Chapter 3: Affected Environment

Funding and Programming. NPS-wide programs maintain a five-year funding cycle; it is important that Gateway projects be submitted and programmed to these multi-year lists. The park should improve the updating and revising of the Annual Checklist Program to reflect existing conditions for museum collections. Additional staffing is a critical need.

Visitor Use and Experience

Spanning three New York City boroughs and the northernmost portion of the New Jersey shore, Gateway's park lands stand in sharp contrast to the nearby metropolitan area and offer abundant opportunities for residents and visitors to recreate and experience nature and historic settings. Natural areas; water, beaches, and coastal views; historic coastal defense and maritime structures; diverse recreation opportunities; and educational and interpretive programming combine to create rich and varied visitor experiences at Gateway.

The Gateway lands and waters serve many millions of visitors a year, making Gateway an important urban park environment on the East Coast and in the New York and New Jersey Metropolitan area.

Visitor Use and Characteristics

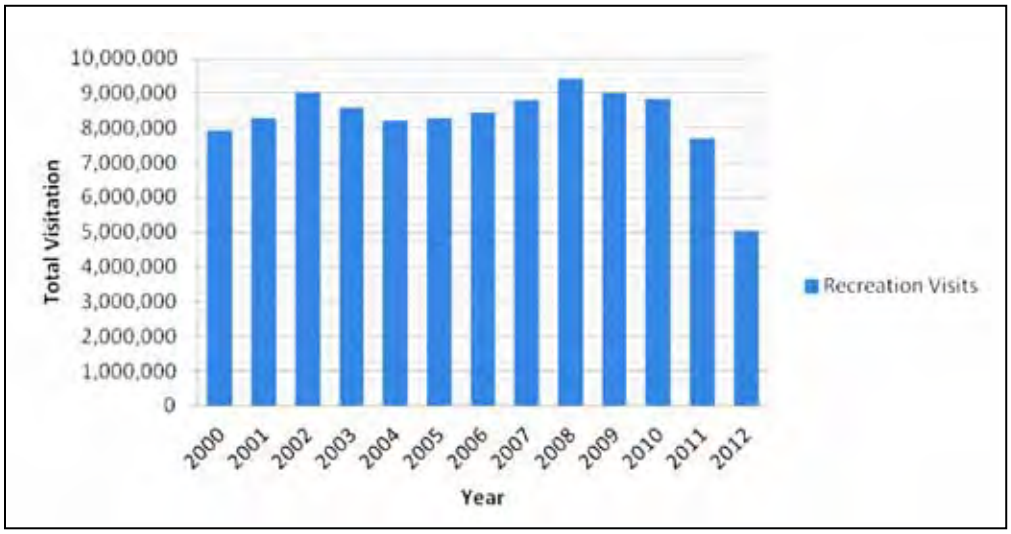
To inform the general management planning effort for Gateway, in 2009 the NPS commissioned Pennsylvania State University's Department of Recreation, Park, and Tourism Management to synthesize findings from past visitor studies and analyze areawide demographics characteristics and projected trends (Mowen, Graefe, and Graefe 2009). Relevant visitor characteristics from the Pennsylvania State University synthesis are summarized in this section (see the "Visitation Patterns" section in this chapter) along with park visitation statistics reported on the NPS Integrated Resource Management Applications portal (NPS 2013c, 2013d).

The Gateway lands and waters serve many millions of visitors a year, making Gateway an important urban park environment on the East Coast and in the New York and New Jersey Metropolitan area. Encompassing 27,025 acres of land and water in New York City and New Jersey, the three units of Gateway form an expansive public green space for both the local urban population and tourists to enjoy.

In 1974, the first year that the park reported visitation, Gateway had over 3.8 million visitors. Substantial increases and a few intermittent decreases have occurred since then, but annual visitation has remained around 9 million total visitors over the last 10 years (NPS 2013c) (figure 3-14 on next page).

Gateway recreation visitation typically ranks it within the top five parks in the national park system (NPS 2013c). Many of the sites in Gateway are in the "backyard" of New York City and New Jersey residents, who use the park lands for recreation and exercise. At most park sites, people from the local area account for the majority of visitors. A review over the last five years indicates that visitor use levels peak in the summer months, decrease in the fall, and are lowest in the winter and spring.

Figure 3-14. Gateway Recreation Visitation by Year (2000-2012).

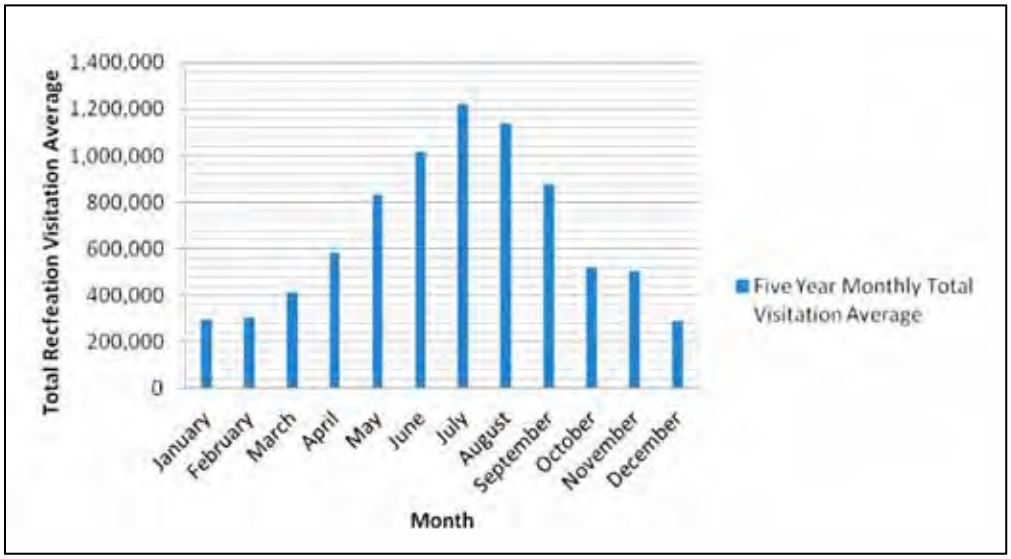


Source: NPS Public Use Statistics Office.

Note: Storms impact visitation numbers. Hurricane Irene in 2011 impacted visitation, and Hurricane Sandy in 2012 caused the park to close for just over two months.

The weather patterns along the northeastern seaboard are the largest influence on these demand fluctuations because visitor demand is tied to outdoor recreation activities (NPS 2013d) (see figures 3-14 and 3-15). This seasonal visitation pattern is reflected in the highest beach use occurring in the summer through early fall. Interpretive and Education and Visitor Services park staff focus on the pulses of school group programming, which typically occur in the spring and fall, with youth group visitation in summer. In addition, at the Jamaica Bay Wildlife Refuge, the spring and fall bird migrations typically result in visitation increases.

Figure 3-15. Gateway Recreation Visitation By Month (2008-2012) Five-Year Average.



Source: NPS Public Use Statistics Office

Annual Visitation

Since 2000, annual recreation visitation has fluctuated between 5 and 9.4 million, typically hovering between 7.7 and 9.4 million (figure 3-14). Recreation visitation has been selected as the more appropriate element to measure since it relates to individuals visiting the park for the purpose of recreation visits. Non-recreation visitation includes suppliers and vendors traveling in and out of the park for non-recreation purposes. Visitation in 2012 was only 5 million because of park closures (November 2012–December 2012) due to Hurricane Sandy that resulted in unusually low visitation in the last quarter of the year. For example, in December 2012, total visits were down 96 percent from December 2011; annual park visitor numbers were down 40 percent from 2011 totals. Additionally, in 2011 Hurricane Irene impacted visitation levels. Subtracting the 2012 visitor numbers, annual visitation since 2000 has averaged 8.5 million. Interestingly, in the park's early years of establishment between 1975 and 1986, annual visitation averaged 8.9 million, so no substantial change in annual visitation has occurred over the course of the park's 38 years (NPS 2013c).

Seasonal Visitation

Summer is when the most people visit Gateway, with July and August typically being the park's busiest months. The spring and fall also see high visitation, and then numbers begin to taper off in November through February, with the quietest time during January (NPS 2013d).

Visitation Patterns

The last parkwide visitor study conducted at *Gateway was the Gateway National Recreation Area General User Study* administered by the NPS Cooperative Park Studies Unit in 1991 (NPS 1991). Although efforts were made to survey visitors across all three park units, a majority of survey respondents were from the Sandy Hook Unit (59 percent), Great Kills (20 percent), and Jacob Riis Park (16 percent). Thus, overall study findings should be considered with this setting bias in mind. The 1991 survey revealed the following characteristics of the Gateway user:

- The average age was 43.7 years, with 46 percent under 30 years old.
- Most visitors were in larger groups, with an average of 5.9 people per group.
- Only 17 percent visited these Gateway units alone.
- Over the past 12 months, 36 percent visited 10 or more times and 25 percent visited only 2 to 4 times.
- Approximately 60 percent of respondents visited for two to five hours and were more likely to report visiting with family (39 percent) than with friends, friends/family, or alone.

The 2003 *Floyd Bennett Field Visitor Study* revealed additional information on the patterns and characteristics of Gateway visitors (NPS 2003a). Although study results and the visitation patterns they reveal are specific to Floyd Bennett Field, it is worth noting that the study's findings are consistent with future projections identified in the NPS Northeast Region's visitation trends report (Godbey et al. 2001).

The *Floyd Bennett Field Visitor Study* assessed race/ethnicity and found that a majority of visitors were White (82 percent), but a sizable minority was African-American (15 percent) or Hispanic (9 percent). The study showed frequent visitation to Floyd Bennett Field, with 47 percent visiting 21 or more times in the past 12 months and 53 percent reporting that they visit once a week. Visitors tended to arrive at midday (68 percent). A majority (56 percent) stayed four or more hours during their visit and visited in small groups of one to two people (72 percent). Floyd Bennett Field was more likely to attract single visitors or groups composed of friends only (versus friends/family, family) (NPS 2003a).

In 2007, the National Parks Conservation Association (NPCA) commissioned an online poll of New York City residents' awareness of, use of, and attitudes toward Gateway. This poll was conducted by Zogby International, Inc. (Zogby) and targeted a broad sample of New Yorkers who were both park users and nonusers. The NPCA/Zogby study revealed that nearly half (47 percent) of New York City area residents were unaware of Gateway, and 39 percent had never visited the park. Forty-four percent of New York City area residents who had visited Gateway evaluated the park facilities as below average in comparison to other national parks, particularly regarding restrooms, beaches, historic buildings, and trails (NPCA 2007d). When asked why they rated Gateway lower, respondents commonly noted dirty water, limited recreation opportunities, poor beaches, dirty bathrooms, poor facility conditions, and overcrowding. This poll also found that a majority of respondents (63 percent) believed that Congress and the Administration should increase the federal budget to benefit Gateway and agreed that both the city and state should also help fund restoration efforts at Gateway (53 percent) (NPCA 2007d).

The Pennsylvania State University research team used data from this online poll to create a general picture of both Gateway user and nonuser characteristics. The Pennsylvania State University research team compared socio-demographic characteristics of poll respondents who said that they had recently visited Gateway ("Recent User"—less than five years ago), had visited Gateway a long time ago ("Lost User"—more than five years ago), and who had never visited Gateway ("Never User"). Results of this analysis revealed that Gateway Never Users were more likely to be younger (18 to 29 years) (table 3-7). This finding is consistent with the general observations made at the Gateway staff workshops. At the same time, however, the 50- to 64-year-old baby boomer respondents were more likely than other age groups to have visited Gateway more than five years ago (Lost Users) (Mowen, Graefe, and Graefe 2009).

User comparisons also revealed that females were much more likely than males to be Never Users, whereas males were much more likely than females to be Recent Users (table 3-7). Low-income households (under $35,000 annually) were more likely to be Never Users, whereas middle- and higher-income households were more likely to be Recent Users (table 3-7). Finally, African-Americans were more likely than other race/ethnic groups to be Gateway Never Users, Asians were more likely than other race/ethnic groups to be Recent Users, and respondents from the Other race category were least likely to be Recent Users. These results indicate that strategies to attract and appeal to females, African-American residents, younger adults, and low-income people should continue and expand if Gateway is to be relevant to future New Yorkers (Mowen, Graefe, and Graefe 2009).

Table 3-7. Demographic Comparison of Gateway Never, Recent, and Lost Users.

Demographic Characteristic	Never Visited (Never Users)	Visited More than 5 Years Ago (Recent Users)	Visited within the Last 5 Years (Lost Users)
Age Group			
18–29	55.5%	5.8%	38.7%
30–49	43.0%	19.7%	37.3%
50–64	33.9%	30.0%	36.2%
65+	38.2%	31.4%	30.4%
Sex			
Male	33.0%	23.4%	43.7%
Female	47.6%	24.1%	28.3%
Household Income			
$0–$34,999	61.0%	24.0%	15.0%
$35,000–$74,999	45.4%	18.9%	35.8%
$75,000 or Greater	33.1%	28.1%	38.8%
Race/Ethnicity			
White	39.5%	23.5%	37.0%
Hispanic/Latino	39.4%	33.0%	30.3%
African-American	48.2%	24.1%	27.7%
Asian	42.9%	0.0%	57.0%
Other	44.1%	35.3%	20.6%

Source: NPCA 2007d.

Visitor Experience and Recreation

Gateway offers a wide array of recreational opportunities and programming throughout the year. Interpretive and recreational offerings range from ecology walks and kayak lessons to history tours and urban camping. The park's trails and natural areas invite self-guided exploration and discovery of the habitats and historic resources, whereas the Gateway beaches present opportunities for relaxation and retreat from the more congested urban environs that surround the park. Finally, the park's athletic fields, picnic facilities, and playgrounds provide community-based recreation opportunities and attract neighboring residents into the park.

From their 2009 synthesis of visitor survey data, the Pennsylvania State University research team found that the most popular recreational activities at Gateway were swimming, picnicking, fishing, bicycling, sunbathing, walking/hiking, gardening, birding, and visiting historic sites. Activity trends identified by Gateway staff are increases in walking (including dog walking), bicycling, fishing (including net fishing), and special events, and decreases in sunbathing (Mowen, Graefe, and Graefe 2009). Recreational activities that were frequently cited as "favorites" during public scoping included boating, fishing, kayaking, biking, swimming, hiking, birdwatching, canoeing, crabbing, exploring, wind surfing, scuba diving,

historic ship viewing, and sightseeing (NPS 2012b). Introduced in all three units in the summer of 2011, camping is also emerging as an increasingly popular park recreational use.

The visitor survey cards collected during 2006 to 2008 by each unit showed that overall, the highest satisfaction lies with recreational services (such as learning about nature, history, or culture; outdoor recreation; and sightseeing), at 85 percent, followed by visitor services (such as assistance from park employees, park maps/brochures, and ranger programs), at 79 percent (Mowen, Graefe, and Graefe 2009). The survey also showed that 75 percent of respondents were satisfied with facilities (such as visitor centers, restrooms, walkways/trails, and campground/picnic areas).

The multiple types of recreation opportunities and visitor experiences available at Gateway are described below.

Trails and Opportunities for Exploration, Adventure, Discovery, and Solitude

Trails are a significant part of the park and offer many recreation opportunities. Trails open up Gateway park lands for recreational use and facilitate the exploration and enjoyment of the park's natural habitats, coastal defense resources, and maritime resources. Approximately 33 miles of official NPS trails at Gateway, which range from paved surfaces to single-track paths, provide walker and hiker access to and through the park's developed and natural areas. With little elevation change, most trails are easy to moderate in terrain and from 0.1 mile to 6 miles in length. Although some trails are heavily used and traverse developed areas, others provide backcountry-like experiences where visitors venture into relatively remote areas and encounter few if any developed facilities. Portions of Gateway's trails are open to bicycles, including the 6.1 miles of multi-use paths at Sandy Hook.

Water-based Recreation

With all its park lands bordering a water body and two-thirds of the park's 27,025-acre area covered in water (17,500 acres), Gateway offers an abundance of water-based recreation opportunities, including fishing, scuba diving, boating, swimming, surfing, and wind sports such as kite boarding, sailing, and windsurfing. Nearly every park site in Gateway provides fishing access. Additionally, there are many hand-launch sites for kayaks, canoes, and other small non-motorized watercraft. Water-based recreation programming includes seining programs, canoe and kayak tours, boat tours, and sailing classes.

Beaches

Beaches play an important role in recreational activities for visitors in the park. Guarded swim beaches at Sandy Hook, Great Kills, Jacob Riis Park, and the Breezy Point Surf and Silver Gull Beach Clubs provide places for visitors to walk, jog, sunbathe, picnic, surf, and swim. Visitation to these beaches is highly weather dependent, with the heaviest use occurring during the summer months. Unguarded beaches at Fort Wadsworth, Miller Field, Fort Tilden,

Breezy Point Tip, and Plumb Beach offer a more natural visitor experience and provide opportunities for fishing, wind sports, beach walks, surfing, and nature study.

Marinas

Gateway has two marinas, both of which are concession-run recreation facilities: Nichols Marina in Great Kills Harbor at Great Kills Park and Gateway Marina in Dead Horse Bay at Floyd Bennett Field. The Nichols Marina was extensively damaged by Hurricane Sandy, but the NPS has committed to reconstructing a marina at Great Kills Park. Both marinas accommodate motorized and non-motorized watercraft and offer dockage as well as boat storage. Overnight stays at the marinas are prohibited.

The Rockaway Yacht Club on the inlet side of Fort Tilden is currently operated under a lease and is not open to public recreation.

Camping

In 2011, camping opportunities were expanded across the park, and camping is now offered as an overnight recreational use in all three park units. With only 87 campsites parkwide, camping opportunities at Gateway are limited compared to camping at more distant and remote national parks. However, the opportunity Gateway affords to camp in the New York City metropolitan area is a unique recreation experience.

Three varieties of camping experiences are offered at Floyd Bennett Field and include programmatic camping at Ecology Village, walk-in tent camping at Goldenrod and Tamarack Campground (40 sites), and recreational vehicle (RV) camping at an RV park (20 sites). On Sandy Hook and Staten Island, walk-in tent camping is offered at Camp Gateway (20 sites, on Sandy Hook) and Camp Hudson (7 sites, on Staten Island). Walk-in campsites typically include a picnic table, grill, and fire ring.

Because Fort Wadsworth's Camp Hudson opened on July 6, 2011, approximately half the campsites were occupied during the week throughout July 2011. Weekends were completely booked, as was the entire month of August. Although more than half the visitors to Camp Hudson are local, the small site has attracted visitors from all corners of the globe, thanks in part to Reserve America (a free iPhone application) and to Frommer's travel guide, *NYC Free & Dirt Cheap* (NPS 2012a).

Picnicking

Visitors enjoy opportunities for picnicking at designated picnic sites in Gateway parks. Group picnic facilities are offered at Guardian Park at Sandy Hook, Miller Field, Jamaica Bay Wildlife Refuge, Frank Charles Memorial Park, Canarsie Pier, Fort Tilden, and Jacob Riis Park.

Additionally, picnicking on the beaches is common during the summer months.

Community Gardening

Community gardening is a current recreation use at Miller Field, Fort Tilden, and Floyd Bennett Field. Each park unit has a community garden with several plots. The community garden at Floyd Bennett Field is very large, at 7.5 acres, whereas the 2-acre garden at Miller Field hosts 100 plots and the garden at Fort Tilden is only 0.5 acre.

Concession-operated Recreation

Several concession-run recreation facilities operate in the park. These include two beach clubs on the Rockaway Peninsula, the Riis Park Pitch-n-Putt at Jacob Riis Park, and the Aviator Sports Complex and driving range at Floyd Bennett Field. As mentioned earlier, Gateway's two marinas are also operated by concessioners.

Equestrian Use

Bergen Beach is distinguished as the only area in the park that offers equestrian use. Operated by a concession, the Jamaica Bay Riding Academy at Bergen Beach features an arena and stables as well as trails. People currently board horses at Bergen Beach (approximately 100 horses) and there is limited equestrian programming.

Athletic Fields and Community-based Recreation

Both the Staten Island and Jamaica Bay Units contain parks with athletic fields, courts, and playgrounds that support a substantial amount of community-based recreation such as sports leagues and tournaments. Community-based recreation is a popular recreational use, and during public scoping many people showed support for continuing organized sports leagues and for community groups using park buildings.

The major athletic field complex at Gateway is at Miller Field. With over 30 playing fields, the park sees intensive community use and can attract 10,000 to 15,000 young people over a weekend. Smaller field complexes and court facilities (including paddle tennis, basketball, handball, and shuffleboard) are in Frank Charles Memorial Park, Hamilton Beach Park, and Jacob Riis Park. Traditional playground equipment can be found at Canarsie Pier, Miller Field, Great Kills, and Jacob Riis Park.

The Great Kills community-based recreation facilities have been closed since 2010 because of the discovery of radium and ongoing cleanup efforts. (For more about the Great Kills closure, see the "Health and Safety" section in this chapter.)

At Fort Tilden, the Rockaway Little League leases a clubhouse and land (five ball fields and one multipurpose field) at Fort Tilden to conduct Little League activities. Community groups also use buildings at Fort Tilden to host community activities and art programming. Additionally, there are rugby and soccer fields at Fort Tilden that are used by the public.

Opportunities for Visitors with Disabilities

The NPS is committed to implementing all practicable efforts to make NPS facilities, programs, and services accessible and usable by all people, including those with disabilities. Accordingly, most administrative offices and visitor contact stations; some trails, campgrounds, and fishing access; and most interpretive and visitor service facilities are accessible. Recreation facilities in undeveloped areas, outside the immediate influence of buildings and roads, have typically not been modified to be universally accessible.

Use Permits and Reservations

Although Gateway does not have an entrance fee, many of the recreation uses require permits. Fishing parking permits are required for some fishing sites in the Staten Island and Jamaica Bay Units and for all-night fishing on Sandy Hook. A fee of $50 is collected for each fishing parking permit issued. These fees are used to offset the costs of administering the permitting program. The permit is valid for the calendar year in which it is issued. Additionally, there are beach parking fees at Jacob Riis Park and Sandy Hook.

Special-use permits are required by the NPS for several other recreation activities in addition to fishing, including the following: parking (beach, surfing, off-road, nature study, and archery), public camping, youth group camping and programs, overlook, picnics, ceremonies, athletic fields, gardens, facility, special events, after-hours park access, filming, photography, and other activities.

Visual Quality: Scenic Natural and Historic Settings

Nature study / wildlife observation and discovering historic sites are two recreation opportunities at Gateway that are associated with the park's scenic qualities.

The open, natural spaces and historic settings preserved in Gateway are a dramatic contrast to the surrounding city environment and provide an attractive location for the park's many recreational uses. During scoping for this plan, the public expressed appreciation for the scenic qualities of the park and the quiet and solitude that they offer. The importance of maintaining access to the park's diversity of natural landscapes and preserving the opportunity to experience nature and view wildlife and native plants was also noted.

Nature Study

Wildlife observation is a prevalent recreation activity for visitors in all three units, with the most popular wildlife observation or nature study activity being birding. Opportunities for watching wildlife and taking in natural scenes are available throughout the park from trails, blinds, park roads, and the water. Urban naturalists and birders seek diverse habitat in the park to maximize the number of species seen, typically looking for places that offer access to different ecosystems. In particular, the Jamaica Bay Wildlife Refuge and Sandy Hook are the most popular destinations for naturalists and birders. Jamaica Bay Wildlife Refuge, Sandy Hook, Floyd Bennett Field, and Fort Tilden include trails through natural areas and viewing blinds or other observation facilities that help facilitate and encourage nature study.

Discovering Historic Sites

Learning about the area's history is also an important part of the Gateway visitor experience tied to the park's scenic and preserved historic settings. Cultural resource–based recreation opportunities include self-guided exploration and discovery of forts and batteries along trails as well as the guided tours and programming.

The opportunities to "discover" historic structures and view signs of military and maritime history enrich the visitor experience at several Gateway park sites. At Fort Wadsworth, Fort Tilden, and Sandy Hook, for example, visitors can follow a trail from the more popular areas of the park into the backcountry and find themselves alone in the presence of impressive batteries and fortifications. Some of the more visible and prominent structures, such as Battery Weed and Fort Tompkins, are interpreted on site with signs and overlooks, whereas others, like Battery Harris East and Battery Kessler at Fort Tilden, have no interpretive signs and therefore carry a bit of mystique to the visitor trying to determine their role in defending New York City.

Night Skies

Section 4.10 of NPS Management Policies 2006 (NPS 2006a) recognizes that the natural lightscapes of parks are a natural resource and value that exist in the absence of human-caused light. As such, the NPS is directed to preserve this resource and value to the greatest extent possible. The natural lightscape of a park plays a role in natural resource processes and affects biological behavior, as well as being a feature that contributes to the visitor experience. Viewing of the night sky is an important aspect of visitor experience in Gateway and "darkness and night sky" is recognized in this GMP/EIS as one of the park's fundamental values.

Given its context in the New York City metropolitan area, the park's night sky visibility is affected by light pollution from the urban environment throughout the park; however, the light pollution is dissipated in the more remote reaches of the park. For example, Sandy Hook night skies are less impacted by human-caused light sources than those of the Staten Island and Jamaica Bay Units due to Sandy Hook being more distant from New York City and urban development.

While completely natural night skies are not obtainable given the surrounding urban environment of New York City, many of Gateway's park sites do offer relatively dark night skies, where the overnight or evening visitor can experience night skies in a natural setting with only dim and distant artificial lights. In the interior and/or more remote sections of the following park lands, artificial light sources do not impair night sky viewing opportunities: Sandy Hook, Great Kills Park, Breezy Point Tip, Fort Tilden, Jamaica Bay Wildlife Refuge, Bergen Beach, and Floyd Bennett Field. Currently, astronomy programs that draw audiences to appreciate the park's night sky are incorporated into programming at Floyd Bennett Field's Ecology Village and at Great Kills Park.

Sources of artificial lighting in the developed areas of the park that intrude into the atural lightscapes include but are not limited to lit building entrances, operations and maintenance structures, parking lots and pathways lit as necessary to meet safety requirements, the lighthouse at Sandy Hook, night lighting at the Riis Park Pitch-n-Putt course, and lights at the Great Kills and Gateway marinas. Where possible, the park does use dark-sky-compliant lighting.

Soundscapes

The NPS mission addresses the protection and enhancement of acoustical environments and soundscapes. A soundscape can be defined as the human perception of acoustic resources (i.e., physical sound sources). The acoustical environment is the combination of all the acoustic resources within a given area. This includes natural sounds and cultural sounds, as well as non-natural human-caused sounds. Gateway's fundamental values include "Feelings associated with open space in a high-density area" and "Direct sensory experience with natural elements," both of which are affected by the acoustical environment (NPS 2012b). In an urban environment like Gateway, the acoustical environment and soundscapes fluctuate with the numbers of visitors who introduce human-caused sounds into the environment and with surrounding land uses.

The soundscapes of Gateway park lands, especially on their coastal edges and in their interiors, are less noisy than the park's urban surroundings.

The NPS is required to preserve, to the greatest extent possible, the natural soundscapes of parks. NPS *Management Policies 2006* (Section 4.9, "Soundscape Management") and Director's Order 47: *Soundscape Preservation and Noise Management* (NPS 2006a, 2000), recognize that soundscapes are a park resource and state that the NPS is to restore degraded soundscapes to natural conditions whenever possible and protect natural soundscapes from degradation due to noise (i.e., undesirable human-caused sound). In addition, the NPS recognizes the value of cultural soundscapes, which play an important role in connecting park visitors to the history and heritage of NPS cultural resources. NPS Management Policies 2006, Section 5.3.1.7, states, "[t]he Service will preserve soundscape resources and values of the parks to the greatest extent possible to protect opportunities for appropriate transmission of cultural and historic sounds that are fundamental components of the purposes and values for which the parks were established" (NPS 2006a).

The soundscapes of Gateway park lands, especially on their coastal edges and in their interiors, are less noisy than the park's urban surroundings. Noise is generally defined as unwanted or objectionable sound that alters or disturbs quality of life or communication. It also affects physical health if it is very loud or continuous. Most environmental noise, particularly in urban areas, consists of a variety of frequencies of common, distant noises that create relatively constant background noise levels. In New York City, the primary source of noise in most areas is traffic (NYCPC 2013). Average decibel levels in the region range between about 60 and 74 A-weighted decibels (dBA), but can fluctuate from as low as about 55 dBA to as high as 84 dBA (NYCPC 2012, 2013). Comparable sound levels are human conversation, 60–65 dBA; a heavy truck passing at 15 meters (80–90 dBA); or background noise in an office (50 dBA) (Cowan 1994). Periodic loud noises, such as construction sounds, horns honking, road noise, trucks driving by, or low-level aircraft, are easily perceived above background noise levels. Many of Gateway's natural areas offer a unique opportunity to find a relatively quiet place amid a loud urban soundscape.

Acoustical environments include natural, cultural, and human-caused sounds. Natural soundscapes include all naturally occurring sounds, such as birdcalls or thunder. They also include the "natural quiet" that occurs in the absence of human-caused sound. The opportunity to experience natural sounds and quiet is a fundamental part of visitor experience at Gateway.

The most common human-caused sources of noise at Gateway are listed below. Some of these sound sources, such as watercraft and operational noises, temporarily impact the acoustical environment. In contrast, the sounds of streets and human voices are part of the acoustical environment of an urban park, such as Gateway.

Watercraft. Noise from motorized watercraft and other vessels on Gateway's waters, as well as ship noise, can be heard at the park. These noise sources include the Staten Island Ferry horn, which is particularly acute at Fort Wadsworth.

Vehicles. The busy thoroughfares, traffic patterns, and city streets surrounding Gateway's park lands generate sounds such as honking, emergency vehicle sirens, road noise, road construction, and trains. The Verrazano-Narrows Bridge is a significant source of transportation noise at Fort Wadsworth.

Aircraft. Commercial airplanes fly low over several of the Jamaica Bay park lands as they approach and departure from John F. Kennedy International Airport. This noise is particularly loud on the waters of Jamaica Bay and at the Jamaica Bay Wildlife Refuge. Commercial helicopter flights also fly low over several areas of park lands and impact the park experience. In addition, banner planes advertise along the beaches and impact the natural beach soundscape.

Airports and Development. As airports seek to enhance their services and facilities, the interface between national parks and airport areas increases.

Human Voices. The voices of people recreating and picnicking, as well as associated sounds of human use, including radios, can be heard throughout the park. Popular recreation destinations like Miller Field and Jacob Riis Park tend to be crowded with visitors and this activity amplifies the sound of human voices. These noises are also intensified during special events hosted on the park lands (e.g., tournaments at Miller Field, the New York Marathon at Fort Wadsworth).

Park Operations and Maintenance. Temporary sounds from park operations and maintenance include lawnmowers, construction, heavy machinery needed for natural resource restoration projects, generators, and the park's and partners' trucks.

Human-caused noise is perceptible throughout most of the park lands in the Staten Island and Jamaica Bay Units and to a significantly lesser degree in the more remote Sandy Hook Unit. These human-caused noises, however, dissipate as one moves into the interior of most of Gateway's park lands, and the sounds and quiet of the natural soundscape become

apparent. The coastal edges of Gateway's park lands, in particular, are soundscape "havens," where the natural soundscape is perceptible and the noises of the urban surroundings is diminished.

The peninsula of Sandy Hook is isolated and is, therefore, a place almost free of human-caused sounds in Gateway. Away from visitor facilities, crowded beaches, and Hartshorne Drive, most of the sounds heard are natural and include waves, wind, and birdcalls. At the campground, in recreation areas on the bayside, on northern beaches (e.g., North Beach and Gunnison Beach), and along the multiple use paths, the natural soundscape predominates and there are few human-caused sounds other than human voices. Although there is more activity at Fort Hancock and the sounds of other visitors, cars, and the ferries create human-caused noise, it is still a relatively quiet environment where visitors can appreciate the natural soundscape.

In the Staten Island and Jamaica Bay Units, the quietest places where visitors can retreat from the noises of the urban surroundings include Crooke's Point at Great Kills, Breezy Point Tip, Fort Tilden, Jamaica Bay Wildlife Refuge, Bergen Beach, and Floyd Bennett Field's North Forty area.

Education, Interpretation, and Understanding

In addition to the recreational opportunities throughout the park, Gateway offers varied experiences to visitors through interpretation, education, and stewardship programs, including the only overnight tent camping program in New York City for school and youth groups. The Gateway Interpretation and Education Division manages various interpretive and educational activities for individuals, youth, school groups, and families, which are designed to illuminate and build appreciation for Gateway's history and ecology. The interpretation and education division is responsible for connecting people to the park and is heavily engaged in community outreach. Educational and interpretive programs are developed to encourage more enjoyment of park resources and facilitate a greater appreciation of the cultural and historical significance of the park setting and historic structures, located strategically at the entrance to New York Harbor. Programs offered by the park and its partners range widely from living history reenactments to ranger-led wildlife observation walks to lantern tours of the coastal defense forts.

In addition to the recreational opportunities throughout the park, Gateway offers varied experiences to visitors through interpretation, education, and stewardship programs, including the only overnight tent camping program in New York City for school and youth groups.

The Gateway interpretive and educational programs were noted and supported during public scoping. It was suggested that programs and activities should target a wide range of ages, from youth to senior citizens, and should be offered throughout the day and the year to accommodate different schedules. Several people suggested that expanding the number of partnerships with local educators and educational institutions, nonprofit groups, community organizations, and interest groups would increase the capacity of Gateway's educational programming. In the Sandy Hook Unit, there are several partners who provide the majority of education programs, and similar arrangements would be desirable in the Jamaica Bay and Staten Island Units.

Pre-visit Information and Orientation

According to anecdotal information collected by park staff, most visitors to Gateway rely on information from friends and relatives who have been to the park, the Internet, and the park website. The park website contains helpful trip planning information, including directions, operating hours, fees and reservations, description of park activities and recreational opportunities, photos and media, background information and interpretive media, photos and multimedia, downloadable maps, and general park management news. Additionally, the park website is updated regularly and is a valuable source of information during park alerts and/or closures due to adverse weather conditions.

Entrances to Gateway parks are signed, but sign design is not consistent across the park and signs are not always clearly visible. Because of poor wayfinding and a lack of NPS visibility at parks like Fort Wadsworth, visitors not familiar with the area or with Gateway often become confused and disoriented. The park is trending toward using new methodologies and technologies such as Quick Response tags and other mobile phone technologies to better inform visitors and potential visitors.

Park bulletin boards and information kiosks throughout the park include standardized "You Are Here" map boards and information about Gateway and the particular unit visitors are in. This is the primary source of orientation for many park visitors, especially in areas that have no staffed contact station.

Interpretation

Interpretation is delivered through various media and at several locations. Learning opportunities range from self-guided tours of historic settings to formal educational programs. Visitor and park information centers are at Jamaica Bay Wildlife Refuge, Floyd Bennett Field, and Fort Wadsworth's Mont Sec House as well as at Horseshoe Cove, Sandy Hook Lighthouse, and Fort Hancock History House on Sandy Hook. At these facilities, visitors can interact with rangers, view exhibits, and learn about activities such as ranger-led tours, self-guided tours, and recreation opportunities. The visitor contact stations at Fort Wadsworth and Canarsie Pier are no longer staffed or open to the public.

Park staff interprets Gateway resources by several methods, including exhibits, ranger tours and talks, educational brochures, campfire programs, and outdoor interpretive panels (known as wayside exhibits). Digital media, including podcasts and social media posting, are also used to share information about the park's resources and history. At Sandy Hook and Fort Wadsworth, NPS partners conduct living history programs.

Educational Programming

The Education and Interpretation Division offers natural and cultural resources education programs to school groups, youth groups, and community organizations. The programs provide hands-on opportunities for learning and promote the protection of natural and cultural resources in the park and the environment as a whole. These programs support the curriculum goals of New York and New Jersey schools.

Environmental education programs are offered in several Gateway sites. For example, at Ecology Village in Floyd Bennett Field, the NPS provides curriculum-based overnight camping programs for school groups and nonprofit organizations, as well as teacher training sessions. Other park sites that have environmental education programming, such as naturalist and wildlife hands-on studies, include the Jamaica Bay Wildlife Refuge, Education Field Station at Great Kills Park, Fort Wadsworth, and Sandy Hook.

Junior Ranger Program

The Junior Ranger Program is available for students and families at the Jamaica Bay, Staten Island, and Sandy Hook Units. The program provides young people age 7 to 12 an enjoyable and meaningful way to explore the resources and history of the park. Upon completion of the program, junior rangers receive a certificate and a patch.

Volunteer Stewardship

Gateway volunteer programs offer opportunities for visitors to become involved in stewardship of the park. In 2012, Gateway had 4,929 volunteers who worked 87,255 hours, with most volunteers ranging in age from 26 to 55. Volunteer programs typically involve cleanups, defined construction projects, habitat restoration, and conservation. One volunteer activity is the BioBlitz, a 24-hour rapid assessment of what lives in a particular area at a given time orchestrated by park staff, partners, and volunteers. In 2011, nearly 150 volunteers and students participated in the Sandy Hook BioBlitz, which was conducted by a partnership between the NPS and the American Littoral Society. The BioBlitz and other natural resource stewardship activities bring school-age young people, college students, naturalists, and community residents to the park, offering them a deeper connection with park lands and exposure to the natural, cultural, and recreational resources that Gateway offers. Other volunteer programs include the Historic Airplane Restoration Project, Floyd Bennett Garden Association, Ranger Rick at the Ecology Village in partnership with National Wildlife Federation, and the Sandy Hook Association working with Clean Ocean Action.

Partner Involvement

Partners play a role in promoting understanding, education, and interpretation. Partner organizations like the Audubon Society, the American Littoral Society, and the National Wildlife Federation develop and operate independent interpretive activities such as birding tours and naturalist walks. Gateway also partners with local nonprofits and other partners to offer introductory recreational programming, such as kayak lessons. Finally, "friends" groups are instrumental in securing funding to help maintain historic structures, fund programs, and develop new initiatives.

The program provides young people age 7 to 12 an enjoyable and meaningful way to explore the resources and history of the park.

Health and Safety

Gateway experiences safety issues similar to those found in any national park as well as facing additional visitor safety challenges due to its urban location. Although the park staff makes considerable efforts to provide safety information in easily accessible locations and

formats, there are many points of entry into Gateway, and visitors are sometimes unaware of and unprepared for potential hazards.

Gateway's more remote natural areas and expansive waters can create hazards for visitors. The lack of lights creates problems for some urban visitors, accustomed to having streetlights and other ambient lighting, who are unprepared for darkness. This can result in people becoming lost or hurt when trying to navigate in the dark.

Gateway's waters, which include the Atlantic Ocean as well as Jamaica Bay, Sandy Hook Bay, New York Bay, and Rockaway Inlet, have associated dangers. Between 2000 and 2010, 33 visitors drowned in the waters of Gateway. Several of the drownings involved multiple victims, as people attempting to rescue the initial victim also drowned. The primary causes of the drownings are alcohol consumption, inability to swim, and swimming in deceptively calm areas that in reality have steep underwater drop-offs and strong currents. Serious injuries to swimmers in the ocean surf are primarily neck and back injuries caused by diving into shallow water and dislocations caused by pounding surf. Additionally, boat traffic and heavy winds on the water bodies create hazards for small, human-powered watercraft such as kayaks.

The most frequent injuries received by visitors occur from slips, trips, and falls. These occur primarily while climbing on rock jetties or other structures; from loose gravel, ice, or wet leaves on multi-use pathways; and while ice-skating at the concession-run sports complex.

Given the high level of visitation at Gateway, conflicts between users can sometimes pose safety problems, such as those between vehicles and pedestrians and between vehicles and bicyclists. Occasionally, incidents are also reported between walkers and bicyclists sharing the multi-use paths and greenways. Visitor use conflicts also exist between surfers, swimmers, fishers, and boaters, which can lead to serious injuries.

Closed or unmaintained cultural resources and facilities also pose risks to visitors who explore them. Many coastal defense structures across the park are in very poor and unsafe condition. They present climbing hazards with unstable surfaces and sharp objects. Although these structures are not open to public access, they are unfenced or inadequately fenced.

Health Benefits and Physical Activity

Located in a major metropolitan area, Gateway can help improve the community's health by offering residents opportunities for personal fitness, active recreation, and other physical exercise, as well as healthy food from the park's community gardens.

With its many opportunities for recreation and for connecting with nature, Gateway improves the psychological and physiological health of the New York City area residents. The park's open spaces and natural areas provide healthy retreats from the congestion of high-density urban living. They also offer healthy environments for young people to recreate and to explore and connect with the natural world.

Radiation Remediation at Great Kills Park

In 2010, sections of Great Kills Park were closed to visitation due to health and safety concerns following the discovery of radium (NPS 2010d). This section of the park remains closed today.

Small sources of radium were found in discrete areas at Great Kills Park. These radium sources, found buried more than a foot below the ground's surface, have been removed; however, since then, additional areas exhibiting above-background radiation readings have been identified within the footprint of the historical landfill at this park site. Investigation into the source of the radium contamination is ongoing; based on the limited information available, it is believed that the radium came from discarded medical treatment sources brought to the landfill site (NPS 2010d). Radium present in these items has probably leaked over time, resulting in contamination of the soil directly surrounding the sources. To ensure public safety, the NPS initiated a wider investigation into the extent of radium at the site in the form of a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, or Superfund) process in 2010. The goals of this CERCLA process are to determine the nature and extent of the contamination, evaluate and select an option for cleanup, and return the park to a condition unencumbered by contamination. As they are identified, the sources of radium are removed from the site for proper storage and disposal at an out-of-state facility. As of 2010 when the CERCLA process was initiated, the NPS (with technical assistance from the USACE) had removed radioactive sources and surrounding contaminated soil from the five locations with the highest radiation readings (NPS 2010d). The radiation at these sites averaged 4.12 milliroentgens per hour (mR/h) and dropped to 0.46 mR/h 3 feet away. Background radiation for this area is 0.02 mR/h (NPS 2010d).

Exposure to radiation can cause cancer, and the improper handling and disposal of radium sources can be harmful to the public. For this reason, the NPS has restricted access to portions of Great Kills Park since 2010. These areas of the park will remain closed until the matter is thoroughly investigated and appropriate cleanup is implemented.

Social and Economic Development

The social and economic conditions of the New York and New Jersey metropolitan area influence Gateway and how it is managed. Conversely, the park contributes to the social and economic conditions of the area as a whole. This section describes the existing conditions related to this relationship by highlighting the park's quality-of-life benefits as well as the New York and New Jersey metropolitan area's demographic and economic trends.

This section summarizes the existing social and economic conditions of the Borough of Staten Island, portions of the Boroughs of Queens and Brooklyn in New York City, and portions of Middlesex and Monmouth Counties in New Jersey. Discussions with NPS staff have indicated that although there are visitors to Gateway from Manhattan, the preponderance of visitors are from these three areas. These three areas have been identified as the primary market drawing areas (PMDAs) for the majority of visitors to Gateway.

The "Social and Economic Environment" section typically includes projections for how the PMDA is projected to change over the next 20 years. However, after the October 2012 impact of Hurricane Sandy, local city and county officials from New York and New Jersey are still estimating the hurricane's impacts on the economic and demographic profile of these market drawing areas. As such, the following analysis is primarily a summary of what was known prior to the hurricane with regard to economic and demographic profile and estimated long-term projections. As information becomes definitely available from New York City and New Jersey regarding post hurricane resettlement, these findings could be reevaluated.

The Importance of Parks to a Community

Park and open space areas in and around an urban area are key contributors to the quality of life in the community. This becomes even more significant in very large metropolitan areas, where population densities and travel distances to open, public lands are greater. The PMDA falls within the New York Metropolitan Statistical Area, which is the largest metropolitan area in the United States. Thus, in addition to parks and open space in New York City and Middlesex and Monmouth Counties in New Jersey, Gateway plays a vital role in sustaining and enhancing the quality of life for the residents of the New York and New Jersey area.

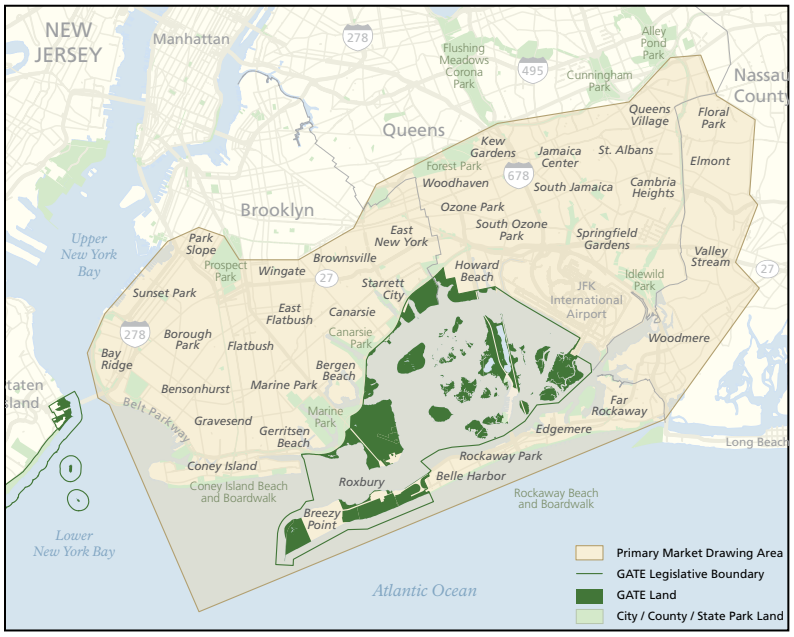
Population and Community Trends

The current and future management of Gateway is directly affected by the population dynamics and composition of the communities that surround it. As the population grows, there will be an increase in visitor use and demands for the park to accommodate traditional and new outdoor recreation opportunities.

Information in this section was developed through interviews with the NPS based upon their understanding of the visitor profiles to each unit in Gateway. This affected area has been identified in this report as the PMDA for activities at Gateway. In New York City, the PMDA includes the Borough of Staten Island for the Staten Island Unit and portions of the Boroughs of Queens and Brooklyn for the Jamaica Bay Unit. The Jamaica Bay Unit's PMDA was developed through comparison of the neighborhood tabulation area developed for New York City Comprehensive Waterfront Plan to a market drawing area developed as part of the NPS Gateway National Recreation Area Supply and Demand Analysis. The PMDA for the Sandy Hook unit includes Middlesex and Monmouth Counties. Figures 3-16 through 3-18 are maps of each of the sub-elements of the PMDA.

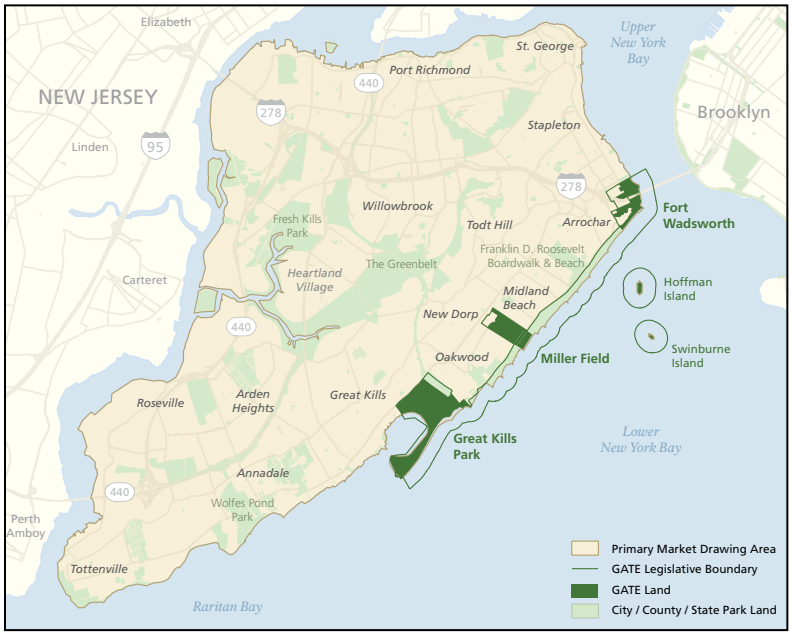
Long-term population forecasts within the range of a 20-year planning horizon are typically part of the GMP process. The planning authorities in New York City and New Jersey have developed planning documents that include 30-year forecasts. The New York City Department of Planning undertook a 30-year population forecast in December of 2006. Recent interviews with the New York City Department of Planning indicate that a revision of these population forecasts was planned for the spring of 2013. With the impact of Hurricane Sandy, these projections are now planned for revision by the summer of 2013. Therefore, the New York City Planning Department is of the opinion that the 30-year population forecasts should be evaluated more for their overall trends rather than for specific population data.

Figure 3-16. Gateway National Recreation Area PMDA by Unit Jamaica Bay, New York.



The New York City population projections by age/sex and borough for the period 2000 to 2030 estimated population growth by borough. In this study, Staten Island was projected to increase its population by 24.4 percent by 2030; Queens by 15.1 percent; and Brooklyn by 10.3 percent. The 2006 study indicated that the preponderance of growth was estimated to occur within the first 5 years of the projection period (2000 to 2005) (NYCDCP 2006). If the 30-year growth rates were converted to equal annual growth rates, this would equate to 0.81 percent annual growth for Staten Island, 0.50 percent for Queens, and 0.34 percent for Brooklyn.

Figure 3-17. Gateway National Recreation Area PMDA by Unit - Staten Island, New York



The New Jersey Department of Labor and Workforce Development also developed 30-year population projections (NJDLWD n.d.). The NJDLWD notes that "these projections, which are neither predictions nor forecasts, reflect identifiable long-term economic and demographic trends which have been implicitly or explicitly incorporated into the models. In other words, the projections are an extrapolation of past and current trends into the future. These projections are best used as a reference framework for planning, research, and program evaluation." These data, developed prior to Hurricane Sandy, indicated that within the New Jersey component of the PMDA, Middlesex County was proposed to grow by 21 percent and Monmouth County was projected to grow by 11 percent by the year 2030. Converting these 30-year growth rates to equal annual growth rates would equate to an annual growth rate of 0.7 percent for Middlesex County and 0.36 percent for Monmouth County.

Using 2010 census data, ESRI has forecasted the PMDA for the Gateway National Recreation Area at an estimated population of 4.66 million in 2012 (U.S. Census Bureau 2010; see figure 3-19). Prior to Hurricane Sandy, this PMDA was projected to experience an increase in population to 4.77 million by 2017, for a compound annual growth rate of 0.60 percent. This estimated annual growth rate is within the range of the individual forecasted 30-year annual averages mentioned previously. However, should the population basis change as a result of Hurricane Sandy, the future growth rate may also change.

Figure 3-18. Gateway National Recreation Area PMDA by Unit - Sandy Hook, New Jersey.

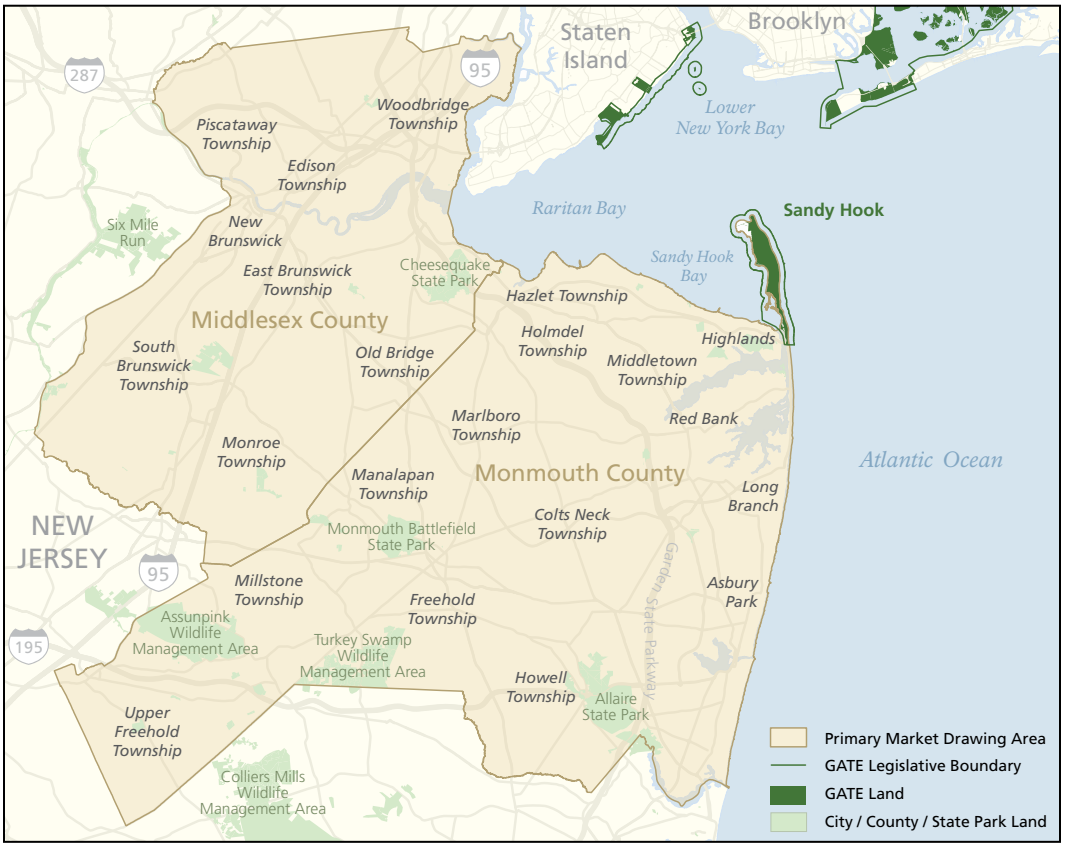
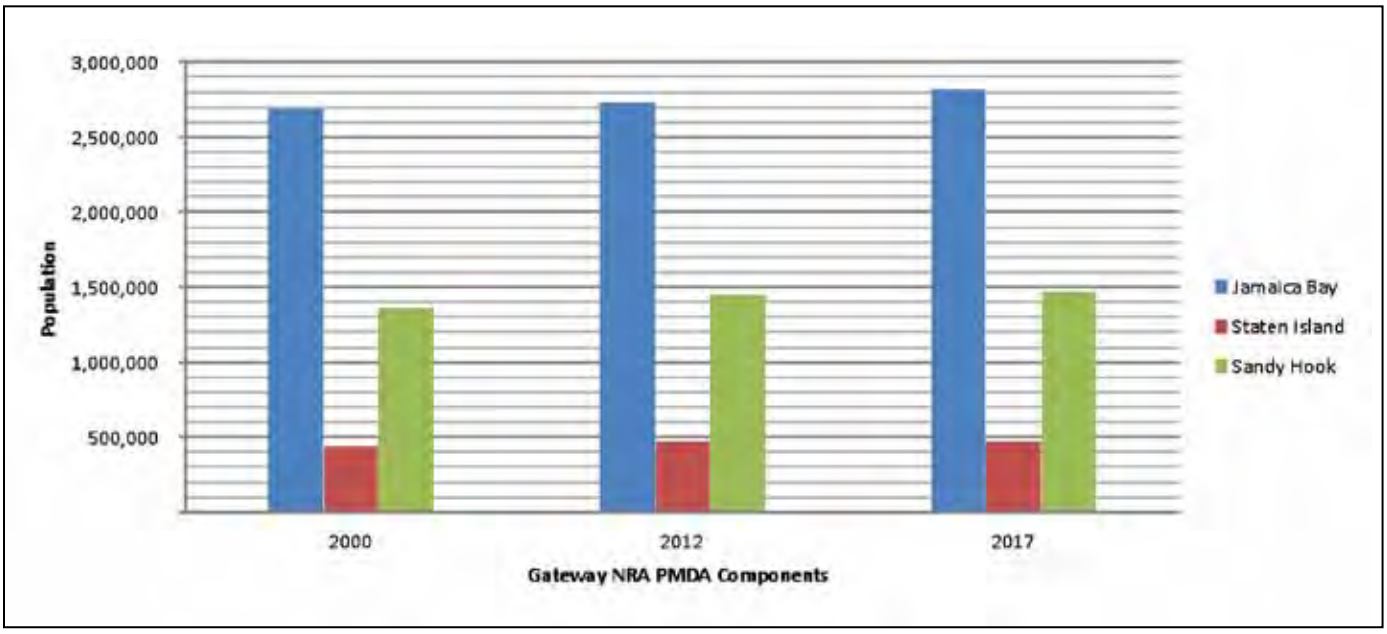


Figure 3-19. 2000-2017 Estimated Population Growth, Gateway PMDA by Unit.



Source: U.S. Census Bureau 2010.

People and Households

In addition to assessing the status and forecast for overall population growth within the PMDA, understanding the changing characteristics of area residents and the composition of the community's households is important. This section discusses the community characteristics of median age, household size, race, income, poverty levels, and education levels.

Median Age and Household Size

As of 2012, the PMDA sub-elements had a median age of 36.2 for Jamaica Bay, 38.6 for Staten Island, and 39.2 for Sandy Hook. The average household size within the PMDA sub-elements was 2.89 for Jamaica Bay, 2.78 for Staten Island and 2.73 for Sandy Hook. (U.S. Census Bureau 2010). The data summarized in table 3-8 show that the median age is anticipated to increase for all the sub-elements and that the average household size is anticipated to decrease for Jamaica Bay but increase slightly for Staten Island and the Sandy Hook PMDA.

A review of the New York City Planning Department population projections by age/sex and borough for the period 2000 to 2030 indicates that the most significant population age cohort that is anticipated to increase is the elderly population. The aging of large baby boom cohorts, a decline in fertility, and improvements in life expectancy all contribute to a general aging of the population, despite more pronounced migration losses. The New York City Planning Department population projections estimate that by 2030, the school-age population and the population age 65 and over will have nearly converged, accounting

Table 3-8. Median Age and Average Household Size for Gateway PMDA by Unit (2010, 2012 and 2017)

PMDA Unit	2010		2012		2017	
	Age	Size	Age	Size	Age	Size
Jamaica Bay	36.0	2.88	36.2	2.89	36.7	2.88
Staten Island	38.3	2.78	38.6	2.78	39.0	2.79
Sandy Hook	38.9	2.73	39.2	2.73	39.5	2.74

Source: U.S. Census Bureau 2010.
Age = median age; size = average household size

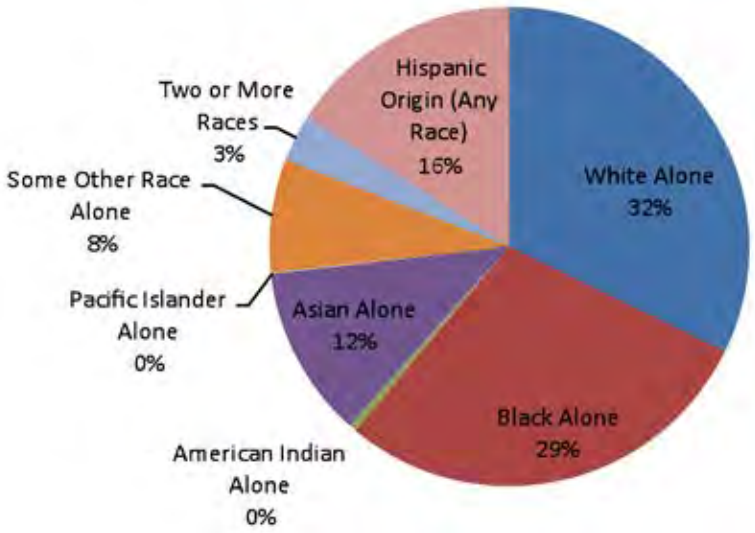
for 15.4 percent and 14.8 percent of the city's population, respectively. In New York City, it is estimated that Staten Island will see the largest percentage increase in the elderly population and that Brooklyn will continue to have the largest elderly population in the city. Overall, the study indicates that New York City's future population will be shaped by low fertility, continued net outmigration, and an aging population.

The New Jersey Department of Labor and Workforce Development population projections for age cohort in the Sandy Hook Unit PMDA provide a similar perspective. In 2010, it was estimated that the school-age population was approximately 26 percent of the population and the population over age 65 was 13 percent. By 2030, it was estimated that the school-age population would be 24 percent of the overall population and the population over age 65 would represent 20 percent.

Race

The PMDA for Gateway includes both densely populated city neighborhoods and suburban environments. The race/ethnicity of the PMDA sub-elements illustrates the diversity in users who are attracted to the outdoor recreation opportunities that Gateway offers. Figures 3-20 through 3-22 provide a 2012 estimate and percentages for each of the racial/ethnic groups

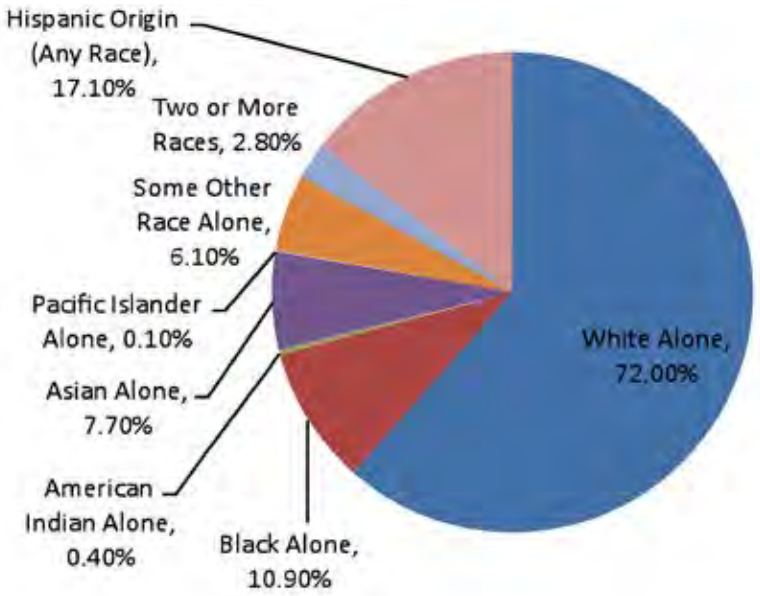
Figure 3-20. Population Estimates for Jamaica Bay PMDA - 2012



Source: U.S. Census Bureau 2010.

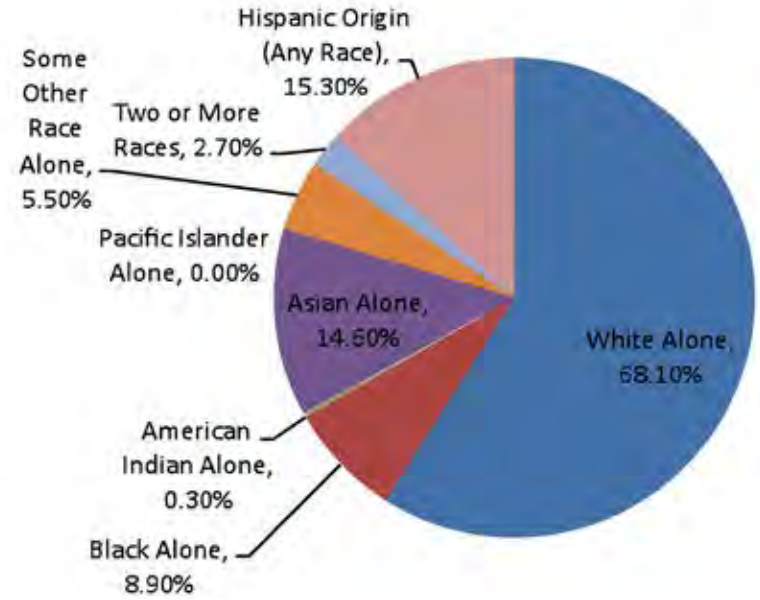
supporting each unit's PMDA. It is important to note that the methods that the 2010 census used for identifying race/ethnicity allows for a dual reporting of ethnicity. As such, the total percentages are greater than 100 percent.

Figure 3-21. Population Estimates for Staten Island PMDA - 2012



Source: U.S. Census Bureau 2010.

Figure 3-22. Population Estimates for Sandy Hook PMDA - 2012



Source: U.S. Census Bureau 2010.

From a park management standpoint, understanding the racial makeup of the community can help shed light on ways to make the park more inviting, develop better outreach with the community, and improve park program relevance. In addition, this awareness contributes to improving the quality of life in the community. As discussed in the "Visitor Use and Experience" section, many people from the PMDA's diverse racial, ethnic, and cultural groups are not visiting Gateway.

The U.S. Census uses the racial/ethnicity information to develop a diversity index for each area of analysis. This index represents the amount of diversity represented in the population. The Jamaica Bay Unit's PMDA has the highest diversity index, at 80.3 for 2012, and it is projected to increase to 81.1 by 2017. The Staten Island Unit's PMDA is similar to the Sandy Hook Unit's PMDA, at 61.9 and 63.5, respectively, in 2012, and these two diversity indices are estimated to increase to 64.8 and 67.0 by the year 2017. These trends reflect the national trends toward greater diversity. In the case of the Jamaica Bay Unit's PMDA, the anticipated increase in diversity is expected to consist of an increase in the Asian and Hispanic population and a corresponding decrease in the white and black racial/ethnic groups. In the Staten Island Unit's PMDA, the diversity trend is anticipated to involve an increase in the Hispanic population, as well as the Black and Asian race/ethnicity groups of the population. For the Sandy Hook Unit's PMDA, the diversity trend is based on an increase in the Hispanic, Black, and Asian race/ethnicity groups of the population. These immediate-term increases in population diversity emphasize the importance of NPS efforts to improve outreach and eliminate barriers that might keep people of all races and ethnic groups from experiencing the park.

Income, Poverty, and Education

Other factors that play a role in park management and visitation trends are the income levels and poverty levels of residents who live near the park. Per capita income varies significantly between the three Gateway PMDAs. The U.S. Census for 2010 and projections for 2012 indicate that the highest per capita income is in the PMDA for the Sandy Hook Unit, at $36,649, with the lowest per capita income at $23,155 for the PMDA surrounding the Jamaica Bay Unit. The Staten Island Unit's PMDA closely resembles that of the Sandy Hook Unit PMDA at $32,941. Forecasts of income over the next five years show moderate growth, but the position of these figures in relation to the others does not change (table 3 9).

Table 3-9. Estimated Income for Gateway Unit PMDAs (2012 and 2017).

PMDA Unit	2012		2017	
	MH Income	PC Income	MH Income	PC Income
Jamaica Bay	$48,261	$23,155	$56,216	$26,605
Staten Island	$72,905	$32,941	$82,484	$37,514
Sandy Hook	$78,710	$36,649	$89,316	$42,426

Source: U.S. Census Bureau 2010.
MH income = median household income; PC income = per capita income

The U.S. Census Bureau does the American Community Survey, the most recent of which was completed for the period from 2005 to 2009. This survey provides insight into poverty levels within census tracts. A review of the data from this survey supports the per capita income data of the PMDAs. Approximately 17 percent of the households in the Jamaica Bay PMDA were below the poverty level, whereas an estimated 10.3 percent of the Staten Island PMDA households and 6.7 percent of the Sandy Hook PMDA households were below the poverty level.

The level of education attained by community residents can often correlate to these income and poverty characteristics. Table 3-10 summarizes the percentage of residents in each area (25 years or older) who attained various levels of education as of 2009 (U.S. Census Bureau 2009). The Jamaica Bay PMDA has the lowest percentage of the population with college degrees, at 33.6 percent, compared to the Staten Island PMDA at 35.7 percent and the Sandy Hook PMDA at 44.7 percent.

Table 3-10. Percentage of Population to Reach Various Levels of Education by Gateway PMDA (2009).

Educational Attainment	Jamaica Bay	Staten Island	Sandy Hook
No Schooling	2.0%	1.0%	0.8%
Nursery to Grade 12 – No Diploma	18.6%	11.6%	10.0%
High School Graduate, GED, or Alternative	31.3%	34.0%	28.3%
Some College, up to 1 or More Years, No Degree	14.6%	17.7%	16.2%
Associate's Degree	7.2%	7.8%	6.7%
Bachelor's Degree	16.9%	16.6%	23.4%
Master's Degree	6.9%	8.3%	10.7%
Professional School Degree	1.9%	2.2%	2.5%
Doctoral Degree	0.7%	0.7%	1.5%

Source: U.S. Census Bureau 2009.
Note: Population surveyed included those 25 years of age or older

Employment Trends

Employment opportunities typically correlate to educational background and impact household income. Within the Gateway PMDA, the healthcare and social assistance industry is the largest employer, providing from 11.5 percent of overall employment for the Sandy Hook PMDA up to 19.8 percent for the Jamaica Bay PMDA (see table 3-11). The retail and educational services are the next-largest employment sectors for residents in the PMDA.

Table 3-11. Civilian Employment for Population age 16+ by Industry by Gateway Unit PMDA.

Industry	Jamaica Bay	Staten Island	Sandy Hook
Agriculture, Forestry, Fishing, and Hunting	0.1%	0.0%	0.3%
Mining, Quarrying, and Oil and Gas Extraction	0.0%	0.0%	0.1%
Construction	6.3%	7.2%	6.1%
Manufacturing	4.7%	3.3%	8.9%
Wholesale Trade	2.8%	2.4%	3.9%
Retail Trade	9.6%	9.5%	11.3%
Transportation and Warehousing	7.9%	6.3%	5.0%
Utilities	0.5%	1.1%	0.7%
Information	2.9%	2.6%	3.8%
Finance and Insurance	6.1%	9.9%	8.4%
Real Estate and Rental and Leasing	2.7%	2.7%	1.9%
Professional, Scientific, and Technical Services	5.8%	6.7%	9.2%
Management of Companies and Enterprises	0.1%	0.1%	0.1%
Administrative and Support and Waste Management Services	4.1%	3.9%	3.6%
Educational Services	9.0%	10.5%	9.8%
Health Care and Social Assistance	19.8%	15.9%	11.5%
Arts, Entertainment, and Recreation	1.6%	1.5%	1.8%
Accommodation and Food Services	5.7%	4.6%	5.2%
Other Services, Except Public Administration	5.5%	4.3%	4.2%
Public Administration	4.8%	7.7%	4.1%

Source: U.S. Census Bureau 2009.

Housing and Urban Growth

This section will identify current and projected trends in the housing market and highlight housing indicators such as home values, housing affordability, own/rent ratios, and single-family/multifamily dwelling ratios. The New York and New Jersey metropolitan areas are recognized for their high median home values. The composition of the household stock and ownership patterns within the PMDA is a function of the urban environment that surrounds Gateway. Table 3-12 illustrates that median home prices are highest in the Staten Island Unit's PMDA, followed by the Jamaica Bay and Sandy Hook Units' PMDA. The lower home value in the Sandy Hook Unit's PMDA may be attributed to the lower land values in the suburban environments. As would be anticipated, single-family detached homes (59.15 percent) and owner-occupied homes (64.2 percent) are found at a greater percentage within the Sandy Hook Unit's PMDA due to its suburban setting. The density of development is greater in the Jamaica Bay and Staten Island Units' PMDAs, and as such, the value of open space and supporting recreation areas is an important value provided by Gateway.

Table 3-12. Housing Value, Stock, and Ownership Patterns, Gateway Unit PMDAs

Housing Type	Jamaica Bay		Staten Island		Sandy Hook	
	2012	2017	2012	2017	2012	2017
Median Home Value	$423,011	$467,729	$441,256	$473,330	$327,749	$360,990
Household Stock						
Single-family Detached	18.8%	NA	33.9%	NA	59.1%	NA
Multi-family Attached	81.0%	NA	65.7%	NA	39.8%	NA
Household Stock						
Owner Occupied	35.4%	36.6%	58.7%	59.9%	64.2%	64.6%
Renter Occupied	56.9%	56.3%	35.1%	34.0%	29.0%	28.6%

Source: U.S. Census Bureau 2009.
NA = not applicable

Economic Effects of the Park on the Community

Just as population growth and community demographics have effects on the management and use of Gateway, the park also has effects on the economy of the community around it. Like many other economic engines in the New York and New Jersey area, Gateway contributes to the local and regional economy by generating business and revenue, creating jobs, and indirectly fueling economic growth in other industries. This section identifies these economic impacts of the park and provides a synopsis of the overall PMDA economies.

Park Contributions to the Economic Stability of the Area

The park has many direct and indirect positive effects on the area's economy. This impact can be traced to several sources and attributes, such as money spent by visitors at local businesses, jobs created at these local businesses due to visitor demand, NPS jobs created at

the park, NPS contracts with local businesses, and other area tourism generated by the park. This section will highlight some of these factors and explain the relevance to the overall PMDA economy.

Contributions to Local Economy from Gateway Visitor Expenditures

Each year, millions of park visitors contribute hundreds of millions of dollars to the region surrounding Gateway. This money directly sustains the revenue stream and jobs at hotels, restaurants, and stores that serve park visitors. Primarily, businesses in the boroughs of Staten Island, Queens, and Brooklyn and Monmouth and Middlesex Counties in New Jersey that are adjacent to Gateway are the direct beneficiaries of this economic contribution. In addition, the visitor money stream can also have other indirect, or secondary, effects. For example, this injected money that directly supports local businesses and jobs eventually recirculates into the local economy and beyond. This recirculation happens when the local businesses in the communities surrounding Gateway buy products or services from other sources (e.g., from wholesale suppliers), or when employees at the local businesses use their income earned at the local businesses in communities surrounding Gateway at other businesses in the area to sustain their lifestyle (e.g., grocery shopping, entertainment). This secondary effect is often referred to as an economic "multiplier," because one dollar injected into the local economy often has more than one dollar's effect on the local economy.

With funding from the NPS Social Science Research Program, researchers at Michigan State University have created the NPS "Money Generation Model 2" (MGM2) to measure these direct and indirect contributions from visitors to local economies. Stynes and Propst used the MGM2 to analyze the effect that visitors to units of the NPS had on the local economies in 2011. This is the most recent data set available for analysis. The 2011 data is based on spending profiles from 2010 adjusted to 2011 using Bureau of Labor Statistics consumer price indices for each spending category. Consumer prices remained fairly stable between 2010 and 2011, except for an increase of 26 percent in gas prices and a 10 percent increase in transportation costs. Visitor segment mixes were assumed to be unchanged except as reflected in overnight stays or new visitor surveys. Except for parks with new visitor surveys, average party sizes, lengths of stay, and reentry factors were assumed to be unchanged from 2010. Visit and overnight stay figures for all parks were updated to 2011 from the NPS public use statistics. Table 3-13 provides an overview of Gateway's spending, economic, and payroll impacts on the local economy.

As an urban park, as opposed to a destination park, the preponderance of Gateway visitation is in the form of day-use recreation visits. Although overnight visitors spend significantly more than day visitors, the size of the day-use market results in significant economic impacts on the surrounding area. In total, park visitors spent $150 million in the local region surrounding the park in 2011. This spending figure excludes airfare and other trip spending outside a 60-mile radius from the park, as well as any durable goods and major equipment.

The model also estimated how this injected money circulated through the local economy, as summarized in table 3-13. Jobs include full-time and part-time jobs, with seasonal positions adjusted to an annual basis. Labor income covers wages and salaries, including income of

Table 3-13. Spending, Economic and Payroll Impacts of Gateway on Local Economy.

Type of Visitation/Spending	Amounts
Public Use Data	
Recreation Visits	7,697,727
Overnight Stays	8,165
Visitor Spending	
All Visitors	$150,947,000
Non Local Visitors	$60,712,000
Impact of Non-local Visitor Spending	
Jobs	668
Labor Income	$30,724,000
Value Added	$50,537,000

Source: Yue, Mahoney, and Herbowicz 2013.

sole proprietors and payroll benefits. Value added is the sum of labor income, profits and rents, and indirect business taxes. The $150 million of total visitor spending result supports 668 jobs, labor income of $30.7 million dollars, and value added of $50.5 million.

Contributions to the Local Economy from National Park Service Operations

The employment offered by the NPS also contributes to the local economy. The social and economic benefits of this job base are twofold. First, the jobs made available by the park and its partners provide hundreds of residents with a steady income that helps sustain their lives and those of their families. Secondly, similar to the economic effects of revenue generated by park and monument visitation (as previously explained), the income earned by park and partner employees also has direct and secondary effects on the local economy. These employees contribute to the local economy by spending the money they earn on goods and services in the community. This spending directly supports local businesses and their growth. The local communities also benefit directly via the sales tax generated by this spending. In addition, secondary economic benefits (i.e., the multiplier effect) are realized when this money eventually circulates further into the PMDA economy and beyond. Because NPS employees reside throughout the entire region, the economic effect of their earned salaries (and subsequent spending in their respective communities) extends throughout the area as well.

Business and Industry Trends

The PMDA provides employment opportunities to local residents as well as residents from other areas. A review of the business types within the PMDA provides insight into the industries that surround Gateway. As table 3-14 illustrates, retail trade establishments are the largest category of businesses within the PMDA. This is followed by other service businesses; professional, scientific, and tech services; and construction firms. This table provides confirmation that the PMDA provides a diverse economic base.

Table 3-14. Percentage of Businesses by North American Industry Classification System Code in the Gateway PMDAs (2011).

Types of Businesses within Areas	Jamaica Bay	Staten Island	Sandy Hook
Agriculture, Forestry, Fishing, and Hunting	0.1%	0.1%	0.3%
Mining	0.0%	0.0%	0.1%
Utilities	0.1%	0.1%	0.2%
Construction	6.8%	11.2%	9.4%
Manufacturing	3.0%	2.3%	3.4%
Wholesale Trade	5.1%	4.0%	5.1%
Retail Trade	19.1%	14.2%	15.0%
Transportation and Warehousing	3.5%	2.2%	2.7%
Information	1.9%	1.9%	2.0%
Finance and Insurance	4.0%	5.3%	5.0%
Real Estate, Rental, and Leasing	4.9%	4.3%	4.8%
Professional, Scientific, and Tech Services	6.4%	8.7%	9.8%
Management of Companies and Enterprises	0.1%	0.1%	0.1%
Administrative and Support and Waste Management and Remediation Services	4.0%	6.3%	5.8%
Educational Services	3.2%	3.1%	2.7%
Health Care and Social Assistance	8.4%	8.2%	8.0%
Arts, Entertainment, and Recreation	1.0%	1.7%	2.0%
Accommodation and Food Services	8.6%	8.5%	6.8%
Other Services (Except Public Administration)	15.8%	13.4%	10.9%
Public Administration	0.8%	1.3%	2.6%
Unclassified Establishments	3.1%	3.2%	3.4%

Source: Infogroup 2012.

Transportation

Each park unit in Gateway has a unique history and associated purpose, which has influenced visitation and reflects how visitors access each unit, circulate among and within the units, and find their way around each unit. For example, some units have no water access, some are not served internally by public transportation, and some reach capacity on a regular basis during peak season. Due to the geographic separation and differing visitor attractions among park units and park sites within a unit, regional transportation access to each area and means of internal circulation are very distinct. In addition, dedicated transportation facilities are also unique within each unit and park site.

Transportation is intricately tied to the varied visitor activities provided in each unit. For example, the Sandy Hook Unit draws beachgoers, sailboarders, surfers, and kite boarders, who sometimes transport large recreational gear, whereas Fort Wadsworth (in the Staten Island Unit) is popular with cyclists and pedestrians seeking ranger-led tours. At Great Kills Park on Staten Island, waterways and water transportation modes are crucial. The Jamaica Bay Unit provides fishing, kayaking, wildlife sightseeing, and beach and cycling opportunities. Each unit also offers different types of alternative access. Access to and within each unit varies by transportation mode, and each unit provides varying degrees of parking and wayfinding.

Some facilities such as the Jamaica Bay Wildlife Refuge are so unique that they draw visitors from throughout the region, while other facilities that provide more standard recreational amenities such as the ball fields at Miller Field tend to draw from the immediately surrounding areas.

In October 2012, Hurricane Sandy came ashore in the New York area, resulting in damage from wind and flooding from rain, overflowed rivers, and storm surge, which in some areas exceeded 13 feet. Damage to transportation-related structures from Sandy included the following, reported by park unit.

In the Jamaica Bay Unit (NPS, pers. comm. 2012f):

- Jamaica Bay Wildlife Refuge East and West Ponds were breached, and the West Pond remains breached, resulting in damage to trails and a subway route.
- All of Fort Tilden was flooded from both the ocean and bay side, damaging transportation infrastructure.
- The Shore Road and fisherman's parking lot were covered in sand.
- At Jacob Riis Park, winds covered much of the park north of the beach in sand.
- Bicycle and pedestrian paths were damaged.

In the Staten Island Unit:

- Wind and storm surge carried sand to cover parking lots and block roads at Great Kills
- Nichols Marina was extensively damaged at Great Kills Park.
- Bicycle and pedestrian paths were damaged.

In the Sandy Hook Unit, which the NPS identified as the park unit mostly heavily affected by Hurricane Sandy:

- Flooding damaged all NPS infrastructure (NPS 2012c).
- A significant loss of beach sand occurred, covering roads and parking lots with sand.
- Bicycle and pedestrian paths were damaged.

Most of the repairs needed to open the park for the summer have been completed as of July 2013. Some damaged roads or paths have not yet been repaired, but planning and implementation of repair strategies may occur outside the context of the GMP. Therefore, this section describes the transportation conditions that exist as a result of the storm, as well as conditions that existed prior to the storm, such as congested roads and parking areas, assuming that such issues would likely return once the storm damage has been repaired and the closed park units reopen. Data were collected from various park and local information sources, from maps, and through examination of the park's transportation facilities during field visits in 2010 prior to Hurricane Sandy. Unless otherwise noted, the condition of the park facilities was generally good during field visits in 2010.

Regional Transportation Overview

The park units that compose Gateway and the regional transportation routes that serve them are shown in figure 3-23. Despite being in an urban area with the most extensive public transit in the nation, the three Gateway units are not connected to each other by transit, and function as independent destinations in a transit riders eyes. Only one public transit service, a single bus route, links Brooklyn and Staten Island, but it does not serve the NPS parks in both those boroughs (it originates and terminates in Bay Ridge). No public transit links the Sandy Hook and Staten Island or Jamaica Bay units to each other.

Jamaica Bay Unit

The Jamaica Bay Unit is on the southwestern tip of Long Island in the boroughs of Brooklyn and Queens, New York. Composed of multiple districts, Jamaica Bay is accessible by car via several key routes and bridges. The Belt Parkway and Flatbush Avenue provide access to Canarsie Pier and Floyd Bennett Field districts from the north, east, and west. Continuing across the Marine Parkway Bridge allows access to Jacob Riis Park, Fort Tilden, and Breezy Point, although Breezy Point is currently open only to pedestrians due to the damage resulting from Hurricane Sandy (IMT 2012j). Belt Parkway and Woodhaven Boulevard provide access to the Jamaica Bay Wildlife Refuge from the north, east, and west. These routes connect to Cross Bay Boulevard, which extends across the Joseph Addabbo-North Channel Bridge into the Jamaica Bay Wildlife Refuge. Routes from the south and local roadway access include Rockaway Freeway, Beach Channel Drive, and Rockaway Point Boulevard.

Regional transit access to the districts of Jamaica Bay can be made via bus connections to subway stations at Flatbush Avenue, Rockaway Park/Beach 116th Street, Rockaway Parkway, and Broad Channel. Ferries run between Riis Landing on Rockaway, the Brooklyn Army Terminal in Bay Ridge, and Pier 11 on Wall Street. New York Beach Ferry service is available

during summer weekends and holidays. As a result of the closure of the A train following damage from Sandy, New York Water Taxi service was established weekdays throughout the year. It is uncertain what the availability of the water taxi service will be once A train service resumes.

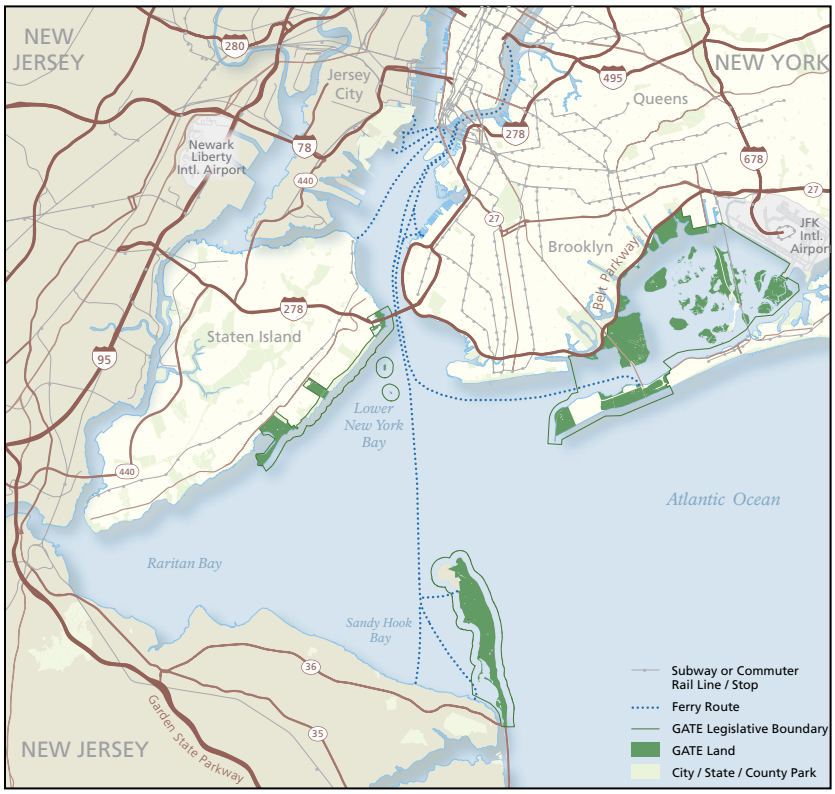
Staten Island Unit

The Staten Island Unit, which is composed of three park sites located along the east and southeast shores of Staten Island, is accessible by car via the Verrazano-Narrows Bridge from Brooklyn or the Goethals or Bayonne Bridge or the Outerbridge Crossing from New Jersey to the Staten Island Expressway (Route 278). The Staten Island Ferry service from Lower Manhattan also provides public transit access and connections to local bus routes at the Saint George Ferry Terminal.

Sandy Hook Unit

The Sandy Hook Unit is a barrier spit that lies along the Atlantic shores of eastern New Jersey. From North Jersey and New York, Sandy Hook is accessible by car via the New Jersey Turnpike, Garden State Parkway, and Route 36 through the Highlands. From South Jersey, roadway access is via Garden State Parkway and Route through the Town of Sea Bright. New Jersey Transit operates one bus route near the park entrance, and commuter bus service to Highlands is available from New York. During the summer season, direct ferry service is available to Sandy Hook from Manhattan daily, with internal shuttle bus service providing

Figure 3-23. Regional Transportation Networks.



beach access in the park. The ferry docks sustained damage from Hurricane Sandy, but are identified by the NPS as a high priority for repairs (IMT 2012j). Year-round ferry service between Manhattan (Pier 11 and East 35th Street) and Highlands, New Jersey, is also available, providing access within approximately 3 miles of the park.

Bicycle Facility Classifications

Various types of bicycle facilities exist in or near some park units. While trails, greenways and bike lanes do connect several of the park districts within Gateway, there is currently no bike sharing infrastructure and bike rentals have only recently been introduced. The Aviator Sports and Events Center (an NPS concessionaire) at Floyd Bennett Field does rent bicycles for $7 per day during spring and summer. There are currently bike rentals at Fort Hancock on Sandy Hook and in the summer of 2013 a commercial use authorization was issued for bike rentals to be established at Canarsie Pier, Riis Park and Riis Landing. There is a need for additional roadway markings (i.e. bicycle lanes or shared lane markings) and signage to make navigating Gateway's park units clear and comfortable for most bicyclists and park users.

Cycling culture is well established in New York City and cycling is growing in popularity as a convenient general means of travel for accessing park and recreation. PLANYC and other programs supported by city agencies actively promote cycling. In 2010, it was reported that the city's bike network of on-street, and physically separated cycle tracks has grown to over 150 miles of painted bicycle lanes and this bike infrastructure continues to grow (NPS 2010g). NYCDCP's 2009 Bike Share Opportunities report indicated that bicyclists make up 0.6 percent of all commuters in New York City.

The breakdown of modal share for accessing Gateway's parks has not been determined so it is unknown how many park users access the park via bicycle. Previous transportation planning reports have recommended that NPS develop a survey to distribute to park visitors inquiring about their mode of access and travel times to Gateway, and also to gauge their interest in non-motorized alternatives.

Bicycle facilities are generally classified as follows:

- Separate Facility (Class I) – A non-motorized facility, paved or unpaved, physically separated from motorized vehicular traffic by an open space or barrier. Also called bicycle path, bike trail, non-motorized trail, multi-purpose trail, or some combination thereof.

- Bike Lane (Class II) – A portion of a roadway that is designated by striping, signing, and pavement markings for the preferential or exclusive use of bicyclists. Often done in pairs, each one being one-way and adjacent to the outside through-travel lane. Also called bicycle lanes.

- Bike Route (Class III) – A segment of road designated by the jurisdiction having authority, with appropriate directional and informational markers, but without striping, signing, and pavement markings for the preferential or exclusive use of bicyclists. Also called bicycle route.

- Bike Friendly (Class IV) – A roadway not designated by directional and informational markers, striping, signing, nor pavement markings for the preferential or exclusive use of bicyclists, but containing appropriate bicycle-friendly design standards such as wide-curb lanes and bicycle-safe drain grates (International Bicycle Fund 2011).

Individual Park Units

Jamaica Bay Unit

Overview

The Jamaica Bay Unit is along the southeastern tip of Long Island on a peninsula that includes Jamaica Bay, the Jamaica Bay Wildlife Refuge, Floyd Bennett Field, Jacob Riis Park, Fort Tilden, Canarsie Pier, Breezy Point, Plumb Beach, and Bergen Beach. It is bounded by the Belt Parkway (New York State Route 27) to the north, John F. Kennedy International Airport to the east, Sheepshead Bay to the west, and the Atlantic Ocean to the south (FHWA 2006). Several city-owned parks, beaches, small towns, industrial areas, and community areas are also located along the peninsula between the ocean and Jamaica Bay. Under the Cooperative Management Agreement that NPS signed with the City of New York in July 2012, and with the City as a Cooperating Partner in the GMP process, these adjoining lands will be increasingly managed collaboratively and represent a unified destination for some users.

Jamaica Bay can be accessed via private car, city bus, subway, ferry, bicycle, or kayak, or on foot. The Marine Parkway Bridge connects Jacob Riis Park to Floyd Bennett Field and Brooklyn. The Cross Bay Bridge connects the southern side of the peninsula to Jamaica Bay. Some districts in Jamaica Bay are within walking distance from residences via existing sidewalks. All of the parks within the Jamaica Bay Unit, with the exception of Floyd Bennett Field are within walking distance of residential neighborhoods. Riis Landing abuts the Roxbury neighborhood, Jacob Riis Park abuts the Neponsit neighborhood, and the new NPS site at Pennsylvania Avenue is located near the Spring Creek Towers housing development. Bicycle/pedestrian access is enhanced by the Belt Parkway Bikeway that runs along the northern edge of Jamaica Bay, including the entire frontage of the new sites at Pennsylvania and Fountain Avenues. In recent summers, entrepreneurial, for-profit van services have sprung up to bring beach-goers from parts of Brooklyn to points on the Rockaway Peninsula.

The Jamaica Bay Greenway Missing Links Study (NPS 2010g) identified a number of issues with the existing road infrastructure affecting both access and safety for pedestrians and bicyclists, including the following:

- High-volume, high-speed arterials with commercial traffic and conflicting turning movements
- Complex traffic weaving/merging
- Lack of signs and wayfinding to key destinations
- Lack of north/south connector roads accommodating to bicyclists and pedestrians
- One-way street patterns that make travel by bicycles circuitous and non-intuitive

Floyd Bennett Field

Private Vehicle and Waterborne Transportation Parking Facilities

Two large parking lots provide a total of 200 spaces at Ryan Visitor Center at Floyd Bennett Field. Informal parking also exists along the tarmac, taxiway, and runway areas. Parking areas are typically only fully utilized during special events. During extremely large special events, drivers are directed to park on runways and tarmac areas. Several thousand cars could be parked in this manner if desired.

According to traffic data collected in 2004 and compiled in the Jamaica Bay Transportation Studies report by Federal Highways Administration (FHWA 2006), Flatbush Avenue carries approximately 26,000 vehicles per day on weekdays and about 19,000 vehicles per day on weekend days. Excluding the summer season, there are approximately 1,600 vehicles per weekday entering/exiting Floyd Bennett Drive and about 1,000 vehicles per weekend day. During the summer months, traffic activity (exclusive of special events) can be up to 3,000 vehicles per day on both weekdays and weekend days. Typical peak hour traffic on Flatbush Avenue is 1,500 (AM) to 1,900 (PM) vehicles per day weekdays and 2,100 vehicles per day on Saturday midday. Peak hour traffic using Floyd Bennett Drive is 150 vehicles (AM) to 200 vehicles per day (PM). Saturday midday peak hour traffic is slightly more than 200 vehicles per day (FHWA 2006).

The Gateway Marina, adjacent to Floyd Bennett Field, provides 500 slips for private watercraft and includes picnic areas, restrooms, and shower facilities. Transient dockage is available daily, monthly, or for longer stays.

Public Transportation Services

One public city bus route (Q35) serves Floyd Bennett Field. This route travels south from Brooklyn, stops at the Brooklyn Marine Park located on the southwest side of Floyd Bennett Field and continues south terminating in Rockaway Park; northbound, it also stops near Aviator Complex. Bus service includes all weekends and holidays (with some service reductions on holidays).

Train access includes the Red/2 to Flatbush Avenue, Blue/A to Rockaway Park / Beach 116th Street. A transfer to the Q35 bus is required to access the park from either train stop. Train service includes all weekends and holidays (with some service reductions on holidays).

Figure 3-24 shows the location of these facilities.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

The Belt/Shore Parkway Bikeway at the northern edge of Jamaica Bay connects to the Rockaway Greenway Bikeway, a paved multi-use path adjacent to Floyd Bennett Field and Jamaica Bay Wildlife Refuge. Biking is allowed on the Floyd Bennett Field historical runways and Fort Tilden trails. The Aviator Sports and Events Center (an NPS concessionaire) at Floyd

Bennett Field rents bicycles for $7 per day during spring and summer. The Jamaica Bay Greenway heads south from Floyd Bennett field and crosses the Marine Parkway Bridge (a "must walk" bridge) providing a linkage to Riis Landing. However, there is no separated multi-use path (Class I) connecting from Riis Landing to Riis Park.

Floyd Bennett Field has a designated launch and landing site for the New York City Water Trail.

Figure 3-24 shows the location of these facilities. Table 3-15 provides more detailed information.

Jamaica Bay Wildlife Refuge

Private Vehicle and Waterborne Transportation Parking Facilities

Private vehicles can park at the visitor center for the Jamaica Bay Wildlife Refuge. No overflow lots or other informal parking spaces are available, which puts a strain on the existing facilities when the main lot is full.

Figure 3-24. Jamaica Bay Transportation Services and Facilities.

Table 3-15. Jamaica Bay Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes.

Type		Location	Biking	Greenway Access	Hiking	Walking	Mode	Surface Type	Parking
Rockaway Gateway Greenway		Parallel to Belt Parkway from Plumb Beach to 78th Street	Yes	NA	No	Yes	Multi-use	Paved	Yes
Floyd Bennett Field									
Hiking Trails		North Forty trail system, N end of Floyd Bennett Field							
No	Yes	Yes	Yes	Ped	Dirt	Yes			
Access Path		Goldenrod and Tamarack Campgrounds	No	No	No	Yes	Ped	Dirt	Yes
Hiking Trails		Saltmarsh, Express Return, and Milestone Trails, SW end of Floyd Bennett Field							
No	No	No	Yes	Ped	Dirt	Across Flatbush Dr at Ranger Station			
Bike Lane		Marine Parkway–Gil Hodges Bridge	Yes	Yes	No	Yes (must use sidewalk on W side)	Bike	Paved	Yes
Jacob Riis Park/Fort Tilden/Breezy Point Tip									
Access Path		Rockaway Point Yacht Club NE end of Breezy Point Tip	No	No	No	Yes	Ped	Paved	No
Hiking Trails		Maritime Forest Trail System, Fort Tilden	No	No	Yes	Yes	Ped	Dirt	Yes
Access Paths		10 paths on Atlantic side of Fort Tilden to beach	No	No	No	Yes	Ped	Sand	W side only
Boardwalk		Outside park; parallels Atlantic Ocean from Beach St 126 E to Beach St 80	No	No	No	Yes	Ped	Boardwalk	No

Table 3-15. Jamaica Bay Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes (continued).

Type		Location	Biking	Greenway Access	Hiking	Walking	Mode	Surface Type	Parking
Boardwalk		S side Jacob Riis Park	No	No	No	Yes	Ped	Boardwalk	Yes
Jamaica Bay Wildlife Refuge									
Bike Lane		Cross Bay Veterans Memorial Bridge	Yes	Yes	No	No	No	Paved	Yes
Access Path		Visitor center	No	No	No	Yes	Ped	Dirt	Yes
Hiking Trails		W pond	No	Yes	Yes	Yes	Ped	Dirt/sand	Yes
Hiking Trails		E pond	No	Yes	Yes	Yes	Ped	Dirt/sand	Yes
Bike Lane		Frank M. Charles Memorial Park	Yes	Yes	No	No	Bike	Paved	Yes

NA = not applicable; N = north; ped = pedestrian; SW = southwest; W = west; NE = northeast; E = east; S = south

Public Transportation Services

The Cross Bay Boulevard is a major four-lane arterial in the Broad Channel neighborhood that connects the Jamaica Bay Wildlife Refuge to the New York City Transit Broad Channel station and the Veterans Memorial Bridge. The Veterans Memorial Bridge leads to the Rockaways and connects to NPS districts around Jamaica Bay.

Two limited-stop bus routes, Q52 and Q53, provide access to the refuge from the same bus stop immediately adjacent to the visitor center entrance. Bus service includes all weekends and holidays (with some service reductions on holidays). The Q52 travels between Elmhurst in Queens and Arverne near Rockaway Park. The Q53 travels between Woodside, Queens, and Rockaway Park.

Train access includes the Blue/A to Broad Channel Station in conjunction with a 0.75-mile walk to the park. Train service includes all weekends and holidays (with some service reductions on holidays). Damage to the A Line track bed, signal, power, and communication systems from Hurricane Sandy forced a complete shutdown of the train service in the immediate aftermath of the hurricane. Work is currently underway to restore A Line service to the Rockaways; the MTA is aiming for a summer restoration. The two major breaches have been rebuilt and the railroad tracks have been fully restored. All structurally compromised areas have been fixed and major work continues on refurbishing critical operational systems for signals, communications, power, and electrical (MTA n.d.).

Figure 3-24 shows the location of these facilities.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

Bicycle lanes and a paved multi-use pathway next to Cross Bay Boulevard provide bicycle and pedestrian access to the refuge. A two-way multi-use path parallel to Cross Bay Boulevard is available for cyclists and pedestrians traveling to the Jamaica Bay Wildlife Refuge. Additionally a boardwalk edges the East Pond. Given gaps in the bike infrastructure south

of Veterans Memorial Bridge there is limited connectivity between the refuge and the Rockaway peninsula. Proposed improvements to establish bike routes and lanes south of the bridge would allow for greater connectivity to Riis Park via Rockaway Beach Boulevard.

Figure 3-24 shows the location of these facilities. Table 3-15 provides more detailed information about them, which was gathered prior to Hurricane Sandy.

Jacob Riis Park/Fort Tilden/Breezy Point Tip

Private Vehicle and Waterborne Transportation Parking Facilities

Jacob Riis Park provides one large parking lot with over 5,000 spaces. The parking lot is significantly over sized and does not fill up even on busy summer weekends.

Jacob Riis Park generates 100 vehicular trips (65 entering and 35 exiting) during the weekday morning peak hour and 210 trips (60 entering and 150 exiting) during the weekday evening peak hour (2006 FHWA). During the Saturday midday peak hour, the Park generates 540 vehicular trips (450 entering and 90 exiting). Approximately 30 percent of the traffic to the Jacob Riis Park beach area arrives from the east and most vehicles use Rockaway Beach Boulevard. On Saturday midday, the hourly volumes on Rockaway Beach Boulevard are approximately 500 vehicles, including 150 (30%) that are related to Jacob Riis Park beach activities (2006 FHWA).

Two kayak launch spots are located in Jacob Riis Park: Riis Landing and Rockaway Point Yacht Club. Riis Landing is centrally located on the northern side of the park near the Marine Parkway Bridge. Rockaway Point Yacht Club is located on the northwestern edge of the park. No water access is provided at Breezy Point or Fort Tilden (NPS n.d.k).

Public Transportation Services

The Q35 provides bus service from Brooklyn to Jacob Riis Park, continuing eastbound along Rockaway Beach Boulevard to Rockaway Park. The Q22 provides bus service between Rockaway Point and Jacob Riis Park, continuing across the Rockaway Peninsula to Rockaway Park and Far Rockaway. Bus service includes all weekends and holidays (with some service reductions on holidays).

Train access includes the Red/2 to Flatbush Avenue and the Blue/A to Rockaway Park / Beach 116th Street. These train routes require taking the Q35 bus from either location or the Q22 bus from Rockaway Park / Beach 116th Street. Train service includes all weekends and holidays (with some service reductions on holidays).

Figure 3-24 shows the location of these facilities.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

Jacob Riis Park contains two sections of the Jamaica Bay Greenway multi-use path. The greenway is an off-street path for cyclists and pedestrians that serves as a bicycle commuter path for local residents. One section travels along the northern edge of Jacob Riis Park parallel to Beach Channel Drive. This section extends from the eastern boundary of Jacob Riis Park to Marine Parkway Bridge, where it continues north across the bridge toward Floyd Bennett Field and south along Beach 169th Street to connect with the Jacob Riis Park Promenade section. Cyclists must dismount on the bridge (Jamaica Bay Greenway Missing Link Study 2010).

Jacob Riis Park contains two sections of the Jamaica Bay Greenway multi-use path. The greenway is an off-street path for cyclists and pedestrians that serves as a bicycle commuter path for local residents.

The Jacob Riis Park Promenade is a boardwalk in the southern portion of Jacob Riis Park. This section of the boardwalk extends east from the Jacob Riis Park boundary and terminates at Beach 193rd Street. The boardwalk suffered damage during Hurricane Sandy; further assessment is needed to identify any safety hazards to visitors (IMT 2012j). A short path also veers north from the promenade at Haan Road to terminate at Steele Road (RPA 2012).

A "protected bike path" connects to the Jamaica Bay Greenway at the intersection of Beach 169th Street and Rockaway Point Boulevard. Per the Regional Plan Association for New York, New Jersey, and Connecticut, a protected bike path is differentiated from a bicycle lane, which is defined as an "on-street striped route," and from a shared lane, which is defined as an "on-street marked route." Therefore, it is assumed that a protected bike path is a Class I separate facility (RPA 2012). The bike path extends approximately 4 miles east to the Fort Tilden park boundary. The bike path was covered in sand by Hurricane Sandy (IMT 2012j).

Figure 3-24 shows the location of these facilities. Table 3-15 provides more detailed information.

Riis Landing

Private Vehicle and Waterborne Transportation Parking Facilities

Riis Landing provides one 84-space parking lot for the entire site. This lot is generally not heavily used nor filled given the relatively low level of activity that currently occurs on the landing. It is only during a marine charter excursion, that the parking lot fills and visitors must park across Rockaway Point Boulevard in one of the parking lots located at Fort Tilden (2006 FHWA).

Fort Tilden parking areas are used when the Riis Landing parking is full. Fort Tilden's T-4 parking lot is used for after-school activities and during evenings. Daytime restrictions on the T-4 lot discourage use.

Figure 3-24 shows the location of these facilities.

Canarsie Pier is a popular local fishing location and offers several recreational opportunities, such as seasonal kite-flying activities, youth group paddling, and a summer concert series.

Public Transportation Services

The Q35 bus route provides bus service from Brooklyn to Jacob Riis Park, continuing eastbound along Rockaway Beach Boulevard to Rockaway Park. The Q22 bus route provides bus service between Riis Landing and Rockaway Point, continuing northbound across Broad Channel into Queens. The New York Water Taxi travels between Riis Landing, Brooklyn Army Terminal (Bay Ridge), and Pier 11 Wall Street. The Water Taxi operates weekdays throughout the year. The New York Beach Ferry also provides service to Riis Landing on summer weekends and holidays. Connections are available from Pier 11, which is near South Street Seaport, Manhattan, and a short walk from Wall Street. Ferry service has been inconsistent and caters to different travel markets (e.g., visitor and commuter). Current facilities lack appropriate access and parking to support increased use.

Figure 3-24 shows the location of these facilities.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

Riis Landing contains two sections of the Jamaica Bay Greenway multi-use path mentioned under "Jacob Riis Park/Fort Tilden/Breezy Point." A protected bike path connects to the Jamaica Bay Greenway at the intersection of Beach 169th Street and Rockaway Point Boulevard. The bike path extends approximately 4 miles east to the Fort Tilden park boundary (RPA 2012).

Figure 3-24 shows the location of these facilities. Table 3-17 provides more detailed information.

Canarsie Pier

Canarsie Pier is a popular local fishing location and offers several recreational opportunities, such as seasonal kite-flying activities, youth group paddling, and a summer concert series. NPS rangers lead paddling trips from a kayak launch and provide fishing demonstrations (NYHP 2012).

Private Vehicle and Waterborne Transportation Parking Facilities

Canarsie Pier is located on Brooklyn's mainland, allowing for more direct access than some other districts. The pier is immediately adjacent to the Belt Parkway where it intersects Rockaway Parkway. The pier provides parking for approximately 300 private vehicles.

Public Transportation Services

The B42 bus route travels Rockaway Parkway from the L subway station to Canarsie Pier and back. The B42 bus route operates daily, all times. Train access includes the Gray/L to Rockaway Parkway in conjunction with the B42 bus to the pier entrance.

Figure 3-24 shows the location of these facilities.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

The Rockaway Gateway Greenway parallels the Belt Parkway and Jamaica Bay's shoreline, providing a connection to Canarsie Pier from the north and south. No hiking trails or paths exist in the Canarsie Pier district itself. Recreational kayakers can paddle a loop route into the bay from Canarsie Pier. No designated blueways connect the pier to other areas. However, paddlers could connect with kayak launches at Floyd Bennett Field southwest of Canarsie Pier and Jamaica Bay Wildlife Refuge east of Canarsie Pier.

Figure 3-24 shows the location of these facilities. Table 3-15 provides more detailed information about them, but reflects pre-Sandy conditions.

Staten Island Unit

The Staten Island Unit is on the southeastern shore of Staten Island in Lower New York Bay and includes Fort Wadsworth, Miller Field, and Great Kills Park.

Fort Wadsworth

On the easternmost tip of Staten Island, Fort Wadsworth is bisected by the Verrazano-Narrows Bridge, which connects the island to Brooklyn. Visitors access Fort Wadsworth via private car, city bus, or bicycle, or on foot. No internal shuttle service is provided within the site. Fort Wadsworth is not accessible by water and no functional dock exists to facilitate water access.

Private Vehicle and Waterborne Transportation Parking Facilities

Interior roads in Fort Wadsworth are closed to private vehicles. Four visitor parking lots are provided for visitors traveling from New York Avenue and USS North Carolina Road; two are paved and two are composed of gravel or gravel and grass. No water access is provided, although there is a non-functional dock known as Torpedo Wharf that could be used for watercraft. The dock is west of the Verrazano-Narrows Bridge and Battery Weed. The National Parks of New York Harbor Conservancy offers a "Gateway to America" water tour created by the conservancy and the NPS. Although this tour includes the Statue of Liberty, Brooklyn Bridge, Ellis Island, and the Narrows between Staten Island and Brooklyn, it does not include Fort Wadsworth (NYHP 2010). However, the conservancy's "America's Frontline" tour does feature Fort Wadsworth.

Public Transportation Services

Two public city bus routes, the S51 and S81, travel through Fort Wadsworth along Battery Road and New York Avenue. The S51 operates daily between Lincoln Ave/Richmond Rd and the St. George Terminal via Fort Wadsworth between 6:00am-7:00pm. During the weeday afternoon peak perio, the S81 runs limited-stop from the St. George Ferry Terminal to

Lincoln Ave/Richmond Rd via Fort Wadsworth. Although the S51 operates 24 hours, the segment through Fort Wadsworth only operates during the span mentioned above. Also the S81 only operates during the peak afternoon period. Route S53 and express routes X4, X5, X7 and X8 are near the park, with stops at the intersection of Lily Pond Avenue and Battery Road. The express routes travel between Staten Island and Manhattan and operate on weekdays only; the other routes operate 24 hours daily. Schedules vary, with more frequent service during morning and afternoon rush hours. Only folding bicycles are allowed aboard local and limited Staten Island buses, and a $5 lifetime bicycle permit is required. The Staten Island Ferry does accommodate bicycle use.

The Staten Island Railway stops at the town of Clifton, north of Fort Wadsworth at Bay Street, where the S51/S81 bus routes also stop. Visitors traveling by train could take the S51 or S81 bus from the Clifton train stop into Fort Wadsworth or could cycle along the Class 3 bicycle route that follows Bay Street to the park site. Standard bicycles are not allowed on the Staten Island Railway trains during morning and afternoon rush hours, although folding bicycles are allowed on trains at all times. Train schedules vary from approximately every 5 to 10 minutes during the morning/evening rush hour to every 30 minutes other times during weekdays. Train schedules are approximately every 30 or 60 minutes on weekends.

No public water access is provided to or from Fort Wadsworth, although Torpedo Wharf could be used for public ferries. Figure 3-25 shows the location of these services.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

An unmarked paved walking route leads to Mont Sec History House; Batteries Catlin, Weed, Bacon, Turnbull, Barbour, and Duane; the overlook; Fort Tompkins; and Camp Hudson. The route follows a paved sidewalk and paved roadway (authorized vehicles only). Several dirt access paths provide access to designated fishing areas on the southeast side of the park.

The New York City Greenway, a paved multi-use path, enters the southernmost corner of the park, connecting Miller Field to Fort Wadsworth. This path suffered damage from Hurricane Sandy, particularly to the pavement, drainage, and guardrails (IMT 2012j). Several additional bicycle lanes or routes exist or are proposed for the area (described under "Cumulative Impacts" in the "Environmental Consequences" chapter). An existing Class 3 bicycle route enters Fort Wadsworth from the north on Bay Street, which becomes New York Avenue once inside the park. A Class 2 bicycle lane follows Father Capodanno Boulevard from Midland Avenue, just north of Miller Field, to Lily Pond Avenue, which traverses Fort Wadsworth's western boundary. This bicycle lane connects with the Class 3 route on Bay Street mentioned above. While biking is popular at Fort Wadsworth, there are no bicycle parking facilities in Fort Wadsworth.

Figure 3-25 shows the bike paths, greenways, blueways, hiking trails, and pedestrian routes for this unit. The map key symbols correspond to Table 3-15, which provides more detailed information about these facilities (gathered prior to Hurricane Sandy).

Figure 3-25. Fort Wadsworth Transportation Services and Facilities.

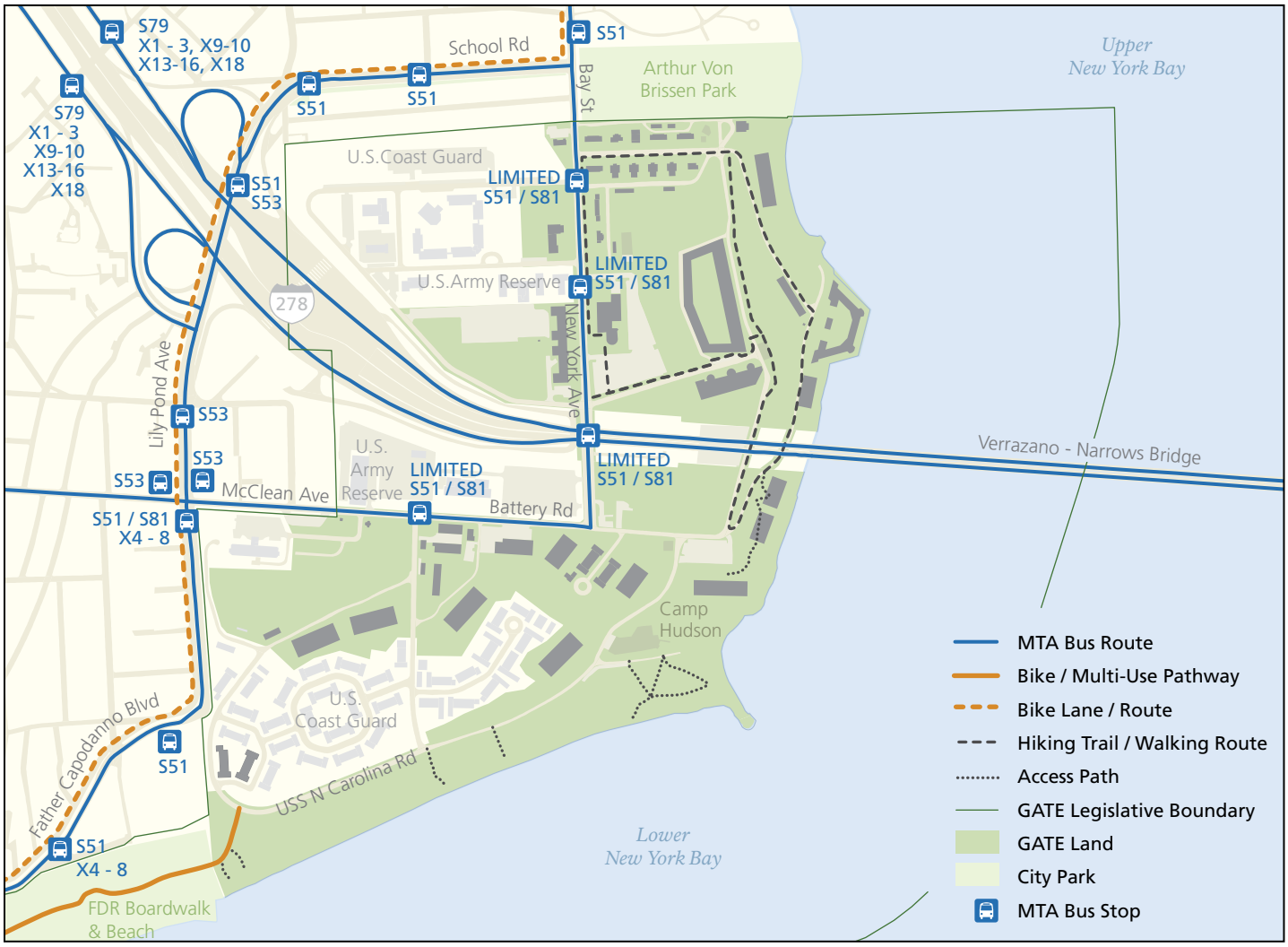


Table 3-16. Fort Wadsworth Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes.

Type		Location	Biking	Greenway Access	Hiking	Walking	Mode	Surface Type	Parking
Walking Route		Begins/ends B120 parking lot	Yes	No	No	Yes	Ped	Sidewalk + paved	Yes
Access Path		On walking/ biking route – S of Battery Barbour	No	No	No	Yes	Ped	Dirt	No
Gravel Drive		Range Road – parking lot	No	No	No	Yes	Ped	Gravel	Yes
Access Path		Range Road – parking lot	No	No	No	Yes	Ped	Dirt	Yes
Access Path		Range Road – parking lot	No	No	No	Yes	Ped	Dirt	No
Access Path		Range Road – parking lot	No	No	No	Yes	Ped	Dirt	No
Access Path		USS NC Rd – S of Battery Dix	No	No	No	Yes	Ped	Dirt	No
Access Path		USS NC Rd – N of USS TN Rd	No	No	No	Yes	Ped	Dirt	No
Bike Path (New York City Green-way)		USS NC Rd – S of USS TN Rd	Yes	Yes	No	Yes	Multi-Use	Paved	No
Access Path		Bike path – S of USS NC Rd	No	No	No	Yes	Ped	Sand	No
Access Path		Bike path – S of access path	Yes	No	No	Yes	Ped	Sand	No
Proposed Bike Route		Proposed bike route through park	Yes	Yes	No	NA	Bike	Paved road	No
Class 2 Bike Lane		Existing Class 2 bike lane W of park	Yes	No	No	NA	Bike	Paved road	No
Class 3 Bike Route		Existing Class 3 bike route N of park	Yes	No	No	NA	Bike	Paved road	No

S = south; ped = pedestrian; USS NC = USS North Carolina; N = north; USS TN = USS Tennessee; NA = not applicable; W = west

Miller Field

South of Fort Wadsworth, Miller Field is home to a variety of sports fields, a bocce court, playgrounds, and picnic area. Recreation is the focus at Miller Field, particularly team sports. Like Fort Wadsworth, Miller Field can be accessed via private car, city bus, or bicycle, or on foot.

Private Vehicle and Waterborne Transportation Parking Facilities

Nine visitor parking lots, all of which are paved, exist at Miller Field. Traffic congestion forms at Miller Field during parking lot turnover, creating a line of cars waiting to enter and exit the park. None of the parking lots required permits, although sports groups needed a permit to use the site's facilities. According to the Gateway State of the Park 2008, the parking facilities have been renovated, allowing easy access to the sports fields. No water access is provided (NPS 2008).

Public Transportation Services

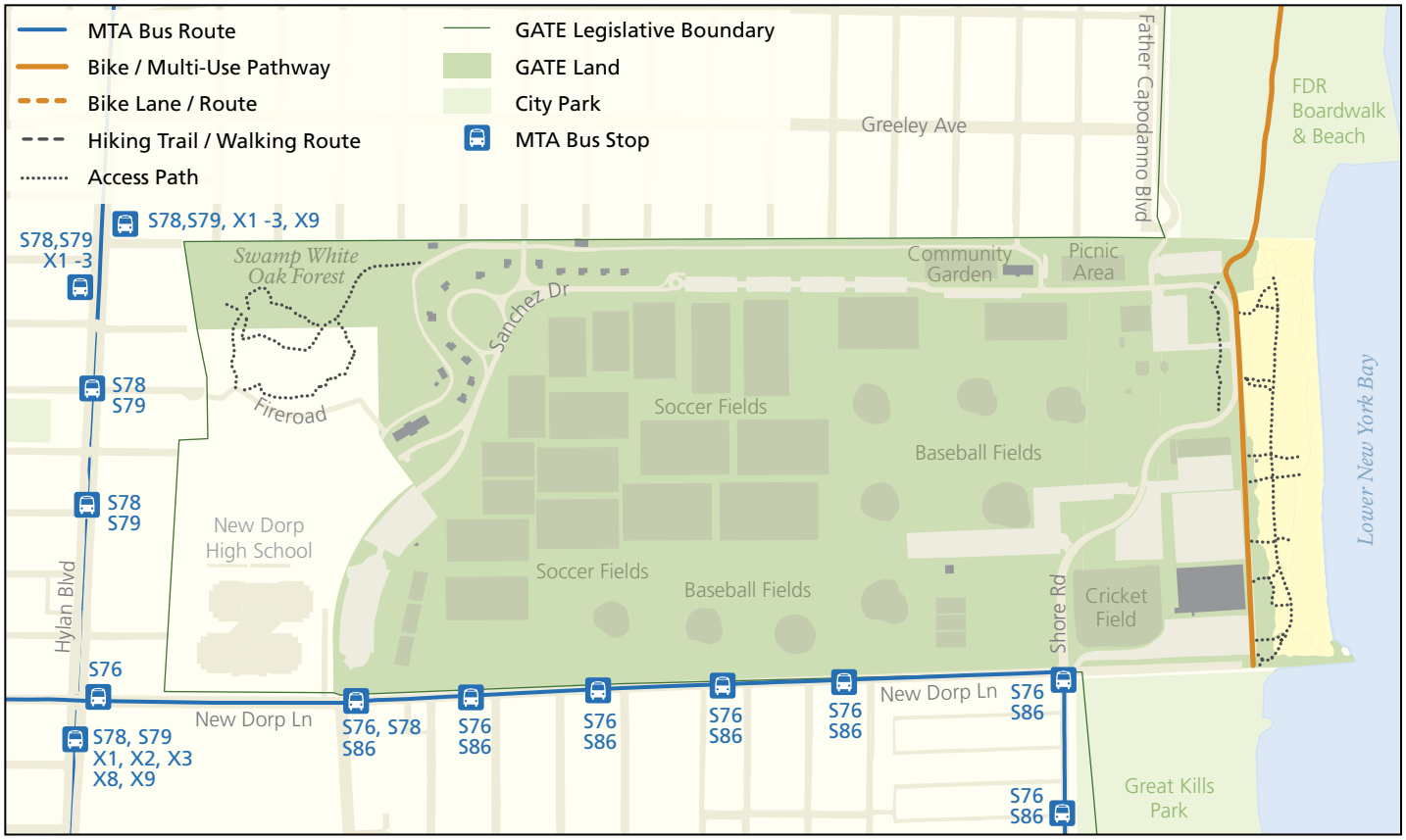
One limited-stop bus, the S76/S86, travels between Oakwood Beach and the St. George Ferry Terminal. No bus routes enter Miller Field, unlike Fort Wadsworth. Other routes travel nearby on Hylan Boulevard, stopping where it intersects New Dorp Lane: the S78, S79, and express routes X1, X2, X3, X8, and X9. The X1 epxress route operates weekdays, Saturdays, and Sundays. The S78 route travels between Tottenville and Saint George Ferry Terminal. The S79 Select Bus Service (SBS) travels between the Staten Island Mall and the Bay Ridge in Brooklyn. The express routes travel between Staten Island and Manhattan and operate on weekdays only; the other routes operate daily. Schedules vary, with more frequent service during morning and afternoon rush hours. Bicycle restrictions and transit services are as described for Fort Wadsworth.

The Staten Island Railway stops where the rail line intersects New Dorp Lane. Visitors traveling by train could take the S76/S86 bus from the train stop directly to either of the Miller Field park entrances. Bicycle restrictions and train schedules are as described for Fort Wadsworth. No public water access is provided to or from Miller Field. Figure 3-26 shows the location of these services.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

Several segments of walking routes and access paths exist in Miller Field. Like Fort Wadsworth, numerous access paths lead to fishing locations along the coastline, but no water access and no public docks are provided. A gravel road, used for hiking, begins at Miller Field's northeast entrance near the visitor's contact station and leads to the swamp white oak forest at the park's northwestern corner. This route was in fair condition prior to the hurricane. Where the gravel road ends, a fire road continues farther into the forest.

Figure 3-26. Miller Field Transportation Services and Facilities.



An access path leads from Memorial Circle, where the New York City Greenway begins, to Shore Road. Several access paths lead to the designated fishing area along Lower New York Bay. These paths filled with sand during the hurricane (IMT 2012j).

The New York City Greenway multi-use path begins and ends at Miller Field, paralleling the Lower New York Bay north to Fort Wadsworth. The greenway enters Miller Field near Memorial Circle in the northeast corner of the park, where the route begins and ends. As mentioned above, this route provides a connection to Fort Wadsworth. Figure 3-26 shows the location of these facilities. Table 3-16 provides more detailed information.

Table 3-17. Miller Field Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes.

Type		Location	Biking	Greenway Access	Hiking	Walking	Mode	Surface Type	Parking
Bike Path (New York City Greenway)		Bike path – N of Memorial Circle	Yes	Yes	No	Yes	Multi-use	Paved	Yes
Access Path		Swamp white oak forest	No	No	No	Yes	Ped	Other – dirt	No
Access Path		NW of Shore Rd	No	No	No	Yes	Ped	Paved	Yes
Access Path		Parallel to Shore Rd	No	No	No	Yes	Ped	Paved	No
Access Path		SE of Memorial Circle	No	No	No	Yes	Ped	Sand	No
Access Path		Access from access path	No	No	No	Yes	Ped	Sand	No
Access Path		Access from access path	No	No	No	Yes	Ped	Sand	Yes
Access Path		Access from access path	No	No	No	Yes	Ped	Sand	No
Access Path		Access from access path	No	No	No	Yes	Ped	Sand	No
Access Path		NE from parking lot	No	No	No	Yes	Ped	Sand	No
Access Path		NE from parking lot	No	No	No	Yes	Ped	Sand	No
Access Path		NE of historic hangars	No	No	No	Yes	Ped	Sand	No
Access Path		E of historic hangars	No	No	No	Yes	Ped	Sand	No
Access Path		Access from access path	No	No	No	Yes	Ped	Sand	No
Gravel Road		N end of park	No	No	No	Yes	Ped	Gravel	No
Class 2 Bike Lane		Existing Class 2 bike lane N of park	Yes	No	No	NA	Bike	Paved road	No
Proposed Bike Route		Proposed bike route S of Miller Field	Yes	No	No	NA	Bike	Paved road	No
Proposed Bike Route		Proposed bike path from New York City Greenway S to Oakwood Beach	Yes	Yes	No	NA	Bike	Paved road	No

N = north; ped = pedestrian; NW = northwest; SE = southeast; NE = northeast; E = east; NA = not applicable; S = south

Great Kills Park

Great Kills Park is on a peninsula that features an inlet harbor, barrier ocean beach, and open space. Like Fort Wadsworth and Miller Field, Great Kills Park can be accessed via private car, city bus, or bicycle, or on foot. Waterways and water access are crucial components of this Staten Island site, unlike Fort Wadsworth and Miller Field.

Private Vehicle and Waterborne Transportation Parking Facilities

Several paved and gravel lots, some requiring permits, provide parking at Great Kills Park. Parking lots provide access to boating, fishing, trailheads, and an educational field station. Prior to the hurricane, a total of 15 parking facilities were available to visitors, although the lot at the model airplane flying field and at ball fields 1, 2, and 3 were closed due to environmental contamination issues (radiation). Two standard bicycle racks—one at the educational field station and one north of Nichols Marina—were provided. The "Entrance Parking East" lot is not on NPS property and is maintained by the city. Two lots at Crooke's Point require permits.

No public watercraft access, such as a public ferry, is provided. Prior to Hurricane Sandy, Great Kills Park provided watercraft access and docking facilities at Nichols Marina for private boaters. The marina was open only to slip leaseholders. A boat ramp was also provided for visitors to the northeast of the marina. Hurricane Sandy damaged the marina in 2012; the permanent docks are now gone. Most of the boats that were moored at the docks were badly damaged or lost. A floating pile of debris at the boat ramp was the responsibility of the New York Department of Environmental Compliance, which is also planning for its removal. Up to 13 boats are sunk in the water next to the Great Kills shoreline and are the responsibility of the U.S. Coast Guard to retrieve and remove. Numerous boats on the Great Kills beaches are the responsibility of the individual owners to retrieve and remove. The NPS has provided supervision for removal by private towing companies thus far. The parking lot and roadway to the marina were also heavily damaged (IMT 2012j).

New York City established a temporary ferry to Manhattan from Great Kills as a result of Hurricane Sandy. Launched on November 25, 2012, the temporary ferry service from Great Kills to Manhattan brought relief to, and eased the commutes of, neighborhoods that saw some of the worst damage from Hurricane Sandy. The schedule ran from Great Kills Park to Pier 11 at Wall Street, continuing on to 35th Street. Vessels left from a newly installed temporary landing near the marina in Great Kills Park along Buffalo Street, and three parking areas in Great Kills Park were available to ferry riders arriving by car. Additionally, a shuttle bus provided by New York City Transit links the ferry landing with the S78 and SBS S79 bus stop at Buffalo Street and Hylan Boulevard and parking areas. The ferry service concluded January 25, 2013, and there are no plans to extend the service at this time (NYCDOT 2013).

Public Transportation Services

Several public city bus routes travel Hylan Boulevard, which parallels Great Kills Park's northwestern boundary, stopping at the park entrance and at an access path into the park. These routes include S78 and S79 Select Bus Service (SBS), described under "Miller Field," and express routes X1, X4, X5, X7, X8, and X24.The express routes travel between Staten Island and Manhattan and operate on weekdays only; the other routes operate daily. The X1 express route operates weekdays, Saturdays and Sundays. Schedules vary, with more frequent service during morning and afternoon rush hours. Bicycle restrictions are as described for Fort Wadsworth.

The Staten Island Railway stops where the rail line intersects Bay Terrace Avenue, which is northwest of the park. However, no bus routes access this train stop. Train users with bicycles could potentially cycle along roads that are not official bicycle lanes or routes to the proposed bicycle route that would follow Hylan Boulevard to the park entrance. Bicycle restrictions and train schedules are as described for Fort Wadsworth. Figure 3-27 shows the location of these facilities.

Figure 3-27. Great Kills Park Transportation Services and Facilities.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

A combined paved and gravel (wheelchair-accessible) multi-use path begins at the entrance to Great Kills Park, roughly following Buffalo Street and extending 1.5 miles to the swimming beach and Nichols Marina. The path offers opportunities for walking, jogging, cycling, and rollerblading. As a result of the hurricane, erosion of sand near the walkway is a potential hazard to path users but could be mitigated through sand relocation. An area of approximately 150 feet was washed out or damaged during the storm, posing a potential safety risk to community users. The Blue Dot Trail, a 1.5-mile path paralleling Hylan Boulevard along the park's northwestern boundary, offers views of diverse wildlife and natural habitats (NYHP 2009). A footbridge near Hylan Boulevard needs to be assessed for damage from the hurricane (IMT 2012j). Three additional hiking trails exist at Crooke's Point on the tip of the Great Kills Peninsula: White Trail, Orange Trail, and Yellow Trail. Access paths extend from the White Trail and the parking lots (by permit only) in this area to fishing areas that surround the peninsula. Other access paths in the park provide access to the bay or harbor. However, the access path from ball field 3 to the Blue Dot Trail is currently closed due to radiation (see "Health and Safety" in this chapter for more information). Trail repairs and bike path repaving due to Hurricane Sandy began in the winter and will continue until they are complete.

The New York City Water Trail (New York City Water Trail) also designates a kayak landing area at Great Kills Park district, without identifying a specific location (NYCDPR n.d.). Figure 3-27 shows the location of these facilities.

Table 3-18. Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes.

Type		Location	Biking	Greenway Access	Hiking	Walking	Mode	Surface Type	Parking
Multi-use Path		Hylan Blvd and Buffalo St	Yes	No	No	Yes	Multi-use	Paved	Yes
Access Path		Parking Area A	No	No	No	Yes	Ped	Other – dirt	Yes
Access Path		S of beach center	No	No	No	Yes	Ped	Sand	Yes
Access Path		S of access path	No	No	No	Yes	Ped	Sand	Yes
Access Path		S of access path	No	No	No	Yes	Ped	Sand	Yes
Access Path		S of access path	No	No	No	Yes	Ped	Sand	Yes
Access Path		Crooke's Point Parking Lot	No	No	No	Yes	Ped	Sand	Yes
Access Path		Crooke's Point Parking Lot	No	No	No	Yes	Ped	Sand	Yes
Access Path		Crooke's Point Parking Lot	No	No	No	Yes	Ped	Sand	Yes
Access Path		Crooke's Point Parking Lot	No	No	No	Yes	Ped	Sand	Yes
Hiking Trail		White Trail	No	No	Yes	Yes	Ped	Other – dirt	Yes
Access Path		Access from hiking trail	No	No	No	Yes	Ped	Other – sand	No

Table 3-18. Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes (continued).

Type		Location	Biking	Greenway Access	Hiking	Walking	Mode	Surface Type	Parking
Hiking Trail		Orange Trail	No	No	No	Yes	Ped	Other – dirt	No
Hiking Trail		Yellow Trail	No	No	No	Yes	Ped	Other – dirt	Yes
Hiking Trail		Crooke's Point Parking Lot	No	No	No	Yes	Ped	Other – dirt	Yes
Access Path		Crooke's Point Harbor Parking Lot	No	No	No	Yes	Ped	Other – dirt	Yes
Access Path		Overflow launch/ trailer parking	No	No	No	Yes	Ped	Other – dirt	Yes
Access Path		Buffalo St	No	No	No	Yes	Ped	Crushed gravel	Yes
Access Path		Education Field Station							
No	No	No	Yes	Ped	Crushed gravel	Yes			
Hiking Trail (Blue Dot Trail)		Hylan Blvd/Buffalo St Entrance to Bulkhead Rd	No	No	No	Yes	Ped	Other – dirt, paved	Yes
Access Path		Access from Hylan Blvd to Blue Dot Trail	No	No	No	Yes	Ped	Paved	No
Access Path		Blue Dot Trail to Ball Field 3 Parking Lot	No	No	No	Yes	Ped	NA	Yes
Access Path		NW park boundary and Wetland Rd	No	No	No	Yes	Ped	Crushed gravel	No
Class 3 Bike Route		Proposed bike route on Hylan Blvd	Yes	No	No	NA	Bike	Not yet developed	No
Proposed Bike Route		Proposed bike path through park	Yes	No	No	NA	Bike	Not yet developed	No
Class 3 Bike Route		Proposed bike route on Mansion Ave (outside park)	Yes	No	No	NA	Bike	Not yet developed	No

Ped = pedestrian; S = south; NA = not applicable

Sandy Hook Unit

Gateway's Sandy Hook Unit is a barrier beach peninsula on the northern tip of the New Jersey shore. Like the Staten Island sites, Sandy Hook is primarily accessed via private car, by bicycle, or on foot. In addition, prior to Hurricane Sandy, a seasonal (summer-only) ferry provided access between the Fort Hancock Historic District and Manhattan. A shuttle bus connection took visitors from the ferry landing to attractions throughout the park and back.

Sandy Hook was perhaps the most damaged unit of Gateway by Hurricane Sandy in 2012. A 13-foot storm surge washed over Sandy Hook, depositing 5-foot drifts of sand along 3 miles of the main road (Foderaro 2012). Restoration work to date has included clearing roads and trails, stabilizing park facilities, and redistributing sand that had filled roadways and parking lots. Due to the extensive damage resulting from Hurricane Sandy, the Sandy Hook Unit was closed to the public until park facilities were restored in May 2013 (IMT 2012a).

Private Vehicle and Waterborne Transportation Parking Facilities

Within the Fort Hancock Historic District in Sandy Hook prior to Hurricane Sandy, 8 visitor parking facilities were provided, with an additional 13 facilities outside Fort Hancock, for a total of 21 parking facilities. Two of these facilities—one at the visitor center and one at Gunnison Beach—provided bicycle parking, offering a total of 11 spaces. The majority of Sandy Hook's car parking lots required permits. Visitors accessing the fishing beach on the ocean side just north of the visitor center parked along a paved road leading from Hartshorne Drive. However, Hartshorne Drive was damaged by Hurricane Sandy and the road edge was in need of repair. Parking lots provided access to boating, fishing, trailheads, and an educational field station. Parking near Pennington Drive in Fort Hancock was in fair condition prior to Hurricane Sandy, showing some cracks and shallow holes in the pavement. Some of the lots in Fort Hancock, particularly overflow lots, were gravel and were heavily damaged by the storm (IMT 2012j).

Although the park includes more than 4,000 parking spaces at highly visited beaches and concessions, as well as approximately 900 spaces elsewhere (primarily at Fort Hancock and fishing access at Parking Lot F), the current parking supply is not sufficient to serve all of Sandy Hook's recreational visitors on peak summer weekends. During these times, vehicles approaching the park back up past the Shrewsbury Bridge into Highlands and Sea Bright, congesting local streets, blocking driveways, and increasing safety, air quality, and noise pollution problems. Regional traffic congestion becomes an even bigger issue when the park reaches capacity, because vehicles on Route 36 need to turn around and leave the Sandy Hook area when parking areas fill and the park gates are closed. Parking Area D, where long lines of cars form, is particularly problematic because many traffic-related incidents occur due to high turnover caused by the area's proximity to the primary beach concession area. Park rangers are required to direct traffic at Parking Area D when long lines of traffic there and on Hartshorne Drive become an issue. Hartshorne Drive becomes congested in the evening as beachgoers from the northern areas of the park leave for the day (Volpe Center 2003).

Although no private watercraft docking facilities are provided, Sandy Hook did provide public watercraft access prior to Hurricane Sandy. A seasonal ferry traveled between the Fort Hancock Historic District and Manhattan during the summer. Fares were approximately $40 round-trip. Repairing the docks was a high priority, and the ferry is once again operational during the summer months (IMT 2012j).

The NPS removed the one-sided barge that was in place at the Sandy Hook Bay Ferry Landing in Fort Hancock in 2009. Currently, there is a new NPS-owned barge/dock. The park began preparing an environmental assessment in 2009 for a new pier with wave attenuation devices, a floating ferry dock, improved parking, and a waiting area for ferry passengers. The new pier would be placed in the same location as the existing pier and barge, behind the Fort Hancock Chapel (NPS 2009i). As of July 2013, these facilities have not yet been built. Figure 3-28 shows the location of these facilities.

Public Transportation Services

Two bus routes—Academy route 36 and New Jersey Transit route 834—travel to the town of Highlands on the mainland near Sandy Hook. Route 36 travels between Long Branch, which is directly south of Sandy Hook, and the Port Authority. Route 834 travels between Red Bank, which is southwest of the park, and Highlands. Bicycles are permitted at all times on buses with bicycle racks on the front or with underfloor luggage compartments on a first-come, first-served basis. Currently half of the New Jersey Transit bus fleet is "bike friendly." Bicycles are not permitted on articulated buses.

Unlike the Staten Island Unit, which has bus routes immediately adjacent to park site boundaries, Sandy Hook has bus routes that approach the park unit but visitors need additional transportation to and through the park. Visitors dropped off near the park entrance would have to walk 2 miles to the nearest bathing beach (Volpe Center 2004).

The North Jersey Coast Line provides train service to the town of Red Bank, which is southwest of the park. Visitors accessing the park by train then have to transfer to bus route 834 to Highlands. However, as described above, no public transportation is available from Highlands to or through Sandy Hook. Collapsible bicycles are accommodated on all New Jersey Transit trains at all times. Standard-frame bicycles are permitted only in accessible cars except during rush hour, on holidays, on the days prior to holidays, and on the Friday after Thanksgiving. There is a limit of two bicycles or Segway® Personal Transporters per accessible car. There is no additional charge for bringing a bicycle on a train.

Public ferries access the town of Highlands and nearby Atlantic Highlands, traveling to and from various destinations in Manhattan. These ferries, some of which are private charters, operate year-round with varying frequency. However, once arriving in Highlands, no public transportation is available from Highlands to or through Sandy Hook.

A seasonal public ferry with a capacity of 400 people operates during the summer between a ferry landing at Fort Hancock and Manhattan. Visitors arriving by ferry at Fort Hancock can take a shuttle bus from the Fort Hancock Ferry Landing to the Fort Hancock Museum, North Beach, Gunnison Beach, and Beach Area E. The shuttle provides a connection to the multi-use pathway that runs most of the length of the peninsula. The shuttle bus does not travel to the entrance gate to transport visitors into the park. Figure 3-28 shows the location of these facilities.

Figure 3-28. Sandy Hook Transportation Services and Facilities.

Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes

A multi-use pathway starts at Sandy Hook's entrance, following Hartshorne Drive and ending in Fort Hancock. The NPS provides mobile bicycle racks at all beach locations when needed. The multi-use pathway was ruptured in several locations during Hurricane Sandy in 2012, but has since reopened (IMT 2012j). Prior to the hurricane, the multi-use pathway was being expanded to loop around Fort Hancock. Phases 1 and 2A of the pathway were complete. The first phase of the multi-use pathway, completed in 2004, was approximately 5.5 miles in length and provided non-motorized access from Sandy Hook's entrance to the Fort Hancock Ferry Landing. Phase 2A, which was completed in 2008 and 2009, added approximately 3.1 miles of trail and created a loop between the North Beach Plaza, the Gunnison Beach Plaza, and the Mortar Battery at Fort Hancock (NPS 2012h).

Hiking trails begin at the Sandy Hook visitor center and Area M near Nine-Gun Battery just north of Fort Hancock, which is a loop near North Pond. Several paths provide foot access to beach and fishing locations, including Gunnison Beach and North Beach. Sidewalks parallel some roads in Fort Hancock. Many of these trails and some boardwalks were damaged during Hurricane Sandy and needed repair. The NPS expects to reopen trails and fishing areas for summer 2013 (IMT 2012j).

Figure 3-28 shows the location of these facilities. Table 3-19 provides more detailed information about them, which was gathered prior to Hurricane Sandy.

Table 3-19. Sandy Hook Bike Paths, Greenways, Blueways, Hiking Trails, and Pedestrian Routes.

Type		Location	Biking	Greenway Access	Hiking	Walking	Mode	Surface Type	Parking
Multi-use Path		Fee Plaza (Main Gate) to Parking Lot I	Yes	No	No	Yes	Multi-use	Paved	Yes
Hiking Trail		Old Dune Trail	No	No	Yes	Yes	Ped	Sand	Yes
Access Path		Visitor center	No	No	No	Yes	Ped	Boardwalk + sand	Yes
Access Path		Visitor center	No	No	No	Yes	Ped	Boardwalk	Yes
Hiking Trail		Holly Forest	No	No	Yes	Yes	Ped	Boardwalk + sand	Yes
Access Path		Gunnison Beach	No	No	No	Yes	Ped	Boardwalk + sand	No
Hiking Trail		Horseshoe Cove	No	No	Yes	Yes	Ped	Other – mixed	No
Hiking Trail		Observation deck	No	No	Yes	Yes	Ped	Sand	Yes
Hiking Trail		South Beach Dune Trail	No	No	Yes		Ped	Sand	Yes
Hiking Trail		Nike Missile Launch Site							
No	No	Yes	Yes	Ped	Sand	Yes			
Multi-use Path (Ft Hancock)		Continued from Fee Plaza (Main Gate)	Yes	No	No	Yes	Multi-use	Paved	Yes
Access Path (Ft Hancock)		Parking Lot G – Gunnison Beach walkway	No	No	No	Yes	Ped	Paved – sidewalk	Yes
Multi-use Path (Ft Hancock)		Knox Rd	No	No	Yes	Yes	Ped	Paved	Yes
Access Path (Ft Hancock)		Gunnison Beach Complex	No	No	No	Yes	Ped	Sand and boardwalk	Yes
Access Path (Ft Hancock)		North Beach Complex	No	No	No	Yes	Ped	Sidewalk	Yes
Access Path (Ft Hancock)		Sandy Hook Proving Ground	No	No	No	Yes	Ped	Sand and gravel	Yes
Sidewalk (Ft Hancock)		Hartshorne Dr	No	No	No	Yes	Ped	Paved	Yes
Sidewalk (Ft Hancock)		Magruder Rd, Kearney Rd	No	No	No	Yes	Ped	Paved	Yes
Sidewalk (Ft Hancock)		Sandy Hook Proving Ground	No	No	No	Yes	Ped	Gravel	Yes

Ped = pedestrian

Park Management, Operations, and Facilities

Staffing

The approved GMP will bring significant new challenges for Gateway operations and management that will be dependent on the availability and efficient management of additional funding and staff resources.

The park management team and staff are responsible for all day-to-day management and operations of Gateway. In 2010, the park was staffed by 316 full-time equivalent employees (FTEs), which include full-time, part-time, term, temporary, and student employment. The staff and volunteers of more than 70 park partners supplement the NPS staff, which fulfills critical roles in all aspects of park operations and maintenance. In Fiscal Year (FY) 2010, the park's operations appropriation was $26.5 million, the majority of which goes to pay salaries and benefits and fixed costs such as electricity, gasoline, and other utility costs. The park attracted some 9.4 million visitors in 2010.

Across all divisions of the park staff, volunteers (from retired seniors to youth conservation corps and college interns) supplement and assist with the work of the career NPS staff, providing volunteer labor to support the goals of the park, while gaining personal experience, knowledge, and professional experience. Going forward, the park will certainly benefit from a growing amount of such assistance.

Office of the Superintendent

The Office of the Superintendent includes managerial activities of the superintendent, the deputy superintendent, office of communication, volunteer coordinator, and strategic planning and initiatives, as well as administrative staffs. The Office of the Deputy Superintendent is responsible for park management, including staff, in the areas of administration, business management, cultural resources, interpretation, education, safety, facility/asset management, natural resources, science, planning and compliance, budget, human resources, IT, fleet and property management, and visitor resources and protection.

Resource Management Division

The division of planning, managed within the Resource Management Division, is responsible for planning, environmental review, transportation, and design. The staff provides park management with the technical expertise and policy guidance needed to plan for the preservation and protection of the park's natural and cultural resources, determines and provides for appropriate public use, and manages public involvement in the planning and decision-making process. The planning staff coordinates with other park divisions; park partners; other federal, state, and local agencies of government; and consultants to carry out their mission and responsibilities.

Cultural Resources

Cultural resource staff are responsible for the management of Gateway's cultural resources, including archeological sites, fortifications, historic structures and museum collections. This includes overseeing resource protection and preservation as well as assisting with interpretation of cultural resources.

Cultural resource staff are currently working with facility management to document the baseline conditions of all park cultural resources in an effort to guide future operations and programs. Volunteers are necessary to support the park staff, given the large number, diversity, and significance of the park's cultural resources.

All alternatives in this GMP/EIS envision the park "banding" cultural resources to identify those whose condition will stay the same or improve, those where some action will be taken to slow but not stop deterioration, and those historic structures that are ruins and that will receive no maintenance. The cultural resources management division, along with facility managers and others, would be tasked with accomplishing this objective to the extent possible depending on the availability of funding, staff, time, and resources.

Cultural resource staff are responsible for the management of Gateway's cultural resources, including archeological sites, fortifications, historic structures and museum collections. This includes overseeing resource protection and preservation as well as assisting with interpretation of cultural resources.

Natural Resources

Natural resource staff are responsible for the management of Gateway's natural resources including its land-based and marine habitats. Natural resource staff are involved in research, monitoring as well as resource protection and habitat restoration projects.

Resource and Visitor Protection Division

The environmental and safety offices, along with the U.S. Public Health Service, are responsible for environmental protection, occupational health and safety, and lifeguard and emergency medical services. It also manages the park's sustainability programs, including addressing best management practices related to minimizing the impacts of climate change. Minimizing the impacts of park operations, including energy use and carbon footprint, is a priority. The group also handles comprehensive water, energy, and hazardous and universal waste management; air permits; hazardous material and hazardous waste remediation projects; and all regulatory requirements associated with these activities.

The safety of Gateway visitors and the protection of resources are management priorities. Staff exercise appropriate safety awareness and law enforcement and ensure resource and visitor protection as well as adherence to park rules and regulations. The environmental and safety office's focus is on ensuring that employees and visitors are safe.

The park relies on the U.S. Park Police for resource and visitor protection in the New York units of the park (Jamaica Bay and Staten Island). Commissioned rangers provide visitor and resource protection in the Sandy Hook Unit. Existing staff resources are proactively managed to maximize law enforcement coverage and visitor safety. Ensuring a strong park ranger / law enforcement presence is a priority in controlling use and protecting resources.

In the New York units, structural and wildfire management is provided under an agreement between the New York City Fire Department (FDNY) with the assistance and cooperation of the NPS. Sandy Hook's structural and wildland fire management is the responsibility of the NPS with the support of local entities under mutual aid agreements.

Office of Asset Management

The asset management division is responsible for ensuring the physical integrity of park assets with a strong emphasis on facility maintenance and operations.

Physical assets that are the responsibility of the asset management division include all park buildings, utilities, roads, trails, grounds, housing, and historic structures, except for those facilities that have been transferred to park partners, lessees, or concessioners for their use. Maintenance responsibilities are divided geographically among the three units, as well as by asset types. Maintenance work performed is supplemented by crews from the conservation corps and by volunteers who assist with assigned projects throughout the park. These additional labor resources help reduce the backlog of needed repairs.

Finding viable contemporary uses for hundreds of historic structures is a priority preservation strategy for Gateway. The maintenance of historic infrastructure in the park is a constant challenge, requiring ever-increasing resources as these buildings age. Deferred maintenance is also challenging, and historically, a majority of asset management needs have gone unmet annually due to insufficient funding.

With over 27,025 acres of marshes, wildlife sanctuaries, and recreational and athletic facilities; miles of sandy beaches; indoor and outdoor classrooms; picnicking and camping facilities; hundreds of historic structures and military installations; airfields; a lighthouse; and ocean and bay waters, this park offers urban residents a national park experience in an urban area. Emergency stabilization of facilities and infrastructure due to damage from Sandy had been largely completed by early 2013, but many of these facilities will remain closed until recovery is accomplished later in the next two or three years.

Hurricane Sandy impacted infrastructure systems, buildings, fleets, and equipment in all three units of Gateway, leaving 92 of these facilities and systems in serious condition and another 74 in poor condition. The storm's impacts required more immediate decision making about the future of many of these facilities and systems than might have otherwise been the case, and Gateway is currently deeply engaged in critical decision making in full consultation with partner agencies, communities, and support organizations. Decisions are being made regarding which systems and facilities would be restored and fully used in park operations and visitor programs; which would be stabilized and maintained as contributing elements of the cultural landscape; and which would be allowed to deteriorate as part of a Ruins Subzone. Each decision on the future of individual buildings would be made by the NPS with all appropriate consultation, documentation, and compliance. Decisions made to date are discussed in the "Asset Management" section. All areas, including flooded buildings, have been stabilized so that their condition does not worsen.

Interpretation and Education Division

With 9.4 million visitors in 2010, Gateway is among the most heavily visited parks in the national park system. Visitors come from a wide diversity of socioeconomic backgrounds. The interpretation and education division is responsible for connecting people to the park, and is heavily engaged in community outreach. Educational and interpretive programs are developed to encourage more enjoyment of park resources and facilitate a greater appreciation of the cultural and historical significance of the park setting and historic structures, located strategically at the entrance to New York Harbor.

The professional staff of the division strives to ensure that visitors are informed and oriented, both before they arrive and throughout their visit. Directing visitors to points of interest or appropriate interpretive opportunities is a major function of various interpretive strategies and tools, and requires constant vigilance and planning to promote visitor use and enjoyment while minimizing impacts on park resources. More actual and virtual interpretive programs are required to reach a broader audience and to increase visitor understanding and enjoyment of what they are experiencing. The GMP anticipates visitor services and facilities that are appropriately scaled and sensitively located to meet the needs of visitors, minimize impacts on park resources, and enhance visitor education and safety.

The demand for more education and interpretive programs far exceeds what the park is currently able to deliver. Many significant resources in the park are inadequately interpreted due to limited staff and funding for program development. Park partners are therefore called on to help meet public demand for educational and interpretive programs. All alternatives in the GMP/EIS envision increased partnership engagement using interagency agreements, concession contracts, leases, cooperative agreements, and other vehicles to increase and secure shared responsibilities for providing interpretive and educational programs at the park and in the adjacent communities.

Office of Business Services

The business services and partnership division oversees complex contracts and partnership agreements that provide key services within the park. The division also manages leases, concessions, and the legal aspects of park and partner projects.

Educational and interpretive programs are developed to encourage more enjoyment of park resources and facilitate a greater appreciation of the cultural and historical significance of the park setting and historic structures, located strategically at the entrance to New York Harbor.

Partners and Other Entities

In addition to programs offered by the NPS, park visitors can enjoy programs provided by a number of nonprofit organizations. Park partners provide conservation, restoration, and protection; environmental education; outreach programs; and recreational opportunities that support the goals of the park while achieving their own organizational missions.

For example, since 2010, MillionTreesNYC and the NYCDPR have been helping to plant native trees and shrubs and weed out invasive plants at Floyd Bennett Field. Similarly, beginning in 2011, park staff and volunteers, with the assistance and skills of the NYCDPR, began a major vegetation restoration project at Crooke's Point, a 28-acre peninsula located at Great Kills

Park in the Staten Island Unit. Great Kills Park has severely degraded habitat dominated by several particularly aggressive invasive, nonnative plant species. Approximately 85 percent of the project area at Crooke's Point consists of invasive vines; without intervention, this degraded plant community would remain a poorly functioning habitat for many years. Starting with a 2-acre plot, members of this partnership are continuing to remove invasive, nonnative vegetation and replace it with species native to local maritime habitat.

Gateway is also exploring a new partnership with the NYCDPR to create a newly integrated partnership park around Jamaica Bay that would include New York City and NPS park lands. The goal of this partnership is to make a contiguous park that benefits people and wildlife while leveraging the use of limited tax dollars. Opportunities exist for a similar approach in the Staten Island Unit.

Eight official NPS cooperating partner organizations operate out of facilities at Fort Hancock, including the Marine Academy of Science and Technology (which teaches high school students), the Sandy Hook Child Care Center, the Sandy Hook Foundation (the park unit's official "Friends" group), the American Littoral Society, and the New Jersey Sea Grant Consortium, among others.

Concessioners provide critical services to enhance visitor experience at the park. There are nine operators providing food services, beach club facilities, equestrian services, golf, a sports complex, and marina facilities.

Each year, close to 5,000 volunteers in the NPS Volunteers in Parks Program contribute over 80,000 hours of their time to protect Gateway's natural and historical resources and to assist visitors. A major benefit of volunteering, in addition to the needed work accomplished, is that volunteers who work 250 hours can receive a pass entitling them to free entry to any federal lands for a year, including all national parks and forests.

Park Facilities

Because of Gateway's large size, in combination with its diversity of natural and cultural resources and history of land use, the NPS is responsible for managing and maintaining numerous facilities in the park. The park contains approximately 1,300 assets, including buildings, trails, utilities, and other structures and landscapes (see table 3-20).

Historic and Non-historic Buildings

Gateway has an infrastructure dominated by hundreds of historic buildings and cultural landscapes, as well as deeply impacted natural features. Much work is needed to bring the diverse infrastructure of the park up to a standard of care that would continue to accommodate a growing diversity and volume of visitors annually. As would be expected for older facilities, the identified deferred maintenance backlog for historic buildings is significantly higher than the identified deferred maintenance backlog for the non-historic buildings (see table 3-21).

The general condition of non-historic buildings is better than that of historic buildings, due to aging facilities and systems requiring maintenance and repair of worn, aged, and obsolete components. Table 3-22 presents the ranked condition of the historic and non-historic buildings as determined by the facility condition index values extracted from the Park Asset Management Plan (NPS 2012e) which is the multi-park coordinating plan for the NPS units in New York Harbor.

Buildings represent 47 percent of the assets at Gateway, a large associated operations and maintenance requirement, and a significant operations and maintenance expenditure (see table 3-23). The Base O&M Benchmarks in this table represents what is required to properly maintain the assets and this figure is significantly higher than the budget that has been allocated.

Table 3-20. Assets at Gateway National Recreation Area.

Asset Type	Number of Assets	Percent of Total
Roads	129	10
Parking	190	15
Trails	58	4
Maintained Landscape	70	5
Building	607	47
Water	27	2
Wastewater	20	2
Electrical System	49	4
Fuel System	12	1
Dam	9	1
Marina/Waterfront	23	2
Monument/Memorial	6	0
Archeological Site	6	0
Fortification	60	5
Towers	13	1
Other	22	2
Total	1,301	100

Source: NPS 2007c.
Note: Due to rounding, percentages may not add up to 100.

Table 3-21. Number and Type of Buildings and Cost to Bring them to Adequate Condition.

Asset Type	Asset Count	Deferred Maintenance Cost
Historic Buildings	211	$115,901,704
Non-historic Buildings	396	$68,675,416

Table 3-22. Condition of Historic and Non-Historic Buildings at the Park.

Rank	Historic Buildings		Non historic Buildings	
	#	%	#	%
Good	80	38	265	67
Fair	25	12	22	6
Poor	69	33	84	21
Serious	37	18	25	6
Total	211	101	396	100

Source: NPS 2007c.
Note: Due to rounding, percentages may not add up to 100.

Table 3-23. Operations and Maintenance Cost, Funding, and Gaps for Park Buildings.

Asset Type	Asset Count	Base O&M Allocations	Base O&M Benchmarks	Coverage	O&M Funding Gap
Buildings	607	$2,780,307	$13,568,073	20%	$10,787,766

O&M = operations and maintenance

Nearly 35 percent of Gateway's buildings are historic, and so carry special legal and regulatory requirements for maintenance. A few buildings are managed and maintained by the partner or concession organization occupying them. For example, at Fort Tilden, the Rockaway Theatre Company offers live performances at the historic Post Theatre and the Rockaway Artists Alliance offers classes, exhibitions, and special events at two repurposed buildings.

Officers' Row at Fort Hancock is a fundamental cultural resource that the park struggles to maintain. The buildings are in disrepair and are vulnerable to the potential threat of future sea-level rise.

The bathhouse, batteries, and other historic structures located on the shorelines of Jacob Riis Park and Fort Tilden are also subject to potential damage from sea-level increases. Many cultural resources are less than 20 feet above sea level and therefore vulnerable to flooding during storm events.

Maintained Landscapes

Gateway maintains diverse natural and cultural landscapes for public use, such as vistas of Jamaica Bay, wetlands, historic parade grounds, and stretches of sandy beaches. Gateway's beaches and natural areas provide unique refuges from the noise and stresses of urban living. In some cases, the landscape attributes are surprising and unique. The grasslands at Floyd Bennett Field are the largest little bluestem old field grasslands in New York City, and provide bird habitat and a stopover for grassland birds in the heavily developed New York metropolitan area.

Although earthen landscapes that historically camouflaged coastal defenses (e.g., Battery Harris East at Fort Tilden) were typically managed as natural landscapes in the past, under this GMP such human-made landscapes will be managed as cultural landscapes and proactively maintained and interpreted as such. Many of the prominent structures are overgrown and unsafe for visitors; visitor access to these structures is prohibited until funds can be obtained to provide more proactive management. The park is currently prioritizing which of these structures are suitable for future park use; those whose condition will be improved; those that would be stabilized; and those that would be documented but allowed to continue to deteriorate or that would be removed and the site restored. Decisions to date are discussed in the "Asset Management" section.

Landscapes at the park can present a constant and demanding management challenge. In some cases, the landscapes are degraded and not sustainable, such as most of the estuaries within the park boundaries. The deterioration of the saltmarsh at Jamaica Bay is severe because the rate of replacement of saltmarsh cannot keep pace with a loss rate that approximates 30–50 acres per year. Because the deterioration is likely a result of many factors outside NPS control (including sea-level rise), the park is unable to maintain the landscape as it would like or as solely natural conditions would dictate.

Trails, Roads, and Parking

The park staff maintains paved and unpaved roads throughout the park. These roads are enumerated and described in the "Transportation" section in this chapter. Roads require continual maintenance and the lack of funding reduces the park's ability to maintain them at an optimum level.

Approximately 33 miles and 58 different trails at Gateway, ranging from paved surfaces to single-track paths, provide access for walkers and hikers to and through the park's developed and natural areas. Because Gateway is an urban park, the trails receive heavy use and require diligent maintenance and upkeep. The full, required budget and staffing for this maintenance is unavailable through NPS sources (see table 3-24) and would require supplemental sources.

Table 3-24. Required Funding for Operations and Maintenance of Roads, Parking and Trails.

Asset Type	Asset Count	Base O&M Allocations	Base O&M Benchmarks	Coverage	O&M Funding Gap
Roads	129	$422,610	$861,422	49%	$438,812
Parking	190	$605,669	$1,915,011	32%	$1,309,342
Trails	58	$260,761	$1,204,507	22%	$943,746

O&M = operations and maintenance

Entrances to Gateway parks are signed, but sign design is not consistent across the park and signs are not always clearly visible. Because of poor wayfinding and a lack of NPS visibility at areas like Fort Wadsworth, visitors not familiar with the area and with Gateway often become confused and disoriented. The NPS recently completed a comprehensive sign plan. Hurricane Sandy damaging or destroying many of the park's signs provides an opportunity to implement the sign plan sooner than would have been possible before the storm. Social networking, websites, use of quick response code tags, and other technological innovations in interpretive media and communications need to continue to be expanded to connect with broader audiences and potential visitors.

Gateway is accessible via public transportation systems (see the "Transportation" section in this chapter of the GMP/EIS), but the park and its regional partners continue to plan to improve transportation linkages for even better recreation and visitor access.

Utilities

Entrances to Gateway parks are signed, but sign design is not consistent across the park and signs are not always clearly visible.

Adequate water and wastewater capacity are critical to operating the facilities at all sites in the park. System needs vary over time and can be stressed by increases in use as well as by the age and level of maintenance of the infrastructure. Planning for utilities is critical in order to ensure excellence in operational effectiveness, sustainability, and conservation of water and energy resources. The wastewater treatment plant at Sandy Hook needs complete system replacement of all pumps, electronic controls, wiring, auxiliary power units, and all lift stations because of damage from Hurricane Sandy. In addition, all wastewater treatment piping and manholes need to be cleared from sand/debris incursion. Water system pumps, injection treatment systems, and controls need to be replaced. All water lines need to be disinfected. This process is estimated to require at least six months and planning is currently underway by the Denver Service Center of the NPS (NPS 2013j).

Park Maintenance Facilities

Maintenance facilities including maintenance yards and equipment storage facilities are located in all three units of the park. For efficient operations, park maintenance staff requires secured vehicle parking, the ability to receive cell and radio transmissions, access to arterial roads and highways for moving equipment, boat harbor access, and access to mass transit. Many of these criteria are not being fully met by the existing facilities.

At Sandy Hook, both the south and north maintenance shops, including vehicles, vehicle lifts, and associated equipment, were completely flooded by Hurricane Sandy. This has temporarily compromised the park's maintenance capability and imposed a major repair and restoration burden.

Public Safety Facilities

Currently, public safety staff shares space with other divisions throughout the park, with the exception of ranger stations and fire management facilities on Sandy Hook. This is less than ideal because there are certain public safety functions that need to be exclusive and secured.

Further, efficient operation requires adequate space for training and meetings, visibility to the public for reporting incidents, adequate cell and radio coverage, and access to public transportation for staff. Current public safety facilities do not meet these requirements in each location, and reassignment of space for public safety is desirable.

NPS Staff Housing

The park continues to provide a limited number of housing units for employees in all three units. Non-NPS housing in the New York area is some of the most expensive in the United States. Recruitment and retention of employees for the park is hindered by the high cost of housing and other living expenses.

Some staff housing was damaged by Hurricane Sandy. Most Sandy Hook housing units suffered basement flooding, a few experiencing flooding of the first floor, and seven units experienced no flooding. Fourteen park staff members and their families at Sandy Hook were made homeless as a result of the storm. Similar damage to park housing occurred at Fort Tilden in the Jamaica Bay Unit; basements were flooded in housing units, necessitating replacement of boilers, water heaters, and electrical panels as well as some mold abatement. The park housing at Fort Wadsworth was untouched and at Miller Field in the Staten Island Unit, only the electric service was impacted (NPS, pers. comm. 2013e).

Interpretive and Visitor Services Facilities

The condition of visitor facilities throughout the park requires extensive restoration and maintenance attention, in part due to the effects of Hurricane Sandy. For example, some visitor structures at Sandy Hook, such as the theater, suffered first-floor flooding. The theater needs all seating, carpet, and the stage replaced, with mold abatement throughout. At Jacob Riis Park, the historic bathhouse was damaged but is structurally sound, and the large parking lot was undercut in areas. The ferry docks, boardwalk, beach pavilion water fountains, lighting fixtures, and historic ships rail were damaged or destroyed. In contrast, the main park visitor center, the William Fitts Ryan Visitor Center, only had one broken window and the marina at Jamaica Bay was untouched. At Great Kills Park Marina on Staten Island, the docks were completely washed away, and access roads overwashed and covered in sand. The marina is currently closed, but the park staff intends to offer a three-year concession contract in 2013 to get it open again as quickly as possible.

Asset Management

With a large number of facilities and constrained funding, the park staff strives to address the challenge of maintaining assets in acceptable condition and sustaining them over time. Park staff is responsible for maintaining nearly 1,300 assets.

For the same NPS-occupied and NPS-maintained assets, annual special project funding of approximately $7.4 million covers only a small portion of its $300 million in deferred maintenance backlog.

Operations and Maintenance Funding Priorities

Assets maintained and managed by the park's maintenance division (e.g., non-partner assets) were categorized into priority levels based on a variety of factors (see table 3-25). Those factors include the importance of the assets to the mission of the park and the recognized level of maintenance needed to keep the assets operational to suit their intended functions.

Table 3-25. Operations and Maintenance Planned Funding Summary.

O&M Optimizer Priority Band	Asset Count	Base O&M Allocations	Base O&M Benchmarks	Coverage	O&M Funding Gap
Highest	116	$1,035,348	$2,457,972	42%	$1,422,625*
High	337	$3,047,951	$8,983,687	34%	$5,935,735*
Medium	483	$787,999	$3,224,858	24%	$2,436,859
Lower	76	$1,864	$252,081	1%	$250,217
Lowest	212	$2,027	$776,373	0%	$774,346
Totals	1,224	$4,875,189	$15,694,970	31%	$10,819,781

O&M = operations and maintenance
*Gap for bands 1 and 2: $7,358,360.

Funding is then directed towards the highest-priority assets, while lower-priority assets are maintained to the best level that limited available funding allows. However, even with prioritization, $7.36 million in priority band 1 and 2 assets would remain unfunded and therefore represent the most pressing unfunded needs for operations and maintenance.

Removal or Reuse of Assets

Removing unneeded, non-historic assets that are not mission related is essential to keeping the portfolio a manageable size and allowing available funding to be spent on a smaller pool of higher-priority assets. In developing the GMP, the park staff identified potential assets that could be disposed of over the life of the plan. The facilities identified through this process generally consist of non-historic structures in poor condition with no mission-related use existing or planned. Another major emphasis of the park needs to be the leasing or reuse by others of historic structures to maintain them without it being a drain on the park's limited budget.

Addressing Deferred Maintenance

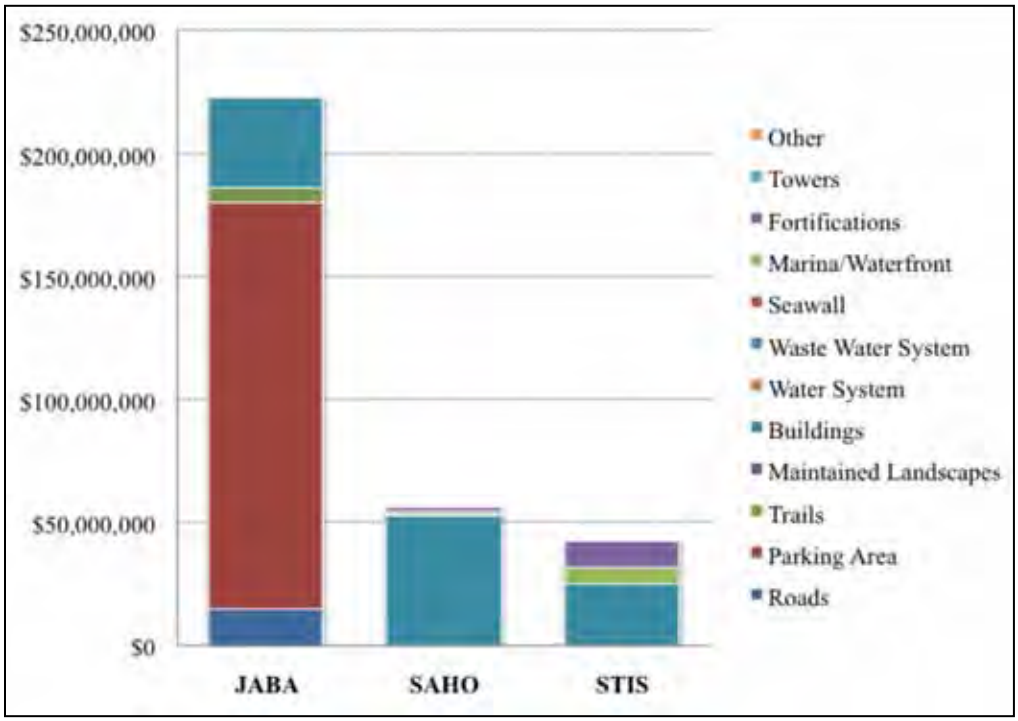
Recognizing that the park cannot reasonably address all of its deferred maintenance in the short run, the park has a schedule of facility projects that extends out 10 years (see figure 3-26). This plan addresses the highest-priority assets and most critical equipment needs. The condition of these more important assets would show the most rapid improvement,

measured by the facility condition index. If 100 percent of project funding were applied to critical needs and projected component renewal, the park would stabilize the condition of the critical components of its portfolio.

The GMP process has also identified deferred maintenance savings that would be achieved by taking the actions proposed. Deferred maintenance issues can be addressed through several actions recommended in the GMP/EIS alternatives, including removal, stabilization, restoration, renovation, and preservation of facilities.

Gateway has been among the most effective units in the national park system at using its authority to lease historic and non-historic structures to other entities that then operate and maintain them, thereby removing them from NPS maintenance responsibility. Many more such opportunities remain at Gateway.

Figure 3-26. Deferred Maintenance Backlog Summary by Asset Type.



JABA = Jamaica Bay Unit; SAHO = Sandy Hook Unit; STIS = Staten Island Unit

Improving Sustainability to Manage Assets

In a funding-constrained world, it is extremely helpful for the park to identify more efficient ways to operate and manage its assets. The park staff has identified goals for achieving a higher level of sustainability, including managing and tracking energy performance, using renewable fuels, conserving water in high-use areas, and continuing to enact best practices in waste management. The park managers also recognize the need to communicate sustainability goals to park staff and to collaborate with park partners. These measures are opportunities for the park to find cost savings and become more fiscally responsible.

Coordination between the GMP and the Park Asset Management Plan

The park continues operations under the coordinated Harbors Parks Facility Management Program. The current Park Asset Management Plan continues to provide guidance and will continue to be actively implemented. Asset data from the Park Asset Management Plan helped to inform the development of the GMP. The updates of the Park Asset Management Plan, in light of the planning process for the GMP, provide an extraordinary opportunity for park managers to promote sound asset management principles, incorporate the value and objectives of partnership relationships, and advance sustainability goals in a coordinated manner.

Sustainability: Energy Resources and Resource Conservations

The park has been taking measures to reduce its energy consumption and is pursuing sustainable practices whenever possible in decisions regarding park operations, facilities management, and development.

Sustainability can be described as the result achieved by doing things in ways that do not compromise the environment or its capacity to provide for present and future generations. Sustainable practices minimize the short-term and long-term environmental impacts of development and other activities through resource conservation, recycling, waste minimization, and the use of energy-efficient and ecologically responsible materials and techniques.

Over the past several years, the federal government has been placing more emphasis on adopting sustainable practices. In 1993, the NPS Guiding Principles of Sustainable Design (guidebook) provided a basis for achieving sustainability in facility planning and design, emphasized the importance of biodiversity, and encouraged responsible decisions (NPS 1993). The guidebook describes principles to be used in the design and management of visitor facilities that emphasize environmental sensitivity in construction, use of nontoxic materials, resource conservation, recycling, and integration of visitors in natural and cultural settings. In 2012, NPS released the "Green Parks Plan," which articulates a vision for reducing the agency's carbon footprint and outlines approaches for sustainable park management (NPS 2012d). In accordance with the guidebook, the "Green Parks Plan," and Gateway's own "Climate Friendly Parks: Framework for Local Action Planning," the park is working to reduce greenhouse gases through increased awareness about climate change and management of transportation, buildings and facilities, grounds and lands, and waste (NPS 2003b). Park staff strives to minimize energy costs, eliminate waste, and conserve energy resources by using energy-efficient and cost-effective technology wherever possible.

The park has been taking measures to reduce its energy consumption and is pursuing sustainable practices whenever possible in decisions regarding park operations, facilities management, and development. Sustainability practices and projects recently implemented at the park include the following:

- **Adopting the U.S. Green Building Council's Leadership in Energy and Environmental Design** (LEED) standard's for new building projects. For example, the visitor center at Jamaica Bay Wildlife Refuge is a Gold LEED-certified building.

- **Enabling and promoting alternative modes of transportation for visitors.** The park has made bicycle and pedestrian improvements in all three units, including improvements to the Jamaica Bay Greenway; an extension of the Staten Island Greenway along the southern tip of Fort Wadsworth to connect NYCDPR parks; connecting Miller Field with the Staten Island Greenway; and extensions to the Sandy Hook Multi-use Path. Additionally, the park is working with partners to plan and secure funding for a project to improve bicycle and pedestrian connections along the eastern Staten Island shore from the Saint George Ferry Terminal to Great Kills Park. Additionally, the park is working with local governments and private groups to increase mass transit options for accessing the park including ferries, and express and local buses. With these transportation-related improvements, park access and visitor circulation is becoming less dependent on cars and vehicle miles traveled in the park are being reduced.

- **Increasing the use of fuel-efficient and/or alternative-fueled vehicles.** The park has begun to upgrade its fleet and replace aging fleet vehicles with energy-efficient vehicles.

- **Encouraging the adaptive reuse and rehabilitation of existing structures and buildings.** Rather than expending additional resources on the construction of new buildings, park management is committed to adaptively reusing existing structures to meet future administration, operations, and visitor needs.

- **Exploring options for renewable energy development.** Gateway is currently reliant on non-renewable energy sources, but park management has initiated discussions and begun exploring the feasibility of developing renewable energy on park sites such as the landfill sites in Jamaica Bay.

- **Developing interpretive programs that address sustainable park and non-park practices.** The park is currently developing an interpretive program that will discuss climate change at the Jamaica Bay Wildlife Refuge. In the context of climate change, the interpretive program will explain the park's efforts to reduce the emission of greenhouse gases as well as adapt to the changing climate.