Chapter 10: Water and Sewer Infrastructure

A. INTRODUCTION

The Proposed Action would rezone an approximately 18-block area of the Hudson Square section of Manhattan as the Special Hudson Square District. As described in Chapter 1, "Project Description," the proposed Rezoning Area would permit a wider range of uses than currently allowed, and is expected to result in new development (including new construction, enlargements, and residential conversion) on sites throughout the proposed district.

PRINCIPAL CONCLUSIONS

This analysis finds that the Proposed Action would not result in any significant adverse impacts on the city's water supply, wastewater treatment or stormwater conveyance infrastructure.

WATER SUPPLY

The incremental water demand generated by the development that would occur as a result of the Future With the Proposed Action (the With-Action condition) compared with the Future without the Proposed Action (the No-Action condition) is 699,173 gallons per day (gpd). This incremental water demand represents a 0.06 percent increase in demand on the New York City water supply system. Based on the projected incremental demand, it is expected that there would be adequate water service to meet the incremental water demand of the anticipated development that would occur as a result of the Proposed Action; therefore, there would be no significant adverse impacts on the city's water supply.

SANITARY SEWAGE

The incremental sanitary sewage generated by the development that would occur as a result of the Proposed Action compared to the No-Action condition is 358,738 gpd. This incremental volume of sanitary flow to the combined sewer system would represent approximately 0.15 percent of the average daily flow to the Newtown Creek Wastewater Treatment Plant (WWTP). This volume would not result in an exceedance of the Newtown Creek WWTP's capacity, and therefore would not create a significant adverse impact on the city's sanitary sewage conveyance and treatment infrastructure.

STORMWATER

The projected development that would occur as a result of the Proposed Action would increase the total amount of impervious surfaces at the projected development sites. However, with the incorporation of selected best management practices (BMPs) that will be required as a part of the New York City Department of Environmental Protection (DEP) site connection application process and are identified in BMP Concept Plan described below, the Proposed Action would not have a significant impact on the city's stormwater conveyance infrastructure.

B. METHODOLOGY

This analysis follows the methodologies set forth in the 2012 *City Environmental Quality Review (CEQR) Technical Manual.* According to the *CEQR Technical Manual,* a preliminary water analysis is needed if a project would result in an exceptionally large demand of water (over 1,000,000 gpd), or is located in an area that experiences low water pressure. The Rezoning Area is not located in an area that experiences low water pressure (i.e., it is not located at the end of the water supply distribution system such as the Rockaway Peninsula or Coney Island). The incremental water demand from the projected development over the No-Action condition would be less than 1,000,000 gpd. Therefore, further water demand analysis is not warranted; however, total water demand has been calculated for purposes of the preliminary sewer analysis.

A preliminary sewer analysis is warranted if a project site is over 5 acres and would result in an increase of impervious services on the site, or if a project is located in a combined sewer area in Manhattan and would result in the incremental development of 1,000 residential units or 250,000 square feet of commercial, public facility and institution and/or community facility space. The location of the Rezoning Area and the development that would result from it meet both of these CEQR thresholds, and therefore a preliminary sewer analysis was conducted.

Existing and future water demands and sanitary sewage generation are calculated based on use generation rates set by the *CEQR Technical Manual*[1]. The DEP Volume Calculation Matrix was then used to calculate the overall combined sanitary sewage and stormwater runoff volume discharged to the combined sewer system for four rainfall volume scenarios with varying durations. The ability of the city's water and sewer infrastructure to handle the estimated demand that is anticipated from the projected development as a result of the Proposed Action is assessed by estimating existing water demand and sewage rates, and then comparing the existing demands with those estimated for the No-Action and With-Action conditions. Per *CEQR Technical Manual* methodology, the incremental water demand and sewage generated from the projected development serves as the basis for the impact assessment.

ANALYSIS APPROACH

As the water and sewer analysis is a density-based technical analysis, only the anticipated development on the projected development sites (including projected new construction, enlargements, and residential conversion) form the basis for this impact assessment. As discussed in Chapter 1, "Project Description," the potential development sites are considered less likely to be developed within the 10-year analysis period and therefore are not included in this assessment.

As discussed in Chapter 1, two reasonable worst-case development scenarios (RWCDS) have been developed to represent potential development scenarios that could result from the Proposed Action. Under RWCDS 1, it is assumed that the maximum permitted residential development would occur on each of the projected development sites. Under RWCDS 2, it is assumed that community facility uses with sleeping accommodations (i.e., dormitories), rather than residential buildings, would be developed on two of the projected development sites. Based on the water and sewer generation rates provided in the *CEQR Technical Manual,* it was determined that RWCDS 2 would result in the larger water demand and overall amount of sewage generated. Therefore, RWCDS 2 provides the basis for the water and sewer impact assessment.

[1] *CEQR Technical Manual,* January 2012, p.13-12.

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. From these watersheds, water is carried to the city via a conveyance system made up of reservoirs, aqueducts, and tunnels. Within New York City, a network of underground water pipes distributes water to customers. On average, the New York City water system delivers approximately 1.1 billion gallons per day (bgd) to the five boroughs and Westchester County.

The Croton system supplies an average of 22 million gallons per day (mgd), primarily to users in the lower-elevation portions of Manhattan and the Bronx. The Delaware and Catskill systems supply all five boroughs and deliver approximately 98 percent of the city's drinking water. 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. 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. City Tunnel No. 1 serves the southern portion of Manhattan where the Rezoning Area is located.

WATER CONSUMPTION

In total, 19 projected development sites and 3 enlargement sites were analyzed. In the existing condition, 15 of the 22 sites are occupied by in-use buildings (some with paved areas), 1 site contains a vacant building, 2 sites are paved parking lots, and 4 sites are vacant land (i.e., undeveloped parcels). **Table 10-1** summarizes the estimated water demand of the projected development sites.

Table 10-1
Existing Water Consumption

Use	Unit	Size (Square feet)	Rate	Consumption (gallons per day)
Residential				
Domestic	54 (people)[1]	NA	100 gpd/person	5,400
Air Conditioning	NA	20,583	0.17 gpd/sf	3,499
Retail				
Domestic	NA	62,063	0.24 gpd/sf	14,895
Air Conditioning	NA	62,063	0.17 gpd/sf	10,551
Commercial[1]				
Domestic	NA	830,443	0.10 gpd/sf	83,044
Air Conditioning	NA	830,443	0.17 gpd/sf	141,175
TOTAL	NA	913,089	NA	**258,564**

Note:
1. Projected Development Site 18 currently contains 16 live/work units. The calculations conservatively consider both 16 dwelling units and 65,756 sf in commercial space for domestic uses; for air conditioning use, this space is included in only the commercial calculations.

Source: Rates from the *CEQR Technical Manual.*

SANITARY SEWAGE

The Rezoning Area is located within the area served by the Newtown Creek WWTP. Sanitary sewage from the projected development sites is conveyed to combined sewers in the abutting streets. For purposes of this analysis, the amount of sanitary sewage is conservatively estimated as all water demand except that used by air conditioning, which is typically not discharged to the sewer system. The estimated amount of daily sanitary sewage generated by the existing development on the projected development sites is 103,339 gpd.

In periods of dry weather, the combined sewers convey only sanitary sewage. During and immediately after wet weather, the combined sewers can experience a much larger flow due to stormwater runoff collection. To control flooding at the Newtown Creek WWTP, where combined sewage from the projected development sites is treated, regulators are built into the system to allow only approximately two times the amount of design dry weather flow into the interceptors. The interceptor conveys the flow to the 13th Street Pumping Station, where flow is pumped from Manhattan to Newtown Creek WWTP in Queens while the excess flow to the regulators is discharged to the nearest water body as combined sewer overflow (CSO).

Three different CSO outfalls are potentially affected by the Proposed Action during wet weather events. The total area of the projected development sites is approximately 7.31 acres. Approximately 4.75 acres of this area is within the NC-075 catchment area, which includes:

- Projected Development Sites 1, 2, 5, 9-13, 15-18
- Projected Enlargement Site 2
- 69 percent of Projected Development Site 3
- 63 percent of Projected Enlargement Site 1

In total, approximately 0.35 acres of the projected development sites are within the NC-076 catchment area, which includes:

- 25 percent of Projected Development Site 4
- 50 percent of Projected Development Site 6

In total, approximately 2.21 acres of the projected development sites are within the NC-080 catchment area, which includes:

- Projected Development Sites 7, 8, 14, 19
- Projected Enlargement Site 3
- 31 percent of Projected Development Site 3
- 75 percent of Projected Development Site 4
- 50 percent of Projected Development Site 6
- 37 percent of Projected Enlargement Site 1

Once flow is conveyed via the interceptor to the Newtown Creek WWTP, wastewater is fully treated by physical and biological processes before it is discharged into the East River. The quality of the treated wastewater (effluent) is regulated by a New York State Pollution Discharge Elimination System (SPDES) permit issued by the New York State Department of Environmental Conservation (NYSDEC). A maximum daily capacity for each treatment facility in the city is set to ensure that the quality of effluent is acceptable to discharge into surrounding water bodies, and the maximum capacity for the Newtown Creek WWTP is 310 million gallons

per day (mgd). The average monthly flow over the past 12 months is 233 mgd, well below the maximum permitted level of 310 mgd[2].

STORMWATER

As discussed above, the projected development sites are located in an area served by the city's combined sewer system. Stormwater runoff from the projected development sites that is not infiltrated is collected and conveyed by the city's combined sewers to the Newtown Creek WWTP.

The projected development sites contain approximately 7.31 acres. Approximately 65 percent of that area is within the catchment area of CSO outfall NC-075, 5 percent is within the catchment area of CSO outfall NC-076, and the remaining 30 percent is within the catchment area of CSO outfall NC-080. **Table 10-2** describes the surfaces and surface areas on projected development sites, and how stormwater runoff is currently discharged from the sites.

Table 10-2
Existing Surface Coverage

CSO Outfall	Surface Type	Surface Areas (sf)/ Percent Coverage	Discharge Method	Weighted Runoff Coefficient
NC-075	Building Roofs	110,795/54%	Combined Sewer	
	Paved Surfaces	48,635/23%	Combined Sewer	
	Unpaved Surfaces	47,545/23%	Infiltration/Combined Sewer	
	Total	**206,975/100%**		**0.78**
NC-076	Building Roofs	13,288/88%	Combined Sewer	
	Paved Surfaces	1,860/12%	Combined Sewer	
	Total	**15,148/100%**		**0.98**
NC-080	Building Roofs	68,049/71%	Combined Sewer	
	Paved Surfaces	12,965/13%	Combined Sewer	
	Unpaved Surfaces	15,104/16%	Infiltration/Combined Sewer	
	Total	**96,118/100%**		**0.85**

Sources: NYC DCP MapPLUTO 10v1 (2010) data

The weighted runoff coefficient of the projected development sites is calculated for the area within the NC-075 catchment area as 0.78, the area within the NC-076 catchment area as 0.98 and the area within the NC-080 catchment area as 0.85. These numbers correspond to the percentage of precipitation that becomes surface runoff.

D. THE FUTURE WITHOUT THE PROPOSED ACTION

As described in greater detail in Chapter 1, "Project Description," there are several development projects expected to be completed by 2022 absent the Proposed Action (the No-Action scenario). Therefore, in the No-Action scenario, infrastructure demands for the projected development sites will increase as compared with the existing condition. Under the No-Action scenario, on the projected development sites, an additional 88,732 sf of commercial/office space, 63,520 sf of retail space and 1,126 new hotel rooms would be developed over the existing condition.

[2] DEP Monthly Operating Efficiency Reports for October 2011.

WATER SUPPLY

In the Future without the Proposed Action, water consumption on the projected development sites is estimated to be 704,465 gpd. This amount is approximately 0.06 percent of the city's total water demand. **Table 10-3** identifies the water uses projected in the No-Action condition.

Table 10-3
No-Action Condition Water Consumption

Use	Unit	Size (Square feet)	Rate	Consumption (gallons per day)
Residential[1]				
Domestic	54 (people)[2]	NA	100 gpd/person	5,400
Air Conditioning	NA	20,583	0.17 gpd/sf	3,499
Commercial/Office[1]				
Domestic	NA	919,175	0.10 gpd/sf	91,918
Air Conditioning	NA	919,175	0.17 gpd/sf	156,260
Retail				
Domestic	NA	125,583	0.24 gpd/sf	30,140
Air Conditioning	NA	125,583	0.17 gpd/sf	21,349
Hotel				
Domestic	1,126 (rooms)	NA	120 gpd/room/occupant[3]	270,240
Air Conditioning	NA	739,170	0.17 gpd/sf	125,659
TOTAL	NA	1,804,512	NA	**704,465**

Notes:
1. Projected Development Site 18 currently contains 16 live/work units. The calculations conservatively consider both 16 dwelling units and 65,756 sf in commercial space for domestic uses; for air conditioning use, this space is included in only the commercial calculations.
2. A Community Board 2 average household size of 1.84 persons was applied.
3. Assumes 2 occupants/hotel room.

Source: Rates from the *CEQR Technical Manual.*

SANITARY SEWAGE

The development that would occur in the No-Action condition would generate 397,698 gpd of sanitary sewage. Overall, the amount of sewage produced is approximately 0.17 percent of the average daily load of 233 mgd at the Newtown Creek WWTP.

Two projects, a large-scale development project and a rezoning, outside the Rezoning Area are within the CSO outfall NC-075 and NC-076 catchment areas—one, the North Tribeca rezoning, is a recently-approved rezoning and the other, New York University (NYU) Core expansion plan, is currently in the planning stages. These projects were identified to analyze the cumulative impacts of notable additional sanitary flows to the CSO outfall NC-075 and NC-076 drainage areas. The North Tribeca rezoning area is partially located within the NC-075 catchment area. The development that was projected to occur as a result of the North Tribeca rezoning consists of 693 dwelling units and additional retail space. The total increase in sanitary sewage as a result of the North Tribeca projected development is anticipated to be 128,822 gpd. Because the precise locations of actual future development in this area is unknown, it is conservatively estimated that all sanitary sewage is conveyed to the NC-075 catchment area. The proposed NYU Core project is also located within the catchment area of CSO outfalls NC-075 and NC-076. This project includes proposed development within the NYU campus, bounded by West 3rd Street, West Houston Street, LaGuardia Place and Mercer Street. By 2031, a total of 2.5 million sf of residential, office and retail space is proposed to be developed. The estimated incremental

sewage generated as a result of the NYU Core project is 357,576 gpd. The cumulative increase in flow as a result of both projects is 486,398 gpd, which is approximately 0.21 percent of the 233 mgd average daily flow to Newtown Creek WWTP.

STORMWATER

The anticipated development in the No-Action condition would result in an increase in stormwater runoff over the existing condition because it is expected that some of the existing vacant land would be developed, resulting in an increase in impervious surfaces.

E. THE FUTURE WITH THE PROPOSED ACTION

WATER SUPPLY

As discussed in Chapter 1, it is anticipated that new development occurring on the projected development sites, under RWCDS 2, would consist of 3,006 residential units, 773 dormitory beds, 676,748 sf of commercial/office space, a 75,000-gsf school, and 224,669 sf of retail space. Compared with the No-Action condition, this represents a net increase of 2,977 residential units, 773 dormitory beds, a 75,000-sf school and 99,086 sf of retail space and a net reduction of 242,427 sf of commercial/office space (when considering dormitory space as residential space) and 1,126 hotel rooms. **Table 10-4** summarizes the water consumption of the anticipated development on the projected development sites.

Table 10-4
With-Action Condition Water Consumption

Use	Unit	Size (Square feet)	Rate	Consumption (gallons per day)
Residential				
Domestic	6,304 (people)[1]	NA	100 gpd/person	630,400
Air Conditioning	NA	2,830,653[2]	0.17 gpd/sf	481,211
Commercial/Office				
Domestic	NA	676,748	0.10 gpd/sf	67,675
Air Conditioning	NA	676,748	0.17 gpd/sf	115,047
Retail				
Domestic	NA	224,669	0.24 gpd/sf	53,921
Air Conditioning	NA	224,669	0.17 gpd/sf	38,194
School				
Domestic	444 (seats)	NA	10 gpd/seat	4,440
Air Conditioning	NA	75,000	0.17 gpd/sf	12,750
TOTAL	NA	**3,807,070**	NA	**1,403,638**

Notes:
1. Community Board 2 rate of 1.84 residents per dwelling unit was applied. A total of 254,896 sf of space is assumed to be used for dormitories for the purpose of this analysis. The number of dormitory residents was calculated by assuming 1 dormitory bed per 330 gsf of dormitory space.
2. Dormitory space is included only as a residential use.

Source: Rates from the *CEQR Technical Manual.*

As mentioned above, the city water system distributes approximately 1.1 bgd to users. The Proposed Action would create a demand of 1,403,638 gpd, which is approximately 0.13 percent of the city's daily demand. When compared with the No-Action condition, the Proposed Action would result in an incremental increase of 699,173 gpd in water demand. The incremental increase in water demand represents 0.06 percent of the 1.1 bgd delivered to users. As a result,

the Proposed Action is not anticipated to result in a significant adverse impact on the city's water supply.

SANITARY SEWAGE

Sanitary sewage flows from the projected development sites would be approximately 756,436 gpd, a net incremental increase of approximately 358,738 gpd when compared to flows projected in the No-Action condition. This increment of 358,738 gpd represents about 0.15 percent of the average daily flow of 233 mgd to the Newtown Creek WWTP and about 0.12 percent of its SPDES-permitted flow of 310 mgd. This increase is not expected to adversely impact the Newtown Creek WWTP nor cause it to exceed its design capacity or SPDES permit flow limit; therefore, the With-Action condition is not anticipated to result in any significant adverse impacts on the city's wastewater conveyance and treatment infrastructure.

As discussed in the No-Action condition, two other projects were identified to analyze the cumulative impacts of other large-scale projects located within the same CSO outfall drainage areas as the proposed Rezoning Area. NYU Core and the North Tribeca Rezoning would be expected to result in a cumulative increase in sanitary flow of 486,398 gpd, approximately 0.21 percent of the 233 mgd average daily flow to Newtown Creek WWTP.

STORMWATER

Since the development program for each of the projected development sites is conceptual, for analysis purposes, it is conservatively assumed that each site would contain up to 100 percent building coverage. The weighted runoff coefficient for the projected development sites within catchment area NC-075 increases from 0.78 in the existing condition to 1.0 in the With-Action condition. Similarly, the weighted runoff coefficient for the projected development sites within the catchment area of CSO outfall NC-076 increases from 0.98 in the existing condition to 1.0 in the With-Action condition and within the catchment area of CSO outfall NC-080 it increases from 0.85 in the existing condition to 1.0 in the With-Action condition. The primary reason the weighted runoff coefficients increase is because the currently vacant, unpaved lots (Sites 1, 5, 14 and 17) would become impermeable area (building roofs) in the With-Action condition.

To calculate the change in wastewater volumes, the DEP Volume Calculation Matrix was completed for the existing and With-Action conditions. The amount of stormwater and sanitary flows conveyed to the catchment area of CSO Outfalls NC-075, NC-076 and NC-080 were converted to volumes for different rainfall events generated on the projected development sites and discharged to the related catchment area. The summary table, taken from the DEP Volume Calculation Matrix, is provided below in **Table 10-5.**

The calculations from the Volume Calculation Matrix help to determine the change in wastewater volumes to the combined sewer system from existing conditions to the With-Action condition. The overall increase in combined sewer discharge from the projected development sites during rainfall events ranges from approximately 2 to 2.75 times the existing volume. The Volume Matrix calculations do not, however, assume any on-site detention or other BMPs that would be used to control peak storm discharges.

Table 10-5
DEP Volume Calculation Matrix:
Existing and With-Action Conditions Volume Comparison

Rainfall Volume (in.)	Rainfall Duration (hr.)	Runoff Volume Direct Drainage (MG)	Runoff Volume To CSS (MG)	Sanitary Volume To CSS (MG)	Total Volume To CSS (MG)	Runoff Volume To River (MG)	Runoff Volume To CSS (MG)	Sanitary Volume To CSS (MG)	Total Volume To CSS (MG)	Increased Total Volume to CSS (MG)	Percent Increase From Existing Conditions (%)
NC-075		Existing				Build				**NC-075 Increment**	
		206,975 sf / 4.75 Acres				206,975 sf / 4.75 Acres					
0.00	3.80	0.00	0.00	0.01	0.01	0.00	0.00	0.07	0.07	0.06	*
0.40	3.80	0.00	0.04	0.01	0.05	0.00	0.05	0.07	0.13	0.07	140
1.20	11.30	0.00	0.12	0.04	0.16	0.00	0.15	0.22	0.37	0.22	139
2.50	19.50	0.00	0.25	0.06	0.31	0.00	0.32	0.38	0.70	0.39	124
NC-076		Existing				Build				**NC-076 Increment**	
		15,148 sf /0.35 Acres				15,148 sf /0.35 Acres					
0.00	3.80	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	*
0.40	3.80	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	174
1.20	11.30	0.00	0.01	0.00	0.01	0.00	0.01	0.02	0.03	0.02	173
2.50	19.50	0.00	0.02	0.00	0.03	0.00	0.02	0.04	0.06	0.04	146
NC-080		Existing				Build				**NC-080 Increment**	
		96,118 sf / 2.21 Acres				96,118 sf / 2.21 Acres					
0.00	3.80	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.04	0.03	*
0.40	3.80	0.00	0.02	0.00	0.02	0.00	0.02	0.04	0.06	0.04	154
1.20	11.30	0.00	0.06	0.01	0.07	0.00	0.07	0.11	0.19	0.11	153
2.50	19.50	0.00	0.13	0.02	0.15	0.00	0.15	0.20	0.35	0.20	133

Notes:
*Percent increase computed for rainfall events only.
CSS = Combined Sewer System; MG = Million Gallons

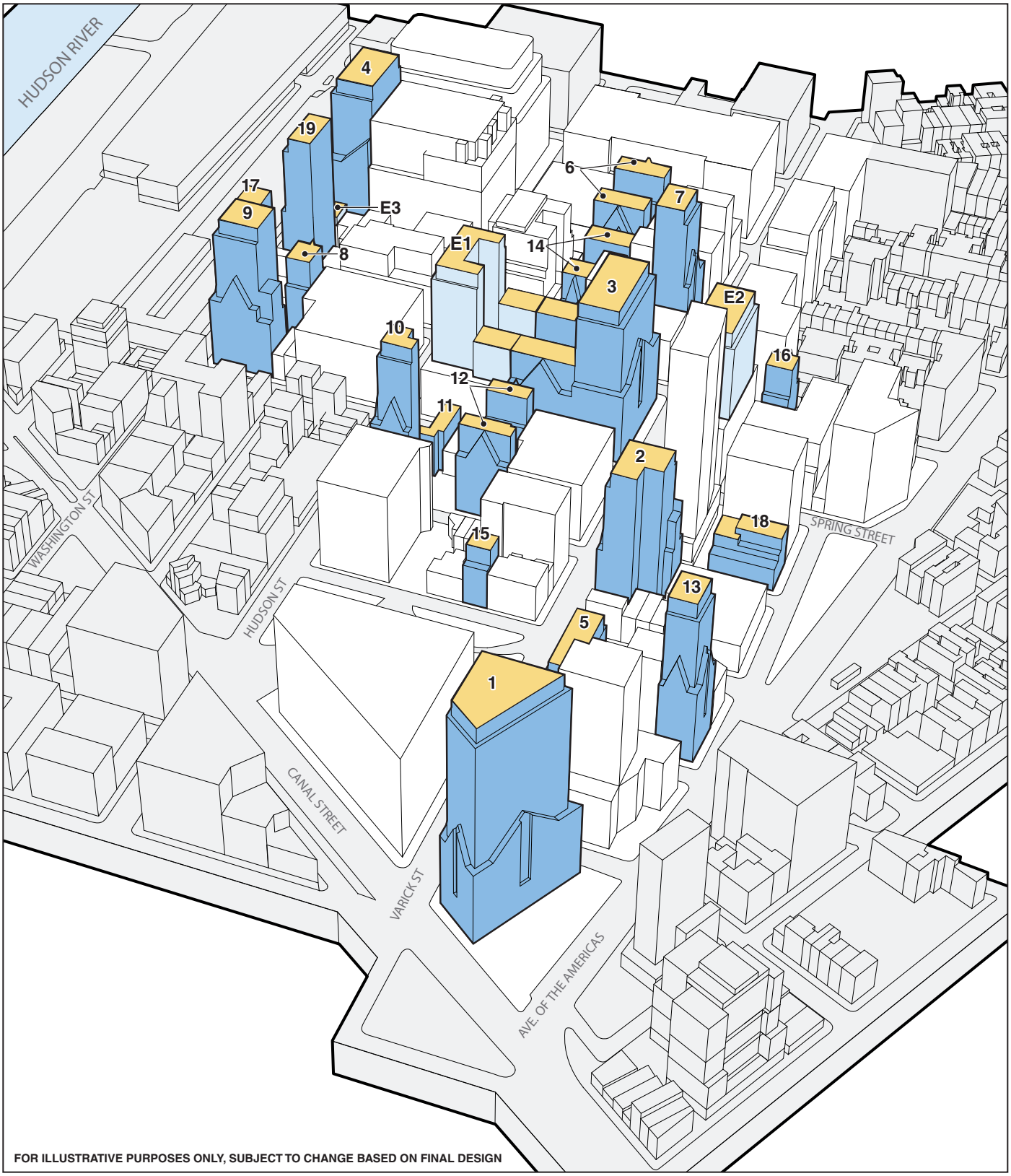
The increased combined sewer volumes generated within the affected CSO catchment areas are a result of the increased sanitary flows associated with the anticipated development from the Proposed Action. The implementation of low-flow fixtures, as per the New York City Plumbing Code, Local Law 33 of 2007 would help to control sanitary flows. To further offset these increases, onsite stormwater source controls or BMPs would be implemented on projected development sites to retain or slowly release stormwater runoff with controlled discharge rates to the city's combined sewer system. The incorporation of selected BMPs will be required for future development in the Rezoning Area, as a part of the DEP site connection application process for new buildings. Applicable BMPs are identified in the BMP Concept Plan described below.

STORMWATER BMP CONCEPT PLAN

A Stormwater BMP Concept Plan has been developed to illustrate opportunities for future development within the Rezoning Area to incorporate onsite stormwater source controls. Refer to **Figure 10-1** for the Stormwater Best Management Practice Concept Plan showing potential onsite stormwater source controls. This BMP Concept Plan would be implemented, in coordination with DEP, by identifying potential BMPs for use on the applicant-owned sites to reduce the overall volume and rate of stormwater runoff into the combined sewer system.

DEP has amended Chapter 31 of Title 15 of the Rules of the City of New York (RCNY), the existing rules governing house and site connections to the city's sewer system. The rule amendment modifies the flow rate of stormwater to the city's combined sewer system for new

8.13.12



Area for Potential Roof Detention

Projected Development

Projected Enlargement

1 *Development Site Number*

E1 *Enlargement Site Number*

NOTES:

1. Sites with subsurface areas (basements/underground parking) have the potential for tanks within subsurface areas of the building. Sites with no subsurface areas have the potential for subsurface detention beneath the building.

2. Non-applicant owned properties would be subject to DEP regulations at the time of the site connection application.

Stormwater Best Management Practices Concept Plan

Figure 10-1

HUDSON SQUARE REZONING

and existing development, as part of sewer availability and connection approvals, and applies to development lots where new buildings or alterations of existing buildings that would result in an expansion of building footprint or impervious surfaces are proposed. The rule was promulgated on January 4, 2012 and goes into effect on July 4, 2012. For a new development, the Stormwater Release Rate will be the greater of 0.25 cubic feet per second (cfs) or 10 percent of the Allowable Flow, unless the Allowable Flow is less than 0.25 cfs, in which case the Stormwater Release Rate shall be the Allowable Flow. For alterations, the Stormwater Release Rate for the altered area will be directly proportional to the ratio of the altered area to the total site area and no new points of discharge are permitted.

Therefore, any developments or alterations under the proposed rezoning requiring a connection to the sewer system beginning July 4, 2012 would be required to achieve the new flow rate. Flexibility in achieving this rate is provided to the development community through a variety of approvable systems including subsurface and rooftop systems.

Joint DEP and New York City Department of Buildings (DOB) guidelines (http://www.nyc.gov/html/dep/html/stormwater/stormwater_management_construction.shtml) are available to ensure the proper design and construction of approvable systems and encourage design professionals to include onsite source controls in the early stages of site planning and building design. This performance standard allows for a wide range of management techniques, costs and space considerations.

The typical BMP measures described below would help future development in the Rezoning Area comply with the modified rules described above governing house and site connections to the city's sewer system and avoid exacerbation of existing CSOs discharged to the Hudson River. BMPs suitable for the type of development permitted in the Special Hudson Square District include:

- On-site detention facilities (roof detention, underground storage tanks or tanks within the buildings);
- Green roofs and blue roofs,
- Subsurface detention,
- Porous pavement,
- Enhanced tree pits,
- Rain gardens/barrels, and
- Infiltration swales.

Stormwater management in the proposed Rezoning Area would be implemented through the use of BMPs including on-site detention facilities (roof detention, underground storage tanks or tanks within the buildings) or other stormwater source controls, which would be required as a part of the DEP site connection approval process.

Green and blue roofs would be suitable for retaining or releasing stormwater with slowed discharge rates to control peak run-off rates. On-site detention would be used to store water for gradual release during rain events, freeing up capacity in combined sewers. BMPs that would reduce sanitary sewage volumes such as gray water reuse and low-flow fixtures could also be implemented.

In addition, onsite rain gardens, infiltration swales and stormwater detention may be included in site design. Subsurface vaults/tanks, stone beds, stormwater chambers, and perforated pipes

would allow stormwater to seep into the ground, where site conditions allow, and would store water for gradual release during rain events, freeing up capacity in combined sewers. Walkways, courtyards and other paved areas onsite could be constructed with permeable concrete or porous asphalt to allow for infiltration, which would decrease the overall volume of stormwater runoff.

For applicant-owned properties, once there is a specific development plan and site characteristics are better defined for a particular site, BMP selection and design could take place in coordination with DEP. Non-applicant owned properties would be subject to DEP regulations at the time of the site connection application. With the incorporation of BMPs outlined in the BMP Concept Plan, the overall volume of sanitary sewage and stormwater runoff and the peak stormwater runoff rate from the projected development sites would be reduced. In conclusion, with the implementation of water efficient fixtures and stormwater BMPs, the Proposed Action would not result in any significant adverse impacts to the city's stormwater conveyance infrastructure. ✷