

A. INTRODUCTION

The visitors and residents expected from the projected development as a result of the proposed actions would create new demands for drinking water and wastewater treatment. The potential effects on those municipal services are discussed in this chapter.

B. METHODOLOGY

The analysis of existing and future demand on the water supply and wastewater treatment services follows the methodologies set forth in the *CEQR Technical Manual*. The analysis examines the potential demand of the proposed actions by estimating water and sewage demand based on established rates for the various uses of the proposed project. This new demand is then evaluated in the context of the local and regional infrastructure servicing the project location (i.e., the specific capacity of the wastewater treatment plant or the regional water supply system). For the Coney Island Rezoning Final Environmental Impact Statement (FEIS), the analysis was expanded to specifically examine the hydraulic characteristics the separate sanitary and storm sewer systems which service the rezoning area and their ability to accommodate the increased flows generated by the project. For this analysis, the FEIS utilizes the findings of a detailed hydraulic study completed in coordination with the New York City Department of Environmental Protection (DEP). With the additional hydraulic assessment, it is noted that the analyses presented in this chapter vary in methodology from the rest of the FEIS. The FEIS infrastructure analysis examines short-term development opportunities based on the proposed rezoning and existing infrastructure, interim development potential based on the proposed rezoning and incremental infrastructure improvements within the rezoning area, and long-term development potential based on the proposed rezoning after the construction of the area-wide infrastructure improvements according to an amended drainage plan (ADP).

C. EXISTING CONDITIONS

WATER SUPPLY

New York City's water supply system is composed of three watersheds—Croton, Delaware, and Catskill—and extends as far north as the Catskill Mountains. In 2006, the DEP delivered an average of approximately 1,069 million gallons of water per day (mgd) to the five boroughs and Westchester County. From these watersheds, water is carried to the City via a conveyance system made up of reservoirs, aqueducts, and tunnels extending as far as 125 miles north of the City. Within the City, a grid of water pipes distributes water to customers.

The Croton system supplied an average of 22 mgd, primarily to users in the lower-elevation portions of Manhattan and the Bronx, and groundwater from the Brooklyn Queens Aquifer supplied about 2 mgd, less than 1 percent of the average daily supply. The Delaware and Catskill systems supply all

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five boroughs and delivered about 98 percent of the City's drinking water in 2005. The Delaware and Catskill water systems collect water from watershed areas in the Catskill Mountains and deliver it to the Kensico Reservoir in Westchester County. This reservoir acts as the seasonally balancing reservoir. Summer demand is usually greater than winter demand. From the Kensico Reservoir, water is sent to the Hillview Reservoir in Yonkers, which balances the daily fluctuations in water demand and pressure to the system. From there, water is delivered to the City through three tunnels, Tunnel Nos. 1, 2, and 3. Tunnel No. 1 carries water through the Bronx and Manhattan to Brooklyn; Tunnel No. 2 travels through the Bronx, Queens, Brooklyn, and then through the Richmond Tunnel to Staten Island; and Tunnel No. 3 goes through the Bronx and Manhattan, terminating in Queens.

The Catskill/Delaware systems supply water to the rezoning area. Water distribution maps were obtained from DEP in late 2007. Water mains currently exist within all of the roadways and walks within the rezoning area limits with the exception of Kensington Walk, Schweikerts Walk, and Bowery. An interconnected grid of 6-, 8-, 12-, 16-, and 20-inch water mains runs beneath the rezoning area and the surrounding streets. These water mains supply water to individual lots and buildings. This grid system equalizes water pressure in an area and allows a section to be cut off for repair and maintenance without affecting users not directly connected to that section. According to DEP, there are currently no problems with the water distribution system's capacity, coverage, or pressure in the area. In 2007, AKRF initiated a conversation with DEP Bureau of Water Supply to determine existing water pressure within the rezoning area. Based on information provided by DEP, the water pressure within the Coney Island neighborhood at curb elevation is 45 pounds per square inch (psi).

As discussed in Chapter 1, "Project Description," the rezoning area is currently occupied by amusement, retail/commercial, and residential uses. Using the *City Environmental Quality Review (CEQR) Technical Manual* water usage rate of 112 gallons per day (gpd) per person, the existing residents within the rezoning area consume about 4,099 gpd of water. The workers and visitors of the amusement, commercial, and retail uses in the rezoning area consume about 46,032 gpd. Therefore, the existing water demand in the rezoning area is estimated to total approximately 50,131 gpd. This estimate includes consumptive water use (sinks and toilets), but does not include air conditioning during the summer. Domestic water use enters the sewer system, while water from air conditioning evaporates. The existing water demand is provided in **Table 13-1**.

SANITARY SEWAGE

WASTEWATER TREATMENT

The rezoning area is located entirely within the service area of DEP's Coney Island Water Pollution Control Plant (WPCP), which discharges treated wastewater flows (or effluent) into the Jamaica Bay. A Stormwater Pollutant Discharge Elimination System (SPDES) permit issued by the New York State Department of Environmental Conservation (NYSDEC) regulates the quality and the quantity of effluent from this WPCP for the purposes of protecting the water quality of the Jamaica Bay and regional water quality as a whole. The Coney Island WPCP is designed and permitted to treat a monthly flow of 110 mgd. The average actual monthly flow rate at the plant for the latest 12 months of records available (January 2007 through December 2007) is 85.5 mgd, which is lower than the plant's treatment capacity (see **Table 13-2**).

Table 13-1
Existing Water Usage/Sewage Generation of Projected Development Sites

Use	Rate ¹	Area (sf)	Water Consumption and Sewage Generation (gpd)	Air Conditioning (gpd) ¹
Residential ²	Domestic: 112 gpd/person Air conditioning: 0.17 gpd/sf	14,529 (15 DUs)	4,099	2,470
Retail /Commercial ³	Domestic: 0.17 gpd/sf Air conditioning: 0.17 gpd/sf	175,873	29,898	29,898
Amusements	Domestic: 0.17 gpd/sf Air conditioning: 0.17 gpd/sf	94,907	16,134	16,134
Subtotals			50,131	48,502
Total Water Consumption			98,633	
Notes:				
sf = square feet				
1 Usage and generation rates from the <i>CEQR Technical Manual</i> .				
2 Assumes 2.44 persons per dwelling unit.				
3 Usage and generation rates for retail were used as a conservative estimate for other commercial uses, including 4,756 sf of eating and drinking establishments.				

Table 13-2
Actual Flows at Coney Island WPCP

Year	Month	Flow (mgd)
2007	January	81
	February	77
	March	83
	April	94
	May	82
	June	87
	July	88
	August	89
	September	83
	October	89
	November	84
	December	89
12-month average		85.5
Notes: SPDES permit flow 110 mgd.		
Source: DEP.		

Based on the existing water demand, the existing residents and businesses in the rezoning area generate approximately 50,131 gpd of sanitary sewage. The water used by air conditioning evaporates into the air and does not become sanitary sewage.

SANITARY SEWERS

For sanitary sewage disposal, the rezoning area relies on a system that conveys sanitary sewage to the Coney Island WPCP. In the streets within the rezoning area, separate sanitary and stormwater sewers exist. The sanitary sewers direct flow by gravity from the rezoning area north, to an interceptor beneath Neptune Avenue that carries flow to the WPCP. The existing sanitary sewers within the rezoning area vary in size from 8-inches to 72-inches and the system is estimated to be up to 100-years old in some parts of the rezoning area. Several ADPs have been prepared by DEP over the last century (in years 1941, 1956, 1968, 1970, 1971, 1975, and most recently in

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2004) for isolated areas within the Coney Island peninsula; however, the rezoning area has remained widely unchanged, with the exception of selective sewer segment upgrades over the years. The interceptor in Neptune Avenue was constructed as part of the ADP prepared in 1941.

Due to Coney Island's flat topography and elevations near sea level, the sanitary and storm sewer systems were constructed at depths that provide less than the standard recommended cover at the upper ends of the catchment areas. Additionally, because of the topographical constraints, the sanitary and storm systems are installed at generally the same elevations, and for this reason, there are locations within the systems where conflict chambers are used. Conflict chambers are structures that allow for two pipes to cross at or near the same elevations without the pipes' flows mixing. The current system operates adequately and these nonstandard elements have not compromised the system's integrity; however, to avoid pipe crossing conflicts, conflict chambers have been designed into the system to ensure its continued functionality.

Primarily 8- and 10-inch sanitary sewers are located beneath the streets and pedestrian walkways within the rezoning area. These collector sewers convey wastewater to trunk mains of various sizes, which generally flow away from the rezoning area to the north. There are two parallel sewer mains beneath Surf Avenue throughout most of the Coney Island neighborhood. The trunk mains include a 12-inch sewer beneath West 19th Street, an 18-inch sewer beneath West 21st Street, a 24-inch sewer located beneath West 12th Street, and a 72-inch sewer beneath West 15th Street.

There are several sanitary sewer catchment areas that originate in the rezoning area, as shown in **Figure 13-1**. The first catchment area (Catchment Area A), in the western portion of the rezoning area, collects sanitary flow along Surf Avenue between West 22nd Street and West 27th Street, West 24th Street between Riegelmann Boardwalk and Mermaid Avenue, and Mermaid Avenue between West 24th Street and West 25th Street. Sanitary sewers located beneath Surf Avenue in this area flow towards West 24th Street. The sewer in West 24th Street conveys wastewater north from the Boardwalk to Mermaid Avenue and then west and north to the interceptor in Neptune Avenue. The sewers in this area are all 8-inch mains with the exception of the sewer beneath West 24th Street between Surf Avenue and Mermaid Avenue (10-inch) and the sewer beneath Mermaid Avenue between West 24th Street and West 25th Street (24-inch).

The second catchment area (Catchment Area B), lies predominantly within the Coney West subdistrict and collects sanitary flow along Surf Avenue between West 19th Street and West 23rd Street, West 20th Street between Surf Avenue and Mermaid Avenue, West 21st Street between Riegelmann Boardwalk and Neptune Avenue, West 22nd and 23rd Streets between the Boardwalk and midway between Mermaid and Neptune Avenues, and Mermaid Avenue between West 19th Street and West 24th Street. The sewers within West 20th, 21st, 22nd, and 23rd Streets convey flow towards Surf and Mermaid Avenues. Sanitary sewers located beneath Surf Avenue and Mermaid Avenue in this area flow towards West 21st Street. The sewer in West 21st Street conveys wastewater north from the Boardwalk to the interceptor in Neptune Avenue. The sewers in this area vary in size and are not smaller than 8-inches and increase to 18-inches before reaching the interceptor.

The third catchment area (Catchment Area C) lies within the Coney West and Coney North subdistricts and collects sanitary flow along West 19th Street between Riegelmann Boardwalk and Neptune Avenue, West 17th Street between the Surf Avenue and Mermaid Avenue, and Mermaid Avenue between West 17th Street and West 19th Street. Sanitary sewers located beneath West 19th Street convey wastewater north from the Boardwalk to the interceptor in

Neptune Avenue. The sewers within West 17th Street flow north to the sewers in Mermaid Avenue and then west to West 19th Street. The sewers in this area are largely 8-inch mains with the exception of the sewer beneath West 19th Street between Surf and Mermaid Avenues (10-inch) and the sewer beneath West 19th Street between Mermaid and Neptune Avenues (12-inch).

The fourth catchment area (Catchment Area D) lies within the Coney East and Coney North subdistricts. South of Surf Avenue, wastewater flows north to Surf Avenue through 8- and 9-inch mains. The sanitary mains located beneath Surf Avenue through this area convey flow towards West 15th Street through 8-, 10-, and 12-inch sewers. The sanitary collectors beneath West 16th Street, West 17th Street, Stillwell Avenue and Mermaid Avenue are 8-, 12-, 18-, and 72-inch mains that direct flow towards West 15th Street. A 72-inch trunk main beneath Mermaid Avenue between West 16th Street and Stillwell Avenue conveys wastewater east to Stillwell Avenue and then north to the interceptor in Neptune Avenue.

The fifth catchment area (Catchment Area E) lies predominantly within the Coney East subdistrict and collects sanitary flow along West 10th Street between Riegelmann Boardwalk and Surf Avenue, Surf Avenue between West 10th Street and West 12th Street, and West 12th Street between the Boardwalk and Neptune Avenue. The sanitary sewers in this area convey flow north to Surf Avenue and west to West 12th Street where a 24-inch sewer main conveys the wastewater flow north to the interceptor.

The sixth catchment area (Catchment Area F) lies predominantly east of the rezoning area and collects sanitary flow from Surf Avenue between West 5th Street and West 8th Street, West 5th Street between Sea Breeze Avenue and Surf Avenue, and West 8th Street between Surf and Neptune Avenues. Sanitary sewers located beneath West 5th Street flow south to Surf Avenue and west to West 8th Street. A sanitary sewer located within a sewer easement serves the New York Aquarium and flows north to Surf Avenue and west to West 8th Street. The sewer beneath West 8th Street conveys wastewater north to the interceptor in Neptune Avenue. The sewers in this area vary in size and are not smaller than 12-inches and increase to 24-inches before reaching the interceptor.

The reasonable worst-case development scenario (RWCDS) under the proposed Coney Island Rezoning was analyzed to determine potential impacts on the area's existing infrastructure. An area-wide hydraulic study was completed (December 2008) to identify the difference between the total sanitary and storm sewer capacity for the existing sewer system and the estimated wastewater and stormwater flows from the rezoning area's existing and proposed zoning designations. Additional site-specific hydraulic analyses would be required for all new development/redevelopment to occur within the rezoning area. The results of the area-wide hydraulic study, which is included in Appendix E, are discussed later in this chapter.

STORMWATER SEWERS

Within the Coney Island WPCP service area, sanitary and stormwater flows are managed with separate sewer systems. The stormwater sewers direct runoff from roofs, lots and street drainage to existing outfalls. The rezoning area is mostly developed, and therefore much of the runoff from impervious areas flows into the stormwater sewer system where available and is discharged into either the Atlantic Ocean or the Coney Island Creek or infiltrates into the subsurface. The existing storm sewer system is limited and most streets within the rezoning area are currently without stormwater sewers with the exception of the following:

- Surf Avenue between West 8th Street and West 17th Street (discharges to Creek);

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- Surf Avenue between West 19th Street and West 24th Street (discharges to Ocean);
- Mermaid Avenue between Stillwell Avenue and West 17th Street (discharges to Creek);
- West 15th Street between Surf Avenue and Mermaid Avenue (discharges to Creek);
- West 20th Street between Surf Avenue and Mermaid Avenue (portions discharge to Creek and Ocean);
- West 21st Street between Surf Avenue and the Boardwalk (discharges to Ocean); and
- West 23rd Street between Surf Avenue and the Boardwalk (discharges to Ocean).

There are four storm sewer catchment areas within the rezoning area, as shown in **Figure 13-2**, that direct stormwater to various outfalls in both the Atlantic Ocean and the Coney Island Creek. The first catchment area (Catchment Area A) is located along Surf Avenue between West 19th Street and West 27th Street. Storm sewers located beneath Surf Avenue in this area flow towards West 23rd Street and discharge to the Atlantic Ocean at the southern terminus of West 23rd Street. Sewers sizes in this area include 18-, 20-, 24-, 30-, 36-, and 42-inch mains.

The second area (Catchment Area B) is located along Mermaid Avenue between West 19th Street and West 24th Street and West 21st and West 23rd Streets between Surf Avenue and Neptune Avenue. Storm sewers located beneath Mermaid Avenue in this area flow towards West 21st Street. The sewer in West 21st Street conveys stormwater north from Surf Avenue to its discharge point in the Coney Island Creek near the intersection of West 21st Street and Neptune Avenue. Sewers sizes in this area include 15-, 18-, 20-, 22-, 24-inch, 2'-1" x 3'-2" egg-shaped, and 42-inch mains.

The third area (Catchment Area C) is located along Surf between West 12th Street and West 17th Street, Mermaid Avenue between Stillwell Avenue and West 17th street, and West 15th Street between Surf Avenue and the Coney Island Creek. Storm sewers located beneath Surf and Mermaid Avenues in this area flow towards West 15th Street. The sewer in West 15th Street conveys stormwater north from Surf Avenue to its discharge point in the Coney Island Creek near the intersection of Hart Place and West 15th Street. Sewers sizes in this area include 20-, 22-, 24-, 30-, 36-, and 48-inch mains.

The fourth area (Catchment Area D) consists of existing storm sewers located beneath Surf Avenue between West 8th Street and West 12th Street and beneath West 12th Street between Surf Avenue and Neptune Avenue. The sewers in this catchment area convey stormwater west beneath Surf Avenue, north beneath West 12th Street and ultimately discharge to the Coney Island Creek at an outfall located near the intersection of West 12th Street and Neptune Avenue. Sewers sizes in this area include 24-, 30-, 42-, and 60-inch mains.

As mentioned above, the results of the area-wide hydraulic study, which identify the differences between the total sanitary and storm sewer capacity for the existing sewer system and the estimated wastewater and stormwater flows from the rezoning area's existing and proposed zoning designations, are discussed in detail later in this chapter.

D. THE FUTURE WITHOUT THE PROPOSED ACTIONS

In the future without the proposed actions, the identified projected development sites are assumed to remain unchanged from existing conditions or become developed by uses that are as-of-right under the existing zoning.

As discussed in Chapter 1, “Project Description,” DCP has identified a No Build scenario for the projected development sites in the RWCDs. These No Build developments would result in additional residential, commercial/retail, community facility, and amusement uses. As a result of this No Build development, the future without the proposed actions is expected to include 94,907 square feet (sf) of amusement space, 627 dwelling units, 268,224 sf of commercial/retail use, and 71,946 sf of community facility space. As shown in **Table 13-3**, the projected development sites in the future without the proposed actions would consume an estimated 245,323 gpd for domestic water use and 180,632 gpd for air conditioning use, yielding a total water consumption of 425,955 gpd. Sanitary sewage generated by these sites would be 245,323 gpd.

Table 13-3

Future Without the Proposed Actions: Water Usage/Sewage Generation on Projected Development Sites

Use	Rate ¹	No Build		
		Area (sf)	Water Consumption and Sewage Generation (gpd)	Air Conditioning (gpd)
Residential	Domestic: 112 gpd/person ² Air conditioning: 0.17 gpd/sf	627,469 (627 DUs)	171,360	106,669
Retail and Commercial	Domestic: 0.17 gpd/sf Air conditioning: 0.17 gpd/sf	268,224 ³	45,598	45,598
Amusements	Domestic: 0.17 gpd/sf Air conditioning: 0.17 gpd/sf	94,907	16,134	16,134
Community Facility	Domestic: 0.17 gpd/sf Air conditioning: 0.17 gpd/sf	71,946	12,231	12,231
Subtotals			245,323	180,632
Total Water Consumption			425,955	
Notes:				
1 Usage and generation rates from the <i>CEQR Technical Manual</i> . For the proposed actions, the retail/public use rates from the manual are used for enhancing uses, amusements, and the active portion of the mapped amusement park.				
2 Assumes 2.44 residents per DU (dwelling unit).				
3 Includes 4,756 sf of eating/drinking establishments.				

WATER SUPPLY

In the future without the proposed actions, the overall water supply system in New York City is not expected to change in any substantial way. However, certain changes are expected to the water supply system. The City has initiated a comprehensive water conservation program that seeks to reduce water use by implementing a metering program and requiring that all new plumbing fixtures in the City, including those in existing and new structures, be of low-flow design (Local Law No. 29, 1989). Other measures—including leak detection programs, water meters, and locking fire hydrant caps—are aimed at further reducing the City’s water needs and would serve to reduce water demand and flows to sewage facilities. DEP projects that over the next decade, the savings from these conservation measures would offset some of the expected increase in water demand from consumers. In addition, Stage 2 of water supply Tunnel No. 3 is now under construction in Manhattan, Queens, and Brooklyn. When Tunnel No. 3 is completed, it would enhance and improve the adequacy and dependability of the entire water supply system

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and improve service and pressure to outlying areas of the City. It would also allow DEP to inspect and repair Tunnel No. 1 for the first time since it was activated.

DEP is planning future water supply improvements within Coney Island to improve water pressure within the area. Based on information obtained from DEP regarding their proposed improvements, it is understood that one 36-inch trunk main would be required in the following locations:

- Stillwell Avenue between Surf and Neptune Avenues;
- Surf Avenue between Stillwell Avenue and West 31st Street;
- West 31st Street or West 37th Street between Surf and Neptune Avenues; and
- Neptune Avenue between Stillwell Avenue and West 31st Street.

In the future without the proposed actions, water usage on the RWCDs projected development sites would be approximately 425,955 gpd (245,323 gpd for water and 180,632 gpd for air conditioning), an increase of 425,955 gpd from existing conditions. This incremental demand is not large enough to significantly impact the ability of the City's water system to deliver water in the future without the proposed actions (it is less than a 0.04 percent increase). As stated above, DEP trunk main projects are proposed to improve the delivery of water to the Coney Island area. With these proposed improvements, the existing system and grid of water mains within the proposed rezoning area and study area are expected to continue to provide adequate water supply and pressure in the future without the proposed actions.

SANITARY SEWAGE

In the future without the proposed actions, it is assumed that there would be development on the projected development sites, as well as background growth in the balance of the Coney Island WPCP that would affect flows to the plant through the 2019 analysis year.

With respect to the development that is anticipated in the future without the proposed actions on the projected development sites, sewage flows are assumed to be the same as the domestic water demand, for an increase of about 245,323 gpd over existing conditions. According to *New York City Demand and Wastewater Flow Projections* (August 1998), the highest projected flows at this WPCP for the 2019 analysis year is 90.0 mgd. This projection is 20 mgd below the SPDES permitted and design capacity of the Coney Island WPCP. Thus, even with the projected increases in wastewater volumes in the future without the proposed actions, the added flows under the No Build scenario would allow the Coney Island WPCP to continue operation within its current design capacity and SPDES-permitted limits.

STORMWATER

Rezoning area conditions are expected to remain largely unchanged from existing conditions in the future without the proposed actions condition and no reduction in the amount of impervious surfaces is anticipated, as additional development is expected to occur. The runoff from impervious areas would continue to flow into the existing stormwater sewer system where available or overland, and discharge into either the Atlantic Ocean or Coney Island Creek.

Under the future without the proposed actions condition, there are numerous projected development sites that could be developed. DEP requires stormwater detention in compliance with the drainage plan for sites fronting streets with sewers, if the site's developed storm flow exceeds the allowable flow of the drainage plan. As a result of these requirements, given that the existing development sites are mostly covered with impervious surfaces and do not provide

detention, it is expected that there would be some reduction in uncontrolled runoff from private development sites in the future without the proposed actions, as these new developments would be required to incorporate stormwater management measures, such as on-site detention, to handle stormwater runoff from the developed site.

E. PROBABLE IMPACTS OF THE PROPOSED ACTIONS

As described in Chapter 1, “Project Description,” in the future with the proposed actions, the area would be redeveloped with a 27-acre amusement and entertainment district with a 9.39-acre amusement park at its centerpiece, as well as mixed-use developments in the Coney North and Coney West subdistricts. It is expected that the projected incremental (net) change that would result from the proposed actions is 2,408 dwelling units, 320,951 sf of commercial/retail space, 606 hotel rooms, 333,253 sf of enhancing uses, and 512,771 sf of amusements. The analysis presented below is based on these net incremental increases in development under the proposed actions.

WATER SUPPLY

As shown in **Table 13-4**, in the future with the proposed actions, total projected water usage in the rezoning area would be about 2.0 mgd, resulting in a net increase of approximately 1.6 mgd over levels in the future without the proposed actions and an increase of 0.19 percent over the City’s current daily water demand.

Table 13-4
Future With the Proposed Actions: Water Usage/Sewage Generation on Projected Development Sites

Use	Rate ¹	No Build			Build Net Increment		
		Area (sf)	Water Consumption and Sewage Generation (gpd)	Air Conditioning (gpd)	Area (sf)	Water Consumption and Sewage Generation (gpd)	Air Conditioning (gpd)
Residential	Domestic: 112 gpd/person ² Air conditioning: 0.17 gpd/sf	627,469 (627 DUs)	171,360	106,669	2,407,941 (2,408 DUs)	658,112	409,350
Retail and Commercial	Domestic: 0.17 gpd/sf Air conditioning: 0.17 gpd/sf	268,224 ³	45,598	45,598	320,951	54,562	54,562
Hotel	Domestic: 150 gpd/room/occupant ⁴ Function space: 0.17 gpd/sf Air conditioning: 0.10 gpd/sf	—	—	—	494,359 (606 rooms)	90,900	71,621
Enhancing Uses	Domestic: 0.17 gpd/sf Air conditioning: 0.17 gpd/sf	—	—	—	333,253	56,653	56,653
Amusements	Domestic: 0.17 gpd/sf Air conditioning: 0.17 gpd/sf	94,907	16,134	16,134	251,411	42,740	42,740
Amusement Park (Active)	Domestic: 0.17 gpd/sf	—	—	—	261,360	44,431	—
Community Facility	Domestic: 0.17 gpd/sf Air conditioning: 0.17 gpd/sf	71,946	12,231	12,231	—	—	—
Subtotals			245,323	180,632		947,398	634,926
Total Water Consumption				425,955			1,582,324
Notes:							
1 Usage and generation rates from the <i>CEQR Technical Manual</i> . For the proposed actions, the retail/public use rates from the manual are used for enhancing uses, amusements, and the active portion of the mapped amusement park.							
2 Assumes 2.44 residents per DU (dwelling unit).							
3 Includes 4,756 sf of eating/drinking establishments.							
4 Assumes 600 sf per hotel room.							

This increased demand would not be large enough to significantly impact the water supply system’s ability to deliver water reliably based on the *CEQR Technical Manual* criteria, and demand for water is not expected to affect local water pressure. As part of the engineering and

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design effort for new development, DEP's water supply engineers would be consulted to ensure adequate water and water pressure to service the surrounding area and for fire protection and other emergency needs. As noted above, DEP is planning to improve the distribution system that conveys water to the Coney Island area. With or without these improvements, the proposed actions would not adversely impact water supply or pressure.

SANITARY SEWAGE

Sanitary sewage generation is conservatively assumed to be equal to the domestic water demand less the water used by air conditioning, which re-circulates and evaporates and does not enter the sewer system. As shown in **Table 13-4**, by 2019, new sewage generation in the rezoning area would be about 1.2 mgd, which would be conveyed to the Coney Island WPCP. This volume is about 0.011 percent of the SPDES permitted flow. The additional sewage generation would not cause the Coney Island WPCP to exceed its design capacity or SPDES permit flow limit. Based on the results of the area-wide hydraulic study discussed below, the existing sanitary sewers in some portions of the rezoning area would not be able to accommodate increased wastewater flows generated by increased zoning densities. Additionally, as part of the rezoning, several new streets are proposed within the Coney East and Coney West subdistricts. These proposed streets would require both sanitary and storm sewer mains to service future developments at adjacent sites. Likewise, as part of the proposed rezoning, several streets would be demapped within the rezoning area and existing infrastructure provided beneath these demapped streets would be removed or relocated. An ADP is currently being developed to address Rezoning, Mapping/De-Mapping, and any major changes to the existing sewer network. The ADP will identify sewer infrastructure improvements for the Coney Island rezoning area and downstream of the rezoning area. In addition, interim infrastructure improvements could be implemented prior to construction of the approved ADP to temporarily address sanitary and stormwater sewer deficiencies and allow for development, as per the proposed rezoning on a site by site basis. With the appropriate phasing of development, adequate interim measures and sewers constructed according to the ADP, the sewage generated from the proposed actions would not cause any significant adverse impacts on the wastewater infrastructure system. The results of the area-wide hydraulic study and the potential effects of the proposed actions on the existing sanitary infrastructure are discussed below.

STORMWATER

As mentioned above, absent of any improvements to the storm sewer system, several existing storm sewer mains located within and outside of the rezoning area do not provide sufficient capacity for current DEP design criteria and several streets within the rezoning area do not provide storm sewer mains. To be issued a permit to connect to a City sewer, DEP requires that stormwater runoff from new developments in excess of the amount allowed under the approved drainage plan be detained on-site. Individual development projects, fronting sewers, would be required to provide stormwater runoff management to comply with DEP detention requirements and ensure that site developed storm flow would not exacerbate the surcharged conditions of the downstream sewers. New developments on lots not fronting sewers may be required to extend an existing sewer to discharge stormwater runoff to the sewer system in addition to detaining stormwater onsite.

Stormwater discharged into the Coney Island Creek and the Atlantic Ocean via separate storm sewers would be treated in accordance with NYSDEC standards, including the SPDES General Permit and related requirements for the development of a stormwater pollution prevention plan

(SWPPP) that would include post-construction stormwater Best Management Practices (BMPs). DEP would also review the SWPPP for consistency with DEP detention requirements and guidance documents.

For the future full build out of the RWCDS, storm flow must be directed to Coney Island Creek and sanitary and storm sewers must be constructed area wide for proposed streets and existing streets currently without storm sewers. Construction of new storm sewer outfalls would also require approvals and permitting from NYSDEC. An ADP is currently being developed to address these major changes to the City's sewer system. With the appropriate phasing of development, adequate interim measures and sewers constructed according to the ADP, no storm sewer infrastructure impacts would occur from the proposed actions. Infrastructure improvements are typically long lead items and are addressed through the multi-year City's capital project process.

HYDRAULIC STUDY

An area-wide hydraulic study of the existing sewer system capacity was completed to determine whether the separate sanitary and storm sewer systems in the area are adequate to accommodate flows once the area is rezoned and the density increases. This area-wide hydraulic study was also completed to identify existing sewer capacities and demand based on full build out of existing zoning designations, and identify locations that could potentially be developed (subject to DEP review and approval) by utilizing existing infrastructure where existing infrastructure could accommodate increased wastewater and stormwater generated by the proposed rezoning.

For the area-wide hydraulic study, a comparison of the total sanitary and storm sewer capacity for the existing sewer system was made against the estimated wastewater and stormwater flows from the rezoning area's existing zoning designations to determine if any sewer segments provide capacity additional to what is needed for existing zoning demand. In areas with additional sewer capacity, the associated increased zoning density that could be accommodated was identified.

EXISTING CONDITIONS

Based on the results of the area-wide hydraulic study, all the existing sanitary sewer mains within the rezoning area are able to accommodate wastewater generated by the full build out of existing zoning densities within the rezoning area. However, two sanitary mains located outside the rezoning area are beyond capacity under existing zoning; these two mains are within sanitary Catchment Area B, downstream of the Coney West subdistrict and portions of the Coney North subdistrict, and they convey wastewater from the rezoning area to the interceptor beneath Neptune Avenue. These sewers, shown in **Figure 13-3**, include the following:

- 12-inch sewer beneath West 21st Street between Surf and Mermaid Avenues; and
- 18-inch sewer beneath West 21st Street between Mermaid and Neptune Avenues.

Numerous existing storm sewer mains—within and outside of the proposed rezoning area—do not provide sufficient capacity for the current DEP 5-year storm design criteria (assumes a peak rainfall intensity of 5.95 inches per hour). These storm sewers are identified in **Figure 13-4** and listed below along with the corresponding storm catchment area:

- 18-inch sewer beneath West 20th Street between Mermaid and Surf Avenues (A);
- 24-inch sewer beneath Surf Avenue between West 20th and West 21st Streets (A);

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- 18-inch sewer beneath West 21st Street between Mermaid and Surf Avenues (A);
- 30-inch sewer beneath Surf Avenue between West 21st and West 22nd Streets (A);
- 20-inch sewer beneath Surf Avenue between West 20th and West 21st Streets (A);
- 30 x 19-inch sewer beneath West 21st Street between Boardwalk and Surf Avenue (A);
- 24-inch sewer beneath Surf Avenue between West 21st and West 22nd Streets (A);
- 24-inch sewer beneath Surf Avenue between West 22nd and West 23rd Streets (A);
- 20-inch sewer beneath Surf Avenue between West 25th and West 24th Streets (A);
- 42-inch sewer beneath West 23rd Street between Surf Avenue and the Boardwalk (A);
- 18-inch sewer beneath West 20th Street between Surf and Mermaid Avenues (B);
- 24-inch sewer beneath Mermaid Avenue between West 20th and West 21st Streets (B);
- 24-inch sewer beneath Surf Avenue between West 12th and West 15th Streets (C);
- 36-inch sewer beneath West 15th Street between Surf and Mermaid Avenues (C);
- 20-inch sewer beneath Mermaid Avenue between West 17th and West 16th Streets (C);
- 48-inch sewer beneath West 15th Street between Mermaid and Neptune Avenues (C);
- 24-inch sewer beneath Surf Avenue between West 10th and West 12th Streets (D);
- 24-inch sewer beneath the Sewer Easement between Boardwalk and Surf Avenue (D);
- 30-inch sewer beneath the Sewer Easement between Boardwalk and Surf Avenue (D); and
- 30-inch sewer beneath Surf Avenue between Sewer Easement and West 10th Street (D).

In addition, as mentioned above, several streets within the rezoning area do not provide storm sewer mains (see **Figure 13-4**).

FUTURE WITHOUT THE PROPOSED ACTIONS

The Coney Island area is currently served by separate sanitary and storm sewers and the existing storm sewers discharge to both the Atlantic Ocean and Coney Island Creek. Independent of the proposed actions, DEP has discussed storm sewer main improvements such as redirecting stormwater runoff currently being discharged into the Atlantic Ocean to Coney Island Creek, and providing storm sewers in streets that currently do not provide them. Due to topographic limitations, mainly the area's uniform topography, if storm sewer improvements are made within the Coney Island area, extensive sanitary sewer main relocations would also be required due to potential pipe conflicts, which are inevitable when designing sewer systems at approximately the same elevation and with little available depth and/or lateral clearance.

Under the future without the proposed actions condition, the existing zoning designations of Coney Island would remain unchanged. There are several background projects expected to be completed by 2019 that would be developed under existing zoning regulations. The Coney Island neighborhood would be served by the existing sanitary and storm sewer infrastructure under the future without the proposed actions condition. With no changes to existing infrastructure, the sanitary and storm sewers would continue to operate as described under existing conditions, assuming full build out of existing zoning designations. The 12-inch sewer beneath West 21st Street between Surf and Mermaid Avenues and the 18-inch sewer beneath West 21st Street between Mermaid and Neptune Avenues (both segments are downstream of the proposed rezoning area) would operate beyond capacity under full build out of existing zoning (as shown in **Figure 13-3**). The storm sewer system would remain limited, with sewer mains

located within and outside of the rezoning area continuing to operate without sufficient capacity for current DEP design criteria (as shown in **Figure 13-4**). In the future without the proposed actions, new developments would be required to provide on-site detention, therefore reducing the rate of stormwater discharge into the City storm sewer system.

FUTURE WITH THE PROPOSED ACTIONS

Based on the results of the area-wide hydraulic study, the majority of the existing sanitary sewer system is sized adequately to accommodate the flow generated by the existing zoning demand; however, to accommodate the proposed rezoning of the entire area, sanitary sewer improvements would be necessary in some areas (see **Figure 13-5**). Many of the existing storm sewers are not sized to accommodate the current DEP design storm under existing zoning and many streets do not provide storm sewers. Where these sewers are beyond capacity, they could be upgraded or detention facilities and stormwater BMPs would need to be implemented to ensure that site developed storm flow would not exacerbate the surcharged conditions of the downstream sewers. Storm sewers may need to be extended to sites without fronting storm sewers to allow development to occur, in conjunction with detention facilities and stormwater BMPs or to ensure surcharging conditions of the storm sewer system is not further exacerbated.

Any proposed streets will require both sanitary and storm sewer mains to service future adjacent developments. Likewise, any infrastructure located beneath any street to be demapped within the rezoning area would be removed and would not be available to adjacent properties for connection. The area-wide hydraulic study does not consider any infrastructure modifications that would be required to construct the proposed street network or changes to the City map related to parkland. The analysis was completed to determine the amount of area where existing zoning densities could be increased without implementing any major infrastructure improvements.

In addition to establishing a new street network south of Surf Avenue, new legal grades will be established which will be higher than existing legal grades in this area. These newly established street grades will improve the soil cover over sewers, potentially increase pipe slope, capacity and velocity, and potentially minimize pipe conflicts due to the existing topographical constraints in this area.

Development in New York City must either comply with an area's adopted drainage plan or propose an amendment to the plan. For the Coney Island rezoning, an ADP is currently being prepared due to several factors, including:

- In some areas, proposed storm or sanitary flows would exceed the capacity of the existing sanitary and storm sewers; and,
- New streets proposed under the rezoning would require new separate sanitary and storm sewers to be constructed.

In conjunction with DEP, NYCEDC is currently preparing an ADP associated with the proposed rezoning. The ADP scope of work includes the rezoning area, as well as the downstream sewers that would convey sanitary and storm flow from the rezoning area to the downstream discharge points. The ADP scope also includes upstream sanitary and storm sewers which contribute flow to the sewers servicing and downstream of the rezoning area. The ADP will show proposed sewers designed to redirect all stormwater flow to Coney Island Creek with the exception of a small area in the Coney West subarea, which currently discharges to the Atlantic Ocean and may continue to discharge to the ocean where topography will not allow for gravity drainage to the

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Creek. The ADP will also identify sanitary sewers required to accommodate increased wastewater flows generated by the proposed rezoning. For sanitary flow, the discharge point will be the interceptor sewer in Neptune Avenue. The ADP is expected to be complete in 2010.

Sewer System Results

The proposed actions will rezone the rezoning area to include densities of R7A, R7D, R7X, and a modified C7 district. The completed area-wide hydraulic study was used to identify the amount of increased zoning that could be supported by existing infrastructure in the short-term and identify the most critical sewers to be upgraded in order to support increased development in the interim period, prior to the full construction of all proposed infrastructure. The increased upstream zoning density of R7/R8 was chosen for the area-wide hydraulic study because it was assumed that the proposed actions would correspond with, and not exceed, the published population densities for these zoning designations. Based on existing zoning demand, sanitary sewers within Sanitary Catchment Areas A and B can not support increased zoning densities; however, infrastructure within Catchment Areas C, D, E, and F can handle increased wastewater flows generated by R6, R7 and/or R8 zoning densities as identified below.

In addition, storm sewer infrastructure is limited within the rezoning area and many pipe segments located throughout the various catchment areas are currently beyond capacity for the current DEP design storm criteria. With no changes to the existing storm sewer infrastructure, the system would continue to operate as described above for the existing and future without the proposed actions conditions. The storm sewer system would remain limited and some sewer mains would continue to operate without sufficient capacity for current DEP design criteria.

The increased zoning density potential and implications for the existing sanitary and storm sewer system is discussed below for each sanitary catchment area with capacity to handle additional limited flows.

Sanitary Catchment Area C: The sewer mains in this catchment area (within the rezoning area) can handle increased wastewater flows generated by higher density zoning (R7/R8) for the entire upstream areas; however, the 12-inch sanitary trunk main—located outside the rezoning area (see **Figure 13-3**) beneath West 19th Street and between Mermaid and Neptune Avenues—which conveys sanitary flow from the rezoning area to the interceptor is nearly at capacity. Additional limited flow of approximately 0.10 cfs, which would correspond to increasing approximately 1.80-acres (10 percent) of the upstream 17.73-acres acres of C7/R6 zoning designations to R7, were demonstrated by the area-wide hydraulic study as potentially acceptable provided storm flow from this area can be adequately addressed with detention facilities and stormwater BMPs and/or storm sewer extensions.

Sanitary Catchment Area D: The area-wide hydraulic study shows that almost all the sewer mains within this catchment area can accommodate increased wastewater flows generated by higher density zoning (R7/R8) for the entire upstream areas. However, the 10-inch sewer main beneath Surf Avenue between Schweikerts Walk and West 15th Street (and conveys wastewater flow—from the area bounded to the north by Surf Avenue, to the west by West 15th Street, to the south by the Boardwalk, and generally to the east by Henderson Walk—towards the trunk main) can only accommodate additional limited flows of approximately 0.16 cfs, which would correspond to either increasing 2.05-acres (17 percent) of the existing C7 upstream 11.83-acre area to an R6 zoning designation or increasing 1.30-acres (11 percent) of the existing C7 zoning designation in this area to an R7 zoning designation, if developed site storm flow from this area can be adequately addressed with detention facilities and stormwater BMPs and/or storm sewer

extensions. The existing 72-inch trunk main can accommodate increased flow for the entire catchment area generated from an R8 designation.

Catchment Area E: As demonstrated by the area-wide hydraulic study, the sewer mains within this catchment area can handle increased wastewater flows generated by higher density zoning (R7/R8) for the entire upstream areas, if developed site storm flow from this area can be adequately addressed with detention facilities and stormwater BMPs and/or storm sewer extensions.

Catchment Area F: As demonstrated by the area-wide hydraulic study, the sewer mains within this catchment area can handle increased wastewater flows generated by higher density zoning (R8) for the entire upstream areas, if developed site storm flow from this area can be adequately addressed with detention facilities and stormwater BMPs and/or storm sewer extensions.

Sewer Capacity Limitations

The storm and sanitary sewer segments that are near or beyond capacity under existing and proposed zoning designations are identified in **Figure 13-5** and are summarized below by general rezoning subdistrict.

The Coney West subdistrict and the westernmost portion of the rezoning area are served by sanitary sewers within Sanitary Catchment Areas A, B, and C, and by storm sewers within Storm Catchment Area A which discharges to the Atlantic Ocean. Within this rezoning subdistrict, the sanitary sewer mains beneath West 19th, West 21st and West 24th Streets, which convey wastewater from the rezoning area to the interceptor, can not accommodate increased demand from proposed zoning densities. Additionally, five of six existing storm sewer segments serving the Coney West subdistrict are beyond capacity for the current DEP design storm.

The Coney North subdistrict is served by sanitary sewers within Sanitary Catchment Areas B, C, and D, and by storm sewers within Storm Catchment Areas A, B, and C. Within this rezoning subdistrict, the sanitary sewer mains beneath West 19th and West 21st Streets, which convey wastewater from the rezoning area to the interceptor, can accommodate some increased demand from proposed zoning densities. Additionally, some of the existing storm sewers servicing the subdistrict are beyond capacity, and the downstream mains which convey stormwater from the subdistrict to the Atlantic Ocean and Coney Island Creek outfalls for Storm Catchment Areas A, B, and C are beyond capacity.

The Coney East subdistrict is served by sanitary sewers within Sanitary Catchment Areas D, E, and F, and by storm sewers within Storm Catchment Areas C and D. Within this subdistrict, the sanitary sewers beneath Surf Avenue between West 15th Street and Stillwell Avenue can not accommodate increased demand from proposed zoning densities, which limits development within the rezoning area south of Surf Avenue between West 15th Street and Stillwell Avenue. Additionally, the existing storm sewers located within Storm Catchment Area C, within the subdistrict and outside the subdistrict which convey stormwater to the Coney Island Creek are beyond capacity. Within Storm Catchment Area D, the existing storm sewer beneath Surf Avenue within the subdistrict is beyond capacity; however, the 60-inch sewer which conveys stormwater to the Coney Island Creek, beneath West 12th Street between Surf and Neptune Avenues, has additional capacity.

Some sanitary and storm sewer limitations can be addressed and do not necessarily preclude development from occurring within the rezoning area. It should be noted that self-certification of

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site connection applications will not be permitted by the Department of Buildings in connection with any proposed development in the subject rezoning area and all applicants will be required to submit a site-specific hydraulic analysis to DEP to establish the adequacy of existing sanitary and storm sewers to serve the proposed developments, in order to obtain site connection approval.

With the said DEP approval, sites which front both sanitary and storm sewers could potentially be developed immediately where the sanitary sewers fronting and downstream of the proposed development have sufficient capacity to accommodate the proposed sanitary flow and detention facilities and stormwater BMPs are utilized to ensure that the site developed flow does not exacerbate the surcharged conditions of the downstream sewers. Otherwise, upgrading or extending critical sanitary and/or storm sewer segments that are beyond capacity or nonexistent would be required prior to development.

The following section will discuss potential stormwater management strategies that could be used throughout the Coney Island rezoning area to manage stormwater runoff for the site connection approval process, pending the implementation of site-specific and area-wide sewer improvements.

STORMWATER MANAGEMENT AND BMP STRATEGIES

The existing stormwater infrastructure throughout the rezoning area is limited and existing sewers (as shown in **Figure 13-5**) are currently beyond capacity for DEP's current design storm criteria. If a Developer's site-specific hydraulic analysis shows that a downstream sewer is beyond capacity and would not be able to accommodate storm flows from the proposed development, then either a sewer upgrade or detention facilities and stormwater BMPs would need to be implemented to address stormwater from the development. The following discussion outlines several stormwater management and BMP strategies that could be implemented to reduce the peak stormwater discharge rate from development sites.

Under existing conditions, the majority of streets within the rezoning area do not have storm sewers and the rezoning area is covered by impervious surfaces, such as buildings and paved parking, and would have high runoff coefficients. It is assumed that most of the buildings in the area pre-date any detention requirements and therefore do not provide any on-site stormwater detention. To meet requirements and implement citywide sustainability initiatives, BMPs would be installed at each development site. The sizing and release rate of each BMP would be reviewed by DEP and, therefore, would reduce the rate of stormwater discharge into the City storm sewer system.

Development sites would need to develop a stormwater management system and ultimately connect to an existing storm sewer (if fronting an existing sewer) or private sewer system (in compliance with Local Law 103/89). The stormwater management system would primarily utilize on-site detention practices, such as roof and underground storage with a regulating outlet device. The on-site detention system would be sized based for the 10-year storm event at an approved release rate.

In addition to on-site detention, infiltration or biofiltration (gravel beds, rain gardens, vegetated swales, permeable pavements, etc.), with an underdrain and/or overflow to a control structure system may be utilized where subsurface conditions allow. Preliminary geotechnical information obtained for the Coney East and Coney West subdistricts identifies that groundwater is located approximately 3- to 7-feet beneath the ground surface within the rezoning area which, in

conjunction with other unfavorable subsurface conditions, may limit infiltration practices. Site-specific groundwater and soil testing would be needed to confirm infiltration capacity for the use of these BMPs to meet DEP's detention requirements or drywell requirements where a storm sewer does not front the site and can not be extended.

In addition to detention BMPs, retention BMPs such as green roofs, rain barrels or cisterns may be more suitable given the subsurface conditions in the rezoning area and the projected development characteristics under the build condition. The proposed zoning text for the Special Coney Island District will mandate that the buildings be located at the streetwall and that parking be wrapped within the future developments to activate the streets with ground-floor retail and residential uses. The 9.39-acre amusement park will contain a mixture of landscaped areas, open and enclosed amusements and small-scale buildings fronting the Boardwalk. Ultimately, the Developer would be able to utilize a number of stormwater BMPs to achieve DEP's detention requirements, NYSDEC's water quality requirements and the City's sustainability initiatives.

Additional stormwater attenuation and treatment mechanisms would be included in the City's design of streets, parks, and development sites within the rezoning area; the design of these systems would be guided by the City's sustainability initiatives described in PlaNYC and the Mayor's Office's Sustainable Stormwater Management Plan, NYSDEC regulatory requirements and Stormwater Management Design Manual, and DEP's detention requirements and guidance documents.

SHORT-TERM DEVELOPMENT

It is expected that temporary amusements (transportable carnival rides, games, and food stalls) would be set up in the Coney East subdistrict on an immediate interim basis. Since the amusements will be temporary and will not result in increased sanitary or storm flow directed to the existing sewer infrastructure, it is anticipated that no sewer connections or upgrades would be necessary. It is generally anticipated that site connection approvals would not be required for these temporary amusements.

As the City acquires additional property, amusements could expand onto vacant lots with the same type of transportable temporary uses. If sewer connection applications are required by New York City Department of Buildings (DOB) for such temporary uses, self-certifications would not be permitted and a site-specific hydraulic analysis, as described above, would be required for DEP's review and approval prior to certification of the site connection application by DEP.

For more permanent structures, absent any sewer infrastructure improvements and the implementation of an ADP, short-term (immediate) development would be confined to areas that front storm and sanitary sewers, provided that the adjacent and all downstream sanitary sewers leading to the interceptor beneath Neptune Avenue provide necessary capacity to support the increased zoning densities under the proposed actions, and detention facilities and stormwater BMPs would be implemented to ensure that site developed storm flow would not exacerbate the surcharged conditions of the downstream storm sewers. Developments would be required to prepare and submit the site-specific hydraulic analysis to DEP as described above, prior to obtaining certification of a site connection application from DEP.

INTERIM DEVELOPMENT AND INFRASTRUCTURE IMPROVEMENTS

Interim infrastructure improvements would temporarily address sanitary and stormwater sewer deficiencies to allow for development, as per the proposed rezoning, on a site by site basis.

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These temporary site specific infrastructure improvements could be implemented prior to construction of the approved ADP, proposed roadway infrastructure and permanent stormwater sewers to convey flow to the Coney Island Creek, and prior to creation of the new blocks and park/amusement areas. Interim infrastructure improvements would support potential development sites within the rezoning area provided that the adjacent sanitary sewer, and any downstream segments, have adequate capacity to accommodate wastewater flows from these developments and developed site storm flow would not exacerbate conditions of downstream storm sewers. Interim infrastructure improvements would not necessarily accommodate full build out of the RWCDs, which could only occur with the construction of the ADP sewers. Interim improvements would be based on site-specific hydraulic analyses, as required by DEP and would be completed by the Developer. Interim improvements could be constructed by the Developer after review and approval by DEP.

Infrastructure improvements that would occur during the interim development period would occur on sites where the site-specific hydraulic analysis shows that adjacent or downstream sewer upgrades are required or on sites that may not be located adjacent to existing sanitary and/or storm sewers. If the site's adjacent sanitary sewer and any downstream segments do not have adequate capacity to accommodate wastewater flows generated by the development, the Developer would be required to upgrade critical sewer segments to ensure satisfactory operations of the sanitary sewer system. In addition, if the site is not located adjacent an existing sanitary sewer, the Developer would be required to build a private sewer or drain that would connect to an existing sanitary sewer. If the site does not have frontage to an existing storm sewer, the Developer would be required to provide feasible detention sized to accommodate the developed site storm flow based on the 10-year design storm with an approved release rate. If the site is not with frontage to an existing storm sewer, the Developer would be required to provide feasible detention facilities and stormwater BMPs (as discussed above) sized to accommodate the developed site storm flow based on the 10-year design storm with an approved release rate, as well as to construct a private sewer or drain system that would connect to an existing storm sewer and discharge at a rate that would not exacerbate surcharged conditions of downstream sewers.

The critical sanitary sewer upgrades (as per the completed Hydraulic Study) that would allow for interim development to occur on sites within the rezoning area (provided storm flow from this area can be adequately addressed with detention facilities and stormwater BMPs and/or storm sewer extensions and, therefore, without exacerbating the surcharged storm sewer system) include the following sewer segments (also shown in **Figure 13-5**):

- 10-inch sewer beneath West 24th Street between Surf and Mermaid Avenues (Sanitary Catchment Area A);
- 12-inch sewer beneath West 21st Street between Surf and Mermaid Avenues (Sanitary Catchment Area B);
- 18-inch sewer beneath West 21st Street between Mermaid and Neptune Avenues (Sanitary Catchment Area B);
- 12-inch sewer beneath West 19th Street between Mermaid and Neptune Avenues (Sanitary Catchment Area C);
- 10-inch sewer beneath the south side of Surf Avenue between Stillwell Avenue and Schweikerts Walk (Sanitary Catchment Area D); and,
- 10-inch sewer beneath the south side of Surf Avenue between Schweikerts Walk and West 15th Street (Sanitary Catchment Area D).

Developments would be required to prepare and submit a site-specific hydraulic analysis to DEP as described before prior to obtaining certification of a site connection application from DEP.

LONG-TERM DEVELOPMENT AND INFRASTRUCTURE IMPROVEMENTS

Independent of the proposed actions, DEP has discussed future storm sewer main improvements that could occur throughout the Coney Island neighborhood. The Coney Island area is currently served by separate storm and sanitary sewers and the existing storm sewers discharge to both the Atlantic Ocean and Coney Island Creek. DEP has discussed redirecting stormwater runoff currently being discharged into the Atlantic Ocean to Coney Island Creek, as well as providing storm sewers in streets that currently do not have storm sewers. Due to topographic limitations, mainly the area's uniform topography, if storm sewer improvements are made within the Coney Island area, extensive sanitary sewer main relocations would also be required due to potential pipe conflicts that are inevitable when designing sewer systems at the same approximate elevation and with little available depth and/or lateral clearance. Through the establishment of a new street network south of Surf Avenue, new legal grades will be established which will be higher than existing legal grades in this area. These proposed street grades may minimize pipe conflicts created by the existing topographical constraints in this area.

An ADP is currently being developed and is expected to be complete in 2010, to address rezoning, mapping/demapping, and any major changes to the existing DEP sewer network, including changes to the storm sewer network, as well as the construction of new sewers for proposed streets that are to be constructed under the proposed actions. Roadway, sewer, and utility infrastructure improvements will be constructed concurrently to minimize utility conflicts. It is expected that they will include:

- Replacing watermains, as required, to allow for the construction of the sanitary and stormwater sewer systems as per the approved ADP;
- Upgrading the existing stormwater sewer system to accommodate DEP's current 5-year storm design criteria and upgrading the existing sanitary system to accommodate wastewater flows from the proposed rezoning;
- Constructing stormwater sewer mains in areas that do not currently provide stormwater sewer mains;
- Constructing stormwater sewer mains to reroute stormwater currently discharging to the Atlantic Ocean to outfalls discharging to the Coney Island Creek where feasible;
- Upgrading private utilities (including gas and electric services) as required by the utility companies, to allow for the construction of the sanitary and stormwater systems as per the approved ADP;
- Raising the legal grades in the Coney East and Coney West subareas per the street alteration maps and mapping proposal; and,
- Defining Developer responsibilities to include site improvements related to detention, BMPs, adjacent sidewalks, street trees, electrical vaults, and connections to in-street infrastructure at the time of site development.

Improvements outside the rezoning area were also examined to determine what would be necessary to support development within the rezoning area, assuming full build out under the proposed rezoning plan (RWCDS). In the future, sanitary flow from the rezoning area will be

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conveyed to the interceptor sewer in Neptune Avenue, and storm flow, where feasible, would be conveyed to the Coney Island Creek.

For the purposes of developing an infrastructure construction phasing scenario, the rezoning area was divided into development zones (see **Figure 13-6**). The infrastructure improvements associated with these development zones include necessary improvements within and downstream of the zones required to support the full build out of the proposed rezoning. The phasing information provided below is preliminary and depends on the results of the ADP. Generally, the infrastructure will be constructed from the downstream discharge points (storm to the Coney Island Creek and sanitary to the interceptor beneath Neptune Avenue) to the upstream segments. Sewer infrastructure downstream and adjacent to the Coney North B development zone will also support the Coney North A, Coney North C, and Coney East development zones. Additionally, the infrastructure downstream and adjacent to the Coney North A and Coney North B development zones would then enable infrastructure improvements adjacent to the Coney West development zone. Thus, the infrastructure downstream and adjacent to the Coney North B development zone has preliminarily been identified as the zone to be developed first because it enables improvements to the amusement district in Coney East and the residential and commercial neighborhood in the Coney West development zone. The completed ADP will confirm the phasing plan outlined above.

Once the ADP is approved, design work associated with the first development zone will commence, which will include completion of a full boundary, topographic and utility survey, completion of geotechnical analyses, preparation of construction documents, and bidding the documents to contractors to construct the improvements. The design period for the first phase is estimated to be two years and construction of the infrastructure improvements would be completed within approximately three years. Contingent upon available funding, design and construction of future phases could be done concurrently.

The ADP will identify drainage improvements for the Coney Island rezoning area and downstream of the rezoning area, including the sewers and other drainage elements to be installed. In addition, interim infrastructure improvements could be implemented prior to construction of the approved ADP to temporarily address sanitary and stormwater sewer deficiencies and allow for development, as per the proposed rezoning on a site by site basis. With the appropriate phasing of development, adequate interim measures and sewers constructed according to the ADP, the sanitary and stormwater sewage generated from the proposed actions in 2019 would not cause any significant adverse impacts on the sewer infrastructure systems.

F. CONCLUSIONS

By 2019, the uses from the proposed actions are expected to generate net new water usage of about 2,008,279 gallons per day (gpd) and net new wastewater flows of 1,192,721 gpd within the rezoning area. The difference between water demand and sewage generation is caused by water demand for air conditioning, which evaporates and does not enter the sewer system.

The projected development that would likely result from the proposed actions would create new demands for water and wastewater treatment. With the proposed actions, an ADP is being developed and instituted for the rezoning area, and a new separate sewer system will be constructed to divert storm flows from the Atlantic Ocean to Coney Island Creek, provide storm sewers beneath streets that currently do not provide storm sewers, provide necessary sanitary sewer capacity to support the proposed rezoning, and provide sanitary and storm sewers beneath proposed streets that are to be constructed as part of the proposed actions. Stormwater

attenuation and treatment mechanisms would be included in the City's design of streets, parks, and open spaces within the rezoning area and the designs of these systems would be guided by the City's sustainability initiatives described in PlaNYC and the Mayor's Office's Sustainable Stormwater Management Plan, NYSDEC regulatory requirements and Stormwater Management Design Manual, and DEP's detention requirements and guidance documents. Additionally, all development would be required to manage site developed stormwater through detention facilities and stormwater BMPs that would meet DEP's detention requirements. Through the use of detention facilities and stormwater BMPs, the peak stormwater discharge rate would be reduced and new development would not exacerbate the surcharged storm sewer system.

Absent the proposed ADP improvements, development is anticipated to occur over a short-term and interim period. Development that would occur during the short-term period (immediately) would occur on sites with frontage to both sanitary and storm sewers, provided that the adjacent sanitary sewer and all downstream segments have adequate capacity to accommodate wastewater flows generated by the development and that developed site stormwater would be managed through feasible detention facilities and stormwater BMPs, according to DEP sizing and rate requirements in order to not exacerbate the surcharged storm sewer system.

Absent the proposed ADP improvements, incremental infrastructure improvements would allow for sites that are fronting an existing storm sewer or a sanitary sewer with inadequate capacity to be developed during the interim period prior to the implementation of an ADP. If a site's fronting sanitary sewer and any downstream segments do not have adequate capacity to accommodate wastewater flows generated by the development, the Developer would be required to upgrade critical sewer segments to ensure satisfactory operations of the sanitary sewer system (provided that storm flow from this area can be adequately addressed with detention facilities and stormwater BMPs without exacerbating the surcharged storm sewer system). If the site is not located adjacent to an existing sanitary/storm sewer, the Developer would be required to obtain approval from DEP and construct a private sewer/drain system that would connect to an existing sanitary/storm sewer. They would also be required to provide stormwater detention facilities and BMPs and discharge at a rate that would not exacerbate the surcharged condition of the downstream storm sewers.

Finally, long-term development includes the full build out of the rezoning area in conjunction with the implementation of an ADP. With the appropriate phasing of development, adequate interim measures, and sewers constructed according to the ADP, the local stormwater and wastewater collection systems would have the capacity to meet the expected demand. Therefore, no significant adverse impacts on these services are expected to result. *