used for the disposal of materials after the attacks of September 11, 2001; during this time, no other materials were brought to Fresh Kills Landfill. Large portions of the site are defined by four solid waste landfill sections—3/4, 2/8, 6/7, and 1/9 (see Figure 1-3). The numbering system for the landfill sections was applied to Fresh Kills by DSNY when it was an operating landfill and is used in this Generic Environmental Impact Statement (GEIS) when referring to the four landfill sections. The four landfill sections are regulated as Solid Waste Management Units (SWMUs) by the New York State Department of Environmental Conservation (DEC). Approximately 987 acres or 46 percent of the project site is regulated by DEC and managed by DSNY as SWMUs. With the cessation of solid waste disposal operations at Fresh Kills Landfill, final closure and post-closure activities are underway. DSNY completed closure construction at Landfill Sections 3/4 in 1996 and at 2/8 in 1997. Final closure design has been approved by DEC and closure construction is underway at Landfill Section 6/7. At Landfill Section 1/9, final closure design has been approved by DEC and subbase grading, an early stage of closure construction, has begun.

Additionally, the project site includes lands around the landfill sections that have facilities once used by DSNY when the site was still receiving solid waste. In addition, there is land occupied

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by the environmental control, maintenance and monitoring systems that will remain active for up to 30 years after closure construction is complete. The monitoring systems were installed by DSNY in accordance with a design approved by DEC. DEC also regulates activities in these environmental compliance buffer areas around the SWMUs.

Lastly, the project site also includes land that is essentially undeveloped and contains no landfill-related facilities or monitoring equipment. These include, for example, natural areas such as the Isle of Meadows.

Fresh Kills Landfill is proposed to be converted to Fresh Kills Park. Total acreage of the proposed park is 2,163 acres. In addition, there would be approximately 7 miles of roads within the project, including park roads and new service roads along the West Shore Expressway. The proposed project is an extensive and complex planning and development project, one of the largest in the history of the City of New York. Upon completion, Fresh Kills Park will be the City's second-largest park (after Pelham Bay Park in the Bronx, which covers 2,765 acres), will more than double the size of the Staten Island Greenbelt, and will be almost three times the size of Central Park. The enormity of the proposed project is magnified by its location on what is the City's largest municipal solid waste landfill, which, although closed, requires at least 30 more years of management and monitoring to ensure that the landfill does not adversely impact the environment, the surrounding neighborhoods, or the proposed park users. It is therefore expected that park development would be implemented in multiple phases through 2036 with designs that are expected to evolve over time. The park is organized in five key planning areas: North Park, South Park, East Park, West Park, and the Confluence (see Figure 1-4). Park implementation in North Park and South Park is expected in the earlier phases of the project (through 2016), along with improvements in site access and circulation. Development in East Park and West Park, as well as the Confluence, and completion of the circulation plan are longer term initiatives (through 2036).

The idea of converting Fresh Kills into a park is the result of many years of design collaboration and community input and would create new public access and waterfront recreation at Fresh Kills. The design concepts and implementation strategies developed for the proposed park have involved many City and State agencies, among them the New York City Department of City Planning (DCP), DPR, the Mayor's Office for Economic Development and Rebuilding, DSNY, the New York City Department of Environmental Protection (DEP), NYCDOT, and the New York City Department of Health and Mental Hygiene (DOHMH). State agencies involved in this process have included NYSDOT, DEC, and the New York State Department of Health (NYSDOH).

If the proposed park is developed, it would dramatically transform the project site over the next 30 years from an underutilized City waterfront property that includes a closed municipal solid waste landfill into a major recreational facility for the City and region. It would also provide substantial natural landscape enhancement and create an entirely new environment at the site. The proposed park would feature recreational fields; landscaped areas and enhanced ecological landscapes; new park roadways and connecting roads, including a new connection with the West Shore Expressway and a signature bridge across Fresh Kills Creek; water access for motorized and non-motorized craft; cultural, entertainment and commercial facilities (e.g., amphitheater, restaurants, event and banquet space); and the supporting park operations, maintenance facilities, and parking. The proposed park roadways would connect the park with Richmond Avenue on the east and the West Shore Expressway on the west. Necessary service roads, parking, and

transit facilities (e.g., bus stops) would be supported by vehicular access. Existing natural areas, such as the Isle of Meadows, would continue to be protected.

This Generic Environmental Impact Statement (GEIS) has been prepared to describe and analyze the proposed project. The GEIS is supported by a number of technical and engineering studies that have been prepared relative to the design of the proposed project including its recreational elements, the circulation system of proposed park roadways and parking facilities, and landscape enhancement elements. Among the documents used in the preparation of this GEIS are the *Fresh Kills Park 100 Percent Schematic Roadway Design*, the *Fresh Kills Park Road Alternatives Report* (January 2008);¹ and the *Fresh Kills Park Stormwater Management Plan* (January 2008). The proposed project is a major capital investment with a long-term, multi-phased implementation program. This GEIS is an analysis of park implementation through two phases of completion, with a 2016 interim analysis year and the full build out of the park projected to be completed by 2036.

PERMITS AND APPROVALS

There are many City, State, and Federal land use and environmental approvals that are necessary to implement the proposed park. With respect to local (City) regulations, the following approvals are necessary:

- Amendment to the City map to establish as parkland those portions of this project site that are not currently mapped as parkland;²
- Amendment to the City map to eliminate unbuilt paper streets;
- Amendment to the City map to map a public place to serve as the right-of-way for the future vehicular road system, which entails demapping a small portion of the existing mapped parkland;
- A zoning map amendment to assign a zoning district (M1-1) to the areas being de-mapped as park and simultaneously mapped as public place.
- A zoning map amendment to vacate the NA-1 zoning where it currently exists on the site; and
- A zoning text amendment to remove “Fresh Kills Park” from Section 105-941 of the current zoning text.

Among the paper streets to be eliminated and permanently closed are

- Park Drive East;
- Park Drive West;
- Park Drive South;
- Fresh Kills Road; and
- Victory Boulevard Extension.

Among the unbuilt record streets proposed to be extinguished and permanently closed are sections of:

- Pearson Street (southeast of Watson Avenue);

¹ These referenced documents are available for review through the offices of the lead agency.

² The area of the proposed park is shown on Figure 1-40.

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- Roswell Avenue (southeast of Dean Avenue);
- Alberta Avenue (southeast of Dean Avenue);
- Beresford Avenue (southeast of Dean Avenue);
- Walton Avenue (southeast of Dean Avenue);
- Dean Avenue (south of Mackay Avenue); and
- Cartledge Avenue (southeast of Dean Avenue).

At the State level, approvals necessary for the proposed project include modifications to the approved Fresh Kills Landfill Final Closure Plan; Part 360 landfill closure approvals for end use; permits for activities in tidal wetlands and adjacent areas; protection of waters; and construction activities and access to a State highway (Route 440). Federal approvals would apply to constructing structures over or in navigable waterways or activities in wetlands as delineated in accordance with U.S. Army Corps of Engineers (ACOE) procedures. Construction of the proposed signature bridge over the Fresh Kills waterway would also require approval of the U.S. Coast Guard. The principal objectives of the above-mentioned environmental regulations are to protect natural resources, air quality, and water quality conditions for the benefit of the environment and public health. These regulatory requirements will therefore provide minimum standards for public health and environmental protections as the project site becomes a publicly accessible open space. A complete listing of all agencies involved in the approval of the proposed park is provided near the end of this chapter in Table 1-12. As a multi-phased construction project, the role of each agency will depend on the particular elements of each project phase and the applicability of regulations to ongoing construction and development activities.

A State legislative action was approved previously for the alienation of parkland along these segments of proposed road corridors (Chapter 659 of the 2007 Laws of the State of New York) because the proposed park roadways would pass through existing mapped parkland (portions of the project site are already mapped parkland, although they have never been publicly accessible). The park mapping proposed actions examined in this GEIS would redefine the limits of the parkland and establish a public place corridor for park roadways. The proposed actions would increase the amount of public parkland mapped at the site by 1,453 acres, creating a total of 1,895 acres of mapped parkland. The total site size is 2,163 acres, including this mapped parkland, a public place right-of-way, and navigable waters west of the West Shore Expressway bridge.

PROJECT PHASING AND COORDINATION WITH DSNY ACTIVITIES

The proposed park is a large, multi-phased project that would be constructed over 30 years. As currently proposed, the near-term phases include multiple segments of the park roadways, North Park, most of South Park, and the accompanying landscape enhancement projects. These shorter-term projects are expected to be completed by 2016. Long-term completion of the park is expected to continue through 2036. This would include completion of the East and West Parks, the central activity area of the Confluence and the Point, and the completed circulation network. In accordance with agreements between the City and State of New York and the permits and approvals issued to the City, DSNY will complete final closure at Landfill Sections 6/7 and 1/9, continue to maintain the landfill facilities and environmental control systems, and perform the required monitoring in accordance with the Fresh Kills Landfill Post-Closure Monitoring and Maintenance Operations Manual. Among the DSNY facilities at Fresh Kills Park that must remain in operation during this period are the leachate and landfill gas collection, and treatment infrastructure, and the environmental monitoring systems. These systems are integral to the protection of public health and the environment around the landfill into the indefinite future, and are expected to remain in

operation through at least 2036 and possibly beyond. These facilities include the leachate treatment plant, the landfill gas collection system and purification plant and are therefore included as part of the proposed park mapping and are part of the project site. In addition, to move the park project forward, DPR and DSNY would continue to coordinate all phases of project design and construction to ensure compatibility between the continued operation of Fresh Kills Landfill post-closure facilities, monitoring, and maintenance operations and the implementation of the proposed park (see the discussion below).

FRAMEWORK FOR ENVIRONMENTAL REVIEW

To assess the potential environmental impacts of the proposed park, DCP and DPR developed a reasonable worst-case development scenario (RWCDS) which was presented in the *Fresh Kills Park Final Scope of Work to Prepare a Generic Environmental Impact Statement (GEIS)* as completed by DPR and DCP on August 31, 2006. This RWCDS was developed to cover the range of potential uses for impact analysis used in [this FGEIS](#) since the proposed project is a multi-year, multi-phased project, and it is fully expected that park design will evolve over the next few decades as individual development phases are implemented. Therefore, the objective of the RWCDS is to allow future flexibility in the project design and implementation by examining a range of possible uses in this GEIS. The RWCDS will identify programmatic land uses and activities based on different land cover types and activities, including active recreational paved surfaces (for skateboarding, basketball), active recreational field surfaces (for baseball, soccer), active recreational indoor surfaces (for indoor track and field) commercial uses (retail and restaurants, cafés, banquet hall), natural landscapes with public access (restored marshes with a boardwalk), meadows and forests (with paths), water recreation (kayaking and boating facilities), and an amphitheater for outdoor events. In order to understand the maximum potential impacts of the proposed circulation system, all park roads are presented as four-lane-wide roads.

Since the proposed project is very large and park development would occur over many decades, the GEIS has two impact analysis years: 2016 and 2036. The near-term projects are analyzed in the 2016 analysis year and full build out is analyzed in the 2036 analysis year. While the analyses presented in this GEIS are comprehensive, based on the current RWCDS assumptions and designs, it is expected that subsequent and supplemental environmental reviews are likely to be necessary as project design advances to implementation.

ENVIRONMENTAL REVIEW PROCESS

This GEIS has been prepared in conformance with applicable laws and regulations, including Executive Order No. 91 of 1977 and the Rules of Procedure for City Environmental Quality Review (CEQR). It has also been prepared in conformance with Article 8 of the Environmental Conservation Law (the State Environmental Quality Review Act [SEQRA]) and its implementing regulations found in Part 617 of Title 6 of the New York Codes, Rules, and Regulations (6 NYCRR Part 617) and follows the guidance of the *CEQR Technical Manual* (October 2001) and the National Environmental Policy Act (NEPA). DPR is the lead agency in preparing this GEIS with the assistance of DCP and other City agencies. The GEIS contains a description of the proposed project and its related actions including the project site and its environmental setting. It examines the short- and long-term environmental impacts of the proposed project for the two analysis years, and identifies and discloses any significant adverse environmental impacts. This GEIS also presents and analyzes alternatives to the proposed project, identifies the irreversible and irretrievable commitments of resources, and describes the mitigation measures necessary to minimize, eliminate, or avoid significant adverse environmental impacts that could occur with the

proposed project. Implementation of the proposed park requires many discretionary actions, among them review under the City's Uniform Land Use Review Procedure (ULURP) procedures. This FGEIS has been prepared in support of that ULURP application and the related actions.

B. BACKGROUND TO THE PROPOSED PROJECT

SITE HISTORY

PRE-DEVELOPMENT AND EARLY HISTORY

Early maps of this area of Staten Island (early 18th century) show the settlement of Richmondtown, then known as "Cuckold's Town," was located to the east of the Fresh Kills. However, the map does not give any indication of settlements at Fresh Kills itself, which is indicated primarily as coastal wetlands. Structures near the project do not appear until 1776, when the map shows several of them surrounding the marshland.

The area continued to grow towards the end of the Revolutionary War. The area to the north of the Fresh Kills is described as being "well settled" by the late 18th century. During this time, the Fresh Kills area evolved into a community as more structures appeared.

Because Staten Island grew as an agricultural center during the 18th century, it is likely that the land within Fresh Kills and adjacent to the marshes was used at this time as cultivated farmland. The marshes at Fresh Kills were also extremely valuable to Staten Island farmers, as they provided salt hay for livestock, which was a major cash crop during the 18th and early 19th centuries.

Throughout the 19th and 20th centuries, the Fresh Kills area became increasingly developed. One of the most significant developments within the project site during the 19th century was the construction of the Fresh Kills Bridge, which allowed people to cross the western side of Staten Island without having to go out of their way to travel around the marshland. The bridge was built in the vicinity of the modern Richmond Avenue in 1851 by the Plank Road Company, which dates from 1853. A new bridge was later constructed in 1896.

Throughout the late 19th and early 20th centuries, many of the farms and domestic residences which had characterized the Fresh Kills area were replaced with commercial buildings. Because the marshy areas provided a great deal of moist clay, many brick yards were constructed in the area south of the Fresh Kill and Richmond Creek. The first of these brick yards appear in the late 19th century.

The 1898 Robinson atlas indicates that two additional brickworks, the New York Anderson Pressed Brick Company and Robert Colgate Bridge Manufactory, were operating along the western side of the project site at that time. Both brickyards contained railroad tracks that stretched all the way to the Arthur Kill shoreline, presumably to load bricks onto cargo ships. Just south of these brick yards, the E.P. Benedict Artificial Granit Company was also in operation within the project site. By 1907, both the Anderson and Colgate brick companies appear to have been consolidated into the Rossville Brick Company, while the former Wood and Kiernan property was now the property of the Richmond Brick Company.

An 1898 atlas is also the first to depict Meadow Road, a small stretch of road that ran north-south along the periphery of the marshland in the southern portion of what is now the East

Mound, or Landfill Section 6/7, and connected to what is now Richmond Avenue via another small road, Meadow Lane.

SOLID WASTE DISPOSAL AND LANDFILLING

A 1917 atlas for the area also shows that a garbage disposal plant had been established within the project site on what was referred to as Lake's Island. This garbage disposal plant was originally meant to be located on nearby Prall's Island. However, during a 1916 real estate dispute in which 15 armed men took control of Prall's Island, the location of the dump was moved to Lake's Island. Community members protested the establishment of the plant. Nevertheless, the plant was approved and ultimately constructed. The disposal plant was not governed by today's sanitary and environmental standards. In 1918, in an attempt to determine the source of foul odors emanating from the plant, the Commissioner of the Department of Street Cleaning, the precursor to the Department of Sanitation, ordered the 15 unloaded barges of garbage dumped at sea.¹

Talk of reclaiming the marshland around Fresh Kills for a full-scale urban landfill increased in the 1920s and 1930s. The location was naturally conducive to such purposes because barges carrying solid waste from across the City could be transported directly to the landfill via its network of creeks and waterways. Newspapers carried stories about the proposed landfill, spear-headed by City Construction Coordinator Robert Moses, as early as 1938. As with the Lake's Island plant, the proposed Fresh Kills Landfill was met with criticism from Staten Island's citizens and community activists, who felt that it would be a "potential health menace and an annoying source of disagreeable odors." However, the City of New York defended the proposal by promising to "take a swampy area full of mosquitoes and odors no better than those from refuse and transform it into fertile soil that can be made into beautiful parks."

The City moved forward with its plan to place a light layer of fill over the marshes and used dirt generated by the cutting down of the tall hills surrounding the site. Other materials were used as fill, including dirt excavated during the construction of roads, subways, and buildings, clean sand, and raw garbage. The land was obtained through condemnation, which is supported by historic deeds showing that the Treasurer of City of New York took control of many of the tax blocks and immediately granted them to the City.

By 1948, to address its increasing solid waste disposal needs, the City operated Fresh Kills Landfill as a network of municipal solid waste landfills that were developed to serve the dual purposes of municipal solid waste disposal and land reclamation. At the time, the filling of tidal wetlands for the purposes of creating developable land was encouraged, considered a benefit to the City, and unregulated. However, in the decades that followed, Fresh Kills became the City's principal facility for the disposal of collected household and municipal waste.

The City's original intention was to operate the landfill for no more than two years, after which time the land would be suitable for industrial development, open park space, and possibly even an airport. Dubbed "Operation Fresh Kills," the City intended to "reclaim" more than 1,800 acres of former wetlands over the course of a decade using 20 percent of New York City's daily garbage as fill. In a report released by the City in November 1951, the potential for the landfilling operation for land reclamation was outlined. The report recognized that centuries of

¹ Ocean dumping was not banned until 1934, when the U.S. Supreme Court ruled it a nuisance that spoiled the shorelines of Long Island and New Jersey.

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landfilling in New York City had created substantial waterfront land, and that Fresh Kills had that potential as well. The report cited the reclamation that occurred with the 1939 World's Fair at the site of the former Corona dump and the grading that was performed to create Flushing Meadow Park. That plan anticipated the completion of the sanitary landfilling project in about 1968, after which redevelopment could take place. Future envisioned uses included hundreds of acres of parkland, residential and industrial development along the Arthur Kill for a comprehensive mixed-use development. Access would be improved with the completion of the West Shore Expressway.

However, as the decades moved on, the City continued to push back the landfill's anticipated closure through the end of the 20th century. In addition, the landfill's acreage kept increasing as more and more solid waste was brought in from across the City. In 1952, the landfill's area was doubled and additional underwater land was acquired five years later so that landfilling could continue. At that time, the creeks and waterways comprising Fresh Kills were dredged and widened and the bulkheads lining them were straightened not only to improve conditions at the landfill, itself, but to better prepare the site for future industrial development.

As the mid-20th century continued, other major development projects took place within the landfill vicinity. Beginning in the 1950s and lasting through the mid-1970s, the West Shore Expressway was constructed through the center of the project site. The Expressway is one of Staten Island's main thoroughfares, running between the Outerbridge Crossing to the south and the Staten Island Expressway and Goethals Bridge to the north. The road had been planned since 1947 but the final section, between Arthur Kill Road and Victory Boulevard, was not opened until 1976.

LATE 20TH CENTURY TO THE PRESENT¹

By the late 20th century, Fresh Kills had become the largest landfill in the world and was the principal recipient of New York City's domestic and municipal refuse. At its peak, Fresh Kills received as much as 29,000 tons of trash per day. While the City had a number of operating landfills in the latter half of the 20th century, many were closed as new landfill and environmental regulations came into effect. However, the opening of Fresh Kills predated the existence of Federal and State regulations pertaining to the design and operation of solid waste landfills. With the promulgation of new federal statutes, such as the Resource Conservation and Recovery Act (RCRA) in the 1970s, federal guidelines were established for the siting, design, operation, closure, and monitoring of landfills. In addition, RCRA required states to perform an inventory of their landfills to determine the level of compliance with the new regulations. Following the passage of the Environmental Conservation Law (ECL) of New York State in 1973, stringent new regulations were adopted governing the state's landfills. The regulations required that permit applications be submitted and that the applications contain detailed technical data on landfill operations and the potential for impacts on the surrounding environment, including the surface and groundwater, and air quality resources. In the fall of 1978, a lawsuit was filed in the New York State Supreme Court by Elizabeth Connelly, a Staten Island Assemblywoman, alleging that Fresh Kills was operating illegally since it did not have a

¹ For additional details on the site history with respect to the Consent Orders and amendments that govern activities at Fresh Kills Landfill, see the discussion below under "Regulatory Approvals" as provided in this chapter.

permit. The suit sought to have the landfill closed and named the City and State of New York as defendants. These new regulations included, in 1978, 6 NYCRR Part 360, Solid Waste Management Facilities. To ensure that landfills throughout the state were in compliance with these new regulations, municipalities were required to apply for permits for their landfills. DEC oversees these requirements.

DEC recognized that bringing existing landfills into compliance with new regulations would not occur immediately. To enable the Fresh Kills Landfill to come into compliance with the Part 360 regulations for solid waste management facilities, DEC entered into three consent orders with DSNY, beginning in 1980, with a second Consent Order in 1985, both of which had the objectives of reducing the impacts at the landfill as an interim measure while long-term measures were developed. A third Consent Order was initiated in 1990 between DEC and the City (April 24, 1990, as subsequently modified, Case # 02-9001-03), and is in effect today, as subsequently amended (a detailed description of the Consent Order history is provided below under “Regulatory History.”) The 1990 Consent Order allowed DSNY to continue operating the Fresh Kills Landfill while the City made environmental and operational improvements to bring the landfill into compliance with the requirements of the State regulations under Part 360. For example, although deep groundwater at the site is protected by a thick natural clay layer beneath the Fresh Kills Landfill, the landfill lacked a structural liner and other environmental controls required by regulation to protect local groundwater and surface water. As a result, Fresh Kills Landfill began to incorporate a number of contemporary landfill design requirements. In addition, DSNY prepared and submitted to DEC a Part 360 permit application for Fresh Kills Landfill. However, the application was withdrawn and DEC terminated its review when a state law was passed in 1996 requiring the landfill to cease accepting solid waste by December 31, 2001. This law was passed after many decades of local opposition to the landfill, which included lawsuits and other mechanisms to close the landfill that were brought by local residents, community groups, and their representatives. Today, Fresh Kills Landfill continues to be governed by the 1990 Consent Order requirement as subsequently modified, which governs landfill closure construction and post-closure manufacturing and maintenance at Fresh Kills.

With the mandated closure of the landfill, Fresh Kills Landfill received its last barge of solid waste on March 22, 2001. Subsequently, while the landfill was closed to further receipt of solid waste, landfill closure needed to be completed in accordance with a DEC-approved Closure Plan under the Consent Order. Landfill closure construction and post-closure activities include installation of final cover, the long-term operation of the necessary environmental controls and long-term maintenance and monitoring practices. While Fresh Kills Landfill was officially closed on March 22, 2001, after the World Trade Center attack of September 11, 2001, then-Governor Pataki issued an emergency order to temporarily suspend the City’s obligation to cease the acceptance of solid waste material at Fresh Kills Landfill for the purposes of receiving materials from the World Trade Center site.

CURRENT CONDITIONS

The operation of Fresh Kills Landfill at the project site has resulted in a highly engineered complex of man-made infrastructure and artificial landscapes. There are four principal areas on the site where municipal solid waste landfilling occurred, referred to as Landfill Sections 3/4, 2/8, 6/7, and 1/9. Final closure construction was completed at Landfill Sections 3/4 (within the area proposed as North Park) and 2/8 (within the area proposed as South Park) in the mid 1990s. Closure construction of Landfill Sections 6/7 (within the area proposed as East Park) and 1/9 (within the area proposed as West Park) is currently underway. The disturbance to natural ecosystems and the

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effect of 50-plus years of solid waste landfilling operations at the site has been significant, and today much of the landfill area only supports simple, relatively homogenous vegetated cover and biological systems. However, despite these adverse and stressed ecological conditions, the project site retains many significant ecological assets, including hundreds of acres of salt marsh and an extensive network of tidal creeks. Moreover, the site's proximity to the Staten Island Greenbelt and the William T. Davis Wildlife Refuge offers the potential emergence of an even richer mix of vegetation species and wildlife habitat opportunities as part of Fresh Kills Park. These adjacent open spaces can provide opportunities for new public open space linkages with the Staten Island Greenbelt, a network of interconnected trails and recreational opportunities across all of southwest and central Staten Island, and comprehensive watershed management.

PROJECT PURPOSE AND NEED

OVERALL PROJECT

With the City terminating municipal solid waste landfilling operations at Fresh Kills Landfill in 2001, this opened the possibility of transforming this large City property, including the landfill sections, wetlands, and waterways, into a unique and significant public open space for use by neighborhood residents, residents of Staten Island, the City of New York, the region as a whole, as well as national and international visitors to New York City. Similar landfill reclamation projects have been proposed or implemented at a number of locations in the New York Metropolitan area (e.g., Port Washington Landfill in North Hempstead, New York; Norman J. Levy Park in Merrick, New York), across the country (e.g., Shoreline Regional Park in Mountain View, California; Millennium Park in Boston, Massachusetts; Dyer Boulevard Park in West Palm Beach, Florida) and internationally (e.g., Nanji Island Park, Seoul, Korea).

While these projects all represent significant landfill reuse opportunities, and provide a guide for reuse as Fresh Kills Park, there are also significant challenges in landfill reuse, particularly for open space and parkland. These challenges are present at Fresh Kills Landfill, especially given its history and size. Among the hurdles are minimizing the environmental impacts of the existing landfill in order to protect public health as the site becomes accessible, ensuring the protection of the landfill environmental control and post-closure care systems, ensuring that the landfill management systems remain fully operational and functional through the post-closure period, and providing a permanent protective soil cover. In addition, at Fresh Kills, there are extant wetlands and habitats that must also be protected. These design and reuse issues apply to both the proposed open spaces, as well as the park roads proposed across Fresh Kills and its regulated landfill sections.

In light of these challenges, the transformation of Fresh Kills Landfill into a public park is a long-term commitment by the City to create not only a vast new public open space with extensive waterfront access, but also to provide the accompanying cultural amenities and ecological improvements. The proposed park would offer numerous public benefits, including protecting and enhancing ecological landscapes; creating hundreds of acres of land for active and passive recreation; promoting public waterfront access; and improving both site access and the local circulation system through new park roads, bikeways, walkways, and trails that would connect local roadways with the park and the West Shore Expressway, and providing trail connections with existing adjacent parks, such as William T. Davis Wildlife Refuge to the north and LaTourette Park in the Staten Island Greenbelt to the east. This new transportation system would not only support visual and physical access to the water (including enhanced visual access through the driving and biking experience across the landfill), but would provide connections between the local

neighborhoods to the north and south of the proposed park (e.g., Travis to the North and Arden Heights to the south). In addition, the proposed project provides the opportunity to showcase state-of-the-art landfill reclamation techniques in conjunction with innovative park design.

The proposed Fresh Kills Park would establish a much-needed and vast new public park for the City of New York while providing the following benefits:

- Transforming a large, underutilized, and closed City landfill property into a public asset. Under this proposal, the approximately 2,163-acre project area, with its spectacular views, natural landscapes, and miles of waterfront would be open to public enjoyment, ending its isolation from nearby communities and providing a significant attraction for the greater New York City region with a broad range of recreational opportunities that would make it an international destination.
- Converting a large City waterfront property and its waterways into public access opportunities for recreational use. The extensive waterways within the project site provide a unique opportunity for on-water recreation, such as kayaking, as well as environmental education.
- Protecting and restoring the natural features of the project site, including its tidal and freshwater wetlands and upland habitats, such as meadows and forests.
- Developing a new road system across Fresh Kills that can improve local vehicular and pedestrian connectivity while meeting the additional design specifications and maintenance requirements that come with road designs over landfills (see also the more detailed discussion below).
- Protecting the Fresh Kills Landfill systems and ensuring compliance with the closure and post-closure maintenance obligations for Fresh Kills Landfill.

THE NEED FOR FRESH KILLS PARK ROADS

The Fresh Kills Park Draft Master Plan states that the objectives of the vehicular circulation include:

- Optimizing connectivity within and beyond the site, facilitating both local and regional access to major destinations in the park and alleviating local traffic congestion.
- Allowing all areas of the park to be accessible to all people and compliant with American with Disabilities Act regulations;
- Integrating vehicular park drives into the landscape, using curvilinear geometry to follow the contours and create slow (35 mph) scenic driving experiences;
- Enhancing the park experience with an extensive intermodal circulation network, including multi-use paths and trails, local bus connections, and a docking facility;
- Using the drives and pathways to help orient visitors in the park through varied materials, signage, and signature design, and providing pedestrian-friendly crossings; and
- Coordinating the implementation and operation of new drives, paths, and trails with ongoing maintenance and service needs associated with landfill closure.

To this end, the City proposed to construct approximately seven miles of new park roads to provide access to the park and the distributed proposed uses. The roads will be designed to provide connectivity between Richmond Avenue on the east and the West Shore Expressway on the west, while also facilitating the creation of large open spaces and habitat areas.

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The plan for roads across Fresh Kills is responsive to the well founded and clearly expressed wishes of the broad Staten Island community. The construction of roads through the Fresh Kills site is supported by the Staten Island Transportation Task Force, the local community, local Community Boards, and the Staten Island Borough President. The Staten Island Transportation Task Force, a group formed by the Mayor to address the borough's growing traffic congestion, has identified the construction of the Fresh Kills Park roads as one of its key recommendations for relieving local traffic congestion in addition to transit enhancements, alternative transportation modes, and other road improvement projects that are being implemented and considered for the area.

With respect to the project purpose and need as it relates to transportation and pedestrian circulation, the proposed park roads are needed to:

- Provide access to the Park and the various park uses that will be distributed over the 2,163 acre site, as depicted in the Draft Master Plan.
- Create connections between Richmond Avenue and the West Shore Expressway to reduce congestion along major arterials and minimize through traffic in residential neighborhoods.

The roads will provide new opportunities for vehicular, transit, bike and pedestrian access into the park for the purposes of creating public access (recognizing that with such a large site multiple forms of access are necessary at multiple locations). The purpose of the project as a whole is to integrate the Fresh Kills Landfill property into the community by constructing park and transportation connections, thereby minimizing the site's impact as an obstacle to the local transportation network, a condition that has existed for many decades. Additionally, the City seeks to minimize any off-site traffic impacts caused by the proposed park, which will become a regional attraction. To that end, a network of roads, transit access, multi-use paths, and footpaths are proposed. A more detailed discussion follows.¹

Providing Park Access

A fundamental goal of the park roads is to provide access into the park and to the various uses distributed through the park as envisioned in the Draft Master Plan. Figure 1-4a shows how the proposed park uses are distributed throughout the nearly 2,200-acre project site. The primary roads are designed to provide vehicular access to those uses which will generate the greatest demand as described below.

West Shore Expressway Connections and the Confluence Loop

The proposed connections to the West Shore Expressway will provide regional access to the Park and provide direct vehicular access to the proposed recreational facilities in North Park, South Park, and the Confluence and the proposed 9/11 earthwork monument in West Park. The Confluence Loop itself will provide direct vehicular access to the areas within the Confluence,

¹ Text developed for this discussion is developed from the following reports: "Fresh Kills Landfill Traffic Planning Study, Alteration Mapping and Cost Estimate," Submitted to SIBP by URS, December 11, 2001; "Fresh Kills Landfill Traffic Planning Study, Highway Network Modeling and Sketch Planning Evaluation," Submitted to SIBP by URS, December, 2001; "Fresh Kills Landfill Traffic Planning Study, Final Traffic Engineering Analysis Report," Submitted to SIBP by URS, December, 2001; Fresh Kills Landfill Staten Island Borough Presidents Office Roadway Alternative Evaluation Draft Interim Report, prepared for the New York City Department of Transportation and the New York City Department of Design and Construction by the URS Corporation, February 2009.

the most heavily programmed area of the site. These areas include the Point, Creek Landing, The Marsh, and the Terrace. The proposed uses here include a ferry landing, fishing pier, barge gardens, restaurants, marina, boat launch, waterfront promenade, pier overlook, exhibition hall, banquet hall, art and community center, multi-use sports fields, amphitheater, multi-use paths, greenhouses, cafes, esplanade, visitor centers, and fishing piers. The proposed roads are needed to provide access to these uses. Figure 1-4b illustrates the proposed uses accessed by the West Shore Expressway connections and the Confluence Loop.

Connections to Forest Hill Road

The proposed connection from the Confluence to Forest Hill Road will provide direct vehicular access to the southern portion of East Park. The proposed uses include picnic fields and lawns, recreational paths, nature education center, a potential golf course or recreational fields, and a possible kayak and canoe launch. Moreover, this proposed segment of road will provide access from Richmond Avenue to the Confluence and all the uses proposed there. The proposed roads are needed to provide access to these uses. Figure 1-4c illustrates the proposed uses accessed by the connections to Forest Hill Road.

Connection to Richmond Hill Road

The proposed connection from the Confluence to Richmond Hill Road will provide direct vehicular access to the northern portion of East Park. The proposed uses include hilltop fields, overlook decks, mixed woodlands, a potential golf course or recreational fields, successional meadows, an outdoor environmental educational classroom, and berm overlooks. Moreover, this proposed segment of road will provide access from Richmond Avenue to the Confluence and all the uses proposed there. The proposed roads are needed to provide access to these uses. Figure 1-4d illustrates the proposed uses accessed by Richmond Hill Road connection.

Moreover, driving through Fresh Kills Park will be a fundamental park experience for many drivers on Staten Island. The proposed roads would open the waterfront site to new public vistas along the park drive. The proposed roads are needed to provide access to the waterfront and water-dependent recreational uses. With the full park development estimated to take thirty years, the development of the roads will provide visitors an opportunity to see areas of the park that are not yet opened for public access thereby creating a visual connection to the potential of the site. The Draft Master Plan calls for the integration of the vehicular park drives into the landscape, using curvilinear geometry to follow the contours and create slow (35 mph) scenic driving experiences.

Addressing the Traffic Needs

Increasing Regional Connectivity

There is an undeniable need to address traffic congestion on Staten Island. Traffic in this part of Staten Island is particularly heavy; additionally, congestion is only expected to grow worse as western Staten Island continues to develop. In response to growing community concerns about traffic, the City of New York created the Staten Island Transportation Task Force which is multi-agency task force led by representatives from NYCDOT and DCP (also represented are local community boards, representatives, NYSDOT, the MTA and Port Authority). Formed in 2006, the Task Force is charged with exploring multiple short-term and long term opportunities and solutions for improving transportation and circulation across Staten Island. The Staten Island Transportation Task Force has identified the construction of the Fresh Kills park roads as one of its key recommendations for relieving local traffic congestion in addition to transit, alternative transportation modes, and other road improvement projects that are being implemented and considered for the area.

Fresh Kills Park GEIS

Located on the eastern edge of the site, Richmond Avenue is one of the principal arterials for north-south vehicular traffic through western Staten Island; traffic is heaviest in the stretch between the Staten Island Expressway and Arthur Kill Road. Richmond Avenue serves one of the busiest commercial hubs in the borough, providing access to the Staten Island Mall and other large retailers, and also provides regional transportation connections to the Staten Island Expressway and the West Shore Expressway via Victory Boulevard to the north and to the Korean War Veterans Highway to the South.

Minimizing Local Impacts

There is a lack of operational capacity along Richmond Avenue and therefore alternative routes that reduce congestion along Richmond Avenue without increasing traffic volumes in local neighborhoods are needed. During the course of the preparation of the scope of work (including the public hearing), preparation of the DGEIS, and the DGEIS public review and hearing, a significant number of comments were made by local representatives and the general public with respect to the need for not only including new east/west public roads as part of the Fresh Kills Park project, but expediting construction of those roads. With no public through road across Fresh Kills, there is a major local transportation need for a shorter travel distance across (rather than around) the approximately 4-square-mile, 2,200 acre site. Fresh Kills currently presents a significant void in the local street grid, and a significant obstacle to local drivers seeking to reach the West Shore Expressway (WSE) and the regional highway system. While the proposed park would be served by publicly accessible roads for automobile and transit access into the park, the connections to the WSE would simultaneously provide a through road across the site, thereby providing some measure of local traffic relief.

By way of background, in 2001, with the official closing of Fresh Kills, the office of the Staten Island Borough President, through the New York City Economic Development Corporation commissioned a study of alternatives for providing vehicular access across Fresh Kills. Among the findings of that study were that roads through the park could provide traffic relief on local streets. In implementing new east/west connections that would provide access to the West Shore Expressway and a bypass to the congested Richmond Avenue corridor, it was the conclusion of those studies that intersections along Richmond Avenue would experience reductions in vehicular congestion if new roads were to be constructed across Fresh Kills. These improved traffic flows were determined to be directly linked to a shift in traffic patterns from the Richmond Avenue corridor (currently via Arthur Kill Road and Victory Boulevard) to roads across Fresh Kills. Thus, with park roads, not only would congestion be reduced at local intersections, but vehicle miles traveled would be reduced with the potential for accompanying air quality benefits.

The report shows a slight increase in vehicle miles traveled in the short term, but significant reductions anticipated in the long term, as measured against the validated baseline 2000 model year. In addition, based on the data, it is concluded that proposed roads can reduce overall trip time in the network with both more direct (shorter) travel paths and reduced travel times between points of origin and destination. Overall, the 2001 report concluded that these benefits would occur at multiple locations in the local travel network, but particularly along Arthur Kill Road, Drumgoole Road West, Richmond Avenue, Richmond Hills Road, and Forest Hill Road.

The proposed park roads would also eliminate the need for vehicles to travel through the quiet residential neighborhoods adjacent to the Fresh Kills Park site. For example, the existing road network requires that vehicles traveling from Richmond Avenue at Richmond Hill Road to the West Shore Expressway currently have to drive approximate 2,000 feet northeast on Richmond

Avenue and make a left turn at the congested Travis Avenue intersection and then head about 1 mile west on Travis Avenue to the intersection with Victory Boulevard. At Victory Boulevard the driver would again have the make a left turn, and than travel approximately 1 mile through the commercial core of the Travis neighborhood to reach the ramps of the West Shore Expressway. Thus, this total diversion is about 2.4 miles to get around the Fresh Kills property and along the way pass about 8 signalized intersections. With the use of the proposed Fresh Kills Park roads the travel distance is about half that with only 2 signalized intersections to reach the southbound or northbound lanes of the West Shore Expressway. It is estimated in this GEIS that about 300 vehicles in the weekday AM peak hour and nearly 400 vehicles in the Saturday Midday peak hour would use the parks roads to avoid locally congested intersections and take a more direct path between the West Shore Expressway and Richmond Avenue.

For drivers currently traveling from Richmond Avenue at Forest Hill Road to the West Shore Expressway, the limited road network requires traveling south on Richmond Avenue for a distance of about 3,000 feet to Arthur Kill Road. Here, the Korean War Veteran's Highway is accessible by the often-congested intersection with Arthur Kill Road. As such, many drivers instead turn west along Arthur Kill Road for a distance of about 2 miles to reach northbound or southbound entrances to the West Shore Expressway at the Arthur Kill Road. Along the way drivers would pass at least 5 signalized intersections adjacent to the residential neighborhood of Arden Heights. The proposed extension of Forest Hill Road into Fresh Kills Park with connections to the West Shore Expressway would reduce the travel distance by about half with only two signalized intersections in order to reach the Expressway.

It is estimated in this GEIS that about 330 vehicles in the weekday AM peak hour and over 550 vehicles in the Saturday AM peak hour would use the Forest Hill Park Road connection to avoid locally congested intersections and take a more direct path between the West Shore Expressway and Richmond Avenue. It is therefore concluded that the proposed park roads are needed to reduce the through traffic in local, residential neighborhoods.

Lastly, by reducing travel time from the congested Richmond Avenue corridor to the West Shore Expressway, the proposed roads would also provide the benefit of emergency access to and across the site as well as economic and community benefits with improved circulation.

Given these projected benefits, plans for roads across Fresh Kills were integrated into the Fresh Kills Draft Master Plan (March 2006) for the purposes of enhancing local transportation in addition to providing park access.

C. DESCRIPTION OF THE PROJECT SITE

PROJECT SITE BLOCKS AND LOTS

The project site is all City-owned land comprising the blocks and lots listed below in Table 1-1 and shown in Figure 1-5a. The table also presents the City agency with jurisdiction over each lot on the project site. As shown in the table, the project site is currently all City property under the jurisdiction of either DPR, DEP, or DSNY. DSNY has jurisdiction over the majority of the project site.

Table 1-1
Project Site Blocks and Lots

Block	Lots	Jurisdiction*
2520	1 (portion)	DSNY/DPR
2600	100 (portion)	DPR
2649	1	DSNY
2650	1	DSNY
2651	1	DSNY
2652	1	DSNY
2665	20	DEP/DPR
2685	1	DSNY
2725	1	DPR
5804	1	DPR
5804	325	DPR
5804	340	DPR
5900	100 (portion)	DSNY
5900	500 (portion)	DSNY
5965	500	DSNY
6169	37 (portion)	DSNY
6169	103	DPR
6169	200	DSNY
<p>Notes: See Figure 2-2. * Department of Sanitation (DSNY); Department of Parks and Recreation (DPR) The above listing does not reflect those portions of land that are currently part of the Fresh Kills landfill but outside the project site and would remain with DSNY. Source: DPR, February 2008.</p>		

CURRENT ZONING AND MAPPED PARKLANDS

ZONING

The Fresh Kills site has four City zoning districts and two overlying special zoning districts (see Figure 1-5b). The underlying districts are as follows:

- M3-1 and M2-1 zoning districts generally cover the land and water west of the West Shore Expressway and south of the Little Fresh Kill and include Landfill Section 1/9 (Block 6169, Lot 200, Block 5695, Lot 500, Block 5900, Lot 500). The exception is the Isle of Meadows (Block 2725, Lot 1), which is already under DPR jurisdiction.
- An M1-1 zoning district covers lands and water area zoned to the east of the West Shore expressway and includes lands to the south of Main Creek and Richmond Creek, which is principally occupied by Landfill Section 2/8 (Block 5900, Lot 100 and Block 5804, Lot 1).
- To the north of Main Creek is Landfill Section 3/4 (Block 2685, Lot 1). This landfill section and the surrounding area are also zoned M1-1 (Block 2665, Lot 20).
- Lands and water area east of Richmond Creek/Main Creek are covered by an R3-2 zoning district. This district covers Landfill Section 6/7 (Block 2520, Lot 1).

Open space and recreational facilities are allowed in the R3-2 and M1 districts, but are not allowed in the M3-1 and M2-1 districts. Where the site is mapped parkland, the zoning designations do not apply.

There are also two special districts mapped over Fresh Kills: the Natural Area District (NA-1) and the Special South Richmond Development District (SRD). The former is mapped generally south of the Little Fresh Creek/Richmond Creek (Landfill Sections 1/9 and 2/8). The latter is

mapped along both shores of Main Creek and Richmond Creek, east of the West Shore Expressway (see Figure 1-5b). The NA-1 District connects with the William T. Davis Wildlife Refuge to the north and LaTourette Park to the east.

The NA-1 District extends across Staten Island east to the Todt Hill, Dongan Hill, and Emerson Hill neighborhoods and also covers portions of LaTourette and New Springville as well as the William T. Davis Wildlife Refuge. This Special Zoning district was created by the City to preserve the unique natural landscapes and topography of Staten Island. The Special Zoning district supports the Staten Island Greenbelt, and its combination of natural features including steep slopes, rock outcrops, creeks, wetlands, and native woodlands. District regulations further protect the local landscape by shaping new development into the natural condition and minimizing alterations of existing natural features. All new developments and site alterations within this district must be reviewed and approved by CPC. Natural features are protected by limiting modifications in topography; preserving tree, plant, and marine life, and natural watercourses; and requiring clustered development to maximize the preservation of natural features.

In addition to the NA-1 District, the SRD was approved by the City in the mid-1970s to guide future development and land use in the South Richmond area of Staten Island. Overall goals of the district are to promote balanced land use, reduce impacts to irreplaceable natural and recreational resources, and to promote a desirable use of land. This is accomplished by CPC review of all site development and site alteration proposals within the district. Natural features are protected by limiting changes in topography to two feet (minimizing impacts to trees, lakes, and other natural features) and by clustering development to maximize the preservation of natural features. Under the SRD, CPC must authorize new development to ensure that it meets applicable natural features preservation standards. The SRD also includes an Open Space Network, which is a planned system of open spaces that includes public parks, park streets, Designated Open Spaces (DOS), and a waterfront esplanade. DOS is the term applied to properties in the Open Space Network that must be set aside as public open space.

MAPPED PARKLAND

Portions of the project site are currently mapped as parkland. This includes the waterways and lands east of the West Shore Expressway along both Richmond Creek and Main Creek. Along Main Creek the parkland mapping extends north to the William T. Davis Wildlife Refuge. Along Richmond Creek the parkland mapping extends east to Richmond Avenue. The upland limits of the parkland mapping are generally defined by the mapped Park Drives. Although mapped as parkland, the areas are not developed with recreational facilities and are not publicly accessible.

Because the proposed roadways would pass through existing mapped parkland on the project site, a State legislative action was approved for the alienation of parkland along proposed road corridors (Chapter 659 of the 2007 Law, State of New York). The park mapping action examined in this GEIS would redefine the limits of both the mapped parkland and park roadways that are proposed under the Fresh Kills Park plan. However, as described in greater detail below, historically none of this mapped parkland has been publicly accessible and the proposed project provides a significant increase in mapped parkland and would provide for public access to the currently and newly mapped parkland on the site for the first time.

CURRENT LAND USES, STRUCTURES AND OPERATIONS AT THE PROJECT SITE

LAND AND WATER USES

Blocks and Lots

The project site is all City-owned land, the majority of which is under the jurisdiction of DSNY. As shown in Table 1-1 above, portions of the project site are also under the jurisdiction of DEP and DPR. This includes DPR lands that are currently open space or parkland/natural areas, such as the Isle of Meadows.

In addition to the landfill and its associated infrastructure, there are hundreds of acres of undeveloped land, including natural areas with tidal and freshwater marshes and open water. The creeks and wetlands at the project site include the Great Fresh Kills and Little Fresh Kills, which connect Fresh Kills with the Arthur Kill; Richmond Creek, a tributary to the south; and Main Creek, a tributary to the north. Approximately 210 acres of the site are open water and approximately 360 acres are wetlands. Approximately 100 acres encompass the Isle of Meadow.

Fresh Kills Landfill Overview

A large portion of the project site (about 46 percent, or 987 acres) is occupied by four Landfill Sections 3/4, 6/7, 2/8 and 1/9. These landfill sections and the acreage they cover is provided in Table 1-2 and shown on Figure 1-3. In addition, the site has extensive lands that are undisturbed, i.e., natural areas, tidal and freshwater marshes, and open water.

Table 1-2
Landfill Sections and Closure Construction Status at Fresh Kills Landfill

Landfill Section	Area (acres) ¹	Closure Status ²
3/4	142	Construction Complete
2/8	139	Construction Complete
6/7	305	Approved Design, Construction Underway
1/9	401	Approved Design, Construction Underway
Total	987	
Sources:		
¹ Fresh Kills Landfill Post-Closure Monitoring and Maintenance Operations Manual, DSNY, December 2002.		
² DSNY, December 2007.		

The four landfill sections, or Solid Waste Management Unit areas (SWMUs), at the project site were once used by DSNY for the landfilling of municipal and household solid waste and as a result of those activities these areas of the site now range in top elevation from 90 to 195 (2007 survey) feet above sea level. These landfill sections are regulated by DEC as SWMUs because they contain solid waste. In accordance with the Resource Conservation and Recovery Act (RCRA), the SWMUs are defined by areas where waste was placed after 1980. In addition to the SWMUs, the project site contains a network of DSNY facilities that were used during the decades of landfill operations, as well as facilities on the site such as the leachate treatment and landfill gas recovery plants, and landfill gas migration and groundwater monitoring wells that are part of the Fresh Kills environmental control system and post-closure monitoring program (see the discussion below under the “Post-Closure Monitoring and Maintenance”). These environmental control systems and the monitoring and maintenance program for Fresh Kills Landfill are being implemented by DSNY under supervision by DEC. Under the monitoring and maintenance obligations, monitoring data is collected by DSNY and submitted on a regular basis to DEC for review. Lands that contain the environmental monitoring facilities are within the Fresh Kills environmental compliance boundary

(i.e., the lands outside the SWMUs that serve as a buffer between the SWMUs and surrounding properties).

DSNY initiated the placement of final cover at the Fresh Kills Landfill in 1986. For this initial phase of cover placement, a 12- to 18-inch-thick layer of low-permeability clay was used to prevent precipitation from infiltrating into the waste (hydraulic barrier). By 1990, portions of the side slopes on Landfill Section 2/8 and 3/4 were covered. This clay final cover, with a total area of approximately 22.8 acres (for Section 2/8) and 44.6 acres (for Section 3/4), was previously approved by DEC.

Under the terms of the 1990 Consent Order (see the detailed section below), all sections of the landfill are required to be closed with a final acceptable closure plan.

Design of the final cover at Sections 2/8 and 3/4 was presented in the *Final Closure Plan for Sections 2/8 and 3/4* (prepared by SCS Engineers, P.C., May 18, 1992), which was approved by DEC in correspondence dated September 30, 1992.

The contract for the remaining final cover construction at Section 2/8 was awarded in August 1994. Construction was substantially completed in 1996. The contract for the remaining final cover construction at Section 3/4 was awarded in July 1996. Construction was substantially completed in 1997.

Final closure construction is underway at Landfill Section 6/7 in accordance with a DEC-approved design. Final closure design has also been approved by DEC for Landfill Section 1/9 and subbase grading for certain segments has begun. Final closure construction includes a final cover designed to minimize water infiltration with a soil/geomembrane layer and vegetative cover that minimizes erosion. There is also a comprehensive network of drainage structures to collect surface water runoff. It is expected that the final closure construction of Landfill Sections 6/7 and 1/9 will be completed by 2016 (see also “The Future Without the Proposed Project,” below).

To support the final closure of Fresh Kills Landfill, there is an extensive infrastructure system that was installed and is managed and maintained by DSNY (see Figure 1-6). In addition to the final cover, this includes landfill gas and leachate collection and treatment systems, stormwater collection and control structures, bridges and landfill access roads. There are also Plants 1 and 2 and a significant stretch of bulkheaded waterfront, where the solid waste once arrived by barge when the landfill was operating. Currently there are about 113 DSNY employees at the site. These include about 87 employees from the Bureau of Waste Disposal, 4 from enforcement, and 22 in support services.

A description of the more critical components of the DSNY infrastructure at Fresh Kills Landfill is provided below. This includes a discussion of the landfill section final cover, the leachate control and treatment facilities, the landfill gas collection and treatment systems, the stormwater management system, and the Plant 1 and 2 facilities.

FRESH KILLS LANDFILL STRUCTURES AND FACILITIES

Landfill Sections Final Cover

Final cover is to be placed over all the landfill sections for the purposes of minimizing water infiltration, reducing erosion, promoting positive surface water drainage, and providing a physical barrier between the solid waste below and the above-ground environment. Final cover is the regulatory terminology for the system of layers that are generally comprised of an impermeable liner, 2 to 2.5 feet of barrier protection material (a compacted, largely inorganic

soil layer that creates a barrier above the liner), and a roughly 6-inch thick layer of growing medium. The five layers from the top to the bottom comprise the following.

- Top Layer (Vegetation/Roadways/Surface) - The top of the final cover is designed to direct runoff away from the landfill and control erosion of the cover. It typically consists of vegetative cover a 6-inch-thick layer of planting soil but may also include asphalt or gravel road materials. The final cover vegetation includes warm season grasses. Annual rye grass is used initially to establish a cover crop to prevent erosion until the warm season grasses take hold.
- Barrier Protection Material - This layer is composed of a roughly 2-foot thick layer of soil. Its purpose is to protect the underlying hydraulic barrier layer from weather extremes that could cause cracking or heaving and to store excess water until plants uptake water or until the water drains from the cover, and protects against burrowing animals.
- Drainage Layer - Made of either soil or a geosynthetic, this layer facilitates drainage of water that has infiltrated into the final cover, draining the overlying soils so as to minimize the saturation of the final cover.
- Hydraulic Barrier Layer - This layer consists of a geomembrane, or compacted clay layer that prevents water from percolating into the underlying solid waste and creating leachate. It also functions to contain landfill gas.
- Gas Venting Layer - This layer typically consists of a geocomposite layer or landfill gas ducts that allow landfill gas generated within the landfill to move toward landfill gas vents.

A summary of the various types of final covers used at different locations around the landfill is provided in Table 1-3. The cover types comprise two different general categories of landfill cover:

- 1) A geomembrane cap with a 2-foot thick layer of soil that acts as barrier protection material with a 6-inch layer of topsoil and seeding (Type I, II, IV, V, and VIII) or crushed stone and/or gravel (Type VI and VII) or pavement (Type VIII); and
- 2) A 1.5-foot thick layer of compacted clay with a 1.5-foot thick layer of soil that acts as barrier protection material and a 6-inch layer of topsoil and seeding (Type III variants).

Type I, II, IV, V, VI, VII, and VIII final covers include a geomembrane liner. Type I, IV, V, VI, VII final covers include drainage layers. Type IV, V, VI, and VII final covers include gas venting layers. Type III covers do not contain a geomembrane liner, a cap drainage layer, or a gas venting layer, and may require more maintenance.

Each landfill section employs several of the final cover types identified on Table 1-4, depending on the slope, plans for gravel or asphalt roads, drainage and landfill gas collection requirements, and other engineering design considerations. Additional stormwater controls and elements of the drainage system are integrated into the final cover to direct runoff to stormwater basins. A description of these landfill cover types is provided below for each landfill section (see also Table 1-3).

Final Cover Landfill Section 3/4

Section 3/4 is in the northern part of the project site. The final cover for Section 3/4 was installed in two stages beginning with portions of the lower sideslopes and consists of four final cover types: Type I, Type II, Type IIIA, Type IIIB. On sideslopes with slopes between 10 and 33 percent, a Type I final cover was installed. On top portions of the section with slopes no greater than 10 percent, a Type II final cover was installed. Along lower sideslopes of the section, Type IIIA and Type IIIB final covers were installed.

Table 1-3
Summary of Final Cover Types

Final Cover/Layer Information	Final Cover Type										
	I	II	IIIA	IIIB	IIIC	IV	V	VI	VII	VIII	IX
Locations Where Used	Sections 2/8, 3/4 10% - 33% slopes	Sections 2/8, 3/4 Slopes <= 10%	Section 1/9, Southeast perimeter slope north of Arden Ave. Section 3/4, Some perimeter slopes	Sections 2/8, 3/4 Some perimeter slopes	Section 1/9 Southeast perimeter slope south of Arden Ave.	Sections 1/9, 6/7 Slopes > 15%	Section 1/9, 6/7 Slopes <= 15%	Section 1/9, 6/7 Asphalt roads	Section 1/9, 6/7 Gravel roads	Section 1/9, 6/7 Perimeter road	Section 1/9 Northern and eastern perimeter of reclamation area
Top Layer	6" topsoil and seeding	6" topsoil and seeding	6" topsoil and seeding	6" topsoil and seeding	12" topsoil and soil barrier protection material	6" topsoil and seeding	6" topsoil and seeding	4" asphalt; 6" crushed stone and gravel	6" gravel	6" topsoil and seeding (shoulder) or Type 1 or 2 pavement (roadway)	Topsoil and seeding 60" alternative final cover (max. permeability of 1.0×10^{-5} cm/sec)
Barrier Protection Material (BPM)	24" barrier protection material	24" barrier protection material	18-24" soil barrier protection material	18" soil barrier protection material		24" soil barrier protection material	24" soil barrier protection material	Geotextile fabric protection layer 20" soil barrier protection layer	Geotextile fabric protection layer 24" soil barrier protection layer	24" soil barrier protection material	
Drainage Layer (DNL)	Geocomposite (HDPE drainage geonet with a non-woven geotextile on both sides)	-----	-----	-----	-----	Geocomposite: geotextiles heat-bonded to both sides of a HDPE geonet	Geotextile fabric protection layer	Geotextile fabric protection layer	Geocomposite: geotextiles heat-bonded to both sides of a HDPE geonet		
Hydraulic Barrier Layer	40-mil textured HDPE geomembrane	40-mil smooth HDPE geomembrane	12" low-permeability barrier soil layer (1.0×10^{-7} cm/sec)	18" low-permeability barrier soil layer (1.0×10^{-7} cm/sec)	12" low-permeability barrier soil layer (1.0×10^{-7} cm/sec)	40-mil textured LLDPE geomembrane	40-mil textured LLDPE geomembrane	40-mil textured LLDPE geomembrane	40-mil textured LLDPE geomembrane	60-mil HDPE geomembrane	
Gas Venting Layer (GVL)	-----	-----	-----	-----	-----	Geocomposite: geotextiles heat-bonded to both sides of a HDPE geonet	Geocomposite: geotextiles heat-bonded to both sides of a HDPE geonet	Geocomposite: geotextiles heat-bonded to both sides of a HDPE geonet	Geocomposite: geotextiles heat-bonded to both sides of a HDPE geonet	-----	

Source: Fresh Kills Landfill Final Closure Plan, DSNY, June 2003.

The surface layer of all four final cover types for Section 3/4 consists of 6 inches of topsoil. For Types I and II, the next layer is a minimum of 24-inches of soil barrier protection material. For Types IIIA and IIIB, 18-24-inches of soil barrier protection material is recommended. The Type I final cover then contains a geocomposite drainage layer (geotextiles heat-bonded to both sides of a geonet). The hydraulic barrier layers are different for each of the four final cover types in Section 3/4: Type I contains a 40-millimeter thick textured high density polyethylene (HDPE) geomembrane; Type II, 40-millimeter smooth HDPE geomembrane; Type IIIA, 12 inches of low-permeability barrier soil; and Type IIIB, 18 inches of low-permeability barrier soil. Underneath the hydraulic barrier layer, final cover Types I and II also have a 6-inch layer of Type II Cover Soil.

Final Cover Landfill Section 2/8

Section 2/8 consists of two main landfill sections, a smaller northern landfill section and a larger southern landfill section, which are separated by a tributary of Richmond Creek. The final cover for Section 2/8 was installed in two stages beginning with the lower side slopes of the southern mound and consists of three final cover types. Type I final cover was installed on side slopes with slopes between 10 and 33 percent. Type II final cover was installed on top portions of the section with slopes no greater than 10 percent. Type IIIB final cover was installed on along the lower side slopes of the southern landfill section.

The surface layer of all three final cover types for Section 2/8 consists of 6 inches of topsoil. For Types I and II, the next layer is a minimum of 24 inches of soil barrier protection material; for Type IIIB, 18-24 inches of soil barrier protection material was used. The Type I final cover then contains a geocomposite drainage layer. The hydraulic barrier layers are different for each of the four final cover types in Section 2/8: Type I contains a 40-mil thick textured HDPE geomembrane; Type II, a 40-mil thick smooth HDPE geomembrane; and Type IIIB, 18 inches of low-permeability barrier soil. Final cover Types I and II also have a 6-inch thick layer of Type II cover soil underneath the hydraulic barrier layer.

Final Cover Landfill Section 6/7

Section 6/7 is the second largest of the four landfill sections and is located in the eastern part of the project site. Final cover installation for Section 6/7 is in progress. The existing and planned final cover consists of five types: Types IV, V, VI, VII, and VIII.

Type IV final cover is being installed on slopes between 15 and 33 percent. The Type IV final cover is comprised of (in descending order) a minimum of 6 inches of topsoil, a minimum of 24 inches of soil barrier protection material, a geocomposite drainage layer, a hydraulic barrier layer consisting of 40-mil thick textured linear low-density polyethylene (LLDPE) geomembrane, and a geocomposite gas venting layer.

Type V final cover is being installed on slopes between 4 and 15 percent. The Type V final cover is comprised of (in descending order) a minimum of 6 inches of topsoil, a minimum of 24 inches of soil barrier protection material, a drainage layer consisting of a geotextile fabric, a hydraulic barrier layer consisting of 40-mil thick textured LLDPE geomembrane, and a geocomposite gas venting layer.

Type VI final cover will be used for finished asphalt roads. The Type VI final cover is comprised of (in descending order) a minimum of 4 inches of asphalt material, a minimum of 6 inches of crushed stone and gravel, a geotextile fabric barrier protection layer, a minimum 20-inch thick soil barrier protection layer as additional barrier protection material, a drainage layer

consisting of geotextile fabric protection material, a hydraulic barrier layer consisting of 40-millimeter thick textured LLDPE geomembrane, and a geocomposite gas venting net.

Type VII final cover will be used for finished gravel roads. The Type VII final cover is comprised of (in descending order) a minimum of 6 inches of gravel, a geotextile fabric barrier protection layer, a minimum 24 inches of soil barrier protection material, a geocomposite drainage layer, a hydraulic barrier layer consisting of 40-mil thick textured LLDPE geomembrane, and a geocomposite gas venting net.

Type VIII final cover was installed around the perimeter of Section 6/7 and overlies the leachate cutoff wall, leachate collection drain, and other associated components of the leachate collection and containment system. The Type VIII final cover is comprised of (in descending order) a minimum of 6 inches of topsoil or pavement, a minimum of 24 inches of soil barrier protection material, a hydraulic barrier layer consisting of 60-mil thick HDPE geomembrane, and a minimum 6-inch thick HDPE geomembrane bedding layer.

Final Cover Landfill Section 1/9

Section 1/9 is the largest of the four landfill sections and is located in the western part of the project site. Final cover for Section 1/9 will be installed in several stages and is in progress. The existing and planned final cover consists of eight types: Types IIIA, IIIC, IV, V, VI, VII, VIII, and IX.

Type IIIA final cover has previously been installed along the lower central-eastern sideslopes of Section 1/9. The Type IIIA final cover is comprised of (in descending order) a minimum of 6 inches of topsoil, 18-24 inches of soil barrier protection material, and a hydraulic barrier layer consisting of 12 inches of low-permeability barrier soil.

Type IIIC final cover was installed along the lower southeastern sideslope of Section 1/9. The Type IIIC final cover is comprised of a 12-inch thick layer of topsoil and barrier protection material, and a hydraulic barrier layer consisting of 12-inch thick layer of low-permeability barrier soil.

Type IV, V, VI, VII, and VIII final cover uses and components described above for Section 6/7 also apply for Section 1/9.

Type IX final cover is used in the remaining areas of the landfill and consists of a 60-inch thick alternative final cover overlying spoils or, at the bottom of the slope, native sediment. The Type IX final cover ties into the existing Type VIII final cover at the top of the slope. A 2-inch-wide strip of plywood is used as a protective cover at the limit of the existing Type VIII 60-mil thick HDPE geomembrane.

Leachate Control System

Leachate is defined as a liquid solid waste, including any suspended components in the liquid that results from contact with or passage through solid waste. Leachate is created as percolating rainwater travels vertically through the solid waste layer and dissolves soluble substances in the solid waste layers into leachate. As described in detail below, the Consent Order agreement between DEC and DSNY establishes a number of environmental controls, management, treatment, and monitoring programs pertaining to leachate generated by Fresh Kills Landfill. A more detailed discussion follows.

Geologic materials at Fresh Kills are represented by three distinct layers or units: refuse/fill, unconsolidated overburden, and unconsolidated bedrock. The refuse/fill layer consists of man-

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made deposits (i.e., the landfilled solid waste), which is has been lain on top of natural soils. These materials range in thickness from several feet to ±150 feet. Below this layer, the unconsolidated overburden is composed of natural soils lying between the refuse/fill layer and bedrock below. This overburden layer consists primarily of fine-grained silt and clay material.

In accordance with the requirements of the 1990 Consent Order, DSNY has undertaken management and modeling analyses with respect to leachate control at Fresh Kills Landfill. These reports, *Final Hydrological Report* (IT Corporation, July 25, 1993) and *Final Leachate Mitigation Report and Corrective Assessments Report* (IT Corporation, March 7, 1994), detail the activities and findings of these leachate mitigation investigations. As part of the development of a conceptual model of the site hydrology, analytical analyses of the rate of horizontal and vertical groundwater influx was performed in order to estimate the magnitude of leachate and groundwater discharge and the rate of groundwater infiltration into the landfill mounds. To understand this condition, models were developed projecting a volume of flow and solute transport in order to evaluate the effects of the landfill on local groundwater and surface waters, identify the potential vertical leachate migration pathways, and to develop corrective measures, as necessary. In addition to the modeling, groundwater sampling was also performed. Based on that modeling, (steady-state numerical model calibrated to 1993 existing conditions), it was estimated that the combined leachate generation at the site from all the landfill sections was 1.3 million gallons per day prior to implementation of any corrective measures. The calculated volume of leachate is a numerical model output and therefore should not be considered an exact number. Rather the purpose of the modeling was to evaluate the potential for leachate migration away for the landfill unit, conduct a sensitivity analysis to determine potential leachate migration based on a variation of the geologic parameters and to develop a tool for the evaluation of various remedial alternatives during the leachate mitigation design process. The results of pre-corrective measure leachate generation models suggested that approximately 92 percent of the migration away from the landfills (1.2 million gallons per day) affected shallow groundwater and certain upstream surface waters. The remaining leachate volume, approximately 100,000 gallons per day, was estimated to migrate vertically downward, with the majority of the vertical migration (81,000 gallons per day) estimated to occur within the Section 1/9 area of the landfill. The relatively large proportion of predicted leachate migrating through the base of Landfill Section 1/9 may be attributable to the presence of high permeability sand units that are in direct contact with the refuse along the western side and portions of the northern side of Section 1/9.

Age dating of these permeable Cretaceous layers through microfossil analysis indicates that the tested portions of the strata may not directly correlate with extensive Cretaceous deposits located in New Jersey. The major implication of this finding is that Cretaceous strata in the Fresh Kills area are likely separated from the primary water supply aquifers in New Jersey by thick, overlying confining beds of silt and clay. Further, seawater degradation of the Cretaceous sand strata at Landfill Section 1/9 mitigates against the potential effects of a dilute leachate influence in the Cretaceous sand units on possibly connected strata to the south and west of the site. As recent as 2006, groundwater monitoring around Landfill Section 1/9 continues to show seawater and possible leachate mixing within intermediate depth wells along the western portion of the Section 1/9.

Sensitivity analysis also performed as part of the hydrogeologic modeling for Section 1/9 suggested no significant variation in solute distribution when an increased hydraulic gradient across the Cretaceous sand units was modeled. This finding suggested that, for deep units within the model cross section, full correlation between the model sectional alignment and the flow regime is not essential for evaluation of the solute flux. The sensitivity modeling for Section 1/9

also revealed that a clay unit of approximately 15 ft thick or greater can significantly reduce the potential vertical migration of leachate where a recent sand unit is above a shallow Cretaceous sand unit. Under the modeled conditions the leachate migration into the Cretaceous sand unit does not appear to be significant, moving downward approximately 2.5 ft in the Cretaceous sand layer. Therefore, any changes in the leachate mound between the modeled condition and current condition would not be consequential to potential solute transport away from Landfill Section 1/9.

As a result of these modeling and monitoring investigations, a leachate control system was selected by the city and approved for installation at the Fresh Kills Landfill by the DEC. The objectives of the corrective measures system are to minimize leachate impacts to local groundwater or surface waters. The corrective measures have been in place and operating at the Fresh Kills Site for more than ten years, and all monitoring data to date have demonstrated that the measures are meeting or exceeding the original objective and standards. Consequently, the leachate mounds within the landfill units are no longer directly monitored. To the extent that there may be limited vertical migration of leachate, these releases have been disclosed in annual monitoring submitted to DEC and the discharges deemed adequately addressed by the approved corrective measures. A description of the corrective measures, as well as the landfill cap system that will help reduce leachate generation is provided below.

At Landfill Sections 1/9 and 6/7, this leachate control system is comprised of a cutoff wall and leachate collection drain with collection pump stations located around the perimeter of the two landfill sections. At Landfill Sections 2/8 and 3/4, the leachate control system is composed of leachate recovery wells cited at the top of the landfill sections, partial perimeter drains, and leachate collection pump stations located along the segments of partial perimeter drains. Collected leachate from these systems is conveyed through header pipes and force mains to the Fresh Kills Landfill Leachate Treatment Plant (see the description below).

These control measures at Fresh Kills, including the impermeable landfill covers (discussed above), cut-off walls, leachate recovery wells, and a leachate collection and conveyance system and treatment plant, prevent the migration of leachate generated by the landfill sections from reaching local groundwater and surface waters in and around Fresh Kills. In addition, the mostly Pleistocene geological formation beneath the landfill forms part of an impermeable barrier between the landfill and deeper groundwater. The isolated areas that lack the Pleistocene geological layer are composed of sandy Cretaceous deposits.

As stated above, the components of the Fresh Kills leachate containment and collection system for each landfill section are designed based on the underlying substrate and modeling performed at the site. As shown in Figure 1-7a, a vertical hydraulic barrier (i.e., “cutoff wall”) and leachate collection drains have been installed around the perimeters of Landfill Sections 1/9 and 6/7 along with associated leachate collection pump stations. As shown in Figure 1-7b, leachate recovery wells have been installed at the top of Landfill Sections 2/8 and 3/4 and perimeter leachate collection drains have been installed around these two landfill sections. Landfill Section 2/8 has two leachate recovery wells and Section 3/4 has one leachate recovery well.

As described above, the final cover on top of the landfill sections also limits rainwater infiltration into the landfill refuse below, thereby reducing the volume of leachate. The cutoff walls are also keyed into the underlying geological barriers and are constructed to restrict the horizontal in-flow of water from outside the landfill sections and into the leachate collection drain as well as to restrict the flow of leachate from the landfill sections into the surrounding environment. As described above, the leachate collection drains are located completely or

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partially around the perimeter of each landfill section and are constructed of crushed stone and perforated pipe. Leachate recovery wells collect leachate header pipes and force mains to the Fresh Kills Landfill Leachate Treatment Plant at the south edge of the Landfill Section 1/9.

The Fresh Kills Landfill Leachate Treatment Plant has a design capacity of 1,050,000 gallons per day and contains the following major unit processes: influent holding, sequencing batch reactors for biological treatment, metals precipitation, gravity clarification, sand filtration, effluent pH adjustment, and discharge through diffuser outfall. Once leachate is treated, it is discharged into the Arthur Kill in compliance with permitted effluent levels. The residuals are transported off site and properly disposed. Ongoing monitoring of treated leachate discharge from the plant to the Arthur Kill is performed to ensure that the environment is protected and in accordance with permit requirements (see also the discussion below). Pairs of hydraulic wells monitor groundwater elevations around the perimeter of the landfill and are inspected regularly to verify the effectiveness of these systems. The performance of the leachate management system is monitored and data relevant to the performance of the system is submitted to DEC on a regular basis.

In summary, the Fresh Kills Landfill leachate control system is designed to contain, collect, and treat leachate before it reaches surface waters. Moreover, groundwater and surface water monitoring programs are also used to measure the performance of the system and to ensure that any possible impacts to the environment due to leachate releases are identified, and appropriately mitigated, in order to minimize any negative impacts to the environment (see also the discussion below under “Post Closure Maintenance and Monitoring”).

Landfill Gas Management System

Introduction

Municipal solid waste landfills contain buried wastes that produce gaseous compounds through biological and chemical decomposition. The primary components of landfill gas are methane and carbon dioxide with trace amounts of non-methane organic compounds including some highly odorous contaminants. In order to avoid significant impacts to the environment from air emissions at the landfill, Fresh Kills Landfill has an active gas collection system that collects these gaseous compounds. The gas management process includes a mechanical blower to pull in landfill gases (i.e., the blower creates a negative pressure, a vacuum) via landfill trenches and collection pipes. The system was designed to have a collection efficiency of 90 percent or greater. Gaseous emissions not captured by the collection system (i.e., 10 percent or less) are considered fugitive emissions when released to the atmosphere from the landfill. The pathways for these fugitive emissions may include escape through the landfill cover, underground soil gas migration, and the passive vents at the landfill surface if negative pressure in the collection system is not fully attained.

At Fresh Kills Landfill, the collected gases are either sent to a gas recovery plant for re-use as pipeline natural gas after pre-treatment or directed to a flaring station. The primary objectives of the system are to control odors and prevent adverse impacts on air quality. The methane content of landfill gas (usually about 50 percent) is the reason why it can be flared or used as fuel. As with any combustion source, carbon dioxide, a greenhouse gas, is emitted as a by-product of burning the methane. However, methane is also a greenhouse gas and is considered to be at least 20 times more potent a greenhouse gas than carbon dioxide. Therefore, any release of carbon dioxide into the atmosphere from methane combustion would be a minimized impact when compared with the release of methane generated by the landfill, assuming no flaring or gas recovery reuse systems were in place. Current operations at the landfill rely mostly on landfill

gas recovery and re-use as pipeline natural gas. This re-use displaces the need for natural gas from other utility sources that would otherwise have been burned by local customers, providing an overall net benefit to air quality and providing a positive effect with regards to greenhouse gas reductions.

On September 9, 2008, DEC issued the report entitled *Draft Guide for Assessing Energy Use and Greenhouse Gas Emissions in Environmental Impact Statements*. This report addresses the range of issues that are currently under consideration with respect to greenhouse gas emissions, global climate changes, and the affects on sea level rise. The report does not set a threshold for the determination of significance under SEQR, but it does begin to establish a framework for the evaluation of greenhouse gas emissions from larger projects. Among the large projects cited in the report are power-generating facilities and projects that generate millions of vehicle miles traveled or consume a substantial amount of energy. The six main greenhouse gases of concern are carbon dioxide (CO₂), nitrous oxide (N₂O), methane (CH₄), hydroflouorocarbons (HFCs), perflouracarbons (PFCs), and sulfur hexafluoride (SF₆). Of these, CO₂ accounts for an estimated 88 percent of the greenhouse emissions in New York State, of which the majority—approximately 88 percent—come from fuel combustion. Other sources include distribution of energy, refrigerant substitutes, management of municipal waste, wastewater and agricultural activities (which generate methane and N₂O, natural gas leakage, and other sources).

The report recognizes that there are discrete actions that can be taken to reduce methane emissions from landfills. Among them are recovery of organics from the wastestream, enhanced landfill gas collection, and flaring and re-use of landfill gas for energy production. The report states that each of these measures would have a positive impact on total greenhouse gas emissions in New York State with respect to landfill emissions.

As described above, Fresh Kills Landfill incorporates such measures, including gas collection, flaring, and reuse for energy production. Also proposed with the Fresh Kills Park project (see the discussion below), is a substantial vegetative planting program that would further reduce the impacts of greenhouse gases. A more detailed description of the gas control systems at Fresh Kills Landfill follows.

Without gas collections and controls, landfill gas would migrate vertically and horizontally away from the landfill within unsaturated soil layers. The landfill gas migration management system at Fresh Kills is, as stated above, composed of engineered controls for collection supported by gas migration monitoring around the waste cells and buffer areas. The Fresh Kills landfill gas emissions management system is generally composed of an active landfill gas collection system, a landfill gas recovery and flaring system, and a passive venting system. Landfill gas collected at the site is processed through one of two methods in order to comply with regulatory requirements for emissions reduction:

- 1) Recovery and purification of the gas for use as fuel; or
- 2) Flaring, which involves combustion of landfill gas at high temperatures for thermal destruction of both methane and non-methane organic compounds, which otherwise could be harmful to human health.

During normal operating conditions, the active collection, flaring, and gas recovery systems are operated and the passive vents remain closed. Over time, once methane gas production has diminished at the landfill, and after active gas collection is no longer required, the passive vents may be reopened. If the quantity of landfill gas exceeds the capacity of the landfill gas recovery plant or if the plant is decommissioned in the future as gas production declines, then collected

landfill gas is expected to be managed at the flare stations. A description of each of the components of the landfill gas management system follows:

Active Landfill Gas Collection System (see Figure 1-8a)

- Landfill gas extraction wells—these wells collect landfill gas under vacuum pressure. Located at a spacing of approximately one per acre of the landfill sections (see Figure 1-6), these wells extend vertically downward to approximately the saturated zone of the refuse.
- Landfill gas header pipes—a network of non-perforated, lateral pipes which generally lay atop the hydraulic barrier layer of the cover system, these pipes transmit gas collected in the wells toward flare stations or the landfill gas recovery plant.
- Condensate tanks—located at each of the four landfill sections, these tanks collect liquid that condenses from the landfill gas. The liquid is subsequently pumped out by trucks. At Landfill Sections 6/7 and 1/9 condensate is drained into the leachate collection system.

Landfill Gas Recovery Plant and Flaring Stations

- Landfill gas blowers—provide the necessary vacuum to draw landfill gas from the extraction wellfield and convey it to the flare stations, from which it may be conveyed to the landfill gas recovery plant.
- Landfill gas transmission mains—a system of transmission pipes has been constructed to convey landfill gas from the flare stations at Landfill Sections 2/8, 3/4, and 6/7 to the landfill gas recovery plant. Landfill gas from Landfill Section 1/9 goes directly to the landfill gas recovery plant. If the landfill gas recovery plant shuts down, transmission lines will take the landfill gas from the landfill section to one of the flares.
- Flare stations—located on half-acre sites at the north, east, and south mounds. There are 3 flare stations that serve as a back-up safety system for combusting landfill gas in the event that the landfill gas recovery facility is not operating. Landfill gas flare stations are located on Landfill Sections 3/4 and 6/7, and north of 2/8. The flares are sited on ½-acre pads and connected to the vast network of landfill gas collection pipes.
- Landfill gas recovery plant—this highly efficient facility is located in the northeast portion of Landfill Section 1/9. It is designed to manage landfill gas from all landfill sections and to process the landfill gas for reuse.

Passive Landfill Gas Venting System (see Figure 1-8b through 1-8e)

- **Sections 1/9 and 6/7:** Geocomposite landfill gas venting net layer provides for passive venting of landfill gas through the final cover, installed at a spacing of about one per acre.
- **Sections 2/8 and 3/4:** Landfill gas ducts—consist of stone filled in trenches cut into the refuse to facilitate movement of landfill gas to the vents; and passive vents—provide for passive venting of landfill gas through the final cover.

Engineered Controls

- Perimeter landfill gas Interceptor Venting System—independent of the landfill gas extraction network, these vents are located around the perimeter of the landfill, serving as a safety measure to prevent landfill gas from migrating off-site. It is a trench filled with coarse stones extending from the surface to low-permeability soils or the seasonal low groundwater table; and
- Utility Seals—used as a barrier to landfill gas migration in underground utility conduits.

Migration Monitoring System

- Landfill gas migration monitoring wells—62 landfill gas migration monitoring wells are distributed throughout the landfill complex located along the landfill perimeter and placed outside the venting trenches;
- Methane Sensors—89 methane sensors are distributed throughout the site in 35 buildings.

Stormwater Management System

Stormwater management is an essential component of Fresh Kills Landfill. The system at Fresh Kills has been designed to detain all site-generated stormwater runoff on the site and to facilitate the removal of suspended sediments and any adhered pollutants prior to any discharges to local waterbodies. It is designed to prevent erosion of the top layer of the final cover, thereby preventing damage to the underlying hydraulic barrier layer and thus minimizing infiltration and leachate generation. This system was installed by DSNY in accordance with a DEC-approved stormwater management and pollution control plan and has a State Pollution Discharge Elimination (SPDES) permit. In addition to the stormwater management system, erosion and sediment control practices across the site, but particularly on the landfill sections, greatly reduce the potential for water quality impacts from the landfill on the surface waters flowing through Fresh Kills (see the discussion above).

The grading of the landfill sections is carefully engineered to ensure positive drainage and to direct storm flow. Under the Fresh Kills stormwater management system, the high-velocity stormwater runoff that develops on the landfill sections is directed into stabilized swales on the top plateau and on sideslopes. These systems convey the water to downchutes, pipes, and rip-rap lined swales, which in turn convey the runoff to the stormwater basins. The stormwater basins reduce the rate of stormwater discharge from the site and allow sediment to settle out before the stormwater is released to local waters. The components of the drainage systems vary at each landfill section. For example, Sections 2/8 and 3/4 employ underground downchute pipes to convey stormwater from swales to stormwater basins while Sections 1/9 and 6/7 will use gabion downchutes and drop-inlet boxes. Representative cross-sections of the landfill drainage systems are provided in Figure 1-9a for Landfill Sections 1/9 and 6/7 and in Figure 1-9b for Landfill Sections 2/8 and 3/4.

In summary, site drainage and runoff at Fresh Kills is controlled through vegetative cover, grading, and stormwater collection and control systems. To that end, final cover (described above) plays an important role in stabilizing and protecting the soil from erosion during rainfall events.

Plants 1 and 2¹

Plants 1 and 2 were the central activity areas at Fresh Kills when municipal solid waste landfilling facilities operations were performed at the site. These areas contain large structured surfaces (or pads) where the solid waste was unloaded from barges to trucks as well as extensive areas of bulkheaded shoreline since the majority of the solid waste came to Fresh Kills by barge.

¹ Data in this section was obtained from the “Final Facilities Conditions survey Fresh Kills Landfill Plant 1, 300 West Service Road, Staten Island, NY 10314,” prepared by Weston Solutions of New York, Inc. for DSNY, January 2007; and “Final Facilities Conditions Survey Fresh Kills Landfill Plant 2, 1000 West Service Road, Staten Island, NY 10314,” prepared by Weston Solutions of New York, Inc. for DSNY, February 2007.

There are also the sheds, garages, maintenance facilities, trailers, and small offices that were necessary to support the landfilling operations. With the cessation of landfilling and the transition of site activities to final closure construction, monitoring, and maintenance operations, these areas are used for staging for the final closure construction activities as well as a post-closure care and operations facility by DSNY. However, many of the buildings are vacant.

Plant 1 was formerly used as a barge unloading facility when Fresh Kills was actively operating as a solid waste landfill facility. Here, solid waste was unloaded from barges onto pay loaders and on/off road trucks for delivery to the active areas of the landfill. Located at Plant 1 is a two-story equipment maintenance building with a main floor area of approximately 64,000 square feet and a mezzanine level of 15,000 square feet. Maintenance and repair of various equipment including cranes, excavators, and pay loaders was performed at the equipment maintenance building. Additional facilities at Plant 1 also include a one-story equipment repair building (about 9,000 square feet), a boat maintenance building (about 8,500 square feet), a boom and bucket repair shop (about 13,000 square feet), a floating boat repair shop (about 2,000 square feet), a bureau of building maintenance building (about 7,500 square feet), a garage (about 6,000 square feet), a storage building (about 4,000 square feet), and a barge unloading area.

Plant 2, located on the north shore of Fresh Kills Creek, was also used as a barge unloading facility when Fresh Kills was operational. It also has a one-story equipment maintenance building (about 32,000 square feet), a one-story wash building (about 5,500 square feet), a fire pump house (about 1,000 square feet), a barge unloading area, and parking.

These facilities were central to operations at Fresh Kills Landfill and in addition to handling solid waste they were used for industrial repair activities and also contained underground storage tanks for petroleum storage. An assessment of environmental conditions at these sites with respect to hazardous materials is presented in Chapter 11, "Hazardous Materials."

Landfill Service Roads and Bridges

The project site has an extensive internal landfill service road system that allows DSNY vehicular access across much of the site independently of the adjoining public roads. As described below under "Circulation Plan" the proposed project would allow DSNY use of the proposed park roads in order to reduce use of local streets by DSNY vehicles. The existing entrance providing access to and from the site is Muldoon Avenue west of the West Shore Expressway. There is also a gated entry into the site from the West Shore Expressway service road leading south from Victory Boulevard, which provides ingress to the Staten Island Solid Waste Transfer Station, the Composting Facility, and the Crushing and Screening Facility (described below). There is also a gated entrance to the leachate treatment plant. Egress is provided by a northbound service road on the east side of the expressway, which leads to the service road leading to Wild Avenue in the Travis area and continues to Victory Boulevard. An entrance ramp north of Victory Boulevard connects to the West Shore Expressway northbound mainline. The northbound exit to Victory Boulevard provides an exit for vehicles now performing final closure at Landfill Section 6/7 as well as Waste Transfer Station vehicles. Additional service gates are located within the site. These are normally closed and kept locked. Active access and exist points are gated and guarded. Chain-link fences (10 feet high) surround all the landfill sections, preventing access by vehicles or the public at other locations. There is an internal network of landfill haul and service roads that include passages under the north and south end spans of the West Shore Expressway bridges over Fresh Kills Creek, and two haul bridges: one over Main Creek and the other over Richmond Creek (see Figure 1-3).

Vehicle speed within the site is controlled by signs posted along the DSNY service access roads. These roads are regularly inspected and maintained by DSNY.

POST CLOSURE MONITORING AND MAINTENANCE OPERATIONS¹

Regulatory Requirements

In accordance with the requirements of the State of New York including 6 NYCRR Part 360 and the Order on Consent between DEC and DSNY, a Post-Closure Monitoring and Maintenance Operations Manual was prepared for Fresh Kills Landfill to provide all information necessary to effectively monitor and maintain Fresh Kills for the entire post-closure period. Under the requirements of the Post-Closure Manual, the City is required to perform a variety of measures to ensure that closure and post-closure monitoring and maintenance of the landfill occurs in compliance with 6 NYCRR Part 360. Minimum components of the Post-Closure Manual must include the following:

- A description of the environmental control system monitoring program with the sampling locations and methodologies, recordkeeping and reporting requirements for all environmental monitoring activities;
- A description of types, location and frequency of all facility maintenance activities including maintaining the integrity and effectiveness of any final cover, making repairs to the cover as necessary to correct the effects of settlement, subsidence, erosion, or other events, maintaining the appropriate vegetative growth; preventing runoff from eroding or otherwise damaging the final cover; maintaining the leachate collection system; maintaining the landfill gas control and monitoring systems; and recordkeeping and reporting requirements.
- A description of personnel requirements including minimum qualifications, staffing, contact information, and equipment needs;
- A description of contingency plans that are necessary for responses to conditions that include, but are not limited to, major erosion, significant differential settlement, and fire; and a summary of any corrective measures that may be performed;
- Financial assurance that the City will remain in compliance with these obligations; and
- A description of the planned uses of the property during the post-closure period.

Detailed Description of Fresh Kills Post Closure Monitoring and Maintenance Operations Manual

In accordance with the above requirements, the DSNY's *Fresh Kills Landfill Post-Closure Monitoring and Maintenance Operations Manual* (December 2002) is a detailed protocol for the management of the Fresh Kills Landfill over the post-closure period. The manual was prepared to address the requirements of the Part 360 regulations. Volume A of the manual is the main volume, while volumes B, C, and D provide detailed information on leachate control facilities, environmental monitoring, and the landfill gas collection and control system. A summary description of each volume follows.

¹ The source for the information provided below is the *Fresh Kills Landfill Post Closure Monitoring and Maintenance Operations Manual*, prepared by Roy F. Weston of New York, Inc. for DSNY, December 3, 2002.

Volume A: Post-Closure Operations and Maintenance

Volume A of the manual includes a discussion of management and personnel, including minimum resources requirements, and provides information on environmental monitoring processes and procedures, leachate collection and control, landfill gas control and monitoring, financial assurance requirements, end uses, post-closure facility controls, emergency services, and other issues related to landfill operations and maintenance during the post-closure period. Volume A also includes an overview of the maintenance procedures for final cover for the entire Landfill. Three attachments included in Volume A are:

- Attachment 1—Applicable Regulations (Excerpts from 6 NYCRR Part 360 and the Consent Order)
- Attachment 2—Final Cover and Drainage Systems Monitoring and Maintenance Plan
- Attachment 3—Emergency/Contingency Contacts

Volume B: Fresh Kills Landfill Leachate Treatment Plant and Containment and Collection System Operations and Maintenance Plan

Volume B of the manual provides the operations and maintenance plan for the Fresh Kills Landfill Leachate Treatment Plant and the containment and collection system, with a discussion on reporting and record keeping. It also addresses the regulatory requirements as they relate to the leachate control system.

Volume C: Environmental Monitoring Plan

Volume C of the manual provides a description of the post-closure environmental monitoring program. The description includes sampling methods, locations, reporting and record keeping for environmental monitoring.

Volume D: Operations and Maintenance Plan for Landfill Gas Collection and Control System

Volume D of the manual provides the operations and management plan for the landfill gas collection and control systems with detailed descriptions of these systems. Descriptions of the requirements for landfill gas emission monitoring, reporting, and record keeping for the landfill gas collection and control system are also included in this volume.

Monitoring and Maintenance Programs

Overview

The Fresh Kills Landfill post-closure monitoring and maintenance requirements are being implemented by DSNY under the regulatory oversight of DEC in accordance with the manual. The environmental control systems at Fresh Kills have been installed in accordance with designs approved by DEC. They are in-place to ensure that no impacts occur to the local environment, specifically the local air, surface water, and groundwater resources. The duration of post-closure maintenance and monitoring is a minimum of 30 years, or until it is determined by DEC that the landfill environmental control systems, maintenance, and monitoring are no longer necessary. During this period, the biodegradable materials in the landfill sections will have substantially decomposed and settled, and landfill gas production will continually diminish. Three decades from now it is expected that most of the biodegradable material in the landfill sections will be decomposed, and both settlement and landfill gas production will be minimal. However, until this time, and as long as it is deemed necessary by DEC, it is the principal objective of the Fresh Kills Landfill environmental control systems and monitoring program to protect the environment

of the landfill site, as well as to protect the surrounding environment and residential communities.

The environmental monitoring program is extensive and requires sampling of many environmental conditions at the landfill. Among the requirements of the post closure maintenance and monitoring programs that are being performed are the following:

Final Cover and Stormwater Control Systems

- Conduct inspections, record keeping, and reporting for the final cover and storm water control systems;
- Conduct inspections and maintenance of the drainage and erosion control systems quarterly and following major rainfall events (exceeding the five-year, 24-hour storm for Staten Island, which is a precipitation event of 4.75 inches);
- Maintain storm water control systems to mitigate erosion, and ensure conveyance capacity of drainage systems; and
- Maintain final cover to ensure the integrity of the barrier layer and the proper function of the drainage.

Landfill Gas Management

- Conduct inspections, record keeping, and reporting for the landfill gas collection system and landfill gas migration control systems;
- Operate and maintain the landfill gas collection and landfill gas migration control systems;
- Operate and manage the landfill gas recovery, processing and purification systems to minimize combustion of landfill gas and optimize revenues;
- Manage revenue contract for sale of natural gas from the purification system; and
- Administer emergency response and contingency plans as needed.

Leachate Control and Corrective Measures Systems

- Conduct inspections, record keeping, and reporting for the leachate containment, collection, conveyance and treatment systems;
- Operate and maintain the leachate control; and
- Administer emergency response and contingency plans as needed.

Environmental Monitoring

- Conduct environmental sampling, analysis, evaluation, record keeping and reporting for groundwater (see the discussion below), surface water and sediment (see the discussion below), leachate, landfill gas condensate, landfill gas surface emissions (see the discussion below), landfill gas flare stack emissions, landfill gas migration, wastewater discharges; and initiate contingency plan actions in the event of excursions beyond authorized thresholds.

Groundwater Monitoring

Groundwater monitoring well data are used at Fresh Kills to detect any landfill-based groundwater contamination. To this end, there are three levels of monitoring wells at various depths: 1) shallow groundwater monitoring wells are installed at intervals of about 500 feet around each landfill section; 2) intermediate monitoring wells are installed at intervals of approximately 750 feet along the downgradient and cross gradient perimeters of the landfill sections; and 3) deep monitoring wells are installed at intervals of 1,500 feet around the upgradient perimeter of each landfill section. In total, there are 238 groundwater monitoring

wells at Fresh Kills, 116 of which are shallow wells, 61 of which are intermediate wells, and 61 deep wells. Groundwater sampling is performed quarterly on a rotating basis for analysis of baseline plus previously detected analytes. The baseline data set plus detected analyte list includes field background, leachate indicator contaminants, and inorganic and organic constituents. Geochemical sampling and analysis are performed annually for the intermediate depth and deep wells and biennially for shallow/refuse wells.

The groundwater monitoring program evaluates potential impacts to current groundwater quality. If an impact is detected, then the data is used to determine whether a leachate release to groundwater has occurred, or if other sources were the cause. The groundwater monitoring also evaluates trends in water quality by comparing and updating historical water quality data.

Surface Water and Sediment Monitoring

The Fresh Kills surface water and sediment monitoring program provides an effective means of monitoring and evaluating surface water quality trends in the waterbodies at Fresh Kills. The surface water monitoring approach consists of evaluating water quality conditions over time resulting from the implementation of control measures at the landfill complex. Ongoing monitoring of discharges from the leachate treatment plant to the Arthur Kill is therefore performed in accordance with SPDES permit requirements. Monitoring is performed on a regular basis to ensure that the discharges are protective of the environment as stipulated by the SPDES permit. If levels exceed SPDES permitted discharge limitations, the data is evaluated and adjustments are made to the operation of the treatment facility as necessary to keep the landfill in compliance.

The monitoring plan includes all surface water bodies that could be potentially impacted by a release from the landfill and includes monitoring points that would be useful in characterizing the nature and extent of a release, should it occur.

The monitoring program includes an annual surface water monitoring program and a biennial monitoring program for sediment quality and benthic ecology. Surface water and sediment samples are to be analyzed for baseline plus previously detected analytes (field, leachate indicator, inorganic, and organic parameters); benthic ecology samples are analyzed for grain size total organic carbon, and total petroleum hydrocarbons and will be evaluated for identification and enumeration of benthic organisms. Monitoring is performed in the Arthur Kill, as well as Fresh Kill, Main, and Richmond Creeks within the project site boundaries. Surface water and sediment sampling is performed at a total of 14 sampling stations. Four of these stations are also monitored for benthic ecology in both the intertidal and subtidal zones. In addition to the local water, the stormwater detention basins are regularly monitored.

Landfill Gas Migration Monitoring

In addition to the above programs and to monitor the performance of the active collection of landfill gas throughout the landfill, the landfill perimeter is also monitored quarterly for any potential landfill gas migration. Monitoring consists of the measurement of subsurface pressure and concentration of methane, oxygen, and carbon dioxide as a percent of the landfill gas at the monitoring wells located around the perimeter of the landfill. Table [1-4](#) lists the number of landfill gas migration monitoring wells and sensor locations at each landfill section of Fresh Kills.

Table 1-4
Landfill Gas Migration Monitoring Wells

Landfill Section	Number of Landfill Gas Migration Monitoring Wells	Number of Methane Sensors/Structures
1/9	2	63/27
2/8	31	0/0
3/4	12	22/7
6/7	17	4/1
Total	62	89/35
Source: Fresh Kills Landfill Post-Closure Monitoring and Maintenance Operations Manual, New York City Department of Sanitation, December, 2002.		

DSNY FACILITIES ADJACENT TO THE PROJECT SITE

Overview

DSNY operates a number of essential facilities at Fresh Kills that support ongoing solid waste management services and operations for the Borough of Staten Island. As depicted in Figures 1-3 and 1-6, these include the Staten Island Waste Transfer Station as well as two local Sanitation Districts 2 and 3 facilities that are located adjacent to, but outside, the boundaries of the proposed park. These DSNY facilities are the following:

- Staten Island Waste Transfer Station;
- Composting facility;
- Crushing and screening facility; and
- District 2 and 3 garages and borough repair shop.

A more detailed description of these DSNY facilities is provided below.

Staten Island Waste Transfer Station

The site of the Staten Island Waste Transfer Station is northwest of the project site and separated from the proposed park by the Little Fresh Kills and the West Shore Expressway. This facility, which is permitted under Part 360 regulations and was fully operational as of May 1, 2007, serves the Borough of Staten Island and is an important element in DSNY's Comprehensive Solid Waste Management Plan for the City of New York. The facility includes a truck-to-rail transfer station that exports solid waste from the City via rail. The facility accepts solid waste collected by DSNY trucks on Staten Island and packages it for disposal at locations outside of the City.

Composting Facility

The DSNY Yard Waste Composting Facility handles leaves and other "green" waste (e.g., chipped limbs and logs, and grass clippings). Any trees or large woody shrubs are brought to a giant wood chipper, where they are processed into fine chips. The material is then used in the composting process. Compost from this operation is then mixed with wood chips and utilized throughout the City. DSNY provides free compost material to City residents, community groups, and DPR for use in City parks. This facility is located on the north side of Fresh Kills near the waste transfer station, and is a permitted facility under DEC's Part 360 regulations. (Although a composting function is well within the Fresh Kills Park uses, the existing composting facility now run by DSNY would not be mapped as parkland solely because of its location.)

Crushing and Screening Facility

The crushing and screening facility is one of the largest municipally owned construction and debris recycling facilities in the region. Here, large pieces of cement, stone, brick, and concrete are crushed, reduced and sorted into three sizes: 4 to 6 inches, 1½ inches, and sand. Material generated from this plant is then used for a variety of purposes, including constructing the service roads at Fresh Kills. This facility is located on the north side of Fresh Kills near the waste transfer station and is permitted by DEC under the Part 360 regulations.

District 2 and 3 Garages and Borough Repair Shop

There are two DSNY garages adjacent to the project site. One, off Muldoon Avenue, serves collection vehicles for DSNY's Staten Island Sanitation District 3. This is also the location of the borough repair shop. The other garage is located off Richmond Avenue near Richmond Hill Road and serves DSNY's Staten Island Sanitation District 2. DSNY also operates a household hazardous waste drop off facility at the District 3 garage location.

FUTURE CONDITIONS AT THE PROJECT SITE WITHOUT THE PROPOSED PARK: 2016 AND 2036

Final closure construction at Fresh Kills landfill has been completed at Landfill Sections 3/4 and 2/8. DSNY completed final closure of these landfill sections in the mid 1990s. Thus, closure of these landfill sections pre-dated the City's Fresh Kills Park initiative.

Closure of Landfill Sections 6/7 and 1/9 is underway and will continue in the future with or without the construction of the proposed park. Closure design of Landfill Section 6/7 has been approved by the DEC and closure construction is currently underway. A phasing plan for the final closure of Landfill Section 6/7 is shown on Figure 1-10. That plan includes four sequences covering about 60-80 acres, each phase being implemented in a counterclockwise direction around Landfill Section 6/7. As shown in Figure 1-10, final landfill closure construction is expected to continue through 2010 at Landfill Section 6/7. It is expected to take nearly 1,000,000 cubic yards of soil to construct the final cover at Landfill Section 6/7. As part of that final cover construction, the vegetation and drainage systems are also installed. As of September 2008, Phase 1 closure construction activities have been completed and Phase 2 closure construction activities are continuing according to the approved sequence.

Design for the final closure at Landfill Section 1/9 has also been approved by DEC and the subbase grading in certain segments has begun. It is anticipated that the DSNY final closure construction will be completed at Fresh Kills Landfill by the 2016 analysis year that is being examined in this GEIS. While the closure construction would be completed and the monitoring and maintenance program for Fresh Kills Landfill underway, in the future without the proposed Fresh Kills Park project, no public access would be provided at Fresh Kills. In the future without the proposed park, it is assumed that DSNY would have continued use of all needed facilities currently on site and related to landfill and non-landfill uses, such as equipment storage, maintenance offices, and other facilities.

DSNY would continue to use a number of buildings on the project site through the 2016 and 2036 analysis years for a variety of DSNY uses. While the site is zoned for manufacturing uses, it is not assured that in the future without the proposed project that there would be an expansion of these uses on the site. Any use of the site for manufacturing is also likely to require a disposition approval.

D. DESCRIPTION OF THE PROPOSED PARK

FRESH KILLS PARK DESIGN OBJECTIVES

The proposed Fresh Kills Park project would implement the objectives of the City of New York to transform Fresh Kills Landfill into a publicly accessible City landmark park while simultaneously address the supporting objectives of sustainability. The Fresh Kills Park project would also address landscape enhancement with innovative park designs that would provide recreational and cultural amenities. The fundamental elements of every great park is the ability to serve diverse segments of the population and to provide for a range of activities that are as relevant to the City in its design of Fresh Kills Park as they were to Frederick Law Olmsted in his 19th-century designs for Central and Prospect Parks. In the 21st century, however, parks must meet even higher expectations that would provide a more diverse choice of recreational opportunities, ecological stewardship, and environmental education. Fresh Kills Park would embrace this expectation to expand the role of parks in the development of New York City, while meeting the complementary goal of providing ecological benefits.

The Fresh Kills Draft Master Plan (DMP) released in March 2006 outlines seven primary design goals for the project that were defined through public outreach during the master planning phase:

- Create a world-class, large-scale park that capitalizes upon the site's unique characteristics, including its metropolitan location, vast scale, and ecology;
- Improve the ecology of the site and cultivate a diverse, sustainable landscape, potentially incorporating state-of-the-art ecological enhancement techniques and alternative energy sources;
- Establish an extraordinary setting for a range of activities and programs that are unique in the City, allowing for extensive active and passive recreation opportunities, educational amenities, and cultural enrichment;
- Recognize the events of September 11, 2001 and the ensuing recovery efforts that took place at Fresh Kills in a dignified, unique, and powerful way;
- Develop environmentally sensitive and scenic park roadways to optimize local and regional access to and through the park and to reduce local traffic congestion through improved connectivity; and
- Stage the implementation of the park build-out in a way that affords maximum public benefits in the short term (within the next 10 years,) while also ensuring safe and effective operations of ongoing landfill closure, maintenance, and monitoring.
- Ensure park implementation through design that is compatible with landfill closure infrastructure and monitoring and maintenance requirements of the City with respect to Part 360 obligations.

E. FRAMEWORK FOR ENVIRONMENTAL IMPACT ANALYSIS

The proposed Fresh Kills Park project and its related discretionary actions are the subject of this GEIS. The GEIS approach was selected by the Lead Agency (DPR) because of the long-term nature of the proposed build program (expected to be about 30 years) and, for many of the features of the proposed park, the level of design for park facilities is only conceptual at this time. From the present through the 2016 and 2036 GEIS analysis years, site-specific designs are expected to be developed. The purpose of this GEIS approach is to establish a framework for the environmental review that allows for flexibility in future detailed designs while providing the

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required comprehensive examination of the potential environmental impacts of the entire park proposal insofar as possible at this time.

Environmental impacts are measured against a background of “No Build” conditions, referred to in this document as the “Future Without the Proposed Project.” No Build conditions are those conditions that are expected to exist in the future if the proposed project is not approved and implemented. In this case, there are two No Build analysis years, 2016 and 2036.

For the future conditions on the project site, it is assumed that DSNY would complete its final cover construction on Landfill Sections 6/7 and 1/9 by 2016. DSNY would also have all environmental monitoring facilities in-place and would continue to implement its environmental maintenance and monitoring program through both the 2016 and 2036 analysis years.

There are also two currently active DPR capital projects related to Fresh Kills Park, but outside of the project site. One is the 21-acre Owl Hollow Park project that was advanced to provide a much-needed public recreational facility for the local neighborhood (see Figure 1-11). That project was subject to its own environmental review process with DPR as the Lead Agency and a Negative Declaration was issued on March 4, 2008.

Another DPR project in the area is the partial reconstruction of Schmul Park. Schmul Park is an existing park located in the Travis neighborhood and adjacent to the proposed North Park of Fresh Kills Park. Here, DPR is proposing to restore and reconstruct the northern portion of the existing Schmul Park. In the “Future With the Proposed Park,” Schmul Park will provide a gateway entrance to North Park. However, since this park reconstruction project is not within the area of the proposed project, is currently mapped parkland, and is an existing park proposed only for improvements, the Schmul Park project is not subject to environmental review and will proceed independently of this GEIS as a No Build Project. Schmul Park and other No Build projects for the area are described in Chapter 2, “Land Use, Zoning, and Public Policy,” Table 2-4.

For analyzing all impacts of the proposed project, the GEIS takes into consideration many factors, each of which is described below:

- An Illustrative Plan (see Figure 1-12) that was developed by the City during the scoping process for this GEIS (see the discussion below under Section H of this chapter regarding “Scoping”). This Illustrative Plan, described below, presents in a conceptual way the anticipated future uses of the proposed park. It is the intention of this GEIS to use this Illustrative Plan, in the absence of detailed site designs, for the purposes of conducting the GEIS for impact analyses, particularly for the longer-term projects.
- Impact analyses will also rely, as necessary, on the details of the Fresh Kills Park Draft Master Plan (March, 2006). DMP data and assumptions on park elements such as approximate building spaces or number of parking spaces are used in the GEIS to frame specific impact analyses. In certain cases, these DMP assumptions have been modified or updated by the Fresh Kills project team headed by DPR (e.g., parking program, phasing).
- There are a number of design and engineering studies that were prepared to support and advance the park project and this GEIS. These include the Conceptual Roads Report (September 2007), the Bridge Alternatives Report (November 2007), the 100 Percent Roads Schematic Report (January 2008), the Road Alternatives Report, the Fresh Kills Preferred Utility Scenario (January 2008), Fresh Kills Utility Development Scenarios (January 2008), and a Stormwater Management Plan (January 2008). Each of these reports is incorporated into this GEIS and used as the basis for impact analyses in areas of traffic, energy, infrastructure, and natural resources.

- Design of certain near-term elements of the park has been advanced so that park implementation can commence in 2009. Described in this section are the park projects for the 2016 and 2036 analysis years. For the 2016 projects there is an advanced conceptual design for North Park with a site-specific design for the North Park Phase A construction. This GEIS examines North Park Phase A in greater detail as it is proposed as an early phase of park construction. It is also the intention of DPR to use this GEIS to support the permit applications that are necessary for Phase A (e.g., tidal wetlands).
- For the purposes of understanding the maximum potential impact from the proposed circulation system, all park roadways in this GEIS are projected as four-lane-wide roads.

Lastly, it is objective of this GEIS to provide a comprehensive examination of environmental impacts for the park in its entirety, while specifically focusing on the short term projects and those elements that require permits and approvals at the City, State, and Federal levels.

The proposed project and its related actions have been analyzed in this GEIS for the purposes of informing decisions makers as to the potential environmental consequences of the proposed Fresh Kill Park. For the park's environmental review, a GEIS approach was selected by the lead agency during scoping, given that the project is a long term plan, would be implemented over a number of decades, and, at this time, is largely conceptual in design. However, the actions necessary to initiate the park project, including mapping of the proposed park and related actions, need to move forward as a first step in the park development process and under CEQR/SEQR need to be examined comprehensively. To that end, this GEIS relies on a RWCDs developed for the plan (see Appendix A), the Fresh Kills Park DMP (March 2006) and the additional site-specific details that have been described in this GEIS for the near term projects (e.g., North Park Phase A and the Arthur Kill Road parking lot). As park development proceeds and each of the site-specific projects move forward, each project will be reviewed for consistency with the analyses contained in this GEIS. That review will take one of three forms: 1) a technical memo that examines individual capital projects for the purposes of determining if the impact of each capital project has been addressed in this GEIS; 2) an Environmental Assessment Statement and negative declaration for new park proposals where no significant adverse impacts would occur; and 3) preparation of a Supplemental Environmental Impact Statement (SEIS).

An SEIS would potentially be necessary to examine significant environmental impacts that were not previously identified in this GEIS. This could occur in a case where site-specific effects were not previously known or analyzed or new information has come forward that could potentially change the impact analyses previously presented in an EIS, such that new undisclosed significant environmental impacts could occur. Thus, the scenarios under which DPR may consider an SEIS may include:

- Newly discovered information that may result in environmental effects not previously identified in this GEIS;
- A change in conditions that could result in new significant adverse impacts; and
- Site-specific or project-specific analyses that may result in significant new impacts.

In determining the need for an SEIS, DPR would review each proposed capital project following the process described above and evaluate the relevance and importance of the new information and the extent and coverage of technical analyses presented in this GEIS. Should it be determined that additional environmental review SEIS is necessary, the scope of analysis may be

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limited to the new potential significant impact that has been identified. The SEIS would also be subject to the same acceptance and review procedures as an EIS (i.e., scoping, etc.).

For the proposed project, as described in Chapter 1: “Project Description” a range of potential uses have been examined for the proposed park. Those uses have been grouped into a number of categories to reflect park land cover types represented in the RWCDS (e.g., active recreational indoor activities, habitat with people, habitat without people, etc., see Figure 1-12). In addition, certain elements of the project have been advanced including the designs for North Park (particularly Phase A; see Figure 1-30b), the Arthur Kill Road parking lot in South Park (see Figure 1-35b), and the proposed road designs which are presented 100 Percent Schematic Report (Arup et al., January 2008).

Over the anticipated next 30 years of park implementation, individual site designs will be advanced. DPR will review these project elements in accordance with CEQR/SEQR to ensure that each element of the project has been afforded a thorough environmental review, relying first on the analyses presented in this GEIS and for the purposes of determining conformity with the thresholds and criteria developed through the impact analyses presented in this GEIS. The technical memorandum would therefore examine and identify any additional environmental quality review that may be required for discretionary approvals by City, State, or federal agencies (e.g., including permitting), the sufficiency of coverage under the impact analyses prepared for this GEIS, and any site-specific impacts and impact avoidance or mitigation measures that may need to be performed (e.g., archaeology, natural features, see a detailed description in Chapter 23: “Impact Avoidance and Mitigation Measures”). Among the issues that may be considered in each technical memorandum would be:

- Any potential archaeological impacts;
- Site-specific circulation and parking plans, and the need for additional traffic and parking analysis; and
- Identification of impact avoidance methods for natural features (including a site-specific soil erosion and sediment control plan for water quality protection and wetland setback protections), and for constructed solid waste management features such as final cover, leachate or landfill gas collection infrastructure).

Impact thresholds to be considered in the technical memoranda would include:

- Additional activities that could potentially adversely impact water quality or aquatic habitat beyond that identified in this GEIS (e.g., dredging);
- Expanded areas of clearing that could adversely impact natural and native vegetation (e.g., woodland) beyond those impacts disclosed in this GEIS;
- Additional disturbance of freshwater or tidal wetlands that would result in significant impacts beyond those identified in this GEIS (see Table 1-5);
- Substantial land use or programmatic changes that could cause new significant adverse impacts (see the RWCDS land use map, Figure 1-11, and the proposed program and activities as described in Chapter 1, “Project Description.”);
- Expanded facilities that could result in significant traffic, clearing, land use or noise impacts or reduced parking that could result in parking impacts (see Table 1-9 and Figures 1-23 and 1-24);
- New driveway entrances or connections with City streets or the West Shore Expressway that could result in significant traffic impacts and mitigation beyond that identified in this GEIS;

- Alternative roadway alignments that could result in significant impacts to natural features or landfill systems not currently identified in the 100 percent schematic designs and resulting in significant new impacts;
- Substantial changes in the development program, such as any increases in retail or cultural facility space that could result in traffic generation that could result in significant impacts beyond those disclosed in the GEIS;
- Modifications to soil cover or testing that could potentially result in an impact to public health and that would otherwise not be covered by approved guidelines or regulations;
- New information identified through soil testing or additional soil investigations that raises new concerns not identified in this GEIS with respect to hazardous materials or public health protections;
- Substantial changes in clearing or new information that could increase the potential for significant impacts with respect to protected wildlife or plant species beyond that identified in this GEIS;
- Activities that could adversely impact a significant historic resource (e.g., the West Park World Trade Center materials);
- Any activities that individually would exceed the Type 1 thresholds under SEQR (Part 617.4) and could result in impacts not already disclosed in this GEIS;
- New data relative to air quality or significant modifications to on-site air emission permits that could increase the potential for any air quality impacts to park users;
- New project designs that could have potentially significant effects on the final cover or other landfill closure and post-closure environmental controls different from those disclosed in the DGEIS;
- Significant modifications to construction phasing and programming that, for example, would compress construction activities or modify access routes which, in turn, could result in significant construction-period impacts different from those disclosed in the GEIS;
- Alternative designs or programming substantially different from that described in this GEIS (see Chapter 1, “Project Description”) that could result in site-specific or cumulative impacts and mitigation beyond that disclosed in this GEIS; and
- An evaluation of future wind turbine proposals which, as already stated in this GEIS is subject to further environmental review particularly with respect to any potential site-specific impacts on landfill infrastructure or impacts related to natural resources (i.e., avian species).

For longer term projects, and as the park continues to develop, it is possible that additional formal environmental quality review may be necessary to analyze and disclose additional significant impacts that were not foreseen in this GEIS or to consider changes in the project program that were not contemplated at this time. In addition, since this is a long-term project, DPR will continue to examine information gathered for each capital project during project implementation (e.g., soil test data, archaeological field results, traffic circulation patterns, parking demands, construction activities) and will review that data for the purposes of determining the need, at any point, for additional environmental review based on new information that is compiled or new regulatory or environmental standards that may take effect. It is possible that given the long-term nature of the proposed project, an SEIS will be necessary at some point during the project implementation process in order to re-evaluate project impacts in the context of new information, substantial changes in background conditions, or project modifications.

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In addition, circumstances may arise where there are substantive park use changes that reflect the evolution of recreational demands or needs or added structures or buildings proposed with expanded or different uses (e.g., larger retail uses), or there is as significant change in roadway design that could affect traffic patterns or natural features.

Three examples cited in this FGEIS where an SEIS or supplemental environmental review may be necessary include a golf course on top of Landfill Section 6/7, a commercial scale wind farm, as well as the proposed Signature Bridge. In addition, DPR has commenced with the preparation of an SEIS for the proposed roads across East Park for the purposes of further examining design details and the related impact analyses relative to those proposed roads as well as examining potential alternative alignments and their impacts. The Scope of Work for that SEIS was released February 24, 2009.

PLANNING AND DESIGN ASSUMPTIONS FOR THE GEIS IMPACT ANALYSES

ILLUSTRATIVE PARK PLAN

The City of New York, led by DPR, conducted a GEIS scoping process for the Fresh Kills Park that had as its product an Illustrative Park Plan (see Figure 1-12 and also Appendix A, Fresh Kills Park GEIS Scope of Work, August 2006). The Illustrative Plan and the accompanying RWCDS provide a conceptual framework for the impact analyses conducted in this GEIS, supplemented by the DMP and advanced designs for the early phases of the park (e.g., North Park, Phase A.) For the purposes of developing the RWCDS, the proposed land uses and activities described in the DMP were considered illustrative categories of park uses. This approach allows design flexibility over the estimated 30 years of park implementation, specifically with regard to the types of landscape and recreational activities that are expected to be constructed at the proposed Fresh Kills Park. As a result, future park capital projects could include those currently presented in the DMP (see the description below), while also allowing for other potential long-term community or Citywide recreational needs, innovations in landscape design, changes in recreational athletic surfaces and materials, or storm water management techniques that have not yet evolved. The potential park uses and activities that comprise the RWCDS have been grouped into illustrative park-element categories (see Table 1-5), based on a similarity of use or activities and thus an anticipated similarity with respect to environmental impacts.

It is intended that during park final design and capital development and implementation, uses or activities of equal or less intensity that fit into these element categories could be substituted without triggering the need for additional or supplemental environmental review. For example, the proposed park is very large and can support a range of recreational opportunities, some of which may be unique to New York City. These future park uses or activities could be determined during capital project design with additional input from the public, City, State, and Federal reviewing agencies, and the design team during project implementation.

DMP CONCEPTUAL PLAN

The Fresh Kills Park DMP (March 2006) is based on the theme of “lifescape, a new park for New York City.” Lifescape is defined by three functional layers: program, landscape, and circulation. The DMP considers diversity of cultural, athletic, and educational programming, in context of an ecological enhancement comprising reclaimed wetlands, grasslands, and woodlands that would offer wildlife habitat and natural open spaces for park visitors. A primary park circulation system for vehicles and a network of foot, bicycle, and equestrian paths would allow various transport modes throughout the park without creating detrimental effects to the program and habitat layers.

**Table 1-5
RWCDs Park Use/Element Categories**

Element Category	Description	Representative Features
Active Recreational-Paved Surface	Active recreational uses that occur outdoors on constructed surfaces. No structured seating for visitors assumed. Some accessory buildings may be required.	Skate park*, basketball courts, racquetball courts, handball courts, roller-hockey rink
Active Recreational-Field Non-paved—Outdoor	Active recreational uses that occur outdoors and require the construction of playing fields/surfaces. Playing surfaces are assumed to be permeable. Structured seating for visitors varies.	Tennis center, softball or baseball fields, multi-use sports fields, soccer fields, volleyball courts, bicycle velodrome*, mountain biking race course, golf course, snowboard park*, snow making*, sledding*
Active Recreational-Indoor	Active recreational uses that occur indoors and would require the construction of buildings.	Equestrian center, stable, indoor gym, indoor track and field center, pool
Ancillary Facilities	Structures ancillary to park operations.	Greenhouses, light towers/media field posts, comfort stations, maintenance and operations facilities
Art Feature	Constructed elements that are not related to a defined use but are aesthetically interesting. Not assumed to generate auto, transit, or pedestrian trips.	Flare station screen, landfill machine row, light crystals, sculptures
Commercial/Retail	Park-related commercial or retail uses requiring the construction of buildings.	Café, restaurant, banquet hall, outdoor market, park-related retail, concessions, kite store, sporting goods sales, hiking gear, kayak sales/rentals
Cultural	Uses with a cultural or educational component. This category includes uses that could occur on permeable surfaces (e.g., open fields), as well as uses that could require the construction of buildings.	Education center, outdoor classroom, art studios, discovery center, exhibition hall, 9/11 interpretive center, 9/11 monument, art exhibits, community centers
Energy/Infrastructure	Uses that could be created on the site to produce energy to offset envisioned energy needs for the park site or to provide a source of energy for sale for revenue generation.	Wind farm, solar farm, methane, bio-energy production from algae
Event Space	Entertainment uses that could occur on permeable or semi-permeable surfaces. No accessory buildings required.	Event lawn, amphitheater, bleacher seating
Habitat with People	New habitat to be created, or existing habitat to be enhanced, which includes the potential for use by the public. Related structures include boardwalks, decks, and [paved or unpaved] trails. No accessory buildings.	Marsh boardwalk, enhanced marsh exhibit, berm overlooks, hilltop field / meadow, meadow and successional grassland, overlook deck, woodland and berm trail, wetlands with boardwalk, pond and educational wetland exhibit, enhanced stream and trail, swamp forest exhibit basin, earthwork, woodland and trails, sunken forest performance space and exhibit, earthwork ring
Habitat without People	New habitat to be created, or existing habitat to be enhanced, which would not have the potential for public use. In some cases these areas would be fenced off or otherwise made inaccessible. Habitat would be protected and left undisturbed. No accessory buildings.	Mixed woodland, tidal marsh, meadow, mixed woodland, swamp forest exhibit / stone basin exhibit, restored wetlands, swamp forest basin, swamp forests, woodland highway buffer
Linear Recreation	Active recreational uses that occur outdoors and would be limited in area to linear, paved paths.	Bicycle path, esplanade, multi-use recreational path loop, pedestrian crossings, main creek promenade, mountain bike trails

Table 1-5 (cont'd)
RWCDS Park Use/Element Categories

Element Category	Description	Representative Features
Municipal Services	Services related to ongoing municipal operations at the Fresh Kills site. Assumed as part of the baseline condition and not to generate new traffic or impacts.	DSNY district garages, DSNY methane recovery plant, DSNY Muldoon service entrance, NYPD facility
Parking	Public parking, assumed to be constructed using semi-porous surfaces.	Bosque parking, entrance parking lots
Passive Recreation	Passive recreational uses that occur outdoors on permeable surfaces. Related structures include decks and piers.	Overlook, picnic area / fields, lawn, bird observation deck, hilltop field, overlook decks, Isle of Meadows bird watching overlook
Public	Visitors centers/informational kiosks for way finding and educational uses.	Visitors center, kiosks
Transportation	New roadways and bridges, and existing roadways and bridges to be improved.	Park Road North (Alternatives A and B), Richmond Hill entrance, Park Road South, Forest Hill entrance, viaduct over wetland, Richmond Hill entrance, Signature Bridge, Confluence Loop Park Road, reuse of existing bridges, West Shore Expressway access improvements, Parking
Water Recreation and Access	Water-related active recreational uses. Assumed to require the construction of new in-water structures such as piers, docks, and overlooks.	Boat house, canoe rental, boat launch, boating lawn, beach terrace, fishing pier, boat tie-up, canoe dock, fishing dock, barge gardens, picnic pier, ferry landing, marina for small boats, dock
<p>Note: *Element not included in DMP, but possible representative feature that may be in the park and therefore analyzed as part of the RWCDS. Source: <i>Fresh Kills Park Final Scope of Work to Prepare a Draft GEIS</i>, August, 2006, Fresh Kills Park planning team, October 2007).</p>		

The total Fresh Kills Park project site is approximately 2,163 acres, of which 1,960 acres fall within five designated planning areas (see Figure 1-4): the Confluence (175 acres), which comprises primarily two main programmatic areas—the Point (50 acres) and Creek Landing (20 acres) (the balance is open water), North Park (280 acres), South Park (415 acres), East Park (530 acres), and West Park (560 acres) areas. In addition, there is the Isle of Meadows that covers about 100 acres. The West Shore Expressway right-of-way, although it runs through the center of the site, is NYSDOT property and outside the project site. The North, South, East, and West Park project areas include lands within the boundaries of the SWMUs defined by the Fresh Kills Landfill closure plan. These landfill sections are either already closed or currently undergoing final closure construction or design (see the discussion above). The Point and Creek Landing planning areas are outside the boundaries of the existing landfill sections. The objectives for the five planning areas of the DMP are summarized below.

The Confluence

The Confluence, which encompasses the center of the proposed park, is defined by the meeting of the creeks and is to be the central area of park activity and the principal point of arrival by 2036. This park area will orient park users and be defined by the Confluence Loop Park Road that would provide access to all five park areas throughout the park and the location of most of the recreational, cultural, commercial, and educational facilities and activities. The Confluence is the destination core of the park where most visitors would arrive by car, bus, or ferry and walk, bike, or jog into the larger, quieter natural landscape and habitats. It would provide visitor and

information centers, restaurants and event spaces, as well as park landscapes and constructed surfaces (e.g., synthetic turf fields) allowing for a range of more intense uses.

The Confluence concentrates its major development into two specific locations, the Point and Creek Landing. These are the large, flat, paved, bulkheaded and structured surfaces once used for receiving solid waste at Fresh Kills Landfill (Plants 1 and 2). Although DSNY use of these areas is considerably reduced from when Fresh Kills was an active landfill, these areas still contain the equipment and facilities supporting continued landfill closure operations and post-closure maintenance and monitoring. Thus, this area is likely to be occupied by DSNY closure operations through at least 2016. In addition, it is expected that DSNY would occupy a portion of the area to house an operations center for the post-closure staff. However, given the available structured surfaces in this area, including the bulkheaded edges, these areas are ideal for the programming of large-scale active public park activities. In addition to these two main areas, the Terrace and the Marsh and Sunken Forest are envisioned as special, bucolic areas, more representative of the preserve nature of much of the park. (The size of the Sunken Forest would depend on the park road alignment through this area.) These areas, accessible along the Confluence Loop Park Road, would also provide opportunities for new ecological landscapes that are easily accessible to the public.

Within the Confluence is the 50-acre Point, a large waterfront area that would provide sports fields, event spaces, lawns, art works, and other cultural and commercial facilities serving park users such as restaurants and market roofs. The Point is planned for the largest concentration of destination-oriented programs in Fresh Kills Park. This area is accessible to and visible from the West Shore Expressway, and would serve as a gateway marked by a proposed signature bridge crossing Fresh Kills Creek. This location is optimal for iconic, waterfront programs and cultural and commercial uses that depend on high visibility and proximity to other amenities. Structures with larger footprints and ample parking can also be provided here. The Point is also the proposed location for the main park administrative center, a visible structure intended to house park functions, but also supporting active community participation in the stewardship and development of the park. The Point offers opportunities to accommodate active recreation programs and multi-use sports facilities and fields with the ability to host athletic events and is likely to be an active area in daytime and evening. It is also assumed that any relocated DSNY landfill closure operations would be sited in the Point (e.g., in the Boat Maintenance Building).

Creek Landing is part of the Confluence and is located at the convergence of Fresh Kills, Main and Richmond Creeks. It is planned for a concentration of on-water recreation and cultural activities accessible via the north segment of the Confluence Loop Park Road (see also the discussion below under “Vehicular Circulation”). It would be a key location for access to and interaction with the waterfront, a programming goal of particular importance to Fresh Kills Park stakeholders. At 20 acres in size, this area is smaller than the Point, and is scaled and oriented primarily toward family and community uses, with an emphasis on ecological, educational and participatory water-related programs. Creek Landing would be the likely base of operations for a family day-trip, which might include a bike ride in the North Park, lunch at one of the waterfront restaurants, a stop at the visitor center, or exploration of the creeks in a rented kayak. Creek Landing emphasizes waterfront access, including a waterfront esplanade, a canoe and boat launch, restaurant, visitor center, restored wetland exhibit with boardwalk, fishing piers and overlooks, and a large event lawn for gatherings, picnics, and sunbathing. It can also be used as a viewing area for fireworks and festivals.

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East Park

East Park is characterized by large, vegetated spaces with spectacular views and is the main area for vehicular access into the park from the east (see Figure 1-4). East Park is the area of the park that is closest to Richmond Avenue. It is intended to provide primarily landscape enhancement with created and improved wetlands as well as lowland forest. The man-made berm and ponds on the east side of the east mound represent an opportunity for new landscapes as well as hiking and walking trails, with an area for parking off of Richmond Avenue to expand access opportunities into the park. Along the sides and on top of the former landfill mound, new landscape and forest areas would be created, with large meadows.

A major component of the East Park is the proposed Park Road North and Park Road South connections to Richmond Avenue. The proposed project's vehicular circulation plan and alternative alignments for the proposed park roadways through East Park are shown in Figure 1-11 and are also described below under "Circulation Plan."

North Park

North Park would encompass the closed Landfill Section 3/4 (closed since the mid 1990s) and the surrounding lands. Under the DMP, it is proposed for simple recreational facilities, vast natural settings, meadows, wetlands, and creeks and is envisioned in the DMP as a lightly programmed natural area connecting with Schmul Park in the Travis neighborhood. This 233-acre planning area is bordered by the West Shore Expressway and the Travis neighborhood to the north and west, the William T. Davis Wildlife Refuge and Main Creek to the north and east, and the north segment of the Loop Park Road to the south. North Park vehicular access and parking is provided from both the Travis neighborhood entrance to the north, for local access, and through a much larger central parking area to be provided at Creek Landing on the south. North Park is primarily planned as a natural area that would extend the rich habitat provided in the adjacent William T. Davis Wildlife Refuge on the project site, and capitalizing on one of the quietest and most sheltered areas at Fresh Kills. The proposed concept is also responsive to community input suggesting that this area be programmed primarily for wildlife and passive recreation.

North Park is also one of the early phases of implementation at Fresh Kills. Provided below in greater detail is the North Park Concept Design as well as the Phase A project.

South Park

South Park would encompass the closed Landfill Section 2/8 (closed since the mid 1990s) and the surrounding lands. As envisioned in the DMP, South Park is proposed to have active recreational uses, including soccer fields, an equestrian facility, a mountain biking venue and a neighborhood park in a large natural setting. South Park is unique in that it contains both ample flat, non-wetland space for active recreational programming and a large area of natural woodland, encompassing, in addition to the 140-acre landfill section, 155 acres of dry lowland and 50 acres of wetland. To take advantage of the size of the flat, dry lowland and its proximity to major roadway destinations, this park area is planned as a major concentration of active recreation opportunities. Major recreational programming is concentrated in a 38-acre strip in the lowland that lies between Arthur Kill Road and the West Shore Expressway.

Special programs intended for South Park include tennis courts; mountain biking on the landfill section; an indoor aquatic and/or track and field facility; and an equestrian center. South Park also contains the first project in Fresh Kills Park, the construction of the Owl Hollow Park,

which will provide four lighted soccer fields (including two practice fields), along with parking. (As stated above, proceeding in advance of the larger Fresh Kills project, Owl Hollow Park is examined in a separate Environmental Assessment Statement.)

West Park

A focus of the West Park DMP design is the September 11 monument. For 10 months after that tragedy, a team of 16,000 investigators and recovery workers carefully screened and sifted through 1.2 million tons of debris to search for traces of the missing. Over 20,000 remains were recovered at this site and brought to the City medical examiner's office for identification. Once all effects were recovered, the remaining material was placed in a 50-acre area at West Park and covered. In recognition of the important 9/11 recovery activities that occurred on the site, the DMP calls for a 9/11 monument at West Park, including a possible earthwork design at the location of the recovery activities. From here, park visitors would have a panoramic view of New York City, New York Harbor, and New Jersey. An area has been set aside on top of West Park for a monument or another feature that would recognize the recovery efforts and provide a large space open to the sky where visitors would find a quiet place for reflection.

Since Muldoon Avenue currently provides vehicle access for DSNY landfill closure and maintenance operations, as well as the DSNY District 3 garage and repair shop, this entrance would also be the principal service road entrance to the park (i.e., it would be shared by DSNY and DPR vehicles, but not be a park access road).

EVENTS PROGRAMMING PLAN

At this time DPR has not yet developed a formal events program for the park. While it is expected that by the 2016 analysis year there would be park events, there are no event facilities proposed for 2016. However, by 2036, with the completion of the Confluence and the Point there would be event facilities, including an amphitheater. While DPR has not yet developed a program for the amphitheater, it is envisioned that the events would be similar to "Summerstage" in Central Park or "Celebrate Brooklyn" in Prospect Park. In addition, the athletic fields in the Point are expected to host City-wide athletic events and competitions. Since these are longer-term (2036) components of the project, DPR would address transportation issues related to major events (e.g., traffic and transit access), with NYCDOT, NYCTA, and, as necessary, NYSDOT once an events program is developed. At that time, DPR would work with these and other agencies as necessary to ensure that adequate public transit and traffic circulation is provided during events along with opportunities for other means of access, such as buses and biking.

SOIL MANAGEMENT PLAN

Introduction

Development of Fresh Kills Park is expected to require large volumes of soil. This would include a surface soil that is protective of public health, soil that provides a base for the structured recreational surfaces, and engineered soils that would support the proposed roads and parking areas.

Soil Quality and Characteristics

As discussed above, the site is a combination of disturbed areas that have been subject to municipal solid waste landfilling operations, areas of known disturbance that are outside the

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managed landfill sections, and natural areas that are largely undisturbed, but may have been influenced by ambient water conditions or air desposition.

In developing the Fresh Kills Park soils strategy, the following guidelines were established:

- Protection of public health and safety;
- Ecological enhancement utilizing native Staten Island soil types;
- Compliance with landfill closure and post-closure needs;
- Cost effectiveness and feasibility; and
- Environmentally sustainable soil sources and processing.

It is anticipated that soils currently covering large portions of the site (in particular Landfill Sections 3/4 and 2/8) would not meet current DEC criteria for human contact and therefore cannot remain exposed in areas of the park proposed for public access. DSNY completed closure of these landfill sections in the mid-1990s. At that time, unrestricted public access to these landfill sections was not envisioned.

There are no soil standards in the State of New York that are directly applicable to soil cover for landfills when the end use is proposed as parkland. New York State environmental regulations that do apply to landfills include the 6 NYCRR Part 360, which governs Solid Waste Management Facilities. These regulations currently mandate the final closure and post-closure design, operation, maintenance, and monitoring of solid waste landfills in New York State and are implemented at Fresh Kills through the Consent Order. However, Part 360 does not provide criteria for soils to serve as final cover for a public park. Therefore, guiding the conceptual soil strategy for Fresh Kills Park is Title 6 NYCRR Part 375 Brownfield Remediation Program (hereinafter referred to as subpart 375). Although not directly applicable to landfills, DEC can rely on the science behind the regulations to guide their decision-making regarding the use of soils in former industrial areas when converting Fresh Kills to other uses. Thus, soil decisions for the proposed project would be made on a case-by-case capital project basis as to the types of soil that may be used at each Fresh Kills Park project. Such a “project by project” approach (Fresh Kills Park will be comprised of multiple projects over many decades) is also recommended by the New York City Department of Health and Mental Hygiene (NYCDOHMH).

In addition, given the preliminary data indicating that surface and subsurface soils in the areas of the proposed park outside of the landfill sections are suspected to have been impacted by hazardous materials (see Chapter 11, “Hazardous Materials”), soil that meets the DEC Subpart 375 standards would also be used at the off-landfill sections that would be publicly accessible. Depending on the final design of each park element, it is the overall objective of DPR to provide the publicly accessible areas of the site with a minimum of two feet of cover soil meeting the above-referenced standards for the purposes of providing a healthy environment and to protect public health and safety throughout the park. Areas in the Confluence (e.g., the Point, Creek Landing, the Marsh) would also be designed in a way that ensures public health. Given the diversity of existing conditions on the project site and the range of potential uses, a project-by-project review of soil criteria would be performed based on proposed site-specific park programming. It is the ultimate objective of the proposed project to establish various criteria based on 6 NYCRR Part 375 for the soil cover material with consideration of both human and ecological exposure pathways relative to the planned future use. These criteria would ensure protection of public health and safety in the park.

SOIL TYPES

Landscape Soils

In addition to meeting public health requirements, soils must be designed for the proposed landscape applications. Unlike the engineering soils where the focus is physical properties (e.g., grain size, compaction criteria, etc.), the requirements of soils for the proposed landscapes target agronomic properties for intended plants such as meadow, turfgrass, and woodland. Over the past several decades there have been great advances in developing soil specifications that meet both landfill closure requirements and ecological enhancement needs. Incorporating these standards with the chemical and physical composition of the soils used in the final cover at Fresh Kills Park will be critical to the park's success.

The qualities of the soils proposed for Fresh Kills Park have been developed according to the following principles:

- Emulate the soil characteristics of native Staten Island soils, based on studies of existing high-quality native plant communities;
- Emulate natural soil horizons, or the vertical stratification of soils formed by physical and chemical weathering in natural settings;
- Improve the water balance by holding more moisture; and
- Discourage invasive monocultures.

A range of plant communities that will offer diverse landscape settings for recreation, natural resources for local wildlife, and erosion and water management for the landfills are proposed. Targeted plant communities include many “workhorse species” that are easily established and maintained, as well as communities that are distinctive to the island. Soils will vary according to the type of vegetation or landscape use proposed, but each type comprises a topsoil and subsoil measuring a minimum two feet thickness the depth of soil cover proposed for the purposes of protecting public health).

Additional soil depth is proposed, as needed, to improve grading and to enable a deep rooting medium for woody species in some locations. All soils proposed will meet 360 landfill final cover requirements where applicable.

Engineering Soils

Unlike the landscape soils where the focus is agronomic and chemical properties, the requirements of soils for engineering applications will be more stringent with respect to physical properties. Engineering soils (e.g., road bed subsurface) would comprise a relatively small portion of the volumes of soil that are estimated to be necessary for the park. Engineering soils are defined as those soils to be used as structured fill and aggregate in, for example, road construction. It is assumed that these soils would be used at the site in accordance with the roadway design standards of NYCDOT, NYCDDC, and NYSDOT as well as DSNY and DEC. Roadway subbase soils will be overlain by the roadway pavement structure, consisting of additional engineered courses, including a granular subbase course, and asphaltic base, binder, and surface courses.

Soil Volumes and Sources for Landscape Applications

Introduction

It is anticipated that a large volume of soil, about 1.6 million cubic yards for North and South Parks alone, for example, would need to be imported to the Fresh Kills Park site to meet the above-described objectives. In addition, a variety of soils would be needed depending on whether the soil is being used for an engineering purpose (e.g., structural fill or road aggregate) or for a landscape purpose (e.g., active or passive recreational spaces and vegetation communities).

Given that the large volumes of soil that are necessary to meet this goal, there are two options for obtaining the appropriate soils on the project site: (1) “making” or manufacturing the soil on-site; or (2) buying clean soil, which requires little or no on-site processing. A description of the “make” or “buy” processes is presented below.

On-site Soil Manufacture

Two types of on-site soil manufacturing have been considered: biological processing and mechanical processing. The former includes processes, such as “strip cropping,” which slowly transform the characteristics of in-situ soils over time. Biological processing grows out of the ethos of the Draft Master Plan, which proposes to take advantage of existing on-site resources—such as soils—wherever possible. It is also a more environmentally sustainable procedure in that it would not require the mining or transport of raw materials. However, biological processing of soils is most useful when existing soils on-site meet cleanliness standards for public health, requiring only agronomic improvements for plant communities. As discussed previously, however, the majority of Fresh Kills soils are presumed to not meet public health standards and would require a new layer of soil.

Mechanical processing would therefore be a more reliable method of manufacturing soils that meet the Fresh Kills Park objectives. It is assumed in the mechanical manufacturing approach that an on-site batch processing operation would be used, in which soil components are blended to meet the necessary properties for the intended end use. Based on preliminary estimates of the volume of soil needed and the anticipated phasing, a 10-acre area would be necessary to stockpile about 100,000 cubic yards of soil, which would roughly accommodate 20 to 30 acres of park development at a time. Additional lands would then be needed for the processing facility. It is assumed that the soil processing facility could be mobilized and sited at various locations in the proposed park that would depend on the phasing (i.e., a North Park site would be used during the development of North Park). Several sources of soil components are under consideration. They could include, for example, the use of DSNY composting materials or mined sand, among other sources.

Soil Purchase

Under this option, finished soil would be purchased from large soil supply companies and transported to the site via barge, truck, or pipes. (DPR intends to use barge or pipes as much as possible to avoid the traffic impact that haul trucks would have on Staten Island roads.) The soil would be stockpiled for short periods of time and spread on site per the construction schedule. Amendments may be necessary, but no processing or manufacturing would be required.

It is likely that early construction projects (i.e., before 2016) would utilize soil purchasing rather than soil manufacturing because of the relative simplicity of buying a finished product compared to setting up a large-scale manufacturing operation. With regard to mechanical manufacturing, limited space exists on-site to stockpile or process soils at the Fresh Kills Landfill (for example,

to dry out and desalinate dredged sand and add amendments to topsoil). Soils would have to be trucked or barged in at approximately the same rate at which they are placed during park development, which effectively eliminates small, short-term sources (e.g., construction sites). Biological processing was eliminated from further consideration for early construction projects given that it would take too much time to create the volume of soils needed by the project.

LANDSCAPE PLAN

As stated above, the project site is a largely engineered landscape, given the 50-plus years of municipal solid waste landfilling that occurred at Fresh Kills. However, despite these many decades of ecological intrusion and alteration of native coastal marshes, the natural resources of the project site remain significant and include extensive waterways with hundreds of acres of salt marsh, particularly along the shorelines at Main Creek and Richmond Creek, and in proximity to the adjoining natural areas of the William T. Davis Wildlife Refuge to the north, the LaTourette Park to the east, and including the 100-acre Isle of Meadows along the Arthur Kill to the west.

It is the objective of the project to both protect and build upon these assets for the purposes of cultivating a diverse landscape within the park that would provide multiple environmental and park user benefits. The following are goals for the Fresh Kills Park landscape plan (see Figure 1-13):

- Create a diverse, resilient landscape that is a benefit to the local ecology, the City, the New York Harbor Estuary, and the region in terms of ecological connectivity, water and air quality improvement, biodiversity and sustainability;
- Enhance, restore, and construct new landscapes by taking into consideration vegetation and wildlife;
- Build on the native biodiversity of Staten Island to establish distinctive plant communities (e.g., Pine Oak Barrens);
- Design the park around existing natural resources;
- Phase ecological improvements so that the park can be understood and enjoyed as a “landscape in progress,” designed to promote successional diversification over time;
- Integrate ecological improvements with ongoing landfill maintenance and monitoring operations to increase benefits, reduce public expenditure and enhance site sustainability;
- Enhance and create freshwater and tidal wetlands (see also Figure 1-13a);
- Expand grassland on the landfill sections to include native meadows, improving their value as a natural resource;
- Expand woodland and tree plantings both on and off the landfill sections for the purposes of providing wooded trails and canopy and also providing ecological connections to adjacent habitats and a visual buffer at the site perimeter that defines the proposed park; and
- Enhance the final cover on the landfill sections for the purpose of providing more ecologically productive landscapes and a range of settings for recreation.

In implementing the above, the proposed project would expand and enhance biodiversity at Fresh Kills, benefitting not only the site itself but also the adjoining open spaces and natural areas and the regional ecosystem.

The preliminary palette of potential plant communities and vegetative species presented in the DMP was drafted based both on-site investigations and research of flourishing native Staten

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Island habitats. Final plant selection to be made for each of the design phases would be determined by DPR based on the goals of not only creating opportunities for diversity, but also selecting hardy species that can adapt to existing conditions, with the expectation that the majority of selected species used would be those with a high degree of reliability that do not require significant maintenance. There would also be a smaller-scale planting program that would test the adaptability of certain species under the project site conditions and regenerate native plant communities and replenish the seed bank with indigenous species for the purposes of creating a sustainable landscape on the project site. A focus of the enhancement plan on the four landfill sections is to:

- Increase soil quality and quantity while ensuring structural stability in accordance with DEC requirements;
- Retain more water for plants and utilize water as a precious resource, including supporting wetland hydrology understanding that care will be given to protecting the drainage layer of the final cover;
- Reduce the spread of and opportunities for invasive species;
- Reintroduce native plant communities capable of building a diverse seed bank and establishing a robust cover; and
- Minimize maintenance requirements and costs, while complying with regulatory requirements.

In developing this landscaping plan, two former New York City landfills—the 90-acre former Pennsylvania Avenue landfill and the 280-acre former Fountain Avenue landfill, both closed in 1985—were studied extensively to determine planting and soil strategies that could apply at Fresh Kills. Through site investigations and discussions with ecologists familiar with these projects, a number of issues regarding planting and soil strategies were raised that address the success or failure of vegetation, habitat, and wildlife at Fresh Kills. These include the following:

- Soil strategies to discourage invasive species and encourage native plants: The chemical and nutrient composition and the structure of landscape soils are critical elements in the Fresh Kills restoration process. The properties of soil determine the type of plant species able to thrive, which in turn directly influences the amount and types of vegetation and animal communities that can be supported. Based on the precedents at Pennsylvania Landfill, Fountain Landfill, and other landfills, for general planting in upland areas, imported soils must be low in pH and nutrient levels to discourage invasive species. Where soil manufacture is necessary, the compost used in this process should not include food compost, which raises nutrient levels.
- Planting and Soil Hydrology: at Fountain and Pennsylvania Landfills, trees that are not tolerant of wet soils have been impacted by poor drainage on capped mounds. Project managers have been forced to replace certain tree species with species that are wet-tolerant, such as blackgum (*Nyssa sylvatica*). In anticipation of such conditions, specifications at Fresh Kills call for coarse, sand-dominant general planting soil to help ensure adequate drainage. Furthermore, it is believed that the existing waste topography will also help prevent oversaturation of soils.
- A number of important maintenance issues were identified at Pennsylvania and Fountain Landfills that will affect planting success or failure. For instance, voles have been identified at Pennsylvania and Fountain Landfills as a major factor in harming new trees. Similarly, in areas exposed to high winds, dessication has been identified as a key problem for new trees. Accordingly, specifications at Fresh Kills include anti-dessication and vole control measures.

WATER ACCESS AND RECREATION PLAN

The proposed project includes both short- and long-term elements relative to providing water recreation opportunities for the public. In the short term, this includes trails and public access to the water such as that proposed as part of the North Park Phase A construction. In addition to providing a facility for on-water recreation (e.g., a kayak launch), an observation deck would be developed providing visual access to the water and natural areas of Main Creek and the William T. Davis Wildlife Refuge.

The proposed park would include many locations along Main and Richmond Creeks where trails would provide access to the water and facilities would be available for on-water access. A description of these facilities is provided under the park description provided below for each of the park areas (see also Figure 1-14). In addition, in the long term (2036), the proposed park would provide a 50-slip marina for small craft, and it is expected that the ferry/water taxi landing would be provided in the Point providing an alternative mode of travel for reaching the park from other City locations. This landing would be provided in the central area of the park where recreational, cultural and educational activities are proposed. From here, ferry and/or water taxi connections could be provided to other boroughs and would provide an alternative mode of transit to reaching the proposed park, rather than driving by car. Given that there is existing bulkhead and waterfront infrastructure in this area, a ferry or water taxi landing could also be developed here with limited additional maritime infrastructure. Since development of the Point is a longer term element at the proposed park, an analysis of potential impacts from ferry/water taxi service is examined in the 2036 analysis year.

Based on the RWCDs and DMP, a marina is proposed along Fresh Kills Creek at a location on the south shoreline and just west of the existing West Shore Expressway bridges over that creek. It is expected that this marina would be available for smaller craft (assumed boat length 45 feet or less). Given that a bulkhead is already constructed in this area, limited maritime infrastructure is assumed to be necessary. However, it is expected that floating docks and anchoring systems would be constructed. It is estimated in the RWCDs that this area would encompass about 2 acres of water area and that the floating docks and piers would cover about 10,000 square feet of water area. It is assumed at this time that beyond basic services, no additional boat service operations (e.g., repair, fueling) would be available at the marina. It is also assumed that given its use by small craft with shallow drafts, it could be designed to avoid any dredging.

This marina proposal is conceptual. Since it would be located in the Point it is assumed that a site-specific design for a marina would not be put forward until after 2016. Therefore this marina is analyzed as part of the 2036 GEIS Build year.

VEHICULAR CIRCULATION PLAN¹

Overview

The Fresh Kills Park project presents a number of unusual challenges for circulation planning and roadway design, particularly the extensive landfill infrastructure and wetlands in the off-landfill areas. The intent of the proposed vehicular circulation plan at Fresh Kills Park is to

¹ Alternative alignments for the proposed roads were examined in detail in the “Conceptual Roads Report, Fresh Kills Park, Phase 3A, Task 8.3, prepared by Arup, et al., for DPR, (September 6, 2007).

integrate the roads into the natural setting while providing local traffic relief and access to the park and limiting environmental impacts to the extent possible. In the spirit of U.S. National Parks and Scenic Byways, Fresh Kills Park roadways are proposed to be an integral feature of the park experience—an attraction in and of themselves. Distinctive materials, appealing alignments, and broad landscaped corridors would differentiate the proposed “Park Roadways” from standard city streets and would cue motorists that they have entered the park. Moreover, a graceful layout through the varied topography can enable drivers to appreciate the scenic views of the site’s natural areas. The road design and materials are also proposed to be as sustainable as possible and the latest technologies will be incorporated with respect to sustainable materials, and roadway design (see also “Sustainability,” below).

Vehicular travelers are expected to be of two types. The first would be through travelers, traveling to or from the West Shore Expressway (i.e., diverted traffic). Although these drivers would appreciate the park setting, they would be seeking reliable and unconstrained flow through the park. The other source of vehicular and pedestrian traffic would be park users, destined for the park. These users would be seeking a pleasing scenic experience and easy access to park facilities. Their pattern of use would be more dispersed both temporally and geographically.

The Fresh Kills Park vehicular circulation plan is designed to provide new east–west connections between Richmond Avenue on the east and the West Shore Expressway on the west, and a high level of interconnectivity among park elements, while taking advantage of the existing topography, within wide landscaped corridors, and distinctive paving materials.

The design guidelines for the proposed Fresh Kills road system take into account not only engineering criteria, but ecological, sustainability and aesthetic standards, Park functionality, and landfill protection principles. The design process includes use of the City’s *High Performance Infrastructure Guidelines* (New York City Department of Design and Construction and the Design Trust for Public Space, October 2005). The design guidelines are presented in three interrelated groups: park, engineering, and landfill.

Park Design Guidelines for Roads

To the extent possible, Fresh Kills roads would meet the following goals:

- Provide access to the park.
- Site roads above flood level and the wetland buffer wherever possible and avoid negative impact on wetlands, mature trees, and other ecological resources.
- Provide scenic views of park natural features while limiting the visual and physical intrusion of the road in the landscape.
- Create the roads in a way that an extensive system of healthy wetland systems could also be provided.
- Design the roads in conjunction with a landscape corridor that could serve as a robust habitat and stormwater treatment system.
- Incorporate grade separations wherever possible and buffer pedestrian paths and bikeways with native plantings integrated with the stormwater management design.
- Enhance the movement experience with curvilinear layouts, graceful ascents and descents, and smooth passage through the park.
- Create a consistent, legible system—in terms of geometries, widths, materials, edging, lighting, signage and markings—that identifies the road as a park feature.

- Provide an orienting device and visual cues for wayfinding.
- Improve traffic flow and reduce potential for pollution from start-stop activity.
- Coordinate the installation of landscape corridors with road segments construction schedule to eliminate adverse habitat effects.
- Use sustainable and durable materials.

Engineering Design Criteria for Roads

Project specific road standards reflect the particular context in which the project would operate and in keeping with established safety standards. Consequently, separate design criteria are to be applied to the West Shore Expressway Service Roads and Ramps (see Table 1-6) and the proposed Park Roads (see Table 1-7):

**Table 1-6
West Shore Expressway Service Roads and Ramps Design Criteria**

Design Speed	45 mph
Lane Width (service roads)	12' minimum for two-lane operation
Lane Width (ramps)	15'
Shoulder Width (service roads)	4' left, 10' right
Shoulder Width (ramps)	3.5' left, 6.5' right
Grade	6.0% maximum, 0.5% minimum, 6.0% maximum
Horizontal Curvature	711' minimum radius (e = 4%)
Superelevation	4% maximum
Stopping Sight Distance	360' minimum (horizontal and vertical)
Lateral Clearance	1'-6" minimum
Vertical Clearance	14'-6" minimum
Travel Lane Cross Slope	1.5% minimum, 2.0% maximum
Rollover	4% maximum between travel lanes, 8% maximum at edge of travel way
Control of Access	Maintain full access control to the West Shore Expressway
Source: Fresh Kills Park Conceptual Roads Report, prepared by ARUP et. Al for NYCDPR, September 6, 2007	

**Table 1-7
Park Road Design Criteria**

Design Speed	35 mph
Lane Width	11' for four-lane operation 12' for two-lane operation, provide for bypass
Shoulder Width	2' minimum, 6' desirable
Median Width	0' minimum, 4' desirable
Bridge Roadway Width	Same as approach roadway on new bridges, reduced median and shoulders on existing bridges
Grade	8.0% maximum, 0.5% minimum
Horizontal Curvature	371' minimum radius (e = 4%)
Superelevation	4% maximum
Stopping Sight Distance	250' minimum (horizontal and vertical)
Lateral Clearance	1' – 6" minimum
Vertical Clearance	14' – 6" minimum
Travel Lane Cross Slope	1.5% minimum, 2.0% maximum
Rollover	4% maximum between travel lanes, 8% maximum at edge of travel way
Source: Conceptual Roads Report, Fresh Kills Park, Arup et. al., September 6, 2007.	

The West Shore Expressway service roads and ramps are to be designed in accordance with the AASHTO Policy on Geometric Design of Highways and Streets, 2004 version (Green Book) with regard to spacing, and the 2006 edition of NYSDOT's *Highway Design Manual (HDM)* with regard to geometry. The ramp termini are designed in accordance with NYSDOT design criteria. The typical sections of the West Shore Expressway service roads are shown on Figure 1-15. Side

slopes of 1 on 4 or flatter are adopted wherever possible, increasing to no steeper than 1 on 2 where necessary due to high embankments or local constraints.

The conceptual sections for the proposed park roadways are shown on Figure 1-16 (see also Table 1-7). The typical four-lane park roadway section includes 11-foot lanes, a flush four foot textured median, and 6-foot outside shoulders, which may also be textured. The shoulders contribute to improved sight distance along the inside of curved roadway segments and help keep the roadside clear of hazards. Along the Confluence Loop Park Road, the median and shoulders are narrowed to fit in the constrained width of the existing haul bridges and the passages beneath the West Shore Expressway, as shown in the Road Alternatives Report (January 2008).

The pavement structure has not been designed, but is expected to be composed of flexible asphaltic surface, binder and base courses supported by a granular subbase course founded on a suitably prepared subgrade. Special attention will be needed to prepare the subgrade across the landfill and to integrate sustainable materials and principles.

Side slopes of 1 on 4 or flatter are to be provided wherever possible; however, site conditions necessitate fairly extensive use of 1 on 3 (and 1 or 2) slopes to minimize intrusion into wetlands and landfill impacts. Swales and ditches will be incorporated to prevent landfill and other site runoff from encroaching on the roadway pavement.

Landfill Design Guidelines for Roads

With respect to roadway design over the landfill sections, the objective is to not compromise the function or integrity of the existing landfill cover, infrastructure, and environmental systems. The design must provide the level of protection consistent with that provided today with DEC requirements and with DSNY approved design. Thus, any element of roadway infrastructure needs to be designed to the satisfaction of DSNY and DEC. Both agencies need to approve all designs through final detail and construction.

Project implementation must include a plan for the systematic monitoring of construction activities, to ensure that construction is consistent with the design, and a plan for post-construction monitoring to document the long-term protections and maintenance of the landfill closure structures and environmental control systems. Ultimately, the road design must satisfy the following design guidelines:

- Continuity of the landfill's final cover and leachate cutoff wall, which control infiltration and leachate migration must be maintained to reduce leachate generation and migration of additional leachate away from the landfill sections;
- Landfill environmental protection systems, among them leachate control and collection systems, must not be damaged and their functions not compromised;
- Stability of the landfill final cover and roadway slopes must be assured;
- Any landfill infrastructure that may be affected by road elements must be reconstructed or replaced in accordance with DSNY and DEC requirements;
- Dynamic loading on the landfill foundation by vehicles traveling on the roadway must be considered in the design analyses; and
- A specific plan for monitoring the landfill environmental control features both during and following construction must be implemented.

Fresh Kills Landfill must remain accessible to DSNY until the landfill closure process is complete. Access for landfill maintenance and repair activities will continue for many decades to come.

A fundamental goal of the proposed park roadway design is to avoid interference with DSNY landfill service roads. Where this cannot be avoided, it is proposed to either relocate the landfill service road or allow the park roadways to also support landfill service road functions. It is expected that portions of active landfill service roads that need to be modified or relocated would be designed to be continuous and consistent with the adjoining undisturbed segments and would be designed to the satisfaction of DSNY, DEC, and DPR.

Ultimately, the design package for the proposed roadway system will include four primary documents to ensure the landfill design guidelines are satisfied.

- A Geotechnical Investigation Report, to establish the basis of geotechnical parameters used for road foundation design and analysis.
- An Engineering Design Report, to present engineering analyses that demonstrate conformance with the requirements of applicable permit and permit equivalent documents.
- A Construction Quality Assurance Plan, to describe systematic procedures for monitoring and documentation that will be performed during construction of the roadway features.
- An Operations and Maintenance Plan to establish systematic procedures for the post-construction monitoring of the roadway, and landfill environmental protection systems, which is consistent with the operations currently performed as part of the on-going post-closure care and maintenance of the site.

As with every construction project in New York City, the process for design review and approval will provide all individual agencies several opportunities to participate in this multi-year roadway design and to the multi-year construction project. A description of the proposed road system follows.

Primary Road System¹

Introduction

The proposed Fresh Kills Park primary road system is comprised of the West Shore Expressway (Route 440) Corridor, the proposed Confluence Loop Park Road, and proposed connections to Forest Hill Road and Richmond Hill Road at Richmond Avenue.

The typical park roadway sections includes four 11-foot-wide travel lanes, a flush 4-foot textured median, and 6-foot shoulders which may also be textured. Along the Confluence Loop Park Road, the median and shoulders would be narrowed to fit in the constrained width of the existing haul bridges across the creeks and passages beneath the West Shore Expressway.

¹ Sources: Sources used in this description include the *Conceptual Roads Report*, Fresh Kills Park, Phase 3A, Task 8.3, prepared by Arup et al., for DPR (September 6, 2007); the *100 Percent Schematic Report* and the *Fresh Kills Park Road Alternatives Report*, prepared by Arup et al., for DPR (January 2008); the *Fresh Kills Park Bridge Alternatives Report*, Phase 3A Tasks 8.4.3 and 8.4.5, prepared by Arup for DPR (November 2007); and “Contract Drawings for the Construction of the NB/SB West Shore Expressway Service Roads and Vicinity” (40 percent submission), HDR/Daniel Frankfurt for DPR, (September 11, 2008).

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The pavement is expected to be flexible asphalt. Across the landfill, it would be designed to meet the unique challenges associated with long term settlement.

Proposed West Shore Expressway Access Improvements

Overview. The West Shore Expressway is a primary regional vehicular transportation route. It runs north/south through the Fresh Kills Park site within a 400-foot-wide right-of-way under NYSDOT jurisdiction. The proposed project would include modifications within the West Shore Expressway corridor between Arthur Kill Road and Victory Boulevard to improve access to and from the park. The improvements would include new and extended service roads, additional ramps, and ramp relocations. The West Shore Expressway mainline would not be affected beyond the adjustments needed to accommodate new or modified ramp termini. A typical section of the West Shore Expressway Service Roads is shown in Figure 1-15.

No vehicular bridges are necessary. A pedestrian/bicycle bridge is proposed over the Expressway at Muldoon Avenue in 2036 as part of the 2036 park program (see the discussion below) to link South Park and West Park.

Northbound West Shore Expressway Access Improvements. The proposed improvements begin at Arthur Kill Road with the addition of a new service road to Fresh Kills Creek. New intersections would be created with Arden Avenue and the south leg of new Confluence Loop Park Road. The service road would operate one way, northbound.

A new exit ramp just north of Arden Avenue would afford northbound West Shore Expressway mainline traffic direct access to the Park, both in proximity to South Park sports fields and the Confluence area. A new entrance ramp further north would offer park visitors the means to efficiently reenter the northbound West Shore Expressway and provide an additional access point for neighboring traffic.

The proposed service roads border Landfill Section 2/8 south of Fresh Kills Creek, and Landfill Section 3/4 north of the creek. Both segments are located almost entirely within the NYSDOT right-of-way and entirely outside the respective landfill solid waste management unit boundaries.

North of the Fresh Kills waterway, an existing DSNY egress road (from the Staten Island Transfer Station, compost facility, and crushing plant) would be replaced by a new two-lane one-way northbound service road constructed to current NYSDOT standards. The service road would begin at the intersection with the north leg of the Loop Park Road, and connect to the existing West Shore Expressway northbound service road at Wild Avenue. The new service road will provide access to North Park, Wild Avenue, Victory Boulevard, and to the northbound West Shore Expressway Mainline at an entrance ramp just beyond Victory Boulevard. It would also continue to accommodate vehicles exiting DSNY facilities.

South of the Fresh Kills waterway, the northbound service road runs parallel to an existing access road serving Landfill Section 2/8, but impinges on its intersection with the proposed South Loop Road. A new connection to the existing landfill access road will be needed at this location.

The proposed service road would be partially located over the existing landfill gas interceptor vent system located directly west of Landfill Section 2/8. To maintain the function of the vent system, which minimizes lateral subsurface migration of landfill gas beyond DSNY property, the roadway foundation design may include construction of a lateral venting layer keyed into the existing vent system trench. The lateral venting layer would consist of a permeable aggregate within a geotextile filter fabric and perforated venting pipes that would connect the existing vent

trench to the surface placed at 200-foot intervals. To supplement the collection and transmission capacity of the lateral vent layer system, additional vent trenches may also be installed parallel to the existing system. In addition, other designs to ensure vent functionality will also be investigated.

North of the Fresh Kills waterway, the reconstructed service road would be located in the bed of an existing landfill egress service road. The proposed service road will include protected pullouts along the eastern side of the roadway to provide access to six existing groundwater monitoring wells and one leachate collection drain cleanout manhole.

Southbound West Shore Expressway Access Improvements. A southbound service road is in place north of the project site. However, the portion south of Victory Boulevard is not entirely open to the public as it extends to DSNY property, under DSNY control, and is limited to authorized vehicles serving the Crushing Plant, the Compost Facility, and the Staten Island Waste Transfer Station. The project proposes to open the entire length to public use as a park entry road that brings visitors coming from the north to the Confluence and the Loop Road. A separate controlled access driveway would then be provided for the DSNY facility.

A southbound service road is already in place for most of the length of the West Shore Expressway south of the West Shore Expressway Bridge over the Fresh Kills waterway to Arthur Kill Road. It is two lanes wide and operates one way southbound. An existing ramp south of the creek leads to the service road and provides access to Muldoon Avenue and DSNY's District 3 Garage and regional repair shop, and several important landfill facilities. However, the ramp has deficient stopping sight distance and merging geometry. Therefore, the project also proposes to reconstruct the exit ramp to current design standards.

In addition, a new West Shore Expressway entrance is proposed from the southbound service road to the mainline of the highway south of Arden Avenue to offer park visitors an efficient way of reaching the southbound West Shore Expressway mainline. To make room for the new entrance, the existing exit ramp to Arthur Kill Road would be relocated to a position north of Arden Avenue.

In addition, there would be the connection to the southbound service road from the southern leg of the Confluence Loop Park Road. This segment of park road would provide the new entrance to the highway from the park in a southbound direction. This segment of proposed park road borders the northern part of Landfill Section 1/9. It is located inside the NYSDOT right-of-way for most of its length and entirely clear of the landfill access road and landfill solid waste management unit boundary. The road foundation parallels the existing solid waste management unit boundary and maintains an offset from the cutoff wall. The design avoids hydraulic monitoring wells and groundwater monitoring wells located along the eastern side of the landfill monitoring wells and groundwater monitoring wells located along the eastern side of Landfill Section 1/9. The proposed road partially covers an existing segment of landfill gas interceptor venting trench that is located along the alignment. Engineering controls to maintain the effectiveness of the landfill gas interceptor venting trench at this location would be the same as those proposed for the northbound service road.

Proposed Confluence Loop Park Road

The proposed internal loop around the park's central areas is referred to in this GEIS as the Confluence Loop Park Road. It is the primary hub and vehicular circulation organizing element within the proposed park. It links the entire system, providing the means to cross from North

Park to South Park, from East Park to West Park, from Richmond Avenue to the West Shore Expressway.

The Confluence Loop Park Road configuration is dictated by both natural and manmade conditions. It is defined by existing structures at a number of locations—including two existing DSNY bridges across Main and Richmond Creeks, referred to herein as the Main Creek Bridge and Richmond Creek Bridge. Currently these bridges provide access for DSNY haul and maintenance operations among the north, east, and south and west landfill sections. Under the proposed project they would be modified to become part of the park road system as discussed below.

The Loop Park Road alignment is also defined by narrow passages beneath the NYSDOT bridges that carry the West Shore Expressway over the Fresh Kills waterway. The proposed Loop Park Road passes under these bridges along the north and south shorelines. The proposed park roadways would need to improve and expand the relatively narrow existing DSNY service roads. The widening needed to accommodate both vehicular traffic and a pedestrian/bicycle path would require fill, bank stabilization and/or bulkheads.

The south segment of the Loop Park Road parallels the Kills' south shore and occupies the bed of an existing DSNY service road for most of its length, passing beneath the existing West Shore Expressway bridges as noted above and across the Richmond Creek Bridge. The north segment generally parallels the north Kills shore and utilizes the bed of an existing DSNY service road beneath the expressway and across the Main Creek Bridge, and form a crescent in between that will encompass Creek Landing. The east segment completes the Loop Park Road, and provides essential linkages with the eastern gateways to the park—South Park Road and North Park Road. Among the options considered here are a split signalized intersection at the south end in the form of a circle that results in separate two-lane northbound and southbound roadway and modern roundabout intersections at both ends of a four-lane roadway aligned with the bed of an existing landfill service road situated between stormwater Basins C1 and C2.

The West Loop segment would advance the goal of improving regional continuity by crossing the Great Fresh Kills, and connecting directly to the Point in the Park's focal area. The Kills crossing has, as its prime component, an aesthetically distinctive iconic bridge, intended to bring enthusiastic attention to the Point, and the whole of the park. This west segment and the proposed "Signature Bridge" would be constructed in a later stage of Park development (it is in the 2036 analysis year).

Proposed Park Road Connections to Richmond Avenue

Overview

The proposed Confluence Loop Park Road would connect to Richmond Avenue at two locations: at Forest Hill Road and at Richmond Hill Road. These connections would provide new gateways into the park and link Richmond Avenue with the West Shore Expressway. A summary discussion of the proposed connections is presented below.

Forest Hill Road Connection

The Park Road South Alignment would extend Forest Hill Road west into the park from its existing intersection with Richmond Avenue. From the intersection, the park road would extend into the park's southwesterly orientation before turning northwest to connect with the Confluence Loop Park Road near the Richmond Creek Bridge (see Figure 1-12). This proposed park road would traverse wetlands and twice cross an existing DSNY service road that surrounds Landfill Section 6/7. It is anticipated that a viaduct structure or a combination of embankment

and bridges would carry the proposed road over the wetlands and provide a grade-separated crossing at the easterly crossing of an existing landfill service road. For the purposes of this GEIS, this viaduct structure is referred to as the Forest Hill Road Crossing (see discussion below under “Crossings and Bridges”). The viaduct would be limited to vehicles with pedestrian and bicycle access to be located elsewhere in the park.

Landfill Infrastructure Implications. The southern portion of Landfill Section 6/7 is scheduled for final closure in 2009/2010. It is intended that construction of this segment of the proposed park road be phased in conjunction with that of the final landfill cover so as to maximize efficiency and minimize interference with the closure.

This segment of the proposed park road follows an alignment that does not generally cut into the landfill section nor impinge on the more critical perimeter infrastructure elements. However, it cannot avoid impact entirely.

Since a landfill section crossing is proposed, the potential roadway design and landfill infrastructure issues need to be considered as follows:

- Stability of the west slope along this alignment is expected to be controlled by the geotechnical properties of waste. Preliminary stability analyses of this roadway position on the landfill suggest that the factor of safety against sliding is greater than 1.5.
- Settlement of the waste is expected to be on the order of a few feet. Foundation improvements such as pre-loading are likely to be used to reduce settlement prior to roadway construction.
- The proposed roadway would intersect stormwater drainage channels, landfill gas vents, landfill gas extraction wells and landfill gas lateral and header conveyance pipes. To the extent feasible, proposed drainage areas and flow patterns would continue to match DSNY post-closure conditions. The slopes of the proposed swales would be designed in anticipation of settlement of the landfill.
- At the intersection of the roadway with the landfill gas header and lateral pipes, it is proposed that the existing pipes be replaced to facilitate foundation improvement construction. Temporary above-grade connections would be installed to maintain the functionality of the system. Following foundation improvement construction, new landfill gas extraction wells and vents would be installed in nearby locations. Additional wells and vents could be established to compensate for the relocation of the abandoned features. Service vehicle access to each of the condensate knockout and pump station locations would be incorporated into the roadway design.

A typical section for this segment of roadway traversing Landfill Section 6/7 is shown on Figure 1-16.

Richmond Hill Road Connection

Overview

The Park Road North segment would extend from the intersection of Richmond Avenue/Richmond Hill Road west into the park. There already exists a short extension of Richmond Hill Road west of Richmond Avenue in the form of a 200-foot stub that currently operates as the driveway into a Duane Reade parking lot. Here, the proposed park road would modify this alignment (as necessary) to fit the proposed lane arrangement within the existing street right-of-way.

Once in the park, the Richmond Hill Road connection quickly turns south, it passes through existing stormwater basins bordered by freshwater wetlands. These are situated to the east of Landfill Section 6/7 and are part of the landfill drainage system. The alignment crosses the basins twice, as it shifts to the east to run adjacent to the existing berm, and again across basin B1 as it turns westward to cross Landfill Section 6/7 along the Yukon Saddle, in line with Yukon Avenue. At the basin crossings, it is anticipated that the proposed park road would be comprised of an embankment traversed by culverts designed to maintain hydraulic continuity (see the discussion below). The segment of the road adjacent to the existing berm that defines this eastern edge of the park occupies the roadbed of an existing DSNY dead-ended service road that provides access to landfill monitoring facilities. As a two-lane road, it would generally fit within the existing plateau at the base of the berm. As a four-lane road, it would spill into the wetlands and basin for most of the length.

In the vicinity of Yukon Avenue, the road turns west and rises to cross over the existing DSNY landfill service road, and continues west over Landfill Section 6/7 to meet the Confluence Loop Park Road. A short-span bridge would carry Park Road North over the landfill service road. For the purposes of this GEIS, this structure has been designated the Yukon Crossing. The central band of Landfill Section 6/7 traversed by the proposed alignment, also referred to as the Yukon saddle, is scheduled for completion of final landfill closure construction in 2009/2010. As with the Forest Hill Road Extension, it is intended that construction of road be phased in conjunction with that of the final landfill cap such as to maximize efficiency and minimize conflicts between construction of the proposed park roads and Landfill Section 6/7 closure construction. For most of its length, North Park Road is limited to vehicular traffic, with pedestrian, bicycle, and other paths located elsewhere in the park.

Landfill and Infrastructure Implications. As it negotiates the narrow passage between the DSNY District 2 Garage and the landfill, the proposed road would cover the outlet stream from Basin B1, which requires that a closed drainage system be adjacent to Basin A extended to a location south of the existing DSNY garage. The proposed road would also overlap the landfill cut-off wall at two separate points, for which protective slabs are proposed to shield the cut-off wall from the effects of roadway loads.

In addition, the proposed embankments across Basin B1 would divide the basin. Preliminary analyses indicate that the remaining landfill stormwater basin would be sufficient to meet its functional purpose. Culverts will be added to maintain hydraulic continuity and balance water levels.

The proposed alignment passes over Landfill Section 6/7 along the Yukon Saddle, which is an alley extending across the middle of the landfill section that has been used over the years as a DSNY service road. The proposed park road design will account for the unusual roadbed conditions here, as well as the road's influence on post-closure landfill operations.

While this segment of road is much freer of active landfill infrastructure than the areas to the north and south, the alignment passes over several landfill elements that will require protection or modification. Among the potentially affected elements are two landfill gas collection laterals which would have to be relocated and replaced, landfill headers at both ends of the saddle which would be realigned inside protective sleeves, and a water line that already includes flexible joints. The proposed roadway would also interrupt several existing and post closure drainage ditches. Culverts would be introduced to maintain drainage conveyance patterns under the road.

As described in greater detail in Chapter 10, “Natural Resources,” the estimated impacted area of wetlands in basins is about 3.1 acres.

Park Road Crossings and Bridges

Overview

The principal functions of the proposed crossings and bridges are as follows:

- Support the proposed park roads over natural and infrastructure features (e.g., waterways, stormwater basins, service roads);
- Provide access under the West Shore Expressway Bridges;
- Accommodate projected traffic volumes;
- Protect existing ecological resources to the extent practicable;
- Afford views of the park and its natural and constructed features, enhancing the experience for motorists; and
- Enhance the beauty of the park through form and scale.

It is proposed that all park bridges be designed to NYSDOT engineering standards, and become part of the NYSDOT Bridge Inventory System, as are all publicly accessible bridges in New York City. The primary design references for the proposed bridges are:

- NYSDOT LRFD Bridge Design Specifications (2007)
- NYSDOT Bridge Design Manual (2008)
- AASHTO Guide Specification for Design of Pedestrian Bridges (1997)

For culverts, the primary design reference is:

- NYSDOT Standard Specifications for Design of Highway Bridges (2002)

A description of the proposed crossing and bridges follows.

Confluence Loop Park Road: Bridges

Overview. There are two existing bridges and two existing bridge underpasses along the proposed Confluence Loop Park Road alignment. These existing bridges include a bridge over Main Creek and one over Richmond Creek. These bridges were constructed for and under the jurisdiction of DSNY. Since they were not designed as public bridges, they are not currently part of the NYSDOT Bridge Inventory System.

The Main and Richmond Creek Bridges were built to carry heavy haul trucks, a loading that is greater than the standard design traffic load for automobile or pedestrian bridges, so these bridges have more than adequate structural capacity for the proposed park roads. However, both of these bridges are strictly utilitarian in design and appearance.

Main Creek Bridge: Existing Conditions

The existing Main Creek Bridge was completed in 1993. It crosses Main Creek roughly ¼-mile east of the confluence with Richmond Creek. Constructed low to the water, the bridge provides roughly 8 feet of clearance above the creek at Mean High Water (MHW). It is about 524 feet long, with 21 spans.

It is constructed of pre-stressed concrete voided slabs 1.5 feet thick with a cast-in-place reinforced concrete deck top with a flexible pavement surface. Outboard of the exterior

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prestressed slabs are precast concrete parapets rising roughly 4 feet above the roadway surface. The roadway is 50 feet wide between the rub rails. Three utility lines are carried outboard of the north parapet, along with roadway lighting standards and luminaries.

The overall condition of the bridge is generally good, with some deterioration of the wearing surface, parapets, and fences. However, the main structural components are in good condition.

Main Creek Bridge: Proposed Project

Under the proposed project, it is proposed to reuse the Main Creek Bridge for vehicular circulation. Since the proposed vehicular road would use the entire bridge width, it is proposed to transition the park road as it approaches the bridge. To do this, the four-foot median would be eliminated, the shoulders would be narrowed from 6 feet to 3 feet, and the median would be omitted, bringing the park road width down to 50 feet to fit within the existing bridge.

The existing utilities that are part of the bridge are mounted high on the existing north parapet. They would be lowered so as not to impede the view of motorists and pedestrians. Since there is landfill-related infrastructure that uses the bridge, close coordination with DSNY would be required to ensure that there would be no disruption to landfill operations. It is also expected that there would be aesthetic improvements that would integrate the bridge into the park road system.

Reusing the existing Main Creek Bridge does not leave enough width for the Loop Park Road pedestrian/bicycle path. Thus, the proposed project requires either widening the bridge or creating a separate pedestrian/bicycle structure. The preferred solution analyzed in this GEIS is to provide a separate bridge structure for pedestrians and bicycles with its own piers and foundations.

When designing the proposed pedestrian/bicycle bridge, it is assumed to be adjacent to the existing Main Creek Bridge, so the two structures can be made to appear as an intentional working pair. It would be 15 feet wide and at a somewhat higher elevation than the existing bridge in order to maximize the sense of separation from the vehicular traffic and to provide pedestrians and cyclists an unobstructed view over and beyond the existing bridge, making the pedestrian/cycling experience far more pleasant. A second option is to construct the pedestrian bridge 50 or more feet from the existing structure, to intentionally separate the structures.

Richmond Creek Bridge: Existing Conditions

Completed in 1989, the existing Richmond Creek Bridge crosses the creek roughly 800 feet to the south of the confluence with Main Creek. Constructed on a higher profile than the Main Creek Bridge, it provides roughly 18.5 feet of clearance above MHW. It is about 559 feet long, with seven spans. The end span on each shore is about 99 feet long, and the five interior spans are each 80 feet long.

The superstructure is constructed of nine prestressed concrete beams, with a composite concrete deck and an asphalt surface. There are 5.5-foot-high concrete parapets on each side of the bridge. The roadway is 50 feet wide face-to-face of the timber rub rails. Three utility lines and roadway standards and luminaries are carried on the north side of the bridge supported from the outside face of the outboard concrete beam below deck level, and a single utility line is also carried on the south side in a similar configuration.

The overall condition of the bridge is generally good, with some deterioration of the wearing surface, parapets, and fences. The main structural components appear to be in good condition.

Richmond Creek Bridge: Proposed Project

Under the proposed project, it is proposed to reuse the Richmond Creek Bridge for vehicular circulation. While the Main and Richmond Creek Bridges are structurally different, the same constraints, considerations, and opportunities apply to both. Thus, the proposed vehicular road would be carried on the Richmond Creek bridge and a separate structure would be necessary for pedestrians and bicycles. Design parameters for the Richmond Creek pedestrian/bicycle bridge would be similar to those described above for Main Creek.

West Shore Expressway Underpasses

The underpasses take the north and south segments of the proposed Confluence Loop Park Road beneath two NYSDOT bridges that carry the West Shore Expressway over Fresh Kills Creek which are under the jurisdiction of NYSDOT. The underpasses already exist as DSNY service roads. However, these are too narrow to accommodate the proposed park road. The need to also accommodate an adjacent pedestrian/bicycle path adds to the challenge.

Under the proposed project, with four-lane park roads and the pedestrian/bicycle path and barriers, the width of the road requires roughly 80 feet. To accommodate a design width while minimizing intrusion into the Fresh Kills Creek, the roadway would be narrowed to 48 feet at these locations, with four 11-foot travel lanes and two 2-foot shoulders, without a median. Thus, the total required width would be roughly 67 feet. Based on this proposed width, the north shoreline would need to be located roughly 27 feet out from the existing shoreline and the south shoreline would need to be extended roughly 39 feet out from the existing shoreline. Local narrowing of the 15-foot-wide bicycle path can be considered if the reduced intrusion results in a substantial reduction in shoreline impact.

Under the proposed project, the existing north and south service roads would be widened by filling in a portion of the shoreline and stabilizing it in one of two ways: (1) stone rip-rap; or (2) by constructing a bulkhead to retain the fill with steel sheet piling and a concrete cap. A new stabilized shoreline with rip-rap would be more attractive and consistent with the goal of keeping the shorelines in the park as natural as possible, and would retain a shoreline area as wetland habitat, but the toe of the slope would extend further into Fresh Kills, potentially as far as the existing bridge piers. The bulkhead option would not extend out as far but would eliminate the wetland habitat and forego the natural appearance. A third structural option, to widen the road by placing it on top of a pile-supported relieving platform supported by piles that overhang the existing shore, was dismissed as undesirable at this site. For this GEIS, the option presented for analysis is fill retained by a new bulkhead. Figures 1-17 and 1-18 show the two proposed underpasses.

Park Road South: Bridges and Embankments

Overview. Figure 1-12 shows the alignment of the proposed Park Road South (Forest Hill Road Extension). Under the proposed project, the eastern segment of this road would cross wetlands and an existing Landfill Section 6/7 service road. This segment of road would therefore be constructed on a viaduct or, alternatively, an embankment with bridges and/or culverts to maintain hydrological functional connectivity. An embankment is more economical, but impacts a larger area of wetland. A viaduct is more costly to construct and maintain, but minimizes wetland impacts and any loss of wetlands would require mitigation (see Chapter 10, “Natural Resources”). The length of this section is about 800 linear feet and includes a grade-separated crossing of the landfill service road.

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The span crossing the existing service road is controlled by the location of the cutoff wall and leachate collection trench along the east side of the landfill service road, and the Landfill Section 6/7 geomembrane, which begins at the cutoff wall, passes below the perimeter road, and continues over the landfill.

Structural loads cannot be transferred to the cutoff wall or leachate collection drain, so the bridge would have to span these features as well as the service road. This results in the western support lying within the landfill. (A schematic layout of the viaduct is included in the *Fresh Kills Park Road Alternatives Report, January 2008*).

The viaduct is strictly a vehicular corridor and pedestrian, bicycle, and other paths would be located elsewhere in the park.

Park Road North: Bridges and Embankments

Stormwater Basin/Wetland Crossings. Figure 1-12 shows the alignment for the proposed Park Road North (Richmond Hill Road Extension). Adjacent to the DSNY District 2 Garage, the four-lane footprint requires an embankment that fills in a stream that runs between the garage and the landfill. The stream would be replaced by a large longitudinal outfall pipe.

South of the garage, Park Road North shifts to the eastbound edge of the park. In doing so, it crosses a stormwater tributary basin and associated freshwater wetlands. This segment of park road is expected to be on an embankment, with culverts to maintain the basin's functionality and hydraulic connectivity.

At Yukon Avenue, the park road turns west. Along the turn, the road crosses stormwater basin B2 and its associated freshwater wetland. This section of the road is proposed to be on an embankment, with a culvert provided to maintain water flow.

Bridge Over Landfill Section 6/7 Service Road. Further west the road alignment crosses over the existing DSNY Landfill Section 6/7 landfill access service road, with a short-span bridge. This section of elevated road is part of the Yukon Crossing (see the discussion above). The design of this structure is controlled by the presence of the landfill cutoff wall and leachate collection drain on the east side of the existing service road, and the geomembrane. Structural loads cannot be transferred to the cutoff wall or leachate drain, so the bridge would have to span over these features as well as the service road. The bridge would only carry vehicular traffic. A schematic layout of the viaduct is included in the Road Alternatives Report.

Signature Bridge

Completing the Confluence Loop Park Road requires a new crossing of Fresh Kills Creek at the western end of the Loop (see Figure 1-20). Fresh Kills Creek is roughly 600 feet wide at the proposed crossing and the "Signature Bridge" would be constructed to carry the park road over the creek. This new structure is envisioned as a "Signature Bridge" as it is intended to be a park attraction and provide an aesthetic statement for the park.

The West Shore Expressway bridges over Fresh Kills Creek provide about 28 feet of vertical clearance to mean high water over the creek. The navigation channel here is defined as 125 feet wide, with the existing bridges providing slightly more clearance than that distance between their fenders. The proposed Signature Bridge would be designed to provide at least as much clearance as the existing West Shore Expressway bridges, or about 30 feet of vertical clearance above MHW.

Approach structures would be required to allow the Confluence Park Road to rise from the underpasses beneath the West Shore Expressway bridges (see the discussion above) to an

elevation that provides the required vertical clearance over the Fresh Kills waterway. Overall, the length of the Signature Bridge and its approaches would be roughly 1,200 feet with profile grades under 5 percent.

A variety of structural types and span lengths could provide the required crossing, with different impacts, costs, and aesthetics. Three initial bridge concepts are presented in the Bridge Alternatives Report. Each would accommodate the proposed park road and a 15-foot-wide pedestrian/bicycle path. Of these, the Long Span Cable Stayed is the option considered in this GEIS. However, as the Signature Bridge is scheduled for construction in later phases of park development, by the time of implementation, the trends in bridge design are likely to have changed considerably, so the final design may vary from the concept depicted in this GEIS.

Description of Vehicular Circulation: 2016 and 2036

Introduction

The proposed circulation system for the park would accommodate vehicular, bicycle, and pedestrian movement both to and through the park with approximately seven miles of new park roads and secondary roads and an array of paths. The principal components of the internal park road system are Park Road South, which would extend across East Park and connect with Richmond Avenue at Forest Hill Road; the central Loop Park Road, which would provide a circulation loop through the center of the park, reusing two DSNY bridges (one across Main Creek and the other across Richmond Creek) and completing the loop with a new “Signature Bridge” across Fresh Kills Creek at a location just west of the existing West Shore Expressway bridge; and Park Road North, which would extend across East Park and connect with Richmond Avenue at Richmond Hill Road. It is envisioned that construction would begin with a connection from the West Shore Expressway into the park that would then continue east with a segment of the South Loop Park Road and then continue further east with the completion of the segment of Park Road south (the Forest Hill Road connection) over the segment of Landfill Section 6/7, and finally with the segment over the wetlands that would complete the connection to Forest Hill Road/Richmond Avenue. It is intended to construct the road system in this way so that each segment would have its own independent utility. All proposed park roads would have four lanes, with two-way circulation. Chapter 22, “Alternatives,” presents an alternative two-lane road design. This project’s circulation design also includes intersection modifications along Richmond Avenue at Forest Hill Road and Richmond Hill Road (see Figures 1-19a and 1-19b). From the central Loop Park Road, one-way access controlled service roads would extend north and south to connect with the West Shore Expressway facilitating regional connectivity.

The park goal is to bring the focus of users to the center of the site from which all five park areas could be easily accessed by vehicle, bicycle, or walking. In addition, smaller park entrances are planned in the North, South, and East parks to facilitate neighborhood access at the park edges.

As stated above, one of the main project objectives is to provide connectivity to and within the park, including connections between Richmond Avenue, which runs along the east boundary of the project site, and the West Shore Expressway, a state highway with regional interstate connections that runs through the site, but which currently provides only indirect connection to the site. The proposed connection would be open to the public and City vehicles (including DSNY), but not open to public commercial and truck traffic. Given the magnitude of the proposed park roadway network and the complexities of implementing the proposed design, including crossing an existing landfill and the associated infrastructure, bridges, and connections to a state highway (the West Shore Expressway), implementation of the proposed park roads will

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take many years. Thus, the description of the proposed traffic circulation, presented below, is provided for the two GEIS analysis years, 2016 and 2036 (see also Figures 1-21 and 1-22).

2016

- By 2016, a new park road entrance would be provided from the Forest Hill Road/Richmond Avenue intersection. From there, this Forest Hill Road connection would provide access to the Loop Park Road, Creek Landing and the West Shore Expressway. This segment of park road South would extend west on a causeway (or a combination of embankments and structures) over the wetlands southeast of East Park and then cross a portion of the south end of Landfill Section 6/7. At the bend in the road there would be overlook parking for 30 vehicles that would provide a viewing area to Richmond Creek.
- The Forest Hill Road connection would connect with the Loop Park Road at the center of the site at a location near the Richmond Creek Bridge. To reach the southbound West Shore Expressway, drivers would continue west onto the Loop Park Road south leg, across the Richmond Creek Bridge, under the West Shore Expressway, and turn left onto the West Shore Expressway southbound West Shore Expressway southbound service road. Drivers would continue south on the Service Road past Arden Avenue to a proposed ramp entrance into the West Shore Expressway mainline, or stay on the Service Road to reach local destinations (e.g., Arthur Kill Road). Within the park, there would be a 30-space parking lot located in the Marsh that would be accessible from the south leg of Loop Park Road.
- To make room for the new entrance ramp into the southbound West Shore Expressway, it is proposed to relocate an existing exit ramp from a position south of Arden Avenue to a new position north of Arden Avenue. In addition, the project proposes to upgrade an existing southbound ramp located north of Muldoon Avenue to correct geometric deficiencies.
- From the intersection of South Park Road with Loop Park Road, drivers would turn north to reach Creek Landing and points north. To reach Creek Landing, drivers would travel a short distance along the Loop Road east leg and turn west across the Main Creek Bridge along the west leg of the Loop Park Road. (There would be a parking lot for about 325 vehicles at Creek Landing). To reach points to the north, the west leg would connect with an improved northbound West Shore Expressway Service Road that extends to meet an existing service road that links to Wild Avenue, Victory Boulevard, and the northbound West Shore Expressway mainline via an existing entrance ramp north of Victory Boulevard.
- From the West Shore Expressway, northbound drivers would reach the park or Richmond Avenue/Forest Hill Road by exiting the highway via a proposed ramp just north of Arden Avenue. This ramp connects with the proposed West Shore Expressway northbound Service Road. In turn, the service road intersects with the Loop Park Road, providing access to other parts of the park. In addition, a new entrance ramp from northbound Service Road into the mainline is proposed approximately 2,500 feet north of the off ramp to better serve departing park patrons and neighboring traffic.
- From the West Shore Expressway, southbound drivers would reach the park and Richmond Avenue/Forest Hill Road by exiting from the highway at the existing ramp just north of Victory Boulevard. Drivers would continue south across Victory Boulevard and onto a segment of road that is currently only open to DSNY and authorized vehicles accessing the Staten Island Waste Transfer Station. Under the proposed project, this service road would allow public access and would connect with the Loop Park Road. Drivers seeking to reach the Richmond Avenue/Forest Hill Road intersection would turn east, pass under the West Shore Expressway bridges, travel

across the Main Creek Bridge, follow the east leg of Loop Park Road, and proceed eastward on the South Park Road to Richmond Avenue.

- Southbound West Shore Expressway drivers could also enter the park further south, by exiting at the reconstructed Muldoon Avenue exit ramp described above.
- As stated above, the proposed project would also construct a ramp from the southbound services road to the expressway beginning at a location just south of Arden Avenue and connecting with the West Shore Expressway and southbound main line. Construction of this access ramp would require that the existing exit ramp to Arthur Kill Road be relocated to north of Arden Avenue.

The proposed service road would have two 12-foot-wide travel lanes, a minimum 4-foot shoulder on the inside, and a 10-foot shoulder in accordance with NYSDOT standards.

2036

Primary Roads

- By 2036, the proposed Richmond Hill Road connection would be constructed and developed. Two alignments for this connection are considered in this GEIS (see Figure 1-12).
 - Option A—this roadway alignment extends around the west base of Landfill Section 6/7, connecting with the Loop Park Road near the Main Creek Bridge. From here, drivers could reach multiple park facilities, as well as the West Shore Expressway northbound or southbound. This option is analyzed in Chapter 22, “Alternatives.”
 - Option B—this roadway alignment is east of Landfill Section 6/7 and extends south along the berm, and through the stormwater basins and wetlands east of Landfill Section 6/7. This alignment then turns west, crossing the Landfill Section 6/7 to connect with the Loop Park Road. From here, drivers could reach multiple park facilities, as well as the northbound and southbound lanes of the West Shore Expressway. This option is analyzed in this GEIS as the proposed project and is described above.
- The proposed Signature Bridge would be constructed across the Fresh Kills waterway at a location just west of the West Shore Expressway Bridge (see Figure 1-12). This would complete the central Loop Park Road circulation program and would facilitate access between the north and south elements and connections with the West Shore Expressway. It would also provide direct access to the parking facilities of the Confluence by allowing drivers who exit from the southbound West Shore Expressway at the Victory Boulevard exit to cross the bridge and directly access the Confluence and the central recreational area at the Point.

Secondary Roads

- In West Park, a service road is retained around the base of Landfill Section 1/9 to provide continued service vehicle access to DSNY landfill infrastructure, monitoring stations, and major facilities at the south end of Landfill Section 1/9 (including the DSNY Leachate Treatment Plant). The service road would also allow DPR service vehicles to have ready access to West Park. This roadway would not be open to the public, except to accommodate overflow parking under managed circumstances.
- The Muldoon Avenue service road would be completed and improved, as necessary, to allow DPR access to the Point and other park facilities. This service road would also continue to provide secured access to DSNY facilities.

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- In West Park, a secondary access road would be developed to provide controlled vehicular access to the proposed 9/11 monument on top of West Park. This would be a limited access Road that would provide access only to vehicles visiting the monument.

Lighting

Appropriate lighting for the roads would be determined as part of the design process in coordination with NYCDOT and NYSDOT.

Roadway Management and Maintenance

The roads at Fresh Kills Park will require a special maintenance program, likely far different from typical road maintenance programs. Maintenance of the roads at Fresh Kills Park is likely far more involved than filling the occasional pothole and restriping the center line. At Fresh Kills Park, road maintenance will also involve monitoring landfill settlement to ensure that the critical landfill infrastructure is not compromised.

The geotechnical properties of the site itself require special road design and special maintenance practices. While it is not yet established which city agency will have maintenance responsibility of the roadways, as DPR, NYCDOT, the Department of Design and Construction (DDC) and DSNY collaborate on the design the roadways, maintenance practices and programs will be determined.

Intersection and Park Roadway Designs

2016

Forest Hill Road Connection

Under existing conditions, the intersection of Forest Hill Road and Richmond Avenue is a T-intersection, with a southbound approach consisting of an exclusive left-turn lane and four through lanes, a northbound approach consisting of four through lanes, (with the curbside lane operating as two moving lanes with a through lane and a right-turn lane), and a westbound approach consisting of one left-turn and one shared left- and right-turn lane. In 2016, with the proposed project, this intersection is proposed to be reconfigured to accommodate the park entrance/exit to Forest Hill Road and Richmond Avenue (eastbound approach), which is proposed to consist of one exclusive left-turn lane, one through, and one right-turn lane (see Figure 1-19a). The westbound approach of this intersection is proposed to be restriped to have one exclusive left-turn lane and one shared through-right lane. The northbound approach is proposed to consist of one exclusive left-turn lane, four through lanes and one right-turn lane. The southbound approach is proposed to consist of one exclusive left-turn lane, three through, and one shared through-right lane.

South Park Parking Entrance (Arden Heights Neighborhood Park)

In South Park, a driveway entrance would be added from Arthur Kill Road providing access to about 40 parking spaces to be located in the Arden Heights neighborhood park (the Arthur Kill Road Parking Lot).

South Park Parking Entrance at South Park Recreational Center

In South Park there would be a parking driveway entrance from Arthur Kill Road to the proposed South Park Recreational Facility. There would be a total of about 450 standard “bosque parking” (explained below) spaces at this facility with an additional 540 spaces for overflow parking.

North Park Parking Entrances

Two parking facilities and vehicle entrances are proposed at North Park. One would be near the intersection of the northbound service road with Wild Avenue. It would provide access to a 73-space parking facility at the end of Wild Avenue. The other vehicle entrance would be provided at the end of Melvin Avenue, which extends along the south side of Schmul Park. It would provide access to a parking facility with 129 spaces and serve the Travis neighborhood.

2036

Richmond Hill Road/Richmond Avenue/Richmond Hill Road Connection

Under existing conditions, the intersection of Richmond Hill Road and Richmond Avenue is a four-legged intersection, with a southbound approach consisting of an exclusive left-turn lane, three through lanes, and one shared through-right lane, a northbound approach consisting of an exclusive left-turn lane and four through lanes (with the curbside lane operating as two moving lanes with a through lane and a right-turn lane). The Richmond Hill Road eastbound approach to Richmond Avenue is an existing short segment of road (about 200 linear feet that currently terminates at the Fresh Kills property line). This short road segment carries little traffic and currently provides two shared left-through-right lanes and the westbound approach consists of three moving lanes operating as one left-turn, one shared left-through, and one right-turn lane. In 2036, with the proposed project, this intersection would be reconfigured to accommodate the park entrance/exit to Richmond Hill Road at Richmond Avenue (eastbound approach), which is proposed to provide one exclusive left-turn lane, one through and one right-turn lane (see Figure 1-19b). The westbound approach of this intersection is proposed to be restriped to consist of one exclusive left-turn lane, one through lane, and one right-turn lane. The northbound approach is proposed to be restriped to consist of one exclusive left-turn lane, four through lanes and one right-turn lane. The southbound approach is proposed to consist of one exclusive left-turn lane, three through, and one shared through-right lanes.

Yukon Avenue/East Park Parking Entrance

In East Park there would also be a new driveway constructed at the intersection of Yukon Avenue and Richmond Avenue. This new driveway would provide access to overflow parking spaces to be provided in this area of the park

PARKING PLAN¹

The proposed project calls for parking to be distributed throughout the park in a concept of tree-shaded “bosque parking” facilities. The parking facilities would be designed with permeable surfaces to reduce heat island effect and minimize runoff. The parking areas would be located near the many park entrances, and sized appropriately for the park uses that would be directly accessed from that parking site (see Table 1-8 and Figures 1-23 and 1-24). At major gathering points, the tree-lined parking areas, or “bosques,” would become design features of the park.

Overflow parking along Arthur Kill Road could also require coordination between DPR and NYCDOT with the Arthur Kill Road improvement project design currently underway.

¹ It is recognized that development feasibility of all the proposed park driveway entrances and exits, including any curb cuts for the proposed parking lots, would be further evaluated during preliminary and final designs for each capital project containing a proposed parking facility.

Table 1-8
Proposed Parking: 2016 and 2036

Parking Location	Total Number of Permanent Parking Spaces	2016	2036	Overflow Parking
North Park (A) (Wild Avenue)	73	73	73	–
North Park (B) (Schmul Park)	129	129	129	–
Creek Landing	325	325	325	–
The Marsh Terrace/Sunken Forest	112	112	112	–
The Point	614	0	614	207
East Park	40	40	40	–
Yukon Entrance/East Park	0	0	0	167
Forest Hill Road Connection Overlook	30	30	30	–
South Park (Arthur Kill Road)	40	40	40	–
South Park (Recreational Center)	450	450	450	540
West Park	60	0	60	457
Arthur Kill Road	0	0	0	173
Total	1,873	1,199	1,873	1,544
Overflow Parking Total				1,544

Note: It is recognized that the overflow parking shown along Arthur Kill Road on Figure 1-23 would need to be on DPR property and not within the bed of the mapped right-of-way of Arthur Kill Road.
Source: DMP, March 2006, Field Operations, December 2007 (modified November 2008).

NON-VEHICULAR CIRCULATION PLAN

Overview

In addition to the proposed vehicular access, the DMP proposes more than 20 miles of specially designed paths and trails for bicyclists, mountain bikers, horseback riders, pedestrians, and hikers (see Figure 1-25). Water access would be accommodated via numerous docks and launches along the creeks, as well as a small marina proposed for the south bulkhead along the Fresh Kills, west of the West Shore Expressway, where a ferry landing may also be provided.

As shown on Figure 1-25 there would be two non-vehicular entrances in the North Park (Travis Area); four along Richmond Avenue (at Richmond Hill Road, Platinum Avenue, Yukon, Avenue, and the pedestrian overpass at Forest Hill Road) providing access to the East Park, and six along Arthur Kill Road providing access to the South Park.

Multi-Use Recreational Paths

Multi-use paths are designed to accommodate a mix of non-motorized activities such as walking, running, cycling, and horseback riding. These paths would be 20 feet wide and would form loops around the base of the closed landfill sections. In total, multi-use recreational paths in the park would extend for an estimated 13 miles. The paths would have signage, seating, picnic areas and lighting along their length and would be the primary linear recreation paths in the park. They would also be accessible to emergency and maintenance vehicles. Since primary recreation paths would in many cases overlap with DSNY service roads, design and use of the paths would need to be coordinated between DPR and DSNY.

Footpaths and Trails

These footpaths and trails would provide for separate activities for horseback riders, pedestrians and hikers. It is estimated that there would be a total of 40 miles of such footpaths and trails within the park.

Mountain Biking Trails

About 12 miles of mountain biking trails are proposed to be provided in the South Park on Landfill Section 2/8. It is assumed these trails would be constructed as part of the 2016 near-term projects.

Pedestrian/Bicycle Bridges

In addition to the vehicular bridges described above, two pedestrian/bicycle bridges are proposed. For pedestrian bridges, the principal objectives are to:

- Provide pedestrian and bicycle access to the park;
- Afford views of the park and its natural and constructed features, enhancing the experience for pedestrians and cyclists;
- Minimize impacts to ecological resources;
- Motivate pedestrians and cyclists to use the park by helping them to feel that they are valued users of the park; and
- Enhance the beauty of the park by their form and scale.

The primary function of the proposed pedestrian bridges is to provide pedestrian and bicycle access to and within the park. The population of pedestrians and bicyclists value their park experience foremost, so a second function of these bridges is to enhance the user experience by affording views of the park and its natural and constructed features.

Major roadways are always an intimidating obstacle for bicycles and pedestrians and are a significant disincentive for pedestrian and bicycle travel, which is to be encouraged within the park. Where pedestrian and bicycle access must cross major roadways (e.g., the West Shore Expressway and Richmond Avenue), a third objective of the bridge is to engage this population of travelers by providing easy-to-use crossings that make pedestrians and cyclists feel that they are valued users of the park and that their needs have been recognized.

Finally, as with the vehicular bridges, these pedestrian bridges would be prominent features in the park. Therefore, a fourth function of these bridges would be to enhance the beauty of the park by their form and scale. Pedestrian bridges in particular provide excellent opportunities to introduce creative new bridge forms.

To these ends, it is proposed to provide a pedestrian/bicycle bridge over the West Shore Expressway at Muldoon Avenue to connect South and West Park. For the purposes of this GEIS, this bridge is referred to as the Muldoon Avenue Pedestrian Bridge.

In addition, given the road width and heavy traffic volumes along Richmond Avenue, it is proposed to provide a pedestrian and bicycle bridge over Richmond Avenue at Forest Hill Road. For the purposes of this GEIS, this bridge is referred to as the Forest Hill Road Pedestrian Bridge.

Muldoon Avenue Pedestrian Bridge

The initial concept for the Muldoon Avenue Pedestrian Bridge is to pass over the West Shore Expressway mainline and both service roads with a single span of some 390 feet in length, with no support piers in the expressway median. There would be a single flanking span on each end of the main span. The approaches on each end would be helical ramps with a radius of 50 feet. This ramp configuration would provide sufficient length to allow a comfortable grade and gentle turns that could be negotiated by cyclists. Users would enjoy 360 degree views as they climb and descend the ramps.

The concept can be implemented in either of two ways, which differ in the structural system for the main span:

- *Cable Stayed Option.* These bridge designs are efficient for spans of this length and permit relatively shallow superstructures, producing an attractive, ribbon-like appearance. Their structure is intuitively understandable, with a highly transparent and light appearance. The main span would be supported by two planes of six stay cables each radiating from a single A-frame pylon on the northbound side of the expressway.
- *Tied Arch Option.* Tied arches are a practical and common form for pedestrian bridges. Under this design, the deck and superstructure are supported by two planes of suspended cables from the arches that would serve as an integral tension element, restraining the arches from thrusting outward at each end of the bridge, much as the string of an archer's bow does. The cables would descend at interesting angles, giving the appearance of a net as users cross the bridge.

The pedestrian bridges are scheduled for construction in later phases of the park development. Given the pace of innovation in bridge design, the final concept may vary considerably from the forms and details under initial consideration.

Forest Hill Road Pedestrian Bridge

The Forest Hill Road Pedestrian Bridge would provide a grade-separated crossing into the park over wide and busy Richmond Avenue. Two initial concepts developed for this bridge are shorter span versions of the two options across the West Shore Expressway. Each would cross Richmond Avenue in a single span 215 feet in length, slightly more than one half the length of the Muldoon Avenue main span, without support piers in the avenue. There would be a single flanking span on each end of the main span. The approaches on each end would be helical ramps with a radius of 50 feet.

Roadway Crossings

The proposed park roadways would pass through a variety of park uses, including passive and active recreation areas, paths, and waterfront development. Pedestrian/bicycle crossings would be required at a number of locations in order to ensure safe passage over roadways. The safety of pedestrians, cyclists, DPR and DSNY maintenance workers, and motorists is a paramount concern in the design of crossings. Among the features that would be considered are traffic control measures (such as stop signs and signals), controlled crossings, grade-separation, signage, pullouts, and protective devices on a site-specific basis. The inclusion of such measures would be in accordance with the AASHTO Roadside Design Guide (3rd Ed., 2006) and the Federal Manual of Uniform Traffic Control Devices (MUTCD, 2003 Ed.). For example, the decision of whether signals are to be installed to control traffic would be analyzed in accordance with Warrants 1, 2, 3 And 4 in MUTCD chapter 4C.

STORMWATER MANAGEMENT PLAN

There are a number of proposed park features that, if constructed, would convert existing pervious surfaces to impervious surfaces. These include the proposed park roads and park structures and parking. Because impervious surfaces do not allow precipitation to infiltrate to the soil, precipitation runs down a slope, infiltrates into soil, or is conveyed via a ditch or storm sewer system, to a receiving waterbody. Stormwater runoff from imperious surfaces can carry pollutants (i.e., suspended solids, nutrients, fecal coliform bacteria, petroleum hydrocarbons,

metals, chlorides, insecticides and herbicides) that can affect the water quality and aquatic habitats of the receiving waterbody.

As stated above, the construction and operation of Fresh Kills Park would be covered under the DEC SPDES General Permit for Stormwater Discharges from Construction Activity. The stormwater management system for the various phases of park development would complement and enhance the aesthetic of the proposed park, and to meet the drainage needs of the proposed park while avoiding impacts to landfill infrastructure. The approach would include a mix of traditional conveyance and storage measures that would Low Impact Development practices throughout each subcatchment (see Table 1-9). These stormwater management approaches would both reduce runoff and pollutant loadings by managing the runoff close to its source using a set or system of small-scale practices that are linked together and would promote the use of natural systems to achieve stormwater quality requirements, and volume control through both infiltration and evapotranspiration. BMPs such as bioretention and pocket wetlands that provide multiple benefits with providing water quality treatment and wildlife habitat, aesthetic improvements and potential educational opportunities would be employed to the extent possible. Implementation of these measures would minimize the potential for significant adverse impacts to aquatic resources resulting from the discharge of stormwater from Fresh Kills Park. Implementation of the runoff control and drainage system proposed for the park would require coordination and review between DPR and DSNY through both design and construction.

**Table 1-9
List of BMPs for Proposed Park Features**

BMP	Proposed Park Feature
Bioretention cell	Pavement (parking lot), Athletic Fields (impervious) Drainage (junction)
Constructed wetland	Drainage (outfall)
Dry wells	Buildings
Grass/vegetated filter strips	Slopes (gradual)
Grassed swale	Pavement (roads), Slopes (gradual), Athletic Fields (pervious),
Infiltration trench	Athletic Fields (impervious) Buildings Drainage (junction)
Infiltration basin	Drainage (outfall)
Planter box	Pavement (parking lot)
Pocket wetland	Pavement (roads), Drainage (junction)
Porous pavement	Pavement (paths), Pavement (roads), Pavement (parking lot), Athletic Fields (impervious)
Raingarden	Pavement (paths), Slopes (gradual) Athletic Fields (pervious), Buildings
Riprap inlet filter ring	Drainage (outfall)
Riprap outlet protection	Drainage (junction), Drainage (outfall)
Slope stair stepping	Slopes (steep)
Stormwater Pond	Drainage (outfall)
Vegetated treatment swales	Pavement (roads), Athletic Fields (impervious), Drainage (junction)
Source: Draft Fresh Kills Lifescape Park: Stormwater Management Plan, Geosyntec, December 2007.	

PUBLIC TRANSIT PLAN

It is expected that with the proposed Forest Hill Road connection operational in 2016, NYCT could modify its existing bus routes—specifically, the express bus routes that primarily operate via the West Shore Expressway—to take advantage of this direct connection into the park. In addition, to accommodate the park-generated transit demand in 2016, NYCT could amend the existing bus service and expand bus routes to include new stops within the park boundaries, extending service into the site from Richmond Avenue via the Forest Hill Road and Richmond Hill Road connections. Additional bus stops could also be provided along Arthur Kill Road, which is a corridor served by a number of Staten Island buses, in order to provide transit service to South Park facilities. In order to extend bus service into the park, the proposed park roads

Fresh Kills Park GEIS

would need to satisfy the design requirements of NYCT for bus operations (e.g., bus stops, lane widths, turnarounds).

By the year 2036, the second park road connection with Richmond Avenue would be completed at Richmond Hill Road. It is expected that in 2036, with the full build-out of Fresh Kills Park, NYCT could either create new bus routes to accommodate the park-generated transit demand (especially on the weekend summer months) or could amend the existing bus routes to include new stops within the park boundaries or at the park perimeter (e.g., along Arthur Kill Road). This could potentially include service from other boroughs that could access the site via the regional highways (i.e., the West Shore Expressway) as well as augmented local service that is provided along Richmond Avenue and could be extended into the park.

To ensure that bus service is provided into the park and that transit is a viable and supported mode of transportation for park users from around the City, DPR would continue to work with NYCT and MTA to advance transit service and to install the necessary transit facilities as part of the park.

INFRASTRUCTURE, ENERGY, AND SUSTAINABILITY PLAN¹

An evaluation of potential sustainable infrastructure and energy systems was developed for the proposed Fresh Kills Park. That evaluation considered four scenarios, including conventional utility supply and three levels of sustainability. The latter scenarios are progressively less reliant on conventional utility supply and more independent (i.e., “off the grid”) levels of potential service: 20, 50, and 100 percent “off the grid.” Based on that evaluation, the 50 percent level was determined to be the objective for the proposed project. To achieve City goals with respect to sustainability, the proposed project would further evaluate the following techniques for potential implementation.

- ***Energy Reduction and Generation Methods.*** The objective of the proposed project is to minimize energy consumption within project buildings and infrastructure systems and to use renewable energy technologies to supply a share of the proposed park’s energy. Potential techniques for reducing energy demand include: LEED (green building principles); powering all outdoor lights with photovoltaic cells (excluding sports field lighting); powering 10 percent of DPR’s energy need with wind turbines; and powering 10 percent of the remaining DPR utility demand with photovoltaic cells. Other renewable generation methods may be considered during project planning as technologies become more feasible. The above program complies with the City’s Local Law 86 of 2005, which requires LEED accreditation or green building standards for major capital projects. Also assumed in these calculations is energy conservation through intelligent building design. It is assumed that solar power (photovoltaic cells) could be integrated into building roofs. Solar thermal cells could also be used to provide water heating systems. Although the conditions at the lower elevations of the site are not ideal for commercial wind power, it is assumed that up to 10 percent of the proposed park’s energy demand could come from wind power, assuming two mid-sized (100-foot) turbines. It is assumed that these DPR operated wind turbines would be located off the existing landfill sections, possibly in the vicinity of the Point, where the more

¹ The summary text for this section was derived from the “Fresh Kills Preferred Utility Scenario,” Ove Arup & Partners Consulting Engineers, December, 2007.

energy-demanding elements of the proposed project would be located (e.g., restaurants, cultural facilities.) This is also an exposed area of the site with the potential for greater wind energy. Additionally, smaller building-specific turbines may be constructed with individual park facilities.

In addition to examining the potential for wind power and alternative renewable sources of energy for powering DPR facilities, the “Evaluation of the Feasibility of Installing a Commercial Scale Wind Energy Facility in Fresh Kills” report prepared by BQ Energy (August 2007) noted that a wind turbine facility at Fresh Kills could be a major benefit for the City of New York with respect to producing clean wind energy within the city limits. It would also support the City in reducing its carbon footprint and fulfilling its renewable energy goals. The report noted that wind turbines produce power with the aid of naturally flowing air currents and do not emit any kind of exhaust or pollutants, unlike fossil fuel-driven power plants, which do produce waste and byproducts. The installation of a commercial wind turbine facility at Fresh Kills has the potential to not only service the park facilities, but also potentially provide power to the local electrical grid that could serve local homes. The feasibility of such a facility was analyzed in this report and determined to be potentially viable based on the current wind environment at Fresh Kills. Since the success of such a facility would require a site or multiple sites within the proposed park at the higher elevations, implementation of such a commercial operation would require a number of approvals, including: 1) an agreement between DPR and a commercial operation that could potentially operate such a facility in the park; 2) completion of site-specific studies including an environmental review that would analyze potential environmental impacts associated with wind turbines including visual and natural (avian) resources, noise and the potential for any impacts on the landfill itself; and 3) permits from the DEC since such a project is likely to be sited on the higher elevations of the regulated landfill sections and thus require a permit. A generic analysis of a commercial wind turbine operations is provided in this GEIS. A site-specific analysis would be required for project implementation.

- **Water Supply.** Water demand within the proposed project is assumed to come from water for irrigation, as well as human use (e.g., restaurant, cooking, cleaning), consumption (e.g., drinking), and infrastructure (e.g., bathrooms). While a grid connection would be necessary, it is expected that water supply demands on the grid could be reduced in three ways: LEED/Green Building principles; grey water systems; and rainwater harvesting. Among the specific measures that may be introduced to reduce water supply are the following: waterless urinals and composting toilets, particularly in remote comfort stations where water supply line extensions may be prohibitive; water conservation measures and low-flow fixtures; grey water recycling in larger buildings; rainwater harvesting on buildings. It is assumed that collectively these systems could reduce on-site water demand by about 40 percent from a conventional water supply system.
- **Wastewater Treatment.** Reductions in wastewater demand are, with the exception of irrigation uses, linked in many ways directly to water supply. It is assumed that the following techniques could be employed in reducing the demands on local wastewater systems: LEED/Green Building principles; greywater systems; constructed wetlands. Greywater could be used in a system of separated piping where drain and other non-sanitary wastewater could be used for multiple non-potable purposes. Thus, this water would not require wastewater treatment. In addition, constructed wetlands could be employed to manage wastewater generated in the Confluence area, and in South Park. The constructed

wetlands could potentially treat this wastewater. It is assumed that the constructed wetlands would occupy about 10 acres.

- **Solid Waste.** The proposed park would consider three techniques for reducing the waste stream; waste reduction, recycling, and composting. Together, these strategies have the potential to substantially reduce waste at the site by about 2 tons per day by 2016 and 6 tons per day by 2036.

It is recognized that the design and economic feasibility of these above-described technologies would need to be determined after further detailed, site-specific analyses of the proposed building program and infrastructure design. It is also recognized that given the long-term nature of the project, there are emerging technologies that are currently infeasible, but which the City may choose to consider through the many years of project implementation. In addition, the expansion of City water supply and sewer connections into the project site would be a capital project proposed by DPR.

SIGNAGE PLAN

The proposed park would be provided with extensive signage that would include identifying:

- Park boundaries with DPR signage;
- Water access and trails to the water;
- Areas of restricted or controlled access (see the discussion below); and
- External and internal vehicular circulation guidance.

PLAN TO AVOID IMPACTS TO LANDFILL INFRASTRUCTURE AND TO PROTECT PUBLIC HEALTH

Introduction

A key objective for the park is to provide public access in a way that protects the health and safety of the park users and DPR staff. To that end, it is important to avoid impacts to landfill infrastructure and to properly design and implement any modifications that may be necessary to construct the proposed park and roads. Much of the site of the proposed park is occupied by the landfill sections or has associated landfill infrastructure such as stormwater management basins and monitoring wells. To avoid impacts to the local environment and public health, among the objectives of the proposed park are: creating an acceptable final soil cover throughout the park and continued and expanded monitoring and maintenance. In addition, the proposed park is designed to minimize impacts to the environmental control systems, to replace any elements of such infrastructure that may be necessary by park design and construction, and to retrofit or upgrade any elements of the system that are necessary for the purposes of providing public access. DPR and DSNY would collaborate over the many years of park design and implementation utilizing the extensive monitoring network and data collection with respect to landfill gas, groundwater, and surface water that is in place at Fresh Kills Landfill to protect the health of park users, visitors, and DPR personnel.

With these measures in place, and the environmental and public health protections of the current landfill controls and the added systems of the park, the potential for human exposure to contaminants would be significantly minimized. In addition, with continual and ongoing monitoring, the potential pathways for human exposure to pollutants are regularly monitored and tested to ensure that public health and the environment are not at risk.

Conceptual Impact Avoidance Measures

It is recognized by DPR that the Fresh Kills Park project is a multi-year, multi-phase project (some 30 years of implementation) with a critical need to avoid or minimize impacts to landfill infrastructure as well as other sensitive features of the site, including wetlands. In addition, as the project moves forward, certainly the design requirements and the regulatory approvals are likely to evolve. Nonetheless, DPR is committed to minimizing impacts of the project and to that end has developed an extensive assessment of conceptual impact avoidance and mitigation measures that are presented in Chapter 23 of the GEIS, "Impact Avoidance and Mitigation Measures." Given that Fresh Kills Landfill is also subject to post-closure care monitoring and maintenance requirements, and the proposed project would also provide the public with access to the Fresh Kills site, the potential to access the landfill management systems, and park development may introduce new loading conditions on the subsurface features (e.g., the proposed roads), the following measures are presented as preliminary conceptual measures that could be taken to avoid impacts to landfill systems and thereby avoiding conflicts with post-closure care and maintenance or impacts to public health and the environment:

- Develop park designs that do not adversely affect the leachate control systems or final cover stability;
- Provide instrumentation to monitor for any deformations in the leachate control systems and cutoff wall that would provide data to DSNY if any park elements are adversely affecting the cutoff wall;
- Install locks at leachate collection well vaults, leachate collection well valve chambers, and associated electronic control panels. These measures are intended to protect the public against entry into confined spaces, where potentially unsafe atmospheric conditions may occur, and to protect the public from potential electrical hazards.
- Install security fences, locked gates and appropriate warning signs around leachate collection well vaults, valve chambers, and associated electronic control panels. These measures are intended to act as a deterrent against public interference with leachate management system features. The design of additional fencing and locks at the leachate management system features will require that designs do not conflict with existing post-closure care maintenance and operation program procedures.
- Install locking manhole covers at manholes located along the leachate transmission forcemain route.
- Install perimeter security fence around the Fresh Kills Leachate Treatment Plant and around the Landfill Section 6/7 leachate transmission forcemain pump station. The design of fencing around these leachate management system features will require that designs do not conflict with the existing post-closure care maintenance and operation program procedures.
- Bar malicious activities or vandalism inflicted upon leachate management system infrastructure, park development will not increase the amount of leachate generated, or adversely affect the function of the electrical-mechanical systems as currently designed.
- Provide park grounds keepers and security personnel to deter malicious acts or vandalism of leachate management system features. The grounds keepers and security personnel would receive training regarding identification of landfill infrastructure and would be provided with emergency contact information for responsible landfill personnel

With respect to the landfill gas management system, the following measures would be taken to avoid impacts to public health and the environment:

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- Develop park capital project designs with DSNY and DPR coordination to avoid conflicts with the landfill gas management system features. Measures could include selection of road alignments that avoid flare locations, or use of living fences (i.e., thorn bushes), or landscaping that discourages activity on or along the landfill gas interceptor venting trench. The design would take into consideration any added post-closure care maintenance and monitoring activities that occur at the various landfill gas management system features.
- Redesign and retrofit existing landfill gas extraction well heads and passive gas vents for placement within securable subsurface vaults. This measure would be used to deter park users from interfering with landfill gas features and avoid potential hazards related to combustion of landfill gas.
- Install permeable gas venting layers (i.e., gravel layers) across interceptor venting trenches where park development features would cover the interceptor venting trenches.
- Post signage to inform the public regarding hazards associated with landfill gas.
- Maintain seals on landfill gas vents to prevent escape of landfill gas into the atmosphere. Unsealing of the gas vents would not be allowed without modification to the existing Title V and Part 360 air permits, which would involve review and approval by DEC.
- Install vapor barriers beneath all park structures and the installation of methane monitoring equipment within park structures, as necessary. The installation of new methane monitoring equipment would require a change to the post-closure care maintenance and operations plan.
- Install security fencing and locking gates around landfill gas flare pads and around the landfill gas purification plant.
- Install locking manhole covers on manholes associated with the landfill gas transmission main.
- Provide DPR staff and security personnel with the authority to deter malicious acts of vandalism of landfill gas management system features. The grounds keepers and security personnel would receive training regarding identification of landfill infrastructure and would be provided with emergency contact information for responsible landfill personnel.

With respect to the stormwater management systems, the following measures would be taken to avoid impacts to public health and the environment:

- Place surcharge loads over waste prior to final cover construction to induce and accelerate settlement.
- Install monitoring equipment to measure strain in the landfill cover system geosynthetic materials.
- Develop on-mound program features that minimize the use of large loads, or designing features that use lightweight fill.
- Develop landscape features to discourage park users from entering drainage channel.
- Post signage that informs park users that the stormwater management basins are not publicly accessible (until so designed) and that entry into stormwater culverts is prohibited.
- Provide DPR personnel with the authority to deter malicious acts or vandalism of final cover and stormwater management features. The grounds keepers and security personnel would receive training regarding identification of landfill infrastructure and would be provided with emergency contact information for responsible landfill personnel.

In addition, since public access would be permitted onto to site, security measures would be necessary to protect important landfill infrastructure. Among the landfill structures that would need to be physically separated from landfill systems are the:

- Leachate control plant;
- Gas collection and treatment plant;
- Flare stations; and
- Above-ground transformers and pumping stations.

It is expected that given that the Fresh Kills Park project is a long-term project, as park design moves forward, additional measures would be developed jointly by DPR and DSNY to protect both public health and landfill infrastructure. DPR and DSNY would also need to develop access restrictions to ensure that only those areas of the park that are designed for park access are accessible as each capital project moves forward. DEC would also review the implementation measures as part of its regulatory oversight of the Fresh Kills property.

Implementation of Impact Avoidance Measures

Table H-1 in Appendix H provides a listing of the currently contemplated projects at Fresh Kills Park and identifies currently known potential conflicts that each project may have with the Fresh Kills Landfill Systems and the Post-Closure Care Plan requirements (described above). The table also presents a conceptual approach to avoiding impacts or conflicts with the Post-Closure Care Plan that would be addressed during project design. This preliminary assessment, based only on current illustrative designs for the proposed park, addresses such issues as grading and filling activities in the vicinity of landfill systems, construction activities, security and fencing, landfill cover protections, drainage systems, and monitoring and maintenance access for landfill management personnel. As each capital project moves forward, and there will be multiple projects through the 30 years of project implementation, additional details would be developed through the site design and engineering process that would inform each capital project design as to the measures needed in order to avoid landfill impacts. To that end, a specific set of site design accommodations relative to North Park Phase A (as described above, this is the first phase of park construction) is provided in Table H-2 of this FGEIS (also in Appendix H).

Vapor Infiltration

In light of the potential for leachate and/or groundwater to contain to contain NMOCs or volatile organic constituents from landfill and/or off-site industrial and commercial activities, appropriate sub-slab venting systems and/or vapor barriers is expected to be needed in the design of all buildings and structures at the project site.

Expanded Monitoring and Maintenance

In addition, as the details of the public access plan are developed, it is expected that the modifications for the post closure monitoring and maintenance plan or an additional monitoring plan developed by DPR, may be necessary. This plan may include:

- More intensive surface sampling for landfill gas in areas of the site that become publically accessible; and
- Coordination on exchange of monitoring between DSNY and DPR, including data on surface water quality and sediment sampling performed at Fresh Kills that would be shared with DPR and park managers and ecologists;

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- Additional monitoring in areas not currently monitored in areas where dermal contact could occur under the proposed park project. This includes streams that would be restored, and stormwater basins, particularly in places where eco-classrooms and public access is being proposed.

Signage

Increased signage would also be an important component of the park's public health protection program which would include:

- Warnings about landfill infrastructure and systems;
- Only catch and release and the state health advisories on consumption;
- No swimming or water access unless accompanied by DPR personnel;
- Security signs on fencing provided around DSNY infrastructure and at limits of public access; and
- Signage regarding rabies and other concerns that may arise over time.

OTHER PUBLIC HEALTH PROTECTION MEASURES

In addition to the expanded protection of landfill infrastructure, monitoring and maintenance described above, the following additional measures are under consideration as techniques for the protection of public health.

- Signage. To the extent necessary the proposed project could incorporate signage to alert park users with respect to avoid wildlife contact (the potential for rabies being just one of the concerns) and DPR personnel could be trained in protection and avoidance methods as well.
- Integrated Pest Management. Fresh Kills Park would also use an integrated pest management approach that would take into consideration park usage (turf, landscape, trees, and structural/rodent) and consider least-toxic methods to controlling pests. Given that the proposed Fresh Kills Park would have wetland components, this would influence what the specific rodent control programs should/can be conducted. Baiting procedures (if any, for certain areas of the park), and bait formulation, rodent inspections, for example, would likely need to be customized for the wetlands area park (and perhaps beyond). An emerging issue that DPR is confronting is protection of raptors and birds of prey from rodenticide exposure. It is expected that the Fresh Kills Park program would encourage emphasis on non-chemical control of any of the commensal species of rats (e.g., Norway rat) near any of the wetlands.
- Vector and Rodent Control. The DOHMH prepares an annual mosquito control plan and provides mosquito management in City Parks. In order to avoid impacts from the West Nile Virus, DPR would begin coordination efforts with DOHMH relative to the control of mosquitoes in accordance with that plan at sites with the proposed Fresh Kills Park. The aggressiveness or intensity of the project would be comprehensive, as necessary, to protect the public from any potential health impacts due to West Nile Virus.

PROJECT IMPLEMENTATION AND PHASING

As described above, the 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, but closure of all landfill sections is expected to be completed by 2016. Implementation of the proposed park must be coordinated with the obligations of the City and

DSNY to complete final closure of the landfill and continue with the post-closure monitoring and maintenance program. The proposed park phasing plan must therefore account for the phased opening of the project site to park users in some locations while final closure continues in other areas and the access restriction that would be necessary with phased implementation. The park plan must also allow for the continued DSNY maintenance of those components of the park dedicated to landfill post-closure operations.

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. The year 2036 is the year for full implementation of the park. The latter year may also coincide with the completion of landfill post-closure monitoring and maintenance. This would depend on the conditions present at that time and the approval of DEC.

FUNDING

To transform Fresh Kills Landfill into a world-class park that attracts local, regional, national, and international visitors, demonstrates sustainable environmental practices, and creates natural resources for local ecologies, sizable investments in park construction, facilities, roads, and other infrastructure is necessary. Though the cost to construct the park in its entirety is not yet known, as much of the park is not yet designed, approximately \$200 million has been allocated for park construction. This \$200 million will provide significant investments in numerous capital projects and will provide the public with useable park access.

Fresh Kills Park will also have operating, management, and maintenance that would go beyond the current landfill maintenance and monitoring costs. These operating costs will be determined as the capital projects are designed. To be developed at some point in the future, recreation and potential ancillary commercial activities such as restaurants, cafes, and banquet facilities are also proposed that, to some degree, would provide a revenue stream expected to cover a small portion of the park operating expenses.

At this time, no federal or private foundation funds have been obtained for this project. However, when such funding opportunities become available at a future date, DPR may pursue them.

STEWARDSHIP

With regard to stewardship, the City will seek to develop a new governance model for Fresh Kills Park that recognizes the unique circumstance of the shared responsibility for the site on the part of DPR and DSNY. That new model will likely include the creation of a not for profit organization that can leverage regional public support and philanthropic support for both ongoing operations of the park, as well as support for the creation of opportunities for research and development of sustainability demonstration initiatives. The Fresh Kills Park project intends to employ sustainable and regenerative design, construction, procurement, and maintenance measures considering the importance of ecological sustainability, regeneration, and natural capital investments.

PARK MAINTENANCE FACILITIES AND PERSONNEL

Although the estimates are preliminary, DPR is anticipating a staff of up to 270 full time employees at the park by 2036, with an additional seasonal staff of 220 persons. Of the full time staff, it is estimated that 55 would be Park Enforcement Police over a 3-shift period. In addition, there would be 12 officers on 24-hour coverage in the peak seasons.

MEMORANDUM OF UNDERSTANDING

As stated above, the Fresh Kills property is largely under the jurisdiction of DSNY. However, over time, the property is proposed to become a park in a phased implementation. To that end, large portions of Fresh Kills are proposed to be mapped as parkland. The exceptions are areas of significant DSNY operations (e.g., the DSNY garages) that are outside the area of the proposed park mapping.

For the purposes of implementing the transition of property management from DSNY to DPR, a Memorandum of Understanding (MOU) is being developed. This MOU will address property transfer, management, and coordination issues between DPR and DSNY during the many decades of park development that would occur on a facility that is subject to ongoing DSNY post-closure care and maintenance. To that end, the MOU will address such issues as:

- Coordination between the agencies with respect to regulatory management of the site and the responsibilities of both DSNY and DPR;
- Phases of site ownership and transition;
- Design coordination related to both DSNY and DPR capital project phases;
- Construction coordination including access, security, and maintenance and protection of landfill systems during construction;
- Operations and management of landfill elements with site access agreements and protocols;
- Operations and management of park elements with site access agreements and protocols;
- Record-keeping;
- Liability and protection of landfill systems; and
- Process for modifications.

F. PROJECT PHASING FOR THE 2016 AND 2036 ANALYSIS YEARS

INTRODUCTION

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, ecological landscapes, and significant new roadways and connections with the West Shore Expressway. For these reasons, the proposed project is a multi-year, multi-phase initiative and 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 detailed description of the park elements to be completed by these two analysis years is presented below.

PROPOSED PROJECTS: 2016 ANALYSIS YEAR

Elements of the proposed Fresh Kills Park that are expected to be completed by the 2016 Build year are listed on Table 1-10 and described in greater detail below. The focus of the early phase projects is North Park (in particular, Phase A) and South Park (including the Arthur Kill Road parking lot), a portion of Creek Landing, and much of the proposed roadway system. A detailed discussion of the 2016 park elements follow.

**Table 1-10
Park Projects for Analysis: 2016**

Project Phase	Estimated Completion Date
"Digger" relocation project and signage	2009
North Park (Phase A) Travis Neighborhood Park —arc trail to Main Creek, bird observation tower, <u>plant nursery, seed farm</u> 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 <u>12 acres</u>), 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 enhancement, public access on footpath trails and <u>hilltop field (about 10 acres)</u> , 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 (<u>about 4 acres</u>), <u>berm overlook and footpaths (about 1.4 acres)</u> , signage, lighting, DPR maintenance and operations (secondary), plant nursery/seed farm., <u>comfort stations, and recreational fields</u>	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 (<u>about 5 acres</u>), <u>open meadow (about 15 acres)</u> , horseback riding trails, indoor track and field facility and sports barn, tennis center and <u>associated facilities (about 12 acres)</u> , café, comfort stations, entrance and parking, signage and lighting.	2010/2014
South Park Landfill Section 2/8 Enhancement —enhancements of existing landfill cover for landscape enhancement and public access on top landfill section 2/8, <u>hilltop meadow (about 7 acres)</u> 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, 2009.	

NEW FRESH KILLS SIGNAGE: THE DIGGER SIGNAGE PROJECT

As one of the early phases of park implementation, a decommissioned excavator, or “digger,” once used in the landfill operations is proposed to be modified, dismantled, moved, and reassembled at a road side location along the West Shore Expressway within Fresh Kills Park. The 27-foot, 5-inch-high, 60-foot-long digger is proposed to be situated on a concrete foundation pad on a graded berm, and enclosed in a chain link fence, and would be fitted to hold a series of four signs, each 10 feet tall and 36 feet long, displayed on a rotating schedule. A series of light fixtures powered by two photovoltaic panels erected on the berm alongside the digger are proposed to illuminate the sign and architectural features of the digger at night. As the park is being built, people driving on the West Shore Expressway will see this distinctive sign that re-uses and transforms an artifact from the landfill to announce the new park’s arrival.

The site of the proposed project does not require any permits and is not located on any landfill sections, nor would it interfere with any landfill infrastructure, monitoring or maintenance activities (the site of the proposed project is just west of Landfill Section 2/8 at a location along the West Shore Expressway). No public use or access is proposed with respect to the project, which will provide a visual amenity for the park.

NORTH PARK

Conceptual Plan

The North Park design concept calls for a combination of landscape enhancement, access to the water, active recreation, a multi-use path around the base of Landfill Section 3/4, footpaths and trails throughout the park, and supporting parking and recreational amenities, signage, and DPR facilities. As shown in the conceptual plan (see Figures 1-26 through 1-34) and described below, North Park would include the following:

- **Woodland Landscape.** Under the conceptual plan, woodland landscape enhancement would occur along the west slope of Landfill Section 3/4 and also in the buffer area between the park and the Travis residential neighborhood. This would include enhancement of the wetland corridor that runs along this edge of the park and creation of a forest along this wetland corridor.

Upland hardwood forest plantings would include such species as white oak, black cherry, and tulip poplar. Associated understory shrub species would include witch hazel, and low-bush blueberry, among others.

Preliminary plans for a swamp forest wetland in the low lying areas of the park include removal of the existing invasive species (dominated by common reed), with grading and drainage improvements that would create a mosaic of open water, marsh and forested wetland corridor. Wetland woody species that would be planted in this area include forested wetland plantings such as swamp white oak, black gum, and pin oak as canopy trees. Shrub understory would include southern arrowwood, winterberry, and high-bush blueberry. Herbaceous plants would include cinnamon fern, fowl mannagrass, and cardinal flower.

Under the proposed enhancement plan, the total area of dry woodland to be planted on the landfill portion of the park site is about 65 acres.

Prior to implementation, all proposed plantings would be reviewed by DPR's Natural Resources Group and Forestry to ensure that they are appropriate for the area and are not Asian Longhorned Beetle host species.

- **Meadow Restoration.** There are three meadow landscapes that comprise the meadow component of the North Park landscape enhancement: dry meadow, moist meadow, and wildflower meadow. Wildflower and dry meadows would be created on the landfill section along the east slope and the west slope, above the woodland vegetation. Moist meadows would be planted in the low laying areas in the north portions of the park. Preliminary landscape planning for North Park calls for about 130 total acres of meadow restoration.

Under this conceptual plan, the dry meadow would be composed primarily of eastern prairie grasses, such as side-oats grama, Indiangrass, and little bluestem grasses. The flowering meadow could be composed of species such as black-eyed Susan, stiff goldenrod, purple and pale purple coneflower, blue grama grass, and Joe-Pye weed. The flowering species would provide a colorful aesthetic to the landscape program. The lower elevations of moist meadow would be characterized by eastern gamma grass and switch grass, as well as little bluestem.

- **Stormwater Basin Reuse.** The existing stormwater basins at Fresh Kills Park, including those in North Park provide the opportunity to accommodate freshwater wetland features that would essentially follow the same design rationale as other nontidal freshwater wetland restoration efforts. With hydrologic support being determined by the amount of stormwater collection and retention, many of these basins can be modified to support a diversity of

native freshwater emergent, submerged aquatic vegetation, open water pockets, forest wetlands/swamps or other moist (mesic) coastal plain habitats. Depending upon existing site conditions for each basin area, ongoing *Phragmites* management will be required, particularly around the stormwater basin water/upland interface. Parts of the basins can be managed for deeper water depths to resist *Phragmites* invasion. Stormwater basin retrofits and associated wetland creation can involve reshaping of the systems to provide a more natural shoreline and to create habitat. Any modifications to the basins would require approval of DSNY and DEC.

- **Tidal Wetland Restoration.** Under the North Park conceptual plan, it is also proposed to restore the tidal wetland edge along the west bank of Main Creek from the bridge crossing on the south to the proposed park boundary on the north. Tidal wetland restoration would be a combination of grading, invasive species control and replanting for the purposes of restoring landscapes at the site comprised of native tidal wetland plant species. These landscapes would be a transitional zone from the higher elevations of high tidal shrubland/elder savanna, which would be planted with groundsel, salt meadow hay, and switch grass (among many others), the high salt marsh (composed of salt meadow hay, spikegrass, and sea lavender, among others), and the low salt marsh that would be primarily planted with saltmarsh cordgrass.
- **Active Recreation.** North Park would include footpaths and a multi-purpose recreational loop path, on-water access, and an athletic field. Trails would include footpaths throughout the park and a multi-purpose trail about 6 miles in length that would be a paved surface some 20 feet wide. It would extend essentially around the base of the landfill section on the flatter topography. This paved surface multi-purpose trail would be available for biking, rollerblading, jogging, and other types of active linear recreation and would connect to the bikeway/walkway of the Creek Landing segment of the proposed roadway that would extend east/west just to the south of North Park.

In addition to the multi-purpose trail, there would be non-paved linear recreational footpaths that could be for hiking or jogging. These would include up to one mile of walking trails across the closed Landfill Section 3/4. Also proposed are walking trails that would connect the North Park to the Travis Neighborhood and Schmul Park. These trails would lead to the waters of Main Creek and provide access to the water (see the discussion below).

North Park would also include an athletic field. Although site design of the field is still to be determined, it is estimated that about nine acres of North Park would be dedicated to field sports such as baseball, and possibly skating.

Lastly, the active recreation in North Park includes access to Main Creek. Facilities would be provided at the Creek for limited on-water recreation (e.g., a small kayak launch) at the eastern end of the walking trail. Additional potential uses include a small ecology center and wildlife observation deck.

- **Parking.** Two parking facilities are proposed as part of the North Park. One would be at the northwest corner of the park at the end of Wild Avenue. This proposed parking area would provide about 73 parking spaces in a “bosque parking” design. Access to this parking area would be via Wild Avenue. A second parking facility would provide about 129 parking spaces on land at the end of Melvin Avenue and just on the park site. Currently this area is a ballfield that would be replaced with a new ballfield at another location in North Park (see the discussion above).

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- **Pedestrian Entrances.** There would be two pedestrian entrances to the proposed North Park, one at the end of Wild Avenue near the proposed parking facility, and the other would lead into the park from the existing Schmul Park.
- **Visitors Center.** A 3,000-square-foot visitors center would be constructed near the Wild Avenue parking facility. Access would be from the proposed parking facility via a walking path. The facility would include a comfort station. Additional comfort stations would be provided at various locations in North Park (up to three are anticipated).
- **Signage.** DPR signage would identify the boundaries of the park and those areas of the park that are publicly accessible or not accessible for reasons of ecological or public health protection, safety and/or security. There would also be signage to identify the facilities in the park, their use and regulations, as well as directions to the facilities, in the park including access to the waterfront.
- **Park Maintenance Facilities.** There would be park maintenance facilities located in North Park. This would be in addition to the central facility within the Point. These satellite facilities would provide office and storage functions for DPR use at the south end of North Park.
- **Art Features and Flare Station Screening.** Art features would be provided at various locations in the park. In addition, an art feature, or buffer, would be provided around the flare station at the south end of north park. This feature would provide a visual amenity as well as a security function screening the flare station from the park.

North Park (Phase A)

North Park (Phase A) would be the first phase in the Travis neighborhood park. This project, which totals about 27 acres, would include trails/access to the waterfront of Main Creek and the associated parking and landscape enhancement. The proposed North Park (Phase A) would also provide a new walking trail connection with Schmul Park, which is proposed to be improved in the “Future Without the Proposed Project” (see the description above). The specific elements of the proposed park are as follows:

- A north/south-oriented walking trail and restored landscape corridor that would extend from Schmul Park into Fresh Kills Park (length of trail segment about 3,500 linear feet);
- An east/west walking trail (arc path) that would connect the proposed parking facility on the west with a bird observation tower and overlook viewing facilities on the east;
- A native plant seed farm and tree nursery;
- At the main entrance, near the end of Wild Avenue where it meets the West Shore Expressway Service Road there would be bosque parking for about 73 vehicles; and
- Signage and public access controls identifying park boundaries, limits of public access along the trails, and access to the water.

With this proposed first phase of North Park, vehicular access would be provided from Wild Avenue and pedestrian access would be provided from Wild Avenue and also through Schmul Park. All work would occur outside the limits of the delineated Landfill Section 3/4 SWMU.

If the Fresh Kills Park Project is approved, it is assumed that this North Park Phase A project would start construction in 2009 and be completed in 2010.

SOUTH PARK

Arden Heights Neighborhood Park and Wetland Enhancement

This element of the proposed park would be the first phase of implementation in South Park. As envisioned in the RWCDS, this area is proposed for a park vehicular entrance with parking (a “transportation” use) with a design oriented toward “habitat for people” and “active recreation.” As shown in the DMP (see Figure 1-35a), this would be a main vehicular and pedestrian entrance to South Park from Arthur Kill Road with bosque parking (about 40 parking spaces). There would also be a visitor and information center, which would also serve as a DPR operations maintenance and security facility center (about 600 square feet). A comfort station and recreational ball fields would also be provided. A key feature in this park element is the enhancement of a stormwater basin/freshwater wetland (about 2 acres in size). The DMP calls for this area to be reinstated as a swamp forest. To the east there would be a playground and picnic area (about 4 acres). The picnic area would connect with Arthur Kill Road via two pedestrian entrances. There would also be berm overlooks, art features, and the required park signage and lighting.

In the northern area of South Park (as stated above, Landfill Section 2/8 has two components), the DMP proposes a wetland crossing connecting the landfill sections with a hilltop meadow for passive recreation (about two acres in size).

As part of one of the early phases of South Park, the Arthur Kill Road parking facility would be constructed (see Figure 1-35b). This would begin to open South Park visually to the public and would provide about 40 parking spaces on a site about 2.5 acres in size.

Multi-Use Path and Trails

This element of the proposed South Park, as envisioned in the RWCDS, is a proposed “linear recreation” path. As described in the DMP, this is to be a multi-use recreational path around the base of the two landfill areas that comprise the Landfill Section 2/8. The total linear feet of the proposed trail would be about 8 miles. This would be a paved path about 20 feet wide and would be available for biking, jogging, walking, and other forms of linear active recreation. There would also be a walking trail along the existing berm parallel to Arthur Kill Road that would connect two overlooks (both about 900 square feet in size).

Landfill Section 2/8 Final Cover Landscape Enhancement

Also proposed by 2016 is landscape enhancement and public access on the south landfill section, in a manner similar to that described above for North Park. As envisioned in the RWCDS, this enhancement calls for “active recreation” with “habitat with people.”

As described in the DMP, the South Park landfill cover enhancement would have a mixed woodland (about 74 acres) at its base, with a hilltop created meadow (about 7 acres), and a deck that would allow for passive recreation and vistas of the area, similar in design to the North Park. There would be footpaths throughout the park that would provide access to the hilltop overlook. A key active recreational feature proposed in the DMP for the South Park is mountain biking with about 12 miles of mountain biking trails. The balance of the landfill cover would be planted to provide created, restored, and enhanced landscape.

In the northern landfill area of South Park (as stated above, Landfill Section 2/8 has two landfill components), the DMP proposes a structured wetland crossing connecting the two sections and a hilltop meadow for passive recreation (about two acres).

South Park Recreational Center

As described in the RWCDS, this part of the South Park is a central active recreational area with indoor and outdoor facilities. It is described as “Active Recreational-Constructed Surface” bordered by “Active Recreational-Field Sports.”

As presented in the DMP, this area would have a “sports barn” fronting on the main access road to the area. This facility would provide about 29,500 square feet of indoor recreational space. Near the sports barn would be about 12 acres dedicated to tennis courts (about 20 courts). Adjacent to the courts would be an equestrian center. The total land area of the equestrian center is about 5 acres. Facilities at the center would include stables and a small corral. Near the tennis courts and stables would be about 15 acres of open meadow. This would be available for informal, unprogrammed active recreation.

There would be a main vehicular and pedestrian entrance to this South Park facility from Arthur Kill Road via a new proposed driveway. Parking to be provided here is 456 spaces, with an additional 50 spaces for overflow parking. The access road would provide both vehicular and pedestrian/bicycle access. Pedestrian bicycle/access would continue across the West Shore Expressway via a proposed pedestrian and bicycle bridge across the Expressway that would connect to the Muldoon Avenue service roads on the west side of the Expressway. The parking and recreational area would be separated from the Expressway by a 12-acre wooded buffer.

CONFLUENCE—THE MARSH, SUNKEN FOREST, AND TERRACE

The Confluence is the entire central area of the proposed park (see Figure 1-36). As envisioned in the RWCDS and the DMP, these first phase activities in the Confluence area would enhance and create new landscapes in an area that was previously a central activity area for DSNY operations (Plant 2).

As presented in the RWCDS, these areas are intended for “passive recreation” and “habitat with people.” As described in the DMP, the Marsh is a proposed restoration of tidal wetlands where Main Creek converges with Richmond Creek (about 20 acres of enhancement). Upland of the Marsh is the proposed Sunken Forest which would enhance the DSNY stormwater basin (about 4 acres) with a circumferential boardwalk (earthwork ring) for public viewing and passive recreation. Another basin in this area would be the creation of a freshwater pond/wetland. Lastly, the Terrace program calls for the enhancement of a DSNY stormwater basin with additional freshwater wetlands creation (about 10 acres). There would also be about 30 parking spaces proposed at the Marsh and an additional 82 spaces in the Terrace (see Figure 1-43).

CONFLUENCE—CREEK LANDING

Creek Landing is a subarea of the Confluence (see Figure 1-36). This area was also heavily used by DSNY when Fresh Kills was an operating landfill and as a result it has hard constructed surfaces and waterfront infrastructure and bulkhead, although in various levels of structural condition.

As envisioned in the RWCDS, Creek Landing would take advantage of this existing infrastructure for the purposes of reuse for more intensive park activities. This area is therefore largely programmed for “active-recreational-constructed surfaces.” As described in the DMP, near term (2016) projects are limited to an event lawn (about 4 acres), with an adjacent restored tidal wetland marsh in an existing former barge slip (this restoration would total about 1 acre). The marsh restoration would be bordered by a publicly accessible boardwalk. Access to this area

would be via the loop trail at the base of the north mound and would be open to pedestrians. A total of about 325 parking spaces are proposed in Creek Landing. This would also be an area for DPR facilities and operations. Signage and lighting would also be installed.

COMMERCIAL WIND TURBINES¹

One of the potential near-term sustainability elements of the park is the development of commercial wind turbines. For the purposes of this GEIS, under consideration is up to five commercial wind turbines, to be sited on elevated locations at North, South, and East Park (i.e., the turbines would be located on the higher elevations of the landfill sections.) The proposed wind turbine poles would be about 15 feet in diameter and cylindrical in shape and the height is assumed to be about 230 to 300 feet. The towers would be finished in a non-reflective white or gray, as would the rotor and the three blades. Depending on the wind strength, the blades would rotate at about 15 to 20 rotations per minute and the blades would be about 230 to 320 feet in diameter. Thus, the maximum total height of the structure would be about 460 feet.

The commercial wind turbine system would be single unit systems that are assumed to be supported by a foundation designed to avoid impacts to landfill infrastructure. They would also need to be connected to the existing Fresh Kills substation operated by Consolidated Edison.

The above is a generic description of a wind turbine system. If the proposed project is approved, it is assumed that a commercial wind energy proposal such as this could operate as a park concession. It is therefore expected that the selected operator would be required to seek separate permits or approvals for construction on the landfill and any local, State, or Federal approval that may be necessary as part of the approval process. It is therefore assumed that a separate or supplemental environmental review process may also be necessary as part of the review of the wind energy proposal. Provided in this GEIS is a generic assessment of five commercial wind turbine systems at Fresh Kills Park based on the description above.

PARK ROADS AND WEST SHORE EXPRESSWAY CONNECTIONS

As described in greater detail above, under “Vehicular Circulation,” the proposed project would develop the following road phases by 2016. It is anticipated that the phasing of road construction would begin with the connections to the West Shore Expressway, the southern leg of the Confluence Loop Park Road, and then the connections connecting to Forest Hill Road, first over Landfill Section 6/7, and then the viaduct over the wetlands with each segment of roadway having its own independent utility. The advantages of beginning park road construction with the West Shore Expressway connections and ramps are many and include: allowing park road construction to commence while landfill closure is being completed (i.e., at Landfill Section 6/7); providing road access into the park from a regional highway that can provide an independent utility and access to proposed near-term park facilities; creating new regional access to the highway for park and road construction vehicle access; and proceeding with the

¹ The commercial wind turbine systems would be in addition to DPR wind turbines that may be used to power individual DPR facilities. Alternative 1 in the BQ Energy feasibility study conducted for Fresh Kills included two wind turbines in West Park for a total of seven; it was the conclusion of DPR that wind turbines in West Park would be incompatible with City plans for the proposed 9-11/WTC Monument at this location. This five-turbine design is consistent with Alternative 2 in the BQ Energy study.

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implementation of a park road segment that requires fewer permits and approvals (e.g., no permits of approvals for landfill crossings). A more detailed discussion of this phase of road development follows for the 2016 analysis year.

- Along the West Shore Expressway corridor, the service roads would be completed between Arthur Kill Road and Fresh Kills Creek. The northbound service road would be supplemented by a new exit ramp and a new entrance ramp from and to the mainline. The southbound service road would be served by a new entrance ramp near Arden Avenue, and two relocated exit ramps.
- The Forest Hill Road connection would be completed between the proposed Loop Road on the west and the Richmond Avenue/Forest Hill Road intersection on the east. This proposed segment would extend over the southern limits of Landfill Section 6/7 and pass through an existing wetland.
- Confluence Loop Park Road's south leg would extend the Forest Hill Road connection west to the new West Shore Expressway service roads. This would include an accompanying bikeway/walkway and landscape ribbon. The park road would cross Richmond Creek on the existing DSNY Richmond Creek Bridge that would be modified and reused and pass beneath paired West Shore Expressway bridges. Widening of the existing shoreline road beneath these bridges would be necessary.
- Confluence Loop Park Road's north leg would provide access across a modified Main Creek Bridge to the improved West Shore Expressway service roads. In contrast with the southern leg of the Confluence Loop Park Road, the widening of the existing road beneath the West Shore Expressway Bridge on the northern leg is not necessary by 2016, since it will continue to operate one-way eastbound, and is sufficiently wide for that purpose.
- North of the Fresh Kills waterway, the existing northbound DSNY egress road would be converted to public use and reconstructed to NYSDOT standards. This proposed improvement would connect with the existing service road at Wild Avenue, which provides access to Victory Boulevard and the expressway mainline north of the boulevard. Access to the park would be from a West Shore Expressway southbound exit ramp at Victory Boulevard and from the Boulevard, along a southbound service road that transitions from a public road to a DSNY access road at Wild Avenue. The project would convert the DSNY portion of the road to joint use.

PROPOSED PROJECTS: 2036 ANALYSIS YEAR

OVERVIEW

Elements of the proposed Fresh Kills Park that are expected to be completed by the 2036 Build year are listed in Table 1-11 and described in greater detail below. The 2036 program has additional significant recreational amenities including the more intensive park uses with the recreational, commercial, and cultural facilities of the Confluence/Point—which is proposed as the central activity area of the park. Also proposed is completion of the East Park which would have a combination of recreational fields and meadows, trails and natural areas as well as all of West Park which would have a combination of recreational fields and meadows, trails, and natural areas, with enhancement of the Landfill Section 1/9 (West Park) with trails and the proposed 9/11 monument hilltop feature. A detailed description of these proposed 2036 projects follows.

Table 1-11
Park Projects for Analysis: 2036

East Park —hilltop field (23 acres), within a successional meadow (187 acres), mixed woodland community (187 acres), <u>mound footpaths (about 1.16 acres)</u> , <u>berm footpaths (about 2.06 acres)</u> , <u>berm overlooks (about 0.20 acres)</u> , freshwater wetland enhancement/enhancement and boardwalk (2 acres), freshwater wetland enhancement/enhancement (21 acres), with a nature education center (outdoor classroom, 600 square feet), and nature education center (4,000 square feet), tidal marsh restoration/enhancement (28 acres), multi-use recreational path (12 miles), picnic lawn <u>and fields (about 11 acres)</u> , a flare station screen, parking along the east stormwater basin and additional parking along the Loop Road.	
West Park —hilltop <u>field, meadow September 11 interpretive center and monument (12 acres)</u> , <u>hilltop footpaths (about 4 acres)</u> , successional grassland (173 acres), woodlands (200 acres), <u>multipurpose loop trail (3 mile)</u> , Arthur Kill dock (450 square feet) and Isle of Meadows overlook (450 square feet). West Park, North Section, earthwork art feature (2 acres), 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 restoration (3 acres), exhibition hall/ <u>community center (24,700 square feet)</u> , 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 (approximately 20,000 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 (<u>32,700 square feet</u>), 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 (<u>3,500 square feet</u>), DPR greenhouses (25,500 square feet).	
Park Road North and Completed Confluence Central Loop Park Road and Landscape Ribbons —Completion of the Park Road System: construction of Park Road North, providing a second connection to Richmond Hill Road and Richmond Avenue about 40 parking spaces: construction of the Confluence Loop Park Road with bikeway/walkways, corridor landscaping, and the Signature Bridge over Fresh Kills Creek near the Point.	
Notes:	For proposed parking lot sizes see Table 1-9. <u>If a golf course is proposed for East Park, it is assumed to be subject to an SEIS or supplemental environmental review. In addition, it is expected that the proposed Signature Bridge would be subject to an SEIS.</u>
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 Kills Project Team, November 2007.

EAST PARK

As described in the RWCDS, the East Park, all of which is proposed for the 2036 Build year, is a mix of “Active Recreation-Field Sports” on the upper elevations of the mound and “Habitat with People” in the lower elevations. The stormwater basins east of the landfill section are planned for a mix of “Habitat with People.”

As described in the DMP, this park planning area would have a concentration of field recreational facilities on the upper elevations of the closed landfill section (see Figure 1-37). This would include a hilltop field (23 acres) on the north portion of the closed landfill section. Immediately to the south would be recreational fields, or, alternatively, a golf course. (A golf course is not examined as a potential use in this GEIS. Any formal proposal for a golf course at this location would be subject to a separate environmental review.) These uses may be set within a created landscape of successional meadow (130 acres). At the base of the mound would be a mixed woodland community (187 acres) that would be created landscape. Footpaths would be located throughout East Park.

Ecological enhancements and facilities for public access would be constructed within the stormwater basins (B1 and B2) and the wetlands to the east. Total acreage of the wetland restoration/enhancement is estimated at 13 acres. Facilities that would be part of this part of East Park include an outdoor classroom (600 square feet) and a natural education center (4,000 square feet). A boardwalk would be constructed along the wetlands. In addition, about 28 acres of the existing wetlands (in the area south of basins B1 and B2) would be restored as tidal marsh.

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A 12-mile recreational multi-purpose loop trail would extend around the base of the landfill section. This would be a 20-foot-wide paved path that would be open to a variety of active linear recreational pursuits. On the south end of East Park there would also be a 2-acre picnic-lawn area that would be accessible from this loop via footpaths. There would also be art features, including a flare station screen.

Overflow parking would be provided along the east side of the existing stormwater basin with from the Richmond Avenue/Yukon Avenue intersection.

WEST PARK

As described in the RWCDS, the West Park, which is all proposed for the 2036 Build year, is a mix of “Passive Recreation” on the upper elevations and “Habitat with People” in the middle and lower elevations. A proposed service road would extend along the south and west base of the landfill sections (see also the discussion below, under “Park Roads and Completed Roadway System”).

As described in the DMP, the West Park would have an overall concept of landfill landscape enhancement with public access focused around a 9/11 monument on the upper elevations of the park (12 acres) providing a signature feature of the West Park (see Figure 1-38). From this hilltop there would be vistas of the region and Lower Manhattan. Footpaths would provide access to this area. To the north there would be a meadow and successional grassland (173 acres). The lower elevations would be restored with woodlands (200 acres) with footpaths traversing the woodlands. The monument would also be accessible via a proposed secondary road with 60 parking spaces. A multi-purpose recreational loop path would extend around the base of the West Park. It would be 3 miles in length and 20 feet wide. This multi-purpose loop path would be a paved surface that would provide opportunities for a variety of active linear recreation pursuits. It would also connect with two waterfront facilities; one would be an overlook and dock on the Arthur Kill (450 square feet) and the other would be an overlook fronting on Great Fresh Kills for viewing the Isle of Meadows and the Blazing Star Historic Shipyard.

The north section of the West Park is lower in elevation, but would also have a hilltop field (about 3 acres) that could be used for passive recreation and informal active recreation. Envisioned below the hilltop field is an earthwork art feature with an overlook (about 450 square feet). About 5 acres of meadow would define the lower elevations of this north section of the West Park. Within the meadow, on the northwest slope overlooking the recreational fields of the Point (see the discussion below) there would be meadow that would accommodate about 2,000 persons. This meadow would face an amphitheater that would host small entertainment/cultural events. On the east slope, about 20 acres of woodland buffer would separate this area from the West Shore Expressway and the proposed exit ramp from the park that would connect with the West Shore Expressway Southbound Service Road.

As stated above, the Muldoon Avenue entrance would be a park service road with about 175 parking spaces to also be provided here just outside the DSNY facilities. These spaces would be for park and DSNY personnel.

THE CONFLUENCE—THE POINT

As described in the RWCDS, the Point is the central facilities and recreation area of the Park. It is proposed for more intensive active recreational field sports (both indoor and on constructed surfaces), as well as indoor commercial facilities and concessions, arts and entertainment, and event spaces (see Figure 1-39).

As described in the DMP, the Point would have a central multi-purpose athletic field totaling about 14 acres). There would be a central track and field area that would have bleacher seating on the west and east end of the facility (with a total of about 1,000 seats). This facility could host track and field or similar events (e.g., a Citywide high school competition) and would be lighted for night events. There would also be an amphitheater that would provide a facility for small outdoor concerts and performances similar in scope to Central Park's Summerstage or Celebrate Brooklyn in Prospect Park. Seating for the amphitheater would be on the north slope of the north section of the West Park (see the discussion above).

Upland of the waterfront there would be a created swamp forest exhibit and basin (2 acres) with created freshwater wetland habitat. Along the immediate shoreline of Great Fresh Kills the DMP proposed a tidal wetland marsh (about 3 acres). There would be an exhibition hall (about 8,590 square feet) and a family fishing and scenic pier (about 4,100 square feet) that would provide a central community facility along the waterfront. North of this facility and along the shoreline would be a pier overlook (3,500 square feet) and fishing pier (4,900 square feet).

Fronting along Fresh Kill would be an esplanade and activities area. The esplanade (occupying about 37,300 square feet) would extend along the water's edge at the point. Fronting the esplanade on the east side would be two commercial operations, with an area for a market roof (approximately 20,000 square feet), and restaurant row, which would house about 3 facilities (20,000 square feet of space total). The market roof and restaurants would provide an amenity for the park and would also overlook a barge garden that is proposed along the water's edge. The barge garden would re-use the old DSNY barges for plantings. East of the garden would be a marina/boating center that would include a marina with about 50 slips for recreational crafts (the facility would occupy about 2 acres including the upland and water areas) and a boat launch (about 6,750 square feet). Fronting the esplanade on the west side would be a banquet hall (about 32,700 square feet). Between the east and west sections of the Point would be an event lawn (10 acres). One of the largest parking facilities in the park would provide about 320 parking spaces at this location in the park. Access would be from the proposed park roads in the central loop.

Additional cultural and art features in the area include a proposed discovery center estimated to be about 32,700 square feet in size. This area would also have a non-commuter ferry/water taxi landing for the purposes of providing water access for park users coming from other locations in the City.

The Point would also be the central area for DPR maintenance and operations including the main office for the Park. It would also provide a facility for a DSNY landfill-related post-closure facility in the former Boat Maintenance Building.

THE CONFLUENCE—CREEK LANDING

As described in the RWCDS, Creek Landing is a central recreational, cultural, and concession area. Much like the Point, it is proposed for more intense active recreation on constructed surfaces, commercial facilities and concessions, arts and entertainment, and event spaces, but at a lesser scale.

As described above, a number of facilities are proposed at Creek Landing for the 2016 Build year including an event lawn (about 4 acres), with an adjacent restored tidal wetland marsh in an existing former barge slip (this enhancement would total about 1 acre) bordered by a publicly accessible boardwalk with access to this area from the loop multi-purpose trail at the base of the

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north mound. In the long term (by 2036), this area would be directly accessible via the proposed park roads and additional facilities would be developed. These are described below.

Along the waterfront of Main Creek (from west to east), there would be an overlook (about 1,000 square feet), a visitor center (potentially in a retrofitted DSNY facility), and a fishing pier (about 1,350 square feet). Central to the Creek Landing waterfront would be a waterfront esplanade (about 22,850 square feet) with a market roof (about 13,750 square feet). On the east end of Creek Landing would be a core area of water access facilities including a boat launch (4,750 square feet), a boathouse for canoe rental (about 900 square feet), with an adjacent cafe (900 square feet). A boating lawn and terrace (about 2 acres) would be provided from which the public could watch the boating activities. Upland from the waterfront and adjacent to the lawn would be a small restaurant (about 1,000 square feet). On the west end of Creek Landing would be DPR greenhouses (about 25,500 square feet).

In addition to the above, on the south side of Main Creek a small boating pier (about 1,600 square feet) would be provided for boat landing.

Framing Creek Landing would be the west segment of the Loop Park Road. There would be a number of pedestrian crossings along the road connecting Creek Landing to the trails at North Park. Another large parking facility here would provide about 325 parking spaces. Access would be from the proposed park roads. There would also be DPR facilities and signage.

PARK ROADS AND COMPLETED CIRCULATION SYSTEM

Overview

As described above, the Forest Hill Road connection and much of the Confluence Loop Park Road would be completed by 2016. By 2036, it is proposed that the remaining segments of the proposed park road system be completed, as follows.

East Park Segments

Park Road North (East Park)

The proposed Park Road North would connect the existing Richmond Avenue/Richmond Hill Road intersection with the Confluence Loop Park Road, and by means of the Loop, to all other park roads and destinations.

As described in the RWCDs and the DMP, there are two alternative alignments for this segment of roadway. Under Alternative A, North Park Road would extend around the North and West base of Landfill Section 6/7, either within the landfill or the tidal wetlands of Main Creek. This alignment is analyzed in Chapter 22, "Alternatives." Under Alternative B, the Park Road North would turn south once it enters the park and skirt the east side of Landfill Section 6/7, extending along the east side of the existing stormwater basins abutting the landfill. The road would then turn west at a location near Yukon Avenue, traversing the stormwater basin and across Landfill Section 6/7, aligning with the north leg of Confluence Loop Park Road near the Main Creek Bridge. Alternative B is the assumed alignment for the purposes of the GEIS.

Confluence Loop Park Road Signature Bridge

By 2036, it is assumed that the Signature Bridge across Fresh Kills Creek would be constructed, completing the Confluence Loop Park Road, providing additional options for circulating within and through the park. With this bridge connection in place, drivers coming from the southbound West Shore Expressway could directly access the Point via the bridge. Similarly, those departing

the Point would have more direct access to the northbound West Shore Expressway. All users would enjoy greater flexibility.

Muldoon Avenue Service Road

Muldoon Avenue would be a service road for vehicles only and would not be open to the public. About 150 parking spaces would be provided along Muldoon Avenue for DSNY and park personnel service vehicles for the park.

CONSTRUCTION PROGRAM AND PRACTICES

The proposed project involves construction activities that would occur over an extended period of some 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 and 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. It is anticipated that the sequence of construction will be North Park (starting with Phase A), South Park, and the accompanying roads. A detailed description of the proposed construction phasing is provided in Chapter 20 "Construction."

G. REGULATORY HISTORY AND REQUIRED PARK PROJECT APPROVALS

REGULATORY HISTORY

CONSENT ORDERS

Table 1-12 provides a chronological listing and summary of the Fresh Kills Landfill Consent Orders and amendments that began in 1980 between DEC and the City of New York, acting through DSNY (Appendix H provides a more detailed description of the Consent Order content). As described above, Fresh Kills Landfill operated as a major municipal landfill operation for several decades prior to the enactment of Federal and State laws that created new regulations for the management, handling, and disposal of solid waste materials. Once these laws were passed and regulations were promulgated at the Federal and State levels, Fresh Kills, as an existing municipal solid waste facility, was in non-conformance with the standards of the new regulations, particularly with respect to managing the environmental impacts on local groundwater and surface waters, air quality, and wetlands. At the same time, Fresh Kills was an essential solid waste disposal facility for the City of New York, and one of the largest municipal landfills in the country.

In 1980, to address these environmental requirements and also in response to actions by local citizens with respect to the Fresh Kills operational issues, DSNY, consented to the issuance by DEC of an Order on Consent to address the non-compliance status of Fresh Kills Landfill with respect to the design and operations of Fresh Kills landfill as a solid waste management facility, as well as the need for protection of local surface waters, groundwaters, and tidal wetlands. The

Table 1-12

Fresh Kills Landfill Consent Order History

<u>Year</u>	<u>Reference/Source</u>	<u>Principal Objectives</u>
<u>1/17/2002</u>	<u>1990 Consent Order Modification #8</u>	Allowed for the temporary use of Landfill Section 1/9 for the acceptance of material from the site of the World Trade Center attacks.
<u>4/27/2000</u>	<u>1990 Consent Order Modification #7</u>	Required cessation of waste disposal by 1/1/02, added Compliance Schedule Appendix A-15 governing the closure and post closure care of the landfill and submittal of appropriate plans and reports therefor, including a post-closure monitoring and maintenance operations manual, final cover design and construction reports for Sections 1/9 and 6/7, annual landfill closure progress reports, a closure and post-closure registration report, closure construction certification reports, and a final landfill closure plan.
<u>1998</u>	<u>1990 Consent Order Modification #6</u>	Added requirements for leachate collection and treatment at closed Sections 2/8 and 3/4, extended milestone deadlines for completion of leachate control at open Landfill Sections 6/7 and 1/9 so that DSNY commenced collection and treatment of leachate for all four landfill sections 1/15/98. Note: DEC issued a Notice of Milestone Deficiency 3/6/95 alleging that the closure plan for Landfill Sections 2/8 and 3/4 was inadequate in that it did not provide for leachate collection and treatment.
<u>7/26/1995</u>	<u>1990 Consent Order Modification #5</u>	Extended the milestone date by one year for submittal of a complete 6 NYCRR Part 360 solid waste management facility permit application from 3/15/95 to 3/15/96 based on changes in federal and state regulations, the need to incorporate data from ongoing environmental and health studies, a desire to maximize public input into scoping and preparation of the DEIS, and the need to decide whether leachate controls at Sections 2/8 and 3/4 would be required.
<u>7/15/1994</u>	<u>1990 Consent Order Modification #4</u>	Added requirement to build enclosed barge unloading facility as per requirement in <i>Township of Woodbridge v. City of New York</i> , (D. N.J.), made minor administrative modifications to requirements for document repository. Note: In an Order dated September 16, 1997, New Jersey District Court Judge Barry eliminated the requirement to build an enclosed unloader in the <i>Woodbridge</i> litigation. Accordingly, this requirement was also eliminated from the 1990 Consent Order in Modification No. 7.
<u>11/18/1993</u>	<u>1990 Consent Order Modification #3</u>	Extended milestones for the submission of studies and design reports in several subject areas: extended the milestone for the cessation of leachate recirculation and the commencement of leachate collection and treatment at the Veterans Avenue Leachate Treatment Plant (the initial phase of the larger facility); heightened the requirements for laboratory verification of data submissions; limited the area of waste that could be exposed during disposal operations.
<u>1992</u>	<u>1990 Consent Order Modification #2</u>	Limited the maximum elevation for Landfill Section 3/4 to 170 feet, required the cessation of solid waste disposal at Landfill Section 3/4 as soon as the Main Creek Bridge was completed or by November 30, 1992, whichever came first, limited the amount of solid waste that could be placed in Landfill Section 3/4 until that time, required DSNY to submit weekly reporting of barge operations and progress reports on the Main Creek Bridge construction, required a Final Acceptable Closure Plan for Landfill Section 3/4, and required DSNY to contribute up to \$750,000 to DEC, which committed \$250,000 to conduct an air monitoring program to characterize the specific air emissions from the landfill and their contribution to the ambient air on Staten Island.
<u>1990 (Sept.)</u>	<u>1990 Consent Order Modification #1</u>	Addressed matters raised by the public during the course of the public outreach program mandated by the April 1990 Order on Consent, added requirements for yearly public meetings, a public document repository, public review of future Consent Order modifications, expedited submission of a contingency plan, and prohibited the knowing acceptance for disposal of incinerator ash; limited the average tonnage disposed of at Fresh Kills to 27,000 tons per day (tpd), and required notification to DEC when it exceeded 25,000 tpd.
<u>1990 (April)</u>	<u>1990 Consent Order</u>	Addressed continued alleged violations of environmental laws at Fresh Kills Landfill related to the absence of a solid waste management permit, continued leachate discharges to local waters, unregulated activities in tidal wetlands and adjacent areas while recognizing DSNY obligations to move forward with remedial measures with a Part 360 permit submission that would upgrade the landfill, and would be comprised of multiple investigations, studies, reports and designs, to be provided to DEC for review and acceptance (e.g., operations and maintenance plan, final cover design, closure plan for all landfill sections, leachate mitigation plan for sections 1/9 and 6/7, waste report for unloading facilities, hydrogeological investigations, water and sediment reports, landfill gas migration investigation, slope stability investigation, geotechnical analysis report, and monitoring system installation plans and specifications), with a schedule for submission of all reports and implementation of Interim Operating Requirements, an Environmental Benefits Plan, and preparation of a City-wide Solid Waste Management Plan as well as ongoing monitoring and public outreach.
<u>1985</u>	<u>1985 Consent Order</u>	Addressed continued alleged violations of environmental laws in the operation of Fresh Kill Landfill related to the absence of a solid waste management permit, leachate discharges to local waters (estimated at 1.5 million gallons per day to surface and groundwater), conducting unregulated activities in tidal wetlands and adjacent areas and noncompliance with Federal rules related to solid waste management facilities and practices, including reporting and planning requirements relative to landfill operations and cover management, examination of alternative methods of solid waste disposal, a management plan for leachate collection, storage, treatment and disposal, site landscaping, remedial measures for daily cover, waste management to protect surface waters, limitation on salvage operations and receipt of waste from municipal sewage treatment facilities, control of landfill gasses, installation of drainage control structures and management of runoff, preparation of an FIS including an examination of alternatives such as resource recovery, establishment of 50-foot perimeter buffer areas, elevation controls, installing security against illegal dumping, fire prevention control, and an environmental monitoring program for all City landfills.
<u>1980</u>	<u>1980 Consent Order</u>	Authorized the operation of Fresh Kills Landfill in absence of a solid waste management permit, acknowledged leachate discharges to local waters (estimated at 4 million gallons per day to surface and groundwater), and conducting unregulated activities in tidal wetlands and tidal wetland adjacent areas and including emergency measures relative to daily cover of solid waste material, management of solid waste material and interim measures to improve operations at the landfill as well as identified restricted activities including filling of wetlands and areas of shallow groundwater.

Consent Order addressed alleged violations of New York State Environmental Conservation Laws and regulations pertaining to solid waste management, water resources and tidal wetlands, protections, respectively. In addition, the Consent Order addressed the requirements of the State Pollutant Discharge Elimination System (SPDES). Also acknowledged was the need for environmental review under the State Environmental Quality Review Act (SEQRA). The 1980 Consent Order outlined a series of remedial actions to reduce landfill impacts. In 1985, a second

Consent Order was executed that added new requirements relative to practices at the landfill and measures to reduce environmental impacts, and the need to perform environmental monitoring.

In 1990, a third Consent Order was entered into between the City and State, which superseded the two prior consent orders. The 1990 Consent Order (DEC Case No. D290018903) prescribed additional investigations, studies, reports, and designs to be completed by DSNY and submitted to DEC for review, comment, and approval for the purposes of bringing Fresh Kills into regulatory compliance. Among the requirements of the 1990 Consent Order were preparation of the following, most of which are necessary components of an application for a permit under Title 6 of the New York State Codes, Rules, and Regulations Part 360 (Solid Waste Management Facilities):

- Operations and maintenance plan;
- Landfill cover design;
- Leachate management for Landfill Sections 1/9 and 6/7;
- Improvements to the waste transport and unloading facilities;
- Hydrogeological investigations;
- Surface water and sediment investigations;
- Landfill gas migration mitigation;
- Preparation of a local solid waste management plan;
- Slope stability investigations;
- Environmental benefits projects;

Through the early 1990s, the City operated and the State regulated Fresh Kills under this Consent Order. Strong local opposition to the landfill continued throughout this time. On June 2, 1996, two weeks after DEC determined that DSNY's application for a Part 360 permit, as required by the Consent Order, was administratively complete and could therefore commence review, the State Legislature passed a law barring the disposal of waste at the Fresh Kills Landfill after January 1, 2002. In light of the legal mandate to close the landfill, on September 15, 1996, the DSNY formally requested that the DEC suspend its review of the Solid Waste Management permit application. Consent Order Modifications 6 and 7 were subsequently implemented with Modification 7 setting forth a compliance schedule for landfill closure (Appendix A-15). Deliverables under Modification 7 included a Closure and Post-Closure Registration Report, a Section 6/7 Final Cover Design Report, a Section 1/9 Final Cover Design Report, Closure Construction Certification Reports, a Post-Closure Monitoring and Maintenance Operations Manual, and a Final Closure Plan.

In January 2001, DSNY submitted to DEC a Landfill Section 6/7 Final Cover Design Report and in January 2002, DSNY submitted a Landfill Section 1/9 Final Cover Design Report. (DSNY had submitted multiple Closure Construction Certification Reports for Landfill Sections 2/8 and 3/4 between November 1995 and March 1997, and the reports for Section 3/4 were submitted between February 1996 and May 1997.) In accordance with the modified Consent Order, DSNY also submitted to DEC a Post-Closure Monitoring and Maintenance Operations Manual for the landfill on December 13, 2002. Finally, DSNY submitted a Final Closure Plan on June 5, 2003. With the exception of the Closure Construction Certification Reports for Landfill Sections 1/9 and 6/7 and Annual Landfill Closure Progress Reports, all activities required under Appendix A-15 of the Consent Order have been completed and approved by DEC.

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FRESH KILLS PERMITS

The current Tidal Wetlands permit (DEC ID: 2-6499-00029/000248) was issued May 26, 2004, and expires May 26, 2014. The current SPDES permit, which regulates discharges from the Leachate Treatment Plant to the Arthur Kill (DEC ID: 2-6499-00029/00037, SPDES ID: NY 020 0867) was issued July 25, 2007, and expires February 28, 2013; however, DEC is currently pursuing a Department-Initiated Modification (DIM) of the SPDES permit. The proposed DEC modifications to the SPDES include the alteration of the types of water quality samples.

At the landfill, DSNY operates three flare stations (six flares) in conjunction with the landfill gas management and processing at Fresh Kills. DSNY has a Title V Air permit to cover all sources of air emissions at the landfill including these activities. The current Title V Air permit (DEC ID: 2-6499-00029/00151) was issued August 16, 2006, and expires August 15, 2011.

OVERVIEW OF PROJECT APPROVALS

There are numerous land use and environmental approvals that apply to the proposed project (see Table 1-13). The applicability of these regulations would vary depending on the specifics of each phase of construction and design. In addition to developing a permitting strategy for the proposed elements of the park, the permitting strategy must recognize the current requirements of DSNY and its obligations to perform final closure as well as on-going environmental control, maintenance and monitoring through at least 2036.

The strategy for park implementation is to present the overall plan and RWCDS for analysis in this GEIS while focusing permits on the site-specific projects. The impact assessments methodologies presented in this GEIS have therefore been scoped to cover the full range of environmental issues that are specific to the short-term projects in addition to providing a comprehensive analysis of the project in its entirety.

To summarize the necessary approvals, at the state level, discretionary approvals that would apply to the proposed project include modifications to the Consent Order and possibly in the future, Part 360 regulatory end use approvals; permits for activities in tidal wetlands and adjacent areas; protection of waters; access to a state highway (Route 440) and structures over the highway. Federal approvals relate to constructing structures over or in navigable waterways or activities in freshwater or tidal wetlands (e.g., dredging or filling) as delineated in accordance with ACOE methodologies. In addition to these approvals, as stated above, New York State legislative approval has already been granted for the alienation of a small portion the existing parkland (Chapter 659 of the 2007 laws of the State of New York) to accommodate the road rights-of-way.

Also listed in Table 1-13 are the agencies that have a regulatory role with respect to the proposed park (these are defined under CEQR/SEQRA as involved agencies), or an advisory role (these are defined under CEQR/SEQRA as interested agencies). All involved and interested agencies have been issued this DGEIS and requested to comment on its content and conclusions. In accordance with CEQR/SEQRA regulations, DPR and DCP are coordinating the environmental review of the proposed Fresh Kills Park project with all of these agencies. This coordination will continue through the preparation of the FGEIS and the issuance of findings, which concludes the environmental review process. DPR would also continue to coordinate with all the involved agencies through the permit application review and approval process.

**Table 1-13
Involved and Interested Agencies**

Agency	Principal Responsibility	Regulatory Role
New York City		
New York City Department of Parks and Recreation	Lead planning and development agency and GEIS lead agency	GEIS Lead Agency, applicant for permits and park mapping and park construction
New York City Planning Commission	Planning, Zoning, and Coastal Zone Consistency	<u>Issuance</u> of City map and zoning amendments, coastal zone consistency
New York City Department of Design and Construction	Design and construction of capital improvements	Construction plans for roadways and infrastructure
New York City Department of Environmental Protection	Watershed management, hazardous materials, water and sewer main connections, septic systems, air quality, natural resources	<u>Issuance</u> of drainage plan for storm water management, best management practices, outlets, and sanitary sewer extensions, water supply connections, air quality permits (<u>minor industrial source</u>)
New York City Department of Health and Mental Hygiene	Advisory agency on public health issues	Advisory review of public health issues and approval of sanitary systems and drainage plans
New York City Department of Sanitation	Compliance with existing permits and closure operations and consent order, and solid waste management operations	Approval of activities potentially affecting closure operations or maintenance, use of DSNY facilities and regulatory compliance
New York City Department of Transportation	Design and operation of City Streets, advisory agency on traffic impacts and management	Road design and connections to existing City streets, parking, street lighting, and bicycle/pedestrian improvements as well as associated traffic and pedestrian mitigation.
New York City <u>Public Design</u> Commission	Review of art, architecture and landscape architecture proposed for City-owned property	Approval of capital projects
New York City Landmarks Preservation Commission	Approval or advisory agency for activities on or near sites of historic or archeological value	Advisory role in EIS process
New York City Office of Environmental Coordination	Coordinating agency for City Actions subject to CEQR	Advisory role in EIS process and coordination among City agencies
New York City Transit Authority	City bus and rail transportation	Advisory role in EIS process
Office of the Staten Island Borough President	Planning and environmental issues	Advisory role in EIS process
New York City Department of Cultural Affairs	Public art and cultural affairs funding and initiatives	Advisory role in EIS process
<u>New York City Office of Environmental Remediation</u>	<u>Coordinating agency for City Actions related to environmental remediation</u>	<u>Advisory role in EIS process</u>
New York State		
New York State Department of Environmental Conservation	Landfill management, hazardous materials, water quality, tidal wetlands, rare and endangered species, air quality, septic systems	<u>Issuance</u> of permits related to landfill closure (Part 360), activities in tidal wetlands or adjacent areas (Article 25), protection of waters (Article 15), or air emission permits (Part 201 <u>and Title V of the Clean Air Act</u>)
New York State Department of Health	Public health	Advisory review of public health issues
New York State Department of State	Coastal Zone Management	Coastal Zone Consistency for actions requiring Federal permits
New York State Department of Transportation	State Highways Access	Approval for work in a state right-of-way and connections to the West Shore Expressway (State Route 440)
New York State Office of Parks, Recreation and Historic Preservation	Designation and Protection of State and National Register Listed and Eligible buildings and places	Advisory role in federal permit review process pursuant to Section 106
Federal		
United States Army Corps of Engineers	Activities within wetlands (tidal or freshwater) and protection of navigable waters	<u>Issuance of permits</u> or authorizations (Section 404) <u>for</u> structures within navigable waters (Section 10)
United States Coast Guard	Structures over navigable waterways	<u>Issuance of permits</u> for structures over navigable waterways, to ensure no impacts on navigation
Environmental Protection Agency, Fish and Wildlife Service, National Marine Fisheries Service	Activities that affect wetlands and RT&E species	Advisory to Army Corps of Engineers during permit review

CITY OF NEW YORK APPROVALS

City approvals for the park's ULURP application include the following:

- Amendment to the City map to establish as parkland those portions of this project site that are not currently mapped as parkland;¹
- Amendment to the City map to eliminate certain unbuilt paper streets (see description above);
- Amendment to the City map to map a public place to serve as the right-of-way for the future vehicular road system, which entails demapping a small portion of the existing mapped parkland;
- A zoning map amendment to assign a zoning district (M1-1) to the areas being de-mapped as park and simultaneously mapped as public place;
- A zoning map amendment to vacate the NA-1 zoning where it currently exists on the site; and
- A zoning text amendment to remove “Fresh Kills Park” from Section 105-941 of the current zoning text.

New York City departments and agencies that are involved and interested agencies in this regulatory and environmental review process are as follows:

- Department of Parks and Recreation (lead agency)
- Department of City Planning (involved, assisting DPR)
- Department of Design and Construction (interested)
- Department of Environmental Protection (involved)
- Department of Health and Mental Hygiene (interested)
- Department of Sanitation (involved)
- Department of Transportation (involved)
- Public Design Commission (involved)
- Landmarks Preservation Commission (interested)
- New York City Office of Environmental Coordination (interested)
- New York City Office of Environmental Remediation (interested)
- New York City Transit Authority (interested)
- Office of the Staten Island Borough President (interested)
- Department of Cultural Affairs (interested)
- Staten Island Transportation Task Force (interested)

STATE OF NEW YORK APPROVALS

As described above, there are a number of state approvals necessary to move the project forward including Part 360 landfill regulatory approvals, modifications to the approved Final Closure Plan,

¹ The area of the proposed park is shown on Figure 1-40.

and approvals and modifications to the Order of Consent for landfill closure; approvals for activities in tidal wetlands and adjacent areas; protection of waters; and access and construction of structures over a state highway (Route 440). State of New York departments and agencies that are involved and interested agencies in this process are as follows:

- Department of Environmental Conservation (involved)
- Department of State (involved)
- Department of Transportation (involved)
- Office Of Parks, Recreation And Historic Preservation (interested)
- Department Of Health (interested)

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The Metropolitan Transportation Authority (MTA)/New York City Transit (NYCT) is an interested agency in the project primarily for the purposes of providing transit service, The proposed project would also coordinate with MTA/NYCT for the provision of enhanced bus service to the proposed park.

FEDERAL APPROVALS

Federal approvals for the proposed project relate primarily to constructing structures over or in navigable waterways or activities in wetlands (e.g., dredging or filling) as delineated in accordance with ACOE methodologies and federally listed RT&E species consultation. Federal departments and agencies that are involved and interested agencies in this process are as follows:

- United States Army Corps of Engineers (involved)
- United States Coast Guard (involved)
- United States Environmental Protection Agency (interested)
- United States Fish and Wildlife Service (interested)
- National Marine Fisheries Service (interested)

H. ENVIRONMENTAL REVIEW/ULURP AND THE PUBLIC PARTICIPATION PROCESS

The above-described discretionary actions are subject both to the City's review procedures under ULURP and CEQR as well as state and Federal permitting processes. These review processes are described below.

UNIFORM LAND USE REVIEW PROCEDURE (ULURP)

The City's ULURP process, mandated by Sections 197-c and 197-d of the City Charter, is designed to allow public review of a proposed action at four stages: the Community Board, the Borough President, the City Planning Commission, and the City Council. The ULURP process has a scheduled review period at each stage to ensure a maximum total review period of approximately seven months. This schedule is described below.

The ULURP process begins with a certification by CPC that the ULURP application is complete, which includes the accompanying environmental review (CEQR) requirements (see the discussion of CEQR, below). Once the ULURP application is certified as complete, it will be

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forwarded to the Staten Island Community Boards 2 and 3, which have 60 days in which to review and discuss the proposal, hold public hearings, and adopt recommendations regarding the application. Once the community board review, which is advisory, is complete, the Borough President reviews the application for up to 30 days. The Borough President, whose review is also advisory, would also adopt recommendations regarding the application. The Borough President then forwards the application on to the CPC. CPC then has 60 days to review the application, during which time public hearings will be held on the ULURP application and the GEIS. Comments made at the GEIS public hearing and submitted in writing afterward (the record for commenting and submitting written comments remains open for 10 days after the hearing) are incorporated into a Final Environmental Impact Statement (FEIS); the FEIS must be completed at least 10 days before CPC makes its decision on the ULURP application. CPC may approve, approve with modifications, or deny the application. If the ULURP application is approved, or approved with modifications, it moves to the City Council for review. The City Council then has 50 days to review the application and during this time will hold a public hearing on the application, through its Land Use Subcommittee. The Council may then approve, approve with modifications, or deny the application. If the Council proposes a modification to the proposed application, the ULURP review process stops for 15 days, providing time for a CPC determination on whether the modification is within the scope of the environmental review and ULURP application it reviewed. If it is, then the Council may proceed with the modification; if not, then the Council may only vote on the application as approved by CPC. Following the Council's vote, the Mayor has 5 days in which to veto the Council's action. The City Council may override the mayoral veto within 10 days.

ENVIRONMENTAL REVIEW (CEQR, SEQR, AND NEPA)

Pursuant to the State Environmental Quality Review Act (SEQRA) and its implementing regulations, New York City has established rules for local environmental quality review, abbreviated as CEQR. CEQR provides a means for decision-makers to systematically consider the environmental effects of a proposed project along with other aspects of project planning and design, as well as a comparison with reasonable alternatives, and to identify, when practicable, mitigation measures that eliminate or reduce significant adverse environmental effects.

The City of New York adopted a local environmental review process under Executive Order 91 from which the City Rules of Procedure for local environmental review were developed. The guidance for the City's methodologies for performing environmental review are presented in the *City Environmental Quality Review Technical Manual* (October, 2001), which was used by DPR for the preparation of the DGEIS.

In accordance with the requirements of SEQR, CEQR review adapts and refines the State rules to take into account the local circumstances in New York City. As stated above, it is the purpose of this GEIS and its supporting documents to address the issues relative to SEQR for state agencies that are involved in this environmental review process.

In addition, the proposed project requires a number of federal approvals. The environmental review process at the Federal level is performed in accordance with NEPA. Beginning with scoping, DPR has coordinated with the Federal agencies and has applied federal criteria (e.g., ACOE wetland delineations) where appropriate in order to ensure that a coordinated environmental review with federal agencies has been prepared as part of this GEIS that meets the coordinated review requirements of CEQR, SEQRA, and NEPA, insofar as possible.

Coordination with all City, State, and Federal agencies will continue through the preparation of the FGEIS, the statements of findings, and the permit review processes that are necessary to implement the proposed project.

A more detailed description of the environmental review process followed in the preparation of this GEIS follows.

Establishing a Lead Agency: Under CEQR, the “lead agency” is the public entity responsible for conducting environmental review. Usually, the lead agency is also the entity principally responsible for carrying out, funding, or approving a proposed action or project. In accordance with the CEQR rules, DPR distributed a lead agency letter to all involved and interested City, State and Federal agencies in April 2006. There were no objections and DPR is the lead agency for the preparation of this GEIS.

Determination of Significance: The lead agency’s first task is to determine whether the proposed project or action may have a significant adverse impact on the environment. To do so, the lead agency prepares an Environmental Assessment Statement (EAS), which is the City’s form for determining whether a significant adverse environmental impact may occur as a result of a proposed project or action. The Fresh Kills Park EAS was issued in April, 2006. Based on that EAS, DPR determined that the proposed project may have a significant adverse impact on the environment and issued a Positive Declaration, requiring that an EIS be prepared.

Scoping: Once the lead agency issues a Positive Declaration, it must then issue a Draft Scope of Work for the EIS. “Scoping,” is the process of identifying the environmental impact analyses, and methodologies to be used for the EIS, and the key issues to be studied. Under CEQR, environmental review for preparing an environmental impact statement requires a public scoping meeting at the outset of that process. In accordance with the City’s Rules of Procedure for preparing an EIS, a Fresh Kills Park Draft Scope of Work to Prepare a DGEIS was prepared and distributed to all involved and interested City, State and Federal agencies, the general public, elected officials and the local Community Boards 2 and 3 in April 2006. A public scoping meeting on that Draft Scope of Work was then held on May 24, 2006. Based on the comments received at that scoping meeting and in comments subsequently received in writing, modifications were made to the draft scope and a Final Scope of Work was issued by DPR on August 31, 2006. This Final Scope established the methodologies and the framework for analyses presented in this GEIS.

Draft Generic Environmental Impact Statement (DGEIS): This DGEIS has been prepared in accordance with the Final Scope of Work (see Attachment A). The Lead Agency has reviewed all elements of the DGEIS, relying on other City State and Federal agencies to assist, as appropriate, in determining its completeness. Once DPR was satisfied that the DGEIS was complete for public review, it issued a Notice of Completion and circulated the DGEIS for public review. The Notice of Completion for this DGEIS was issued on May 16, 2008.

Public Review: Publication of the DGEIS and issuance of the Notice of Completion starts the public review period. During this time, the public, interested and involved agencies and elected officials have the opportunity to review and comment on the DGEIS either in writing or at a public hearing convened for the purpose of receiving such comments. DPR will publish a notice of that hearing at least 14 days in advance, and will accept written comments for 10 days following the close of the hearing. All substantive comments received at the hearing become part of the record and will be summarized and responded to in the FGEIS.

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Final Generic Environmental Impact Statement (FGEIS): After the close of the public comment period for the DGEIS (the comment period closed September 30, 2008), DPR prepared an FGEIS. This FGEIS incorporates relevant comments on the DGEIS (see Chapter 28) as well as modifications to the text, graphics, and tables in response to those comments (see the double underlined text). DPR has determined that this FGEIS is complete, and has issued a Notice of Completion and circulated the FGEIS. As stated above, the FGEIS must be issued (with the Notice of Completion) at least 10 days before the Lead Agency (DPR) or an involved agency (CPC) can make a decision on the proposed project and the related actions. *