Chapter 14: Infrastructure

A. INTRODUCTION

This chapter evaluates the potential increased demand the proposed Willets Point Development Plan would place on New York City's water supply, sanitary sewage treatment, and stormwater drainage, and describes the additional infrastructure and infrastructure improvements needed to meet the projected demand in the Willets Point Development District (District). The analyses address the water supply, wastewater, and stormwater infrastructure for existing conditions, as well as the future conditions without and with the proposed Plan. In accordance with the approach outlined in Chapter 2, "Procedural and Analytical Framework," this chapter considers the cumulative impact of the proposed Willets Point Development Plan and the anticipated development on Lots B and D. An assessment of potential future infrastructure demand is provided for both the proposed Plan and the No Convention Center Scenario, as described in Chapter 2.

The effect of the proposed Plan on other infrastructure components, such as those associated with solid waste management, energy, and transportation, are addressed in Chapter 15, "Solid Waste and Sanitation," Chapter 16, "Energy," and Chapter 18, "Transit and Pedestrians," of this Draft Generic Environmental Impact Statement (DGEIS).

PRINCIPAL CONCLUSIONS

WATER SUPPLY

The proposed Plan and anticipated development on Lots B and D would cumulatively require approximately 4.36 million gallons per day (mgd) of water supply. This additional demand would not result in a significant adverse impact on the City's water supply system. This projected flow would be supplied by the existing 72-inch water main serving the District.

Under the proposed Plan, the existing 72-inch prestressed reinforced concrete pipe (PRCP) water main within Willets Point Boulevard would remain in place. In order to provide acceptable access to the existing main, the developer would provide a permanent easement mapped on the City map. The width and designation of this easement shall be determined in consultation with New York City Department of Environmental Protection (DEP) and in accordance with DEP requirements.

SANITARY SEWAGE

Under the proposed Plan, the District would be connected to the City's sanitary sewer system, replacing the current reliance on septic tanks. Sanitary wastewater from the District would be conveyed to a new sanitary pump station, which would most likely be constructed within the District. Sanitary wastewater from Lots B and D would be connected to the pumped discharge utilized by Citi Field subject to the verification of its adequacy. The new District pump station

would be designed and constructed to DEP standards. A new force main would be constructed to convey sanitary flow from the District to the existing 96-inch-diameter City sewer at 108th Street (which flows to the Bowery Bay Water Pollution Control Plant [WPCP]). This new force main route would cross beneath 126th Street and the Grand Central Parkway.

The proposed Plan and the anticipated development on Lots B and D would result in an increase of sanitary flow to the Bowery Bay WPCP of approximately 2.8 mgd. The projected available capacity at the Bowery Bay WPCP in 2017 is 28 mgd. The Bowery Bay WPCP has adequate capacity to meet the increased demand associated with the proposed Plan.

In addition, the Special District text allows for the development of a water reclamation facility, provided it would primarily serve the District. If proposed, a water reclamation facility would require a special permit by the Board of Standards and Appeals (BSA) and would be subject to separate environmental and public review process. The water reclamation facility would treat the District's sanitary wastewater to DEP's effluent standards, return a portion of the treated water for reuse in the District (for toilets, cleaning, irrigation, air conditioning, etc.), and direct the remaining treated water to the stormwater system and existing outfall at 126th Street. If a water reclamation facility were constructed, it would obviate the need for a new pump station.

STORMWATER

Prior to redevelopment of the site, an amended drainage plan would be prepared by the developer to comprehensively address all the surface runoff and separate handling of the sanitary dry flow that would be generated as a result of the proposed Plan, and drainage features to be included in the development of the District. This drainage plan would accommodate the City's current drainage plan for the area (Plan No. 295[5]), and easements associated with highway drainage, and would be subject to prior review and approval by DEP.

The proposed Plan would maintain separate stormwater and sanitary sewer systems, in accordance with the City's goals to reduce combined sewer overflow (CSO) events. Since the existing area is largely impervious (the District and Lots B and D are currently largely built with impervious structures including buildings, paved surfaces, and roads, which create surface runoff), its conversion to a high density mixed-use district would not significantly change the overall runoff conditions within the area. The overall stormwater runoff volume in the future with the proposed Plan for the District and Lots B and D would therefore remain largely unchanged from the current runoff volume of 366 cfs. Approximately 327 cfs would be generated from the District with an additional 39 cfs from Lots B and D. Stormwater generated within the District is currently directed without any detention to the two existing outfalls on 126th Street and 127th Street. The current runoff from the District is more than the allowable flow per drainage plan to these two outfalls. The current stormwater conveyance system is not sized to accommodate the uncontrolled runoff being generated, resulting in street flooding during storm events. To eliminate these stormwater management issues, the proposed Plan would require the construction of a new stormwater conveyance system, including piping, sustainable design features, and an adequately sized detention tank, or other equivalent means, to accommodate the 5.13 acre-feet of stormwater to meet the allowable flow to the outfall. Approximately 4.20 acre-feet of the total required detention would be required for the District, with an additional 0.93 acre-feet for Lots B and D. The runoff coefficient for Lots B and D assumes a permeability equivalent to pavement. In addition to an amended drainage plan, the developer would be required to prepare a site stormwater management plan, to be reviewed and approved by DEP, that would specify Best Management Practices and sustainable design

features that the project would include. If a future developer proposes to develop a water reclamation facility pursuant to a BSA special permit, as described above, such a facility would treat the District's sanitary wastewater to DEP's effluent standards, return a portion of the treated water for reuse in the District, and direct the remaining treated water to the stormwater system and existing outfall at 126th Street. The water reclamation facility would require a State Pollutant Discharge Elimination System (SPDES) permit to operate, and would result in a slight increase in the amount of detention to be provided in the District.

With the implementation of adequate stormwater management features, stormwater flow could be controlled to remain within the capacity of the two existing outfalls without the need to modify these outfalls. If it is determined that the capacity of the two existing outfalls, as supplemented by stormwater management features selected for the detailed development is not adequate, a new outfall would be proposed to augment the existing system. Construction of a new outfall would require permits from NYSDEC and the US Army Corps of Engineers.

The proposed Plan would require coverage under the current SPDES general permit program for stormwater discharges from construction activities, as well as post construction (Build) conditions. Prior to the initiation of construction activities, a Stormwater Pollution Prevention Plan (SWPPP) would be developed pursuant to the requirements of the general permit and would be enforced throughout the sequence of construction activities and after construction is complete. Since Flushing Bay is a regulated water body, stormwater would have to be pre-treated prior to discharge to ensure that applicable discharge criteria would be met after construction is completed. Such pre-treatment measures would be subject to DEP review and approval. These actions would ensure that pollution prevention measures are in place during and after construction activity and enable adequate control of potential sources of pollution relating to stormwater management.

B. METHODOLOGY

This chapter includes the following:

- Discussions of the existing water supply network serving the proposed District area;
- Assessment of the existing water demand in the District using water demand rates from the *City Environmental Quality Review (CEQR) Technical Manual*, the New York State Department of Environmental Conservation (DEC)'s *Design Standards for Wastewater Treatment Works* (1998), and DEP's *Draft Rules and Regulations Governing the Construction of Private Sewers and Drains;*
- Description of the existing sanitary sewage management in the District and the Bowery Bay WPCP service area;
- Data on the existing flows to the Bowery Bay WPCP for the latest 12-month period, and information about the nearest existing pump station;
- Estimates on the existing sanitary and stormwater infrastructure capacity in the District area;
- Description of the future water supply demands resulting from additional planned developments within the ¾-mile study area boundary, as discussed in Chapter 2, but without the proposed Plan and anticipated development on Lots B and D;
- DEP's predicted wastewater demands for the Bowery Bay WPCP service area;
- Description of the future sanitary and stormwater system without the proposed Plan and Lots B and D;

- Estimate of the increase in water demand associated with the proposed Plan and Lots B and D to assess the impacts on the City's water supply and conveyance system;
- Estimate of the amount of sanitary sewage that would be generated by the proposed Plan and Lots B and D, and assessment of the resulting effects on the existing local wastewater management system and operations at the Bowery Bay WPCP;
- Identification of the additional wastewater infrastructure that would be required to transport and treat the sanitary sewage generated by the proposed Plan and Lots B and D;
- Assessment of the potential demand the proposed Plan and Lots B and D would place on the sanitary and stormwater collection system, and description of the sanitary and stormwater management strategies for the proposed Plan;
- Results of the modeled analysis of combined sanitary and stormwater runoff flows in the Bowery Bay WPCP service area and examination of the flows generated by the proposed Plan and Lots B and D to determine any potential impacts on CSO events; and
- Evaluation of the effect of the No Convention Center Scenario on water supply, wastewater, and stormwater systems.

SUSTAINABLE DESIGN FEATURES RELATED TO INFRASTRUCTURE

The proposed Plan would adopt a separate and sustainable stormwater drainage plan to be reviewed and approved by DEP. Additional sustainable features would be encouraged by the City and included as design guidelines for the development of the site. The sustainable design features under consideration would decrease the demand on infrastructure.

C. EXISTING CONDITIONS

WATER SUPPLY

New York City's primary surface water supply, which provides approximately 1.2 billion gallons of water per day, is serviced via a network of reservoirs, aqueducts, and tunnels extending as far as 125 miles north of the City. This network comprises three systems: the Catskill system, the Delaware system, and the Croton system, which are all operated by DEP. The systems are supplied with water from watershed areas in the Catskill Mountains and Upper Delaware River drainage basins. Water is conveyed from these systems to the local distribution grid via aqueduct tunnels that primarily operate via gravity flow; only 4 percent of the City's water must be pumped to its final destination.

The water from the Delaware and Catskill systems is distributed to the City through three tunnels: City Tunnel No. 1, which goes through the Bronx and Manhattan to Brooklyn; City Tunnel No. 2, which currently supplies the District (and goes through the Bronx, Queens, and Brooklyn (and from there through the Richmond Tunnel to Staten Island); and City Tunnel No. 3 (Stage 1), which goes through the Bronx, Manhattan, and terminates in Queens. Tunnel 3 is being constructed in three stages and, when completed, will enhance and improve the City's water delivery system, and allow for the inspection and repair of City Tunnels No. 1 and 2 for the first time since they were put into service, in 1917 and 1936, respectively. According to the New York City 2006 Drinking Water Supply and Quality Report, construction of City Tunnel No. 3 is expected to be completed in 2025. The 13-mile Stage 1 section went into service in August 1998. It runs from Hillview Reservoir in Yonkers, through the Bronx, down Manhattan across Central Park, and into Astoria, Queens. Stage 2 consists of a 5.5-mile section in Brooklyn

that connects to a 5-mile leg in Queens. These sections were completed in May 2001 and could be activated as early as 2009. This section would serve as a backup water supply for the District and the surrounding area, e.g., for instances in which Tunnel No. 2 requires maintenance.

Within the City, a grid of underground mains distributes water to consumers. Large mains, up to 96 inches in diameter, feed smaller mains, including 20-, 12- and 8-inch mains, which distribute water to individual locations. These mains also provide water to fire hydrants along many of the City's streets. Water pressure throughout the City water supply system is controlled by pressure regulators.

The proposed Willets Point Development District is within the boundary of the federally designated Brooklyn-Queens sole source aquifer. This designation was made pursuant to Section 1424 (e) of the Safe Drinking Water Act (SDWA), in recognition of the importance of the aquifer's vulnerability to contamination. The area's reliance on septic disposal inherently conflicts with SDWA goals. The aquifer is currently not used as a potable water source.

The District and adjoining streets currently have a complete, interconnected grid of water distribution mains that are served by a 72-inch water main, constructed of PRCP, located on Willets Point Boulevard. This gravity distribution system is fed by City Water Tunnel No. 2. The existing demands within the District are generally limited to the current on-site uses and the episodic supply needs of Shea Stadium, which range from 1 to 2 mgd. In addition to these demands, the existing 72-inch main also supplies water to a substantial portion of northeast Queens. This supply main currently operates under its capacity to provide water to the area. The pressures in these lines are adequate to meet the service demand.

As described in Chapter 3, existing uses in the area include automotive repair shops and other industrial-type uses. Based on water generation rates that are typical for these uses, the existing water consumption demand (i.e., potable water use) in the District is estimated to be approximately 422,242 gpd (see Table 14-1).

Table 14-1
Existing Water Consumption and Sewage Generation Rate

Current Use	Area	Domestic Rate		Air Conditioning Rate		Total
	Square Feet (sf)	gpd/sf	gpd	gpd/sf	gpd	gpd
Retail [a]	39,230	0.17	6,669	0.17	6,669	13,338
Commercial/Office [b]	59,389	0.10	5,939	0.10	5,939	11,878
Commercial/Other [c]	135,178	0.17	22,980	0.17	22,980	45,961
Industrial/Manufacturing [d]	558,011	0.46	256,203	0.17	94,862	351,065
TOTAL	791,808	N/A	291,792	N/A	130,450	422,242

Notes:
[a] Assumes water usage and sewage generation rates for Retail/Public Use.
[b] Assumes 0.10 gpd/sf and 25 gpd/person, which equates to 1 person per 250 sf.
[c] Use group includes one residence, a deli and private club in addition to auto related facilities and miscellaneous businesses. Assumes water usage and sewage generation rates for Retail/Public Use.
[d] Use group includes storage, recycling, non-retail auto uses, transportation, construction, distribution and manufacturing. Assumes 20,000 gpd/acre (10,000 gpd/acre multiplied by zoning district factor of 2.00 for M3-1).

Sources:
New York City Department of Finance Real Property Assessment Database (RPAD) 2005 and business information provided by the New York City Economic Development Corporation for the floor area by use group.
3L-2 Table in the *CEQR Technical Manual* for Water Consumption and Sewage Generation Rates.
Table 3 in the DEC Design Standards for Wastewater Treatment Works (1998) for Water Consumption and Sewage Generation Rates.
DEP's Draft Rules and Regulations Governing the Construction of Private Sewers and Drains.

SANITARY SEWAGE

New York City's sewer system includes an extensive grid of sewers beneath the streets that convey wastewater to 14 WPCPs. Together, these plants, which are operated by DEP, treat approximately 1.7 billion gallons of sewage per day. Most of the sewer systems within New York City are combined sewer systems, which carry both sanitary sewage from buildings and stormwater collected in catch basins and storm drains. However, some areas of the City, primarily in Queens and Staten Island, have separate systems for sanitary sewage and stormwater. In addition, small areas of Staten Island, Brooklyn, and Queens, including the Willets Point Development District, use septic systems to dispose of sanitary sewage.

The Willets Point Development District is located within the service area of the Bowery Bay WPCP, which is located on the East River in Astoria, Queens. Currently, the Willets Point area is not connected to the New York City sanitary sewer system and relies entirely on septic systems as the means of sewage treatment. The nearest connection to the City sewer infrastructure from the District is at the existing below-grade 37th Avenue Pump Station, located approximately 4,000 feet northwest of the District. This pump station has the capacity to pump up to 5 mgd into the 20-inch force main, which discharges into a 36-inch gravity combined sewer. Based on information obtained from DEP and as-built drawings, the pump station includes two 10-inch dry pit submersible pumps, each rated for 3,450 gallons per minute (gpm) with a peak rating of 4,600 gpm. However, some reports suggest the existing pump station peak rated capacity is 3,450 gpm. Nevertheless, the existing pump station has no extra capacity.

The sewer system downstream of the 37th Avenue Pump Station consists of combined sewers, regulators, and interceptors. The 36-inch combined sewer feeds into a 96-inch combined sewer under 108th Street, which carries the sewage through a series of regulators to the Bowery Bay WPCP (see Figure 14-1 for the Bowery Bay WPCP drainage schematic and sewer map.)

BOWERY BAY WPCP SERVICE AREA

The Bowery Bay WPCP treats sanitary wastewater to secondary treatment standards prior to discharge to the East River. The existing sewer system within the Bowery Bay WPCP service area is a combined sewer system that collects both sanitary sewage and stormwater runoff. Discharges from this plant are regulated by DEC through a SPDES permit. At the plant, water is treated through a variety of physical and biological processes that remove solid contaminants so that the water discharged into the City's waterways does not adversely affect water quality. During dry weather, combined sewers function as sanitary sewers, conveying all flows to the WPCP for treatment. During wet weather, however, stormwater entering the combined sewer/regulator system can exceed the capacity of the regulator and the treatment plant and trigger a CSO event into the City's waterways. The purpose of a regulator is to divert sanitary flow from the existing combined sewers to the intercepting sewer during normal flow periods (dry weather), and limit the flow to the intercepting sewer to twice the dry weather flow during storm periods (wet weather). During a significant storm event, CSOs within the Bowery Bay WPCP service area discharge to the East River and Flushing Bay. Currently, the CSO outfalls that may potentially be affected by the development within the District and on Lots B and D discharge 5,711.68 million gallons per year to area waterways (see Table 14-5). Generally, the impact of CSO events on local water quality is short-term at most locations, due principally to the mixing caused by tidal currents of the receiving waters and the fact that sanitary flows are diluted by runoff.

The combined sewer/regulator system within the Bowery Bay WPCP service area is designed to deliver twice the mean dry weather, or sanitary, flow to the Bowery Bay WPCP for treatment.

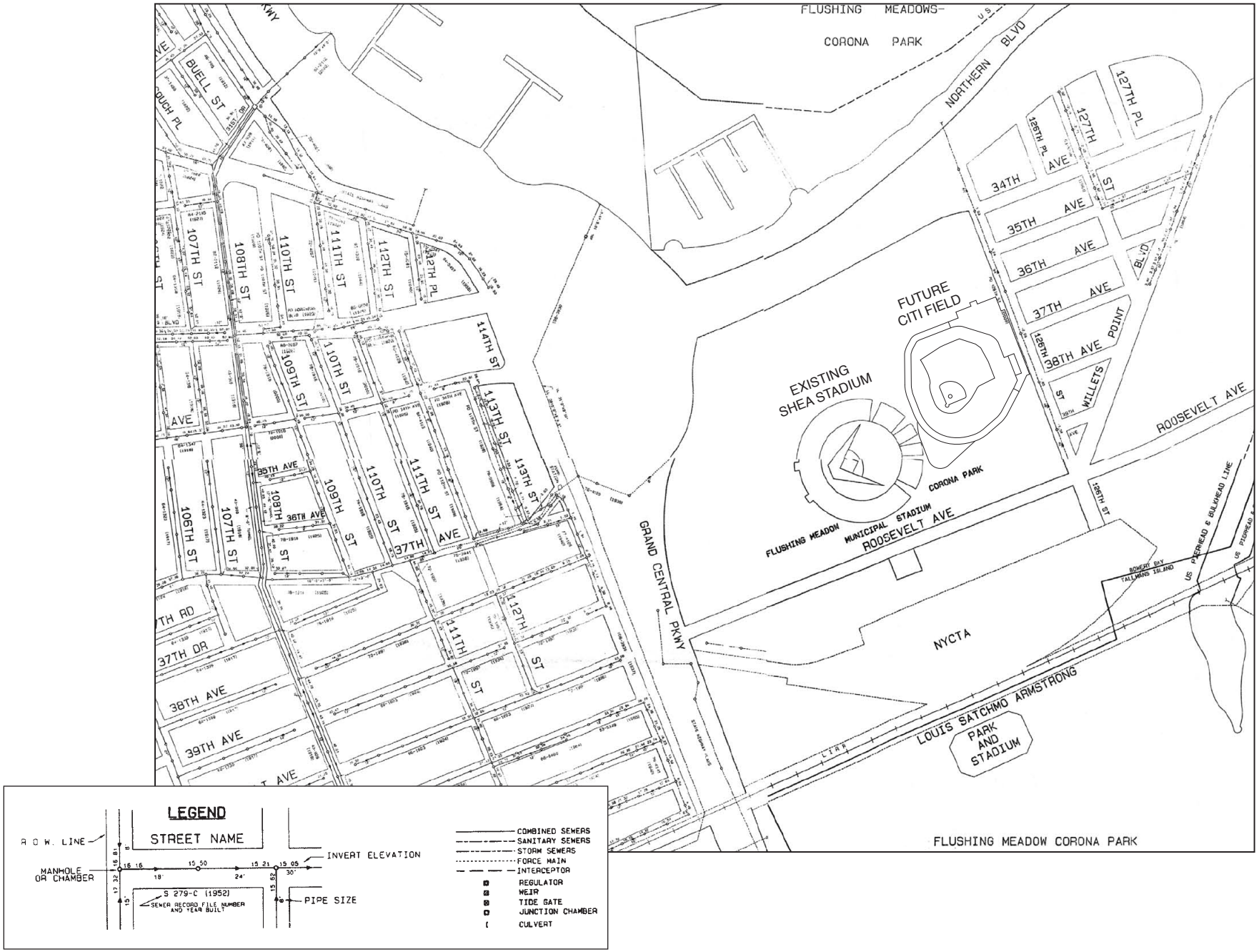

Figure 14-1

Bowery Bay Existing Sewer System

While the total hydraulic capacity of the Bowery Bay WPCP is 300 mgd, it can only provide treatment to secondary levels for 150 mgd. Flow records for the plant are maintained by DEP and are reported to DEC. Table 14-2 presents the current flow data for the Bowery Bay WPCP as reported by DEP. As shown in the table, the average daily flow rate at the plant for the period between January 2007 and December 2007 was 105 mgd. This value is significantly less than the 150 mgd permitted design capacity of the plant.

Table 14-2
2007 Monthly Average Daily Flows at Bowery Bay WPCP

Month	Flow (mgd)
January	88
February	85
March	104
April	119
May	106
June	114
July	117
August	115
September	101
October	105
November	97
December	104
12-Month Average	**105**
SPDES Permitted Capacity	**150**
Source: DEP	

As described above, the District currently has no connections to the New York City sanitary sewer system and relies on septic systems as the only means of sewage treatment. Individual property owners are responsible for maintaining these systems.

STORMWATER

Stormwater runoff is flowing surface water generated by rainfall. Runoff volume and rate of discharge vary depending upon the type of land cover and slope. The existing stormwater runoff was calculated for the District based upon these parameters using the Rational Method.[1] The Willets Point Development District comprises 14 blocks (Blocks 1820 through 1833) and segments of public streets, and is generally bounded to the east by the Van Wyck Expressway and an undeveloped lot owned by the Metropolitan Transportation Authority (MTA), to the south by Roosevelt Avenue, to the west by 126th Street, and to the north by Northern Boulevard. The area is currently developed at a moderate density for industrial uses and comprises mostly developed land, and thus is impervious in its present condition.

The estimated existing stormwater runoff generated within the limits of the proposed District and Lot B, based on DEP's Actual Stormwater Flow Criteria (Revised September 2006), is approximately 366 cubic feet per second (cfs) for a 5-year storm return frequency. Approximately 327 cfs would be generated from the District with an additional 39 cfs from Lots B and D. Stormwater runoff generated in the District and Lots B and D is currently discharged

[1] The rational method is a method used by DEP to determine storm flow. Using this method, the peak rate of runoff is dependent upon rainfall intensity, infiltration, topography, type of land cover, geographic location, and the drainage basin area.

into Flushing Bay via two 60-inch outfalls on 126th Street and 127th Street without any detention, resulting in surcharge and flooding conditions. The maximum capacity for each outfall is 74 cfs. Since the runoff generated is greater than the allowable flow quantity tributary to the two outfalls (148 cfs), the current stormwater discharge infrastructure is inadequate. In addition, there is only minimal stormwater conveyance infrastructure, and a portion of the District is below a sufficient grade to allow for gravity conveyance of stormwater towards the outfalls. Since the area lacks an adequate drainage system, much of the runoff flows as overland flow and ponds, causing area streets to flood during storm events. Furthermore, runoff from the many facilities in the area is neither controlled nor treated prior to entering storm drains that convey this stormwater to the outfalls.

D. THE FUTURE WITHOUT THE PROPOSED PLAN

WATER SUPPLY

In the future without the proposed Plan, no significant change in future water demand is expected within the District. The water usage within the District is expected to remain at its current level, and within the capacity of the City's water supply system. The water demand generated by the projects expected to be developed in the future without the proposed Plan would not overburden the City's water supply system, nor would it be large enough to significantly impact the City's water supply system.

In addition, in the future without the proposed Plan, Stages 1 and 2 of the City Tunnel No. 3 could be activated as early as 2009 to serve as a backup water supply for the District.

SANITARY SEWAGE

In the future without the implementation of the proposed Plan, there would be no significant change in demands within the District on infrastructure systems. The Bowery Bay WPCP Phase II upgrade, which entails replacement of several WPCP components, will be completed by 2009; these improvements will not result in a change in the 150 mgd capacity of the facility. It is not assumed that there would be an extension of City sewers into the area; therefore; the District would continue to rely on septic systems for sanitary waste disposal.

As previously noted, the new Citi Field Stadium, to the immediate west of the proposed District, is expected to be completed in 2009. However, it is not expected that the demand on local infrastructure would change appreciably with the completion of the stadium, since the size and infrastructure demands of the replacement stadium would be comparable with the existing Shea Stadium. In addition, the new Citi Field Stadium would retain the existing configuration of water supply and sewer infrastructure passing beneath the Grand Central Parkway.

Preliminary calculations by DEP indicate that the Bowery Bay WPCP would receive an average of 122 mgd sewage flow in the year 2017, 17 mgd greater than the 2007 monthly average daily flow. This 17 mgd sewage generation increase has been predicted by DEP based upon the increase in development anticipated for the entire Bowery Bay WPCP service area. Based upon these 2017 projections, the Bowery Bay WPCP would have an available capacity of approximately 28 mgd in the future without the proposed Plan.

CSO discharge volumes are primarily influenced by the amount of storm water entering the combined sewer system. Substantial increases in CSO discharges at Bowery Bay outfalls are not

anticipated by the No-Action year, since the area is urbanized and projected new development in the area would not result in large increases to impervious surface draining to the combined sewers.

STORMWATER

In the future without the proposed Plan, there would be no significant change in demands within the Willets Point Development District on stormwater management infrastructure. Stormwater runoff generated in the area would continue to be managed by an undersized separate stormwater collection system and discharged into Flushing Bay via the two 60-inch outfalls located on 126th Street and 127th Street. Since there would be no change to runoff generated or existing stormwater management infrastructure, there would be no change to the drainage plan.

It is assumed that no other improvements to the stormwater infrastructure would be made and the area would continue to rely on the existing ineffective stormwater conveyance infrastructure. Therefore, in the future without the proposed Plan, runoff in the area would continue to be neither controlled nor treated prior to entering storm drains, and streets in the area would continue to flood during storm events.

E. PROBABLE IMPACTS OF THE PROPOSED PLAN

WATER SUPPLY

With the proposed Plan the existing local water supply distribution network would be replaced with appropriately sized infrastructure within the streetbeds, as the new streets are developed. It is also expected that the area would continue to be served by City Water Tunnel No. 2, which feeds the existing 72-inch transmission main, described above in section "C. Existing Conditions." In addition, Stages 1 and 2 of the City Tunnel No. 3 could be activated as early as 2009 and serve as a backup water supply for the District.

Under the proposed Plan, the existing 72-inch PRCP water main within Willets Point Boulevard would remain in place. In order to provide acceptable access to the existing main, the developer would provide a permanent easement mapped on the City Map. The width and designation of this easement would be determined by DEP in accordance with DEP requirements.

Preliminary calculations indicate that the proposed Plan and Lots B and D would cumulatively require 4.36 mgd water supply (see Table 14-3), which is nearly twice the increase in demand anticipated in the study area in the future without the proposed Plan. However, this is still within the capacity of the existing 72-inch transmission main. This incremental increase in demand represents approximately 0.36 percent of the City's total current average daily water demand of 1.2 billion gpd, and would not overburden the City's water supply system, nor be large enough to significantly impact the City's water supply system. In addition to this calculated demand, a minimal amount of additional water demand would be required for landscaping. This demand would be seasonal, and it is expected that some portion of it could be met through recycled water that would be collected in stormwater runoff tanks, as identified in Section B, "Methodology." A summary of the future projected demand calculations for the proposed Plan is presented in Table 14-3.

Chapter 3L, Section 211 of the *CEQR Technical Manual* indicates that actions that would have exceptionally large demand for water, such as large developments (e.g., those that use more than 1 mgd) may require an additional assessment of the effect of such action on water pressure and supply. As noted above, the existing infrastructure is adequate to supply water to the site. The proposed Plan would replace and improve the distribution system that conveys water within the

District. These improvements would completely upgrade the local water supply network and the distribution system's ability to handle the additional demand without creating an impact on local water pressure. Since the existing distribution system within the District is above the minimum acceptable pressure of 20 psi for uninterrupted service, and the developed infrastructure would be designed to a similar standard, it is concluded that the proposed Plan would not have an adverse effect on water pressure.

Table 14-3
Projected Water Usage with the Proposed Plan and Lots B and D

Proposed Use	Flow Rate		Sq. Ft. Redevelopment Area			Water Consumption (gpd)		
	Type	gpd/sf	Willets Point	Lots B and D	Total	Willets Point	Lots B and D	Total
Residential	Domestic	0.401	5,500,000	0	5,500,000	2,200,000	0	2,200,000
	Air Conditioning	0.17				935,000	0	935,000
Retail	Domestic	0.17	1,700,000	184,500	1,884,500	289,000	31,365	320,365
	Air Conditioning	0.17				289,000	31,365	320,365
Commercial/ Office	Domestic	0.10	500,000	280,000	780,000	50,000	28,000	78,000
	Air Conditioning	0.10				50,000	28,000	78,000
Hotel	Domestic	0.1875	560,000	0	560,000	105,000	0	105,000
	Air Conditioning	0.17				95,200	0	95,200
Convention Center	Domestic	0.17	400,000	0	400,000	68,000	0	68,000
	Air Conditioning	0.17				68,000	0	68,000
School	Domestic	0.205	130,000	0	130,000	25,500	0	25,500
	Air Conditioning	0.10				13,000	0	13,000
Community Facility	Domestic	0.17	150,000	0	150,000	25,500	0	25,500
	Air Conditioning	0.17				25,500	0	25,500
Proposed Plan and Lots B and D (sq. ft.)			**8,940,000**	**464,500**	**9,404,500**			
Water Consumption Subtotals (gpd)			**Domestic**			**2,763,000**	**59,365**	**2,822,365**
			Air Conditioning			**1,475,700**	**59,365**	**1,535,065**
Total Water Consumption (gpd)						**4,357,430**		

The following assumptions were made:
Residential: Assumes 400 gpd per unit[a] and 1000 sf per unit, which equates to 0.40 gpd/sf. Assumes 112 gpd/person.
Retail: Assumes 0.17 gpd/sf[a].
Commercial/Office: Assumes 0.10 gpd/sf[a] and 25 gpd/person[b], which equates to 1 person per 250 sf.
Hotel: Assumes 150 gpd per room[b] and 800 sf per room, which equates to 0.1875 gpd/sf.
School: Assumes 30 gpd/seat[b] and approximately 850 seats,(153 sq ft per seat for 130,000 sq ft total area) which equates to 0.20 gpd/sq. ft. (Assumes no boarding)
Community Facility: Assumes water usage and sewage generation rates for Retail/Public Use.
No water usage is anticipated for the development of Lot D.
Source:
a: 3L-2 Table in the CEQR Technical Manual for Water Consumption and Sewage Generation Rates
b: Table 3 in the NYSDEC Design Standards for Wastewater Treatment Works (1998) for Water Consumption and Sewage Generation Rates

SANITARY SEWAGE

As discussed above, the entire Willets Point Development District currently has no connections to the New York City sanitary sewer system, and individual septic fields are used throughout the area. The proposed Plan would include the development of sanitary sewer infrastructure that would provide a new sanitary collection service to the area and eliminate the existing septic systems. The elimination of septic disposal in Willets Point is consistent with SDWA provisions for the protection of designated sole source aquifers. Sanitary wastewater from the District and Lots B and D would be conveyed to a new sanitary (dry flow) pump station, which would most likely be constructed within the District. The pump station would be designed and constructed to DEP and DEC standards. A new force main would transmit sanitary flow from the District to the existing 96-inch-diameter City sewer in 108th Street (which flows to the Bowery Bay WPCP). This new force main route would cross beneath 126th Street and the Grand Central Parkway. Sanitary wastewater from Lots B and D would be connected to the pumped discharge utilized by Citi Field subject to the verification of its adequacy.

According to the *CEQR Technical Manual*, for assessment purposes, estimates of an area's daily sanitary sewage generation are assumed to be equivalent to the domestic water usage rates. Wastewater generated from air conditioning use is minimal because of the recirculation and evaporation processes of water cooling systems, and is therefore not included in the overall wastewater volumes.

The projected sanitary sewage generation rates were evaluated based on the proposed Plan and the anticipated development on Lots B and D. Wastewater flow rates were estimated using DEC 1988 Design Standards for wastewater flow rate design and the *CEQR Technical Manual*. Table 14-4 presents the anticipated sewage generation under the proposed Plan and Lots B and D. Based on that analysis, the sanitary wastewater rate with the proposed Plan and the anticipated development on Lots B and D would be approximately 2.8 mgd or less than 2 percent of the Bowery Bay WPCP total treatment capacity. As described above in Section D, "The Future Without the Proposed Plan," the projected available capacity at the Bowery Bay WPCP in 2017 is 28 mgd. The sanitary wastewater rate with the proposed Plan and the anticipated development on Lots B and D is approximately 10.1 percent of the Bowery Bay WPCP available capacity projected for the 2017 Build year. Thus, the additional wastewater flow expected from the proposed Plan and Lots B and D would not cause the Bowery Bay WPCP to exceed its capacity or SPDES permit limits of 150 mgd. Therefore, sanitary wastewater generated by the proposed Plan and Lots B and D would not compromise the ability of the Bowery Bay WPCP to properly treat wastewater, and the proposed Plan and Lots B and D would not significantly impact the City's Bowery Bay WPCP in the 2017 analysis year.

Table 14-4
Estimated Wastewater Generation
for the Proposed Plan and Lots B and D

Proposed Use	Domestic Sewage Generation Rate (gpd/sf)	Sq. Ft. Redevelopment Area			Sewage Generation (gpd)		
		Willets Point	Lots B and D	Total	Willets Point	Lots B and D	Total
Residential	0.40	5,500,000	0	5,500,000	2,200,000	0	2,200,000
Retail	0.17	1,700,000	184,500	1,884,500	289,000	31,365	320,365
Commercial / Office	0.10	500,000	280,000	780,000	50,000	28,000	78,000
Hotel	0.1875	560,000	0	560,000	105,000	0	105,000
Convention Center	0.17	400,000	0	400,000	68,000	0	68,000
School	0.20	130,000	0	130,000	25,500	0	25,500
Community Facility	0.17	150,000	0	150,000	25,500	0	25,500
Subtotals		**8,940,000**	**464,500**	**9,404,500**	**2,763,000**	**59,365**	**2,822,365**
Total Sewage Generation (gpd)					**2,822,365**		

The following assumptions were made:
Residential: Assumes 400 gpd per unit[a] and 1000 sf per unit, which equates to 0.40 gpd/sf. Assumes 112 gpd/person.
Retail: Assumes 0.17 gpd/sf[a].
Commercial/Office: Assumes 0.10 gpd/sf[a] and 25 gpd/person[b], which equates to 1 person per 250 sf.
Hotel: Assumes 150 gpd per room[b] and 800 sf per room, which equates to 0.1875 gpd/sf.
School: Assumes 30 gpd/seat[b] and approximately 850 seats,(153 sq ft per seat for 130,000 sq ft total area) which equates to 0.20 gpd/sq. ft. (Assumes no boarding)
Community Facility: Assumes water usage and sewage generation rates for Retail/Public Use.
No sanitary sewage generation is anticipated for the development of Lot D.
Source:
a: 3L-2 Table in the CEQR Technical Manual for Water Consumption and Sewage Generation Rates
b: Table 3 in the NYSDEC Design Standards for Wastewater Treatment Works (1998) for Water Consumption and Sewage Generation Rates

Since the sanitary sewage generated by the proposed Plan would bypass the existing 37th Street Pump Station and be conveyed to the Bowery Bay WPCP via a new force main connection directly to the adequately sized combined sewer in 108th Street, an evaluation of the effect of the proposed Plan on the sewer system within the vicinity of the existing 37th Avenue Pump Station is unnecessary. Since the sanitary sewage generated by Lots B and D would not bypass the existing 37th Avenue Pump Station, NYCDEP would require an evaluation of the sewer system in the vicinity of the 37th Avenue Pump Station prior to issuing connection permits for that development.

Since the development within the District would provide separate adequately sized storm sewers, stormwater runoff would not contribute to flow being directed to the Bowery Bay WPCP. The only discharges to the Bowery Bay collection system from the proposed Plan development would be from the sanitary sewers. Since the increase in sanitary flow could impact CSO discharges, the effect of an increase in sanitary flow to the combined sewer/regulator system within the Bowery Bay WPCP service area was investigated using the current Bowery Bay CSO model. The Bowery Bay collection system was modeled using Wallingford Software's InfoWorks model.

The purpose of the modeling analysis was to quantify potential changes in CSO conditions with the proposed Plan and Lots B and D. The CSO model simulation focused on the effect of additional sanitary discharge flows to the combined sewer/regulator system, since the sewer/regulator capacity would determine any changes in CSO volumes resulting from the proposed Plan and Lots B and D development to Flushing Bay. Modeling simulations were performed for the projected sanitary wastewater rate of 2.8 mgd from the development Plan and Lots B and D. Meteorological and tidal data for 2006 were used for this simulation. Modeling simulations were performed evaluating projected additional sanitary discharge from the proposed Plan and Lots B and D compared with the future volumes in the Bowery Bay system without the proposed Plan to estimate whether the additional sanitary flow associated with the proposed Plan would, when combined with the baseline wet-weather flows, increase the CSO volumes.

Based upon model simulation results of conditions with the proposed Plan and Lots B and D, the total annual volume of CSO discharge would increase by less than one percent (0.76 percent) in the system. The largest increase in discharge would occur at Outfall BB-008 (see Figure 14-2). The distribution of the increase in CSO discharges by outfall is summarized in Table 14-5.

The model predicts that with a projected annual sanitary wastewater rate of 2.8 mgd to the Bowery Bay collection system from the development and Lots B and D, the total annual CSO volume being discharged to the East River and Flushing Bay would be approximately 44 million gallons. The predicted annual increase in flow to the Bowery Bay WPCP would be 882 million gallons. The results of these simulations show that there would be no significant increase in CSO volumes. In addition, model simulations indicate that there would be no increase in the frequency of CSO events as a result of the proposed Plan, since CSOs primarily relate to stormwater inputs, which greatly exceed sanitary flow rates during storm events.

Figure 14-2
Bowery Bay CSO Collection System

Table 14-5
CSO Discharges – Existing and Proposed Conditions

Outfall	Existing (MG)	Proposed (MG)	Increase (MG)	% Increase (MG)
BB-002	575.26	583.52	8.26	1.44%
BB-003	75.95	76.02	0.07	0.09%
BB-005	1,231.5	1,245.64	14.14	1.15%
BB-005 (24th Ave)	870.78	872.54	1.76	0.20%
BB-006L	414.78	414.80	0.02	0.00%
BB-006U	1,412.02	1,414.28	2.26	0.16%
BB-007	11.94	12.02	0.08	0.67%
BB-008	535.37	552.06	16.69	3.12%
BB-041	130.47	130.87	0.4	0.31%
TI-010	453.61	453.61	0	0.00%
Total CSO	**5,711.68**	**5,755.36**	**43.68**	**0.76%**
WPCP	26,143.09	26,981.21	838.12	3.21%
Grand Total	**31,854.77**	**32,736.57**	**881.8**	**2.77%**

Notes:
Total CSO – Total CSO volume to Flushing Bay
WPCP – Total combined sewage flow to BB WPCP
Grand Total – Total volume of both CSO volumes to Flushing Bay and combined sewage to BB WPCP
Source: Model simulation results of Existing Bowery Bay CSO collection system using Wallingford Software's InfoWorks. Assumes 2006 rainfall and tide.

As indicated above, the flow increases associated with the proposed Plan and Lots B and D are within the capacity of the Bowery Bay WPCP. The proposed Plan would include a new sanitary pump station and force main to transmit sanitary wastewater from the District to the Bowery Bay WPCP. This pump station and force main would exclusively carry sanitary flows and would not significantly affect CSO volumes or frequency. The Plan would also provide new sanitary collection sewers in the District and a separate stormwater collection and discharge system (see discussion below). Under the proposed Plan, provided these system improvements are incorporated into the amended drainage plan for the area, significant impacts on the sanitary sewer system would not occur.

The proposed Plan would establish separate storm and sanitary waste water disposal systems in the District. Overall, this is expected to result in improved water quality in Flushing Bay by:

- eliminating the reliance on septic disposal;
- improving the stormwater quality by eliminating site flooding, improving the quality of the soil substrate of the site, and providing direct drainage to storm sewers;
- incorporating sustainable design features, where feasible, to reduce the discharge volume and increase the quality of storm water discharges; and
- preventing stormwater generated within the District from entering the combined sewer system, which would increase the frequency and volume of CSO discharges.

The sanitary system would discharge to the combined sewer in 108th Street. The increased volume of sanitary flow to this combined sewer system would result in an increase, by volume, in CSO discharge to Flushing Bay of less than 1 percent. No increase in the frequency of CSO events is predicted to occur. The effect of this small increase in the annual CSO volume on Flushing Bay would be mitigated by the beneficial effects of the storm and sanitary wastewater disposal systems, as indicated above. In addition, water conservation measures would be

employed to minimize sanitary sewage flow to the existing combined sewer system. Water conservation measures, which could be included as design guidelines for the development of the District, include, but are not limited to:

- Low water usage water closets;
- Low water usage urinals;
- Low water usage showers;
- Low water usage lavatories;
- Pressure-assist/'Vacuum-assist' toilets;
- Composting toilets;
- Waterless urinals (in high use areas);
- Automatic shut-off controls on sinks, toilets, and urinals;
- Rainwater use for irrigation, toilet/urinal flushing, etc.; and
- Graywater use for water closets and urinal flushing.

In addition, the Special District text allows for the development of a water reclamation facility, provided it would primarily serve the District. This facility would support the City's goal to incorporate the latest innovative building and planning technologies in the District. If proposed by a future developer, a water reclamation facility would require a special permit by the Board of Standards and Appeals (BSA) and likely a State Pollutant Discharge Elimination System (SPDES) permit from NYSDEC, and would be subject to separate environmental and public review process. The water reclamation facility would treat the District's sanitary wastewater to DEP's effluent standards, return a portion of the treated water for reuse in the District (for toilets, cleaning, irrigation, air conditioning, etc.), and direct the remaining treated water to the stormwater system and existing outfall at 126th Street. It is anticipated that a water reclamation facility would be a centralized structure. The water reclamation facility would result in a modest increase in the amount of detention to be provided in the District. If constructed, the facility would obviate the need for a new pump station.

STORMWATER

Even though the proposed Plan would transform an industrial area into a high density mixed-use district, the overall volume of stormwater runoff within the area would remain unchanged, since the District and Lots B and D are largely built with impervious structures, including buildings, paved surfaces and roads that create surface runoff. The overall stormwater runoff volumes in the future with the proposed Plan would remain largely unchanged from the current estimated runoff volume of 366 cfs in the District and Lots B and D. Approximately 327 cfs would be generated from the District with an additional 39 cfs from Lots B and D. Stormwater generated within the District and Lots B and D is currently directed without any detention to the two existing outfalls at 126th Street and 127th Street. The current runoff from the site is more than the allowable flow per drainage plan to these two outfalls. Furthermore, the current stormwater conveyance system is undersized, and a portion of the District is below a sufficient grade to allow for gravity conveyance of stormwater towards the outfalls, resulting in uncontrolled and untreated runoff and street flooding.

The proposed Plan would include a requirement to raise the overall grade between one to seven feet to meet the Federal Emergency Management Agency (FEMA) 100-year floodplain

elevation. The final change in grade would be calculated to achieve the 14 feet NGVD29 after 25 years of settlement. The greater increases in grade (five to seven feet) would be limited to the south and southeastern portions of the District. This elevation increase would allow for a completely new stormwater system to be designed and connected to the existing outfalls.

Prior to development of the site, an amended drainage plan would be prepared by the developer to comprehensively address all the surface runoff that would be generated as a result of the proposed Plan, and drainage features to be included in the development of the District. This drainage plan would accommodate the City's current drainage plan for the area (Plan No. 2955), and easements associated with highway drainage. Since a separate stormwater collection system is proposed, the amended drainage plan would be consistent with City policies for reducing stormwater inputs to combined sewers as a means of preserving treatment capacity at the treatment plants. As such, stormwater collected in the District would be managed so as not to increase the occurrence of CSOs (see the discussion above). The development would need to implement adequate detention to accommodate the runoff currently exceeding the design capacity of the outfalls. The amendment to the drainage plan would be reviewed and approved by DEP.

If a future developer proposes to develop a water reclamation facility pursuant to a BSA special permit, as described above, such a facility would treat the District's sanitary wastewater to DEP's effluent standards, return a portion of the treated water for reuse in the District, and direct the remaining treated water to the stormwater system and existing outfall at 126th Street. The water reclamation facility would likely require a SPDES permit to operate, and would result in a modest increase in the amount of detention to be provided in the District.

In addition, the developer would be required to prepare and implement a site stormwater management plan, to be reviewed and approved by DEP prior to commencement of construction. This plan would specify Best Management Practices and sustainable design features to be incorporated in the project. Such features could include:

- Increased quantity, density, and diversity of trees;
- Sustainable irrigation and landscaping practices;
- Graywater recycling for individual building sites;
- Integration of vegetated swales;
- Green roofs;
- Blue roofs;
- Rooftop storage and filters;
- Underground storage;
- Inline pipe storage;
- Decorative wet ponds;
- Detention dry ponds;
- Proprietary pre-treatment structures (e.g., Stormceptor, Vortechnics);
- Bioengineered and structural practices to reduce and control runoff;
- Stormwater recycling facilities (reuse for toilet flushing, custodial work, landscape irrigation, and other uses to reduce demand for potable water);
- Optimized right-of-way drainage;

- Vegetated filters and buffer strips;
- Water quality inlets including oil and grit separators, media filters, and high-volume treatment proprietary devices;
- Surface, perimeter, and/or underground sand filters;
- Infiltration trenches, with under-drain and overflow to a control structure connection to a storm sewer;
- Bioretention-shallow swales, with under-drain and overflow to a control structure connection to a storm sewer; and
- Other low-impact, effective measures.

With the implementation of adequate stormwater management features, if stormwater flow could be controlled to meet allowable flow to the two existing outfalls. A new outfall would not be required.

If, notwithstanding the stormwater management features selected for a detailed development plan, runoff would exceed the allowable flow to the existing outfalls, a new outfall would be proposed to augment the discharge capacity of the existing system.

The proposed Plan would require coverage under the current SPDES general permit program for stormwater discharges from construction activities, as well as post construction (Build) conditions. Prior to the initiation of construction activities, a Stormwater Pollution Prevention Plan (SWPPP) would be developed pursuant to the requirements of the general permit and would be enforced throughout the sequence of construction activities and following the completion of construction. Since Flushing Bay is a regulated water body, stormwater would have to be pre-treated prior to discharge. Such pre-treatment measures would be subject to DEP review and approval. The implementation of the SWPPP would ensure that applicable discharge criteria would be met after construction is completed. These actions would ensure that pollution prevention measures are in place during and after construction activity and enable adequate control of potential sources of pollution relating to stormwater management. Provided these improvements along with an appropriate detention system are incorporated in the proposed Plan, no significant adverse impacts (e.g., street flooding) would occur, and conditions would greatly improve. Elements of that system would be such that outflow would meet both flow and quality criteria of the existing outfalls.

GLOBAL CLIMATE CHANGE ADAPTATION

Given the District's location within the 100-year floodplain, the potential effects of global climate change on the proposed Plan have been considered. Although a large range of sea level rise is possible depending on the precise emissions and response scenarios used for global modeling, there is sufficient information to suggest an increment of approximately 1.6 feet by the end of the century based on warming and some ice cap, sea ice, and glacial melting. Note that the project elevation of 14 feet is well above that stillwater level, so an increase of 1.6 feet would not impact the project area under normal conditions.

The main components that inform infrastructure planning are storm surge and the frequency of severe storms. These components are much more uncertain at this time. Although catastrophic acceleration of ice cap melting is a possibility still being investigated by the scientific community, it is not considered sufficiently likely to be used for planning purposes, and the

Intergovernmental Panel on Climate Change (IPCC)[1] did not include that component in its quantitative projections.[2]

The current 100-year floodplain is currently the only regulatory standard relating to elevation of new development. Under the proposed Plan, the District would be raised above the floodplain, reducing the District's vulnerability to storm surges as compared to existing conditions. The City has established an interagency group to work with the Federal Emergency Management Agency (FEMA) to revise the Flood Insurance Rate Maps for the City. These maps establish flood elevations, which are the triggers for the City building code's flood protection requirements. The City is working with FEMA to reflect current shoreline and elevations, and technological changes that allow for more accurate map-making. It is anticipated that the map revisions will be completed in 2010. Subsequent development within the District will reflect any changes to the floodplain elevations.

The City is also engaged in several initiatives related to better assessing potential local climate change impacts and developing City-wide strategies to adapt to projected effects of climate change:

1. The City recently launched the Climate Change Adaptation Task Force, which is working to secure the city's critical infrastructure against rising seas, higher temperatures and fluctuating water supplies projected to result from climate change. The Task Force is composed of over 35 city and state agencies, public authorities and companies that operate, regulate, or maintain critical infrastructure in New York City.

   The task force will be assisted by the New York City Panel on Climate Change (NPCC), which is modeled on the IPCC and includes leading climatologists, sea-level rise specialists, adaptation experts, and engineers, as well as representatives from the insurance and legal sectors. The NPCC will provide the city and task force members with information about climate risks (including climate change projections), adaptation, and risk assessment. The NPCC is expected to issue preliminary climate change projections in late 2008/early 2009.

2. The City is convening a task force to amend the building code to incorporate climate change adaptation measures on a City-wide basis. This task force will evaluate the need for new structural requirements.

3. DEP is in the process of evaluating adaptive strategies for City infrastructure. DEP has issued a preliminary report on future climate change predictions relating to sea levels in the New York City area. At this time, much of the data generated by scientific studies is not yet sufficiently detailed for site-specific infrastructure planning.[1] DEP will be undertaking a

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[1] The IPCC is the internationally recognized organization tasked with providing decision-makers and others interested in climate change with an objective source of information about climate change. Its role is to assess on a comprehensive, objective, open and transparent basis the latest scientific, technical and socio-economic literature produced worldwide relevant to the understanding of the risk of human-induced climate change, its observed and projected impacts and options for adaptation and mitigation. IPCC reports are neutral with respect to policy, are of high scientific and technical standards, and aim to reflect a range of views, expertise and wide geographical coverage.

[2] IPCC. "Climate Change 2007 - The Physical Science Basis, Contribution of Working Group I to the Fourth Assessment Report of the IPCC", chapter 10. www.ipcc.ch. 2007.

long-term planning and conceptual engineering effort, beginning in May 2009. The goal of this effort is to ensure that future design criteria and infrastructure sizing meet future population demands and minimize the risks posed by climate change to the drainage and wastewater management systems in the City.

The development would include a number of features, in addition to the requirements of the building code and current DEP drainage standards, designed to absorb or retain stormwater and reduce the potential for flooding. These features would form part of a site stormwater management plan that would be reviewed by DEP in light of its developing understanding of the effects of climate change on infrastructure. Furthermore, the developer would be required to submit to the City, prior to the placement of fill, an assessment of the appropriate grade for the District in light of all available information concerning potential sea level and other changes due to climate change. If appropriate and if warranted by data available at that time, the City would have the authority to require an increase in the proposed grade of the District at that time, but other measures could be used if more appropriate.

As detailed local climate change projections become available and are adopted into the City's infrastructure design criteria, such criteria will be incorporated into the development program. In addition, the City's agreement with the developer would require the preparation of an engineering study prior to commencement of construction that would assess the feasibility of implementing adaptation strategies for climate change impacts into the design of the development program in light of the most current climate change projections. Based on that engineering study, the City would require the developer to implement the adaption strategies that it determines are practicable.

F. THE NO CONVENTION CENTER SCENARIO

WATER SUPPLY

In the No Convention Center Scenario, the additional residential and retail use would increase the water supply demand by 0.08 mgd above the demand required by the proposed Plan and would require a total water supply increase of 4.44 mgd for the Plan and the anticipated development on Lots B and D. This demand level is 2.25 times the anticipated demand from the District (and Lots B and D) without the proposed Plan; however, it is within the available capacity limits of the existing 72-inch transmission main and can be provided without upgrade. This incremental demand increase—approximately 0.37 percent of the City's total current average daily water demand of 1.2 billion gpd —would not overburden the City's water supply system, nor would it be large enough to significantly impact it. A minimal water demand above these calculated values would be required on a seasonal basis for landscaping; however, it is anticipated that some portion of the landscaping demand may be met through recycled water that would be collected in stormwater runoff tanks. A summary of the future projected demand calculations for the No Convention Center Scenario is presented in Table 14-6.

Table 14-6
Projected Water Usage for No Convention Center Scenario

Proposed Use	Flow Rate		Sq. Ft. Redevelopment Area			Water Consumption (gpd)		
	Type	gpd/sf	Willets Point	Lots B and D	Total	Willets Point	Lots B and D	Total
Residential	Domestic	0.40	5,500,000	0	5,500,000	2,340,000	0	234,0000
	Air Conditioning	0.17				994,500	0	994,500
Retail	Domestic	0.17	1,700,000	184,500	1,884,500	297,500	31,365	328,865
	Air Conditioning	0.17				297,500	31,365	328,865
Commercial/ Office	Domestic	0.10	500,000	280,000	780,000	50,000	28,000	78,000
	Air Conditioning	0.10				50,000	28,000	78,000
Hotel	Domestic	0.1875	560,000	0	560,000	105,000	0	105000
	Air Conditioning	0.17				95,200	0	95,200
Convention Center	Domestic	0.17	400,000	0	400,000	0	0	0
	Air Conditioning	0.17				0	0	0
School	Domestic	0.20	130,000	0	130,000	25,500	0	25,500
	Air Conditioning	0.10				13,000	0	13000
Community Facility	Domestic	0.17	150,000	0	150,000	25,500	0	25,500
	Air Conditioning	0.17				25,500	0	25,500
Proposed Plan and Lots B and D (sq. ft.)			**8,910,000**	**464,500**	**9,374,500**			
Water Consumption Subtotals (gpd)			**Domestic**			**2,843,500**	**59,365**	**2,902,865**
			Air Conditioning			**1,475,700**	**59,365**	**1,535,065**
Total Water Consumption (gpd)						**4,437,930**		

The following assumptions were made:
Residential: Assumes 400 gpd per unit[a] and 1000 sf per unit, which equates to 0.40 gpd/sf. Assumes 112 gpd/person.
Retail: Assumes 0.17 gpd/sf[a].
Commercial/Office: Assumes 0.10 gpd/sf[a] and 25 gpd/person[b], which equates to 1 person per 250 sf.
Hotel: Assumes 150 gpd per room[b] and 800 sf per room, which equates to 0.1875 gpd/sf.
School: Assumes 30 gpd/seat[b] and approximately 850 seats,(153 sq ft per seat for 130,000 sq ft total area) which equates to 0.20 gpd/sq. ft. (Assumes no boarding)
Community Facility: Assumes water usage and sewage generation rates for Retail/Public Use.
No water usage is anticipated for the development of Lot D.
Source:
a: 3L-2 Table in the CEQR Technical Manual for Water Consumption and Sewage Generation Rates
b: Table 3 in the NYSDEC Design Standards for Wastewater Treatment Works (1998) for Water Consumption and Sewage Generation Rates

SANITARY SEWAGE

In the No Convention Center Scenario with the anticipated development on Lots B and D, the sanitary wastewater rate would be approximately 2.9 mgd or less than 2 percent of the Bowery Bay WPCP total capacity, 0.1 mgd greater than with the proposed Plan and Lots B and D. The projected sanitary sewage generation rates are summarized in Table 14-7. As described above in Section D, "The Future Without the Proposed Plan," the projected available capacity at the Bowery Bay WPCP in 2017 is 28 mgd. The sanitary wastewater generated by the No Convention Center Scenario is 2.9 gpd, or 10.4 percent of the Bowery Bay WPCP capacity that is projected as being available at Bowery Bay in the 2017 Build year. Therefore, there would be no significant impact on the Bowery Bay WPCP.

Since the increase in sanitary flow could impact CSO discharges, the effect of an increase in sanitary flow to the combined sewer on 108th Street was investigated using the current Bowery Bay WPCP CSO model. The Bowery Bay collection system was modeled using Wallingford Software's InfoWorks model. The purpose of the modeling analysis was to quantify potential changes in CSO conditions with the proposed Plan. Modeling simulations were performed for the projected annual sanitary wastewater rate of 2.9 mgd, using 2006 rainfall and tide data. Based upon model simulation results of conditions with the proposed Plan, the total CSO discharge

would increase by less than 1 percent (0.79 percent) in the system. The largest increase in discharge would occur at Outfall BB-008 (see Figure 14-2).

Table 14-7
Conceptual Wastewater Flow Rate Generation Based on the No Convention Center Scenario

Proposed Use	Domestic Sewage Generation Rate (gpd/sf)	Sq. Ft. Redevelopment Area			Sewage Generation (gpd)		
		Willets Point	Lots B and D	Total	Willets Point	Lots B and D	Total
Residential	0.40	5,850,000	0	5,850,000	2,340,000	0	2340000
Retail	0.17	1,750,000	184,500	1,934,500	297,500	31,365	328865
Commercial/ Office	0.10	500,000	280,000	780,000	50,000	28,000	78000
Hotel	0.1875	560,000	0	560,000	105,000	0	105000
Convention Center	0.17	0	0	0	0	0	0
School	6	130,000	0	130,000	25,500	0	25500
Community Facility	0.17	150,000	0	150,000	25,500	0	25500
Subtotals		**8,910,000**	**464,500**	**9,374,500**	**2,843,500**	**59,36**	**2,902,865**
Total Sewage Generation (gpd)					**2,902,865**		

The following assumptions were made:
Residential: Assumes 400 gpd per unit[a] and 1000 sf per unit, which equates to 0.40 gpd/sf. Assumes 112 gpd/person.
Retail: Assumes 0.17 gpd/sf[a].
Commercial/Office: Assumes 0.10 gpd/sf[a] and 25 gpd/person[b], which equates to 1 person per 250 sf.
Hotel: Assumes 150 gpd per room[b] and 800 sf per room, which equates to 0.1875 gpd/sf.
School: Assumes 30 gpd/seat[b] and approximately 850 seats,(153 sq ft per seat for 130,000 sq ft total area) which equates to 0.20 gpd/sq. ft. (Assumes no boarding)
Community Facility: Assumes water usage and sewage generation rates for Retail/Public Use.
No sanitary sewage generation is anticipated for the development of Lot D.
Source:
a: 3L-2 Table in the CEQR Technical Manual for Water Consumption and Sewage Generation Rates
b: Table 3 in the NYSDEC Design Standards for Wastewater Treatment Works (1998) for Water Consumption and Sewage Generation Rates

The effect of average flow was investigated by simulating average dry weather flow for existing conditions. The results of these simulations (Table 14-8) showed that there would be no significant increase in sanitary sewage overflows.

As shown in Table 14-8, the flow increases associated with the No Convention Center scenario are within the capacity of the Bowery Bay WPCP; however, the existing 37th Avenue Pump Station has no extra capacity to accommodate these increases. Therefore, a new sanitary (dry flow) pump station and force main would be required in the District to transmit sanitary wastewater from the District to the Bowery Bay WPCP. Sanitary wastewater from Lots B and D would be connected to the pumped discharge utilized by Citi Field subject to the verification of its adequacy. The incorporation of these features into the drainage plan for the District would prevent significant adverse impacts.

Table 14-8
2006 CSO Discharges - Existing Conditions and Proposed Conditions for the No Convention Center Scenario

Outfall	Existing (MG)	Proposed (MG)	Increase (MG)	% Increase (MG)
BB-002	575.26	583.79	8.53	1.48%
BB-003	75.95	76.02	0.07	0.09%
BB-005	1,231.5	1,246.12	14.62	1.19%
BB-005 (24th Ave)	870.78	872.58	1.8	0.21%
BB-006L	414.78	414.80	0.02	0.00%
BB-006U	1,412.02	1,414.35	2.33	0.17%
BB-007	11.94	12.02	0.08	0.67%
BB-008	535.37	552.64	17.27	3.23%
BB-041	130.47	130.88	0.41	0.31%
TI-010	453.61	453.61	0	0.00%
Total CSO	**5,711.68**	**5,756.81**	**45.13**	**0.79%**
WPCP	26,143.09	27,008.38	865.29	3.31%
Grand Total	**31,854.77**	**32,765.19**	**910.42**	**2.86%**

STORMWATER

In the No Convention Center Scenario, stormwater runoff generation rates would be essentially equivalent to the proposed Plan. Stormwater drainage from the District would be conveyed to Flushing Bay through detention system and storm drains, with the ultimate discharge point at the 126th Street and 127th Street outfalls, and, if deemed necessary for a detailed development plan, a proposed outfall.

As with the proposed Plan, detention would be required to manage stormwater runoff being discharged to these existing two outfalls and to a new outfall, if needed. Provided these improvements are incorporated into the detailed design, no significant impacts would occur. ✷