FINAL SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT FOR THE CROTON WATER TREATMENT PLANT AT THE HARLEM RIVER SITE

7.15. WATER RESOURCES

7.15.1. Introduction

This section discusses the existing and potential impacts of the proposed plant on the existing surface water, stormwater runoff, and groundwater resources in the vicinity of the Harlem River Site. The methodology used to prepare this analysis is presented in Section 4.15, Data Collection and Impact Methodologies, Water Resources.

7.15.2. Baseline Conditions

7.15.2.1. Existing Conditions

7.15.2.1.1. Surface Water

The only surface water, which could be affected by alteration in hydrological conditions at the proposed project site, is the Harlem River. The Harlem River is located along the western boundary of the water treatment plant site. It is a navigable tidal channel, eight miles long, in New York City, separating Manhattan from the Bronx and connecting the Hudson and East Rivers. There is a cove of approximately 1.3 acres (previously used as a barge docking bay) located on the water treatment plant site at the landing of the unbuilt Landing Road.

In the vicinity of the water treatment plant site, no freshwater wetlands were depicted on the U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) map or the NYS Department of Environmental Conservation (NYSDEC) Freshwater Wetlands map for the study area surrounding the Harlem River Site. In addition to the 1.3-acre cove, tidal wetlands along the shoreline (1.5 acres in size) in the Harlem River are present (Section 7.14, Natural Resources).

The Harlem River is classified by New York State Department of Environmental Conservation (NYSDEC) as a Class I saline surface water, indicating that the NYSDEC has determined that its best use is for secondary contact recreation and fishing. These waters shall be suitable for fish propagation and survival. NYSDEC water quality standards for Class I saline surface waters are presented in Table 7.15-1. Figure 7.15-1 shows the location of the monitoring stations on the Harlem River. The water quality data collected from the Harlem River are typical of surface water receiving urban runoff. The dissolved oxygen and pH measurements are adequate to support aquatic life. However, the Secchi disk (i.e., a disk lowered in to the water to measure transparency) and total suspended solids indicate that that the River is turbid. High levels of phosphorus and nitrogen indicate potential nutrient enrichment. This is supported by the presence of fecal coliform and high concentrations of suspended solids in all samples. Table 7.15-2 contains the water quality parameters from five monitoring stations during 1999 to 2001.[1] Although none of the numeric water quality standards for a Class I saline surface water were exceeded, these results indicate that the Harlem River receives substantial loading of pollutants from urban runoff. Typically, urban runoff would include stormwater runoff and combined sewage overflow. A combined sewer overflow (CSO) chamber and outfall is located in the cove,

[1] NYCDEP Marine Science Section, September 2002.

near Landing Road on the water treatment plant site. Another CSO outfall is located north of the cove at the northern end of the proposed water treatment plant footprint.

TABLE 7.15-1. NYSDEC WATER QUALITY STANDARDS (6 NYCRR PART 700-706) FOR A CLASS I SALINE SURFACE WATER

Parameter	Units	Standard
Temperature	°C	N/A
Dissolved Oxygen	mg/L	> 4.0 mg/L
DO Saturation	%	N/A
BOD_5	mg/L	
Fecal Coliform	cfu/100 mL	< 200 cfu/100 mL
Nitrate-Nitrogen	mg/L	None in amounts that will result in growths of algae, weeds and slimes that will impair the waters for their best usages.
Oil & Grease	mg/L	No residue attributable to sewage, industrial wastes or other wastes, nor visible oil film nor globules of grease.
pH		6.5 < pH < 8.5
Total Dissolved Solids	mg/L	< 500 mg/L
Total Phosphorous	mg/L	None in amounts that will result in growths of algae, weeds and slimes that will impair the waters for their best usages.
Total Suspended Solids	mg/L	None from sewage, industrial wastes or other wastes that will cause deposition or impair the waters for their best usages.
Turbidity	NTU	No increase that will cause a substantial visible contrast to natural conditions.

Not To Scale

Harlem River Site
Water Resource Monitoring Sites

Croton Water Treatment Plant

Figure 7.15-1

TABLE 7.15-2. WATER QUALITY DATA COLLECTED FROM THE HARLEM RIVER 1998-2001

Site	Year[1]	No.[2]	Depth (feet)	DO Top (mg/l)	DO Bottom (mg/l)	Secchi (feet)	pH Top	pH Bottom	FCOL Top (no./ 100 ml)	FCOL Bottom (no./ 100 ml)	TSS Top (mg/l)	TSS Bottom (mg/l)	CHL a (ug/l) Top	NH_4 (mg/l) Top	NO_3/ NO_2 (mg/l) Top	TKN (mg/l) Top	TP (mg/l) Top	SiO_2 (mg/l) Top	SiO_2 (mg/l) Bottom
HI	1998	14	27.67	7.28	6.48	3.2	7.41	7.42	24	17	14.00	26.67	7.36	0.20	0.48	0.92	0.20	2.50	3.58
	1999	13	26.69	7.62	7.04	2.2	7.35	7.28	69	52	32.55	45.50	9.01	0.22	0.47	1.03	0.18	2.21	
	2000	13	23.20	7.09	6.72	2.2	7.26	7.16	238		32.16	55.20	3.04	0.19	0.55	0.69	0.15	3.30	
H2	1998	14	23.12	6.99	6.62	2.2	7.47	7.48	114	138	23.37	22.40	6.42	0.19	0.48	0.94	0.20	2.42	3.23
	1999	12	23.62	7.09	6.57	2.9	7.28	7.29	62	65	24.72	26.90	9.21	0.24	0.50	0.97	0.17	2.20	
	2000	1	20.00	6.35		2.5	7.46		12				0.80	0.38	0.53	0.95	0.12	3.77	
H3	1998	15	23.12	6.47	6.33	2.7	7.44	7.46	99	90	19.29	18.60	4.60	0.27	0.44	0.96	0.20	1.96	2.68
	1999	12	21.93	7.19	7.15	3.4	7.29	7.31	74	71	30.62	25.53	7.59	0.29	0.45	1.03	0.18	1.94	
	2000	13	22.14	5.93	5.92	3.3	7.09	7.07	527		20.32	23.42	1.44	0.28	0.51	0.78	0.17	2.71	
	2001	12	21.62	5.46	5.39	4.1	7.42	7.53	599		12.34	11.81	2.38	0.36	0.50	1.02	0.18	1.58	
H4	1998	14	20.06	5.79	5.61	3.9	7.41	7.42	230	295	15.60	17.00	3.38	0.34	0.43	1.06	0.18	1.62	1.93
	1999	13	21.73	6.21	6.04	3.6	7.19	7.23	530	209	9.70	16.59	3.69	0.33	0.44	1.07	0.18	1.61	
	2000	2	21.00	7.70	7.27	2.3	7.22	7.23	243		19.60	23.30	1.17	0.24	0.46	0.65	0.10	2.70	
H5	1998	14	20.75	5.69	5.64	4.4	7.37	7.43	175	163	13.23	14.80	4.52	0.38	0.41	1.11	0.18	1.58	1.57
	1999	13	22.21	5.78	5.54	4.5	7.16	7.16	124	126	10.55	13.64	3.62	0.38	0.42	1.07	0.27	1.57	
	2000	2	21.50	7.36	6.91	2.5	7.19	7.19	191		13.60	15.00	1.08	0.30	0.44	0.71	0.10	2.45	

Notes:

DO = Dissolved Oxygen
FCOL = Fecal Coliform
TSS = Total Suspended Solids
CHL a = Chlorophyll A
NH_4 = Ammonium Nitrogen
NO_3/NO_2 = Combined Nitrate and Nitrite
TKN = Total Kjeldahl Nitrogen
TP = Total Phosphorus
SIO_2 = Silicon Dioxide

[1] Water quality measurements were collected during early spring to late fall.

[2] Average number of samples collected for each water quality parameter each year from early Spring - late Fall.

7.15.2.1.2. Stormwater Runoff

Modeling Description. Existing stormwater runoff at the water treatment plant site was simulated using HydroCAD® Version 7 stormwater modeling software.[2] The model provides hydrograph generation and routing based on the Soil Conservation Service (SCS, now known as Natural Resources Conservation Service) TR-20 procedures.

The location of the water treatment plant site allowed for an assumption that there is no off-site contributing watershed. This is because drainage conveyances along the Major Deegan Expressway and Fordham Road block water from upland sources from flowing over land to the water treatment plant site. Conservative assumptions of soil type were also made based on the subsurface investigation of the area. Infiltration and runoff rates were calculated using runoff curve numbers for each soil type and cover type, as provided in the Soil Conservation Service Technical Release 55 (SCS TR-55).

The basin draining the water treatment plant site under existing conditions was delineated based on 2001 topographic survey data identifying spot elevations on the water treatment plant site. The spot elevations were first converted into a digital elevation model, and then a Geographical Information System (GIS) was used to delineate drainage areas and to determine slopes and hydraulic lengths (i.e. the longest distance stormwater runoff would travel in each basin). In addition to the overall area of each basin, the area of various cover types in each basin was determined with GIS in order to facilitate an assessment of infiltration and runoff rates for each cover type. For the existing conditions model, the acreages of wetland, wooded, grass, brush, and impervious areas were approximated using the GIS database.

Soils are classified into hydrologic soil groups (HSGs) to indicate the minimum rate of infiltration obtained for bare soils after prolonged wetting. The HSGs, which are A, B, C, and D, are one element used in determining runoff curve numbers (CN). The results of the subsurface investigation, completed at the water treatment plant site in June 2002, indicated that the first layer of soil was fill material. The fill materials (approximately the top 20 feet on average) consisted of brown medium-dense silty-fine sand with few angular and fragment gravels. The soil classification was SM or gravel soil, corresponding to a Type D hydrologic soil group. Soils in this group have high runoff potential, and exhibit very low infiltration rates when thoroughly wetted. They consist chiefly of clay soils with a permanent high water table. These soils have a very low rate of water transmission (0-0.05 in/hr).[3]

Existing stormwater conditions were simulated for six different design storms using the HydroCAD® model. A Type III 24-hour storm was used to model these storm events, since this is the most common type of storm in New York City and is typical of eastern coastal areas of the U.S., where large 24-hour rain events are typically associated with tropical storms. The modeled

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[2] Applied Microcomputer Systems (AMS, 2001). HydroCAD Stormwater Modeling System. Owners Manual, Version 7. Chocorua, New Hampshire.

[3] AMS, 2001.

24-hour design storms included the 2-year (3.5-inches), 5-year 4.5-inches), 10-year (5.1 inches), and 100-year (8.1-inches).[4]

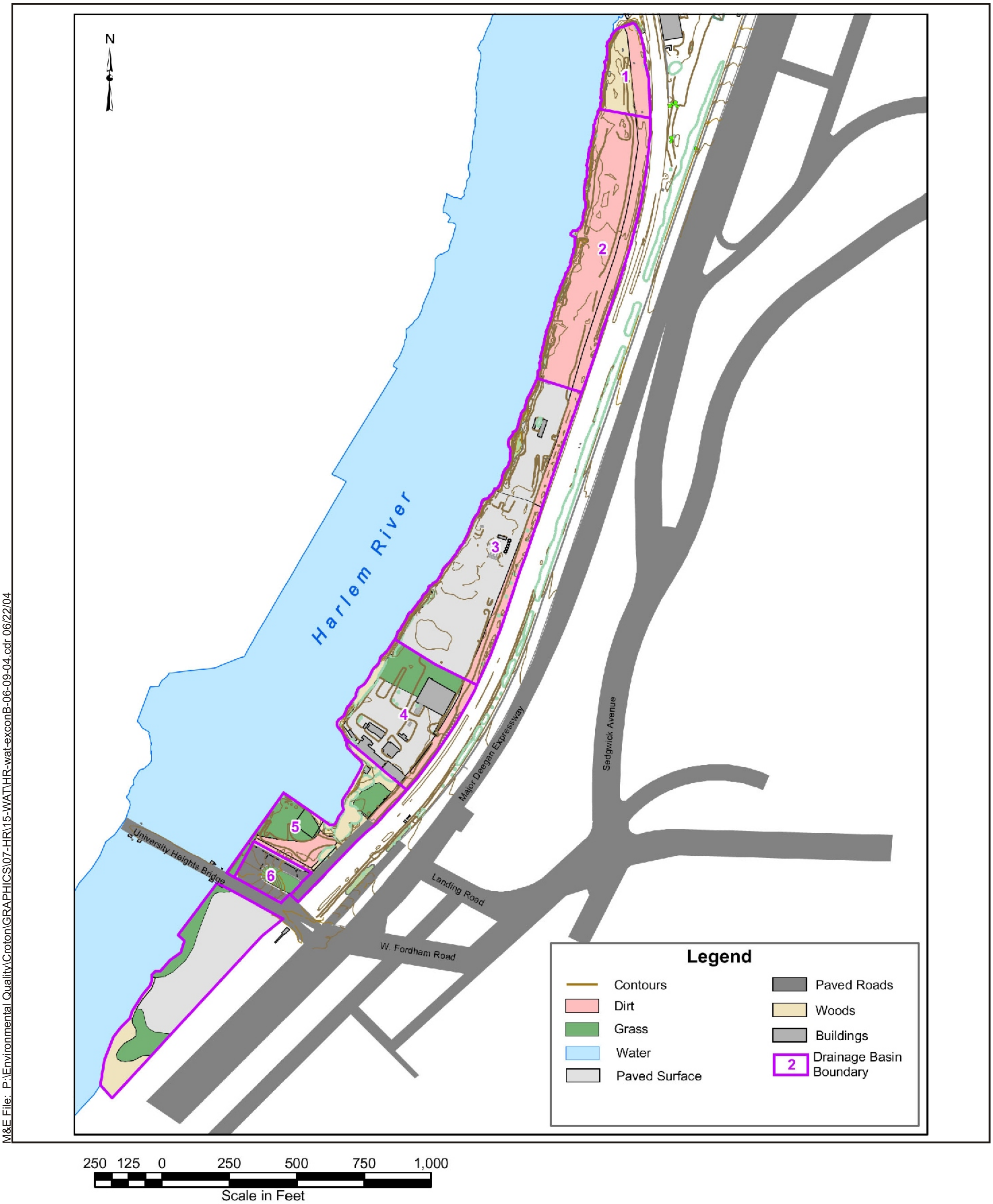
The selected design storms reflect a variety of conditions that may affect natural resources and urban development in the vicinity of the water treatment plant site. For each of the modeled storms, existing peak flows and 24-hour runoff volumes were estimated. Assessment of peak flow rates is important because an increase in peak flows could result in erosion along drainage paths in both upland and riverbank wetland areas. The 2-year and 5-year storms were simulated to determine the existing peak flows and 24-hour runoff volumes under these conditions, which are parameters relevant to both lowland and upland resource areas draining from the water treatment plant site. The 5-year design storm is also the standard design storm used by the NYCDEP to size infrastructure needed to dissipate peak flows and maintain existing 24-hour runoff volumes. The 10-year storm was analyzed for potential water resource impacts because this storm is anticipated to have a greater influence on the natural resources adjacent to the site. In order to comply with SPDES requirements, the modeling effort also included an assessment of the 100-year storm and the potential for downstream flooding.

For the purposes of this analysis, changes in stormwater flows were considered significant if the operation of the proposed plant resulted in an increase in peak runoff rates or runoff volume of stormwater to the Harlem River, in comparison to the existing conditions. Small changes in peak flows or runoff volumes (less than 15 percent) were not considered significant.

Existing Stormwater Runoff. The watershed draining the water treatment plant site is restricted to the site boundary and Exterior Street (Figure 7.15-2). The drainage conveyances along the Major Deegan Expressway prevent overland flows into the site's watershed. The water treatment plant site is narrow in the east-west direction with a maximum width of approximately 400 feet, and it is elongated in the north-south direction. Under existing conditions, the water treatment plant site was divided into six basins based primarily on the conditions of ground cover. The input parameters used to simulate existing stormwater flows in the basins are summarized in Table 7.15-3.

In the vicinity of the water treatment plant site, ground cover consisted of gravel and dirt roads, clusters of trees, and weed-grass fields. Paved areas were generally in poor condition with cracks and open dirt patches. However, the water treatment plant site access ramp road surface is composed of concrete pavement in good condition. Fair ground cover conditions (herbaceous layer 35 percent) were identified for both weed-grass fields (shrubs 10 percent) and the clusters of trees (15 percent). The site contains 40 percent paved areas. At the water treatment plant site, the topsoil layer is fill material of dense silty fine sand with angular fragment gravels. In general, this fill has low infiltration and high runoff rates.

[4] This rainfall data is from the U.S. Weather Bureau. 1961. Technical Paper No. 40-Rainfall Frequency Atlas of the United States (TP 40)



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Existing Stormwater Drainage Basins
Harlem River Site

Croton Water Treatment Plant

Figure 7.15-2

TABLE 7.15-3. BASIN CHARACTERISTICS FOR HARLEM RIVER SITE

Basin	Grass/Weeds (Fair, D)[1]		Industrial Paved		Wooded		Building/Paved		Dirt/Gravel		Composite		
	Area (acres)	CN	Area (acres)	CN	Area (acres)	CN	Area (acres)	CN	Area (acres)	CN	Total Area (acres)	CN	Tc (min)
1	-	-	-	-	0.70	70	-	-	0.44	90	1.14	78	3.4
2	-	-	-	-	-	-	-	-	4.84	90	4.84	90	2.8
3	-	-	5.0	93	0.11	70	-	-	1.05	90	6.16	92	3.3
4	0.72	77	2.21	93	0.23	70	-		0.43	90	3.59	88	4.8
5	0.91	77	-	-	0.79	70	-		0.93	90	2.63	79	5.8
6	0.19	77	-	-	-	-	0.58	98	-	-	0.77	93	1.8

CN = Curve Number, a factor describing the surface permeability; higher numbers are assigned to areas of lower permeability.
Tc = Time of Concentration, the time in minutes required for a particle of water to flow from the most hydrologically remote point in the watershed to the receiving area
1.) Weeds/Grass (Fair D) = grass cover 50% to 75% and CN of 77

Visual inspections revealed that there was no subsurface drainage at the water treatment plant site. Figure 7.15-2 shows the basin delineation and ground cover type. Basins 1 to 6 are located north of the University Heights Bridge. Basin 6 is the site access ramp and was delineated as a separate sub-basin. All sub-basins discharge directly into the Harlem River as surface runoff, except for Basin 6, which contains a 12-inch stormwater drain that collects stormwater and discharges to the Harlem River through an outfall just south of the water treatment plant site. However, a quantity of stormwater surface runoff from Basin 6 discharges to the foot of the off-ramp, which is part of Basin 5. The stormwater eventually drains toward the Harlem River from a depression that often forms after storm events at the foot of the off-ramp. Although retention of the stormwater runoff from Basin 6 does occur, the model assumed that Basin 6 discharges directly to the Harlem River as surface runoff with no retention period. The input parameters used to simulate existing stormwater flows in the basins are presented in Appendix G

Table 7.15-4 summarizes the peak runoff rate, total runoff rate, and total runoff volume for each basin for the 2-year, 5-year, and 10-year storm events under existing conditions. The model indicates that the Harlem River receives stormwater runoff almost instantaneously from the water treatment plant site. Total runoff volume into the Harlem River is predicted to be approximately 6.1 acre-feet for a 10-year storm. This result is most likely due to the fact that the water treatment plant site is mostly covered with surfaces consisting of fill and pavement, which generally prevent the infiltration of stormwater. Also, the short time of concentration (T_c) resulting from the short hydraulic length in the east-west direction toward the Harlem River may prevent the amount of detention time required for stormwater to infiltrate the fill materials.

According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM), the Harlem River Site is located predominantly within Zone B (areas between limits of the 100-year flood and the 500-year flood). Limited portions of the Harlem River Site, immediately adjacent to the Harlem River, are located within Zone A5 (areas of the 100 year flood). The Harlem River 500-year still water flood level is at elevation 11.7 feet MSL (at the University Heights Bridge). The water treatment plant site's existing grade is approximately 10 to 13 feet, sloping toward the Harlem River.

TABLE 7.15-4. EXISTING RUNOFF CHARACTERISTICS IN 2-YEAR, 5-YEAR, AND 10-YEAR STORM EVENTS

Basin	2-Year Storm		5-Year Storm		10-Year Storm	
	Peak Runoff Rate (cfs)	Runoff Volume (acre-ft)	Peak Runoff Rate (cfs)	Runoff Volume (acre-ft)	Peak Runoff Rate (cfs)	Runoff Volume (acre-ft)
1	2.09	0.14	3.22	0.22	3.93	0.27
2	14.70	0.99	20.11	1.37	23.35	1.60
3	19.39	1.35	26.14	1.85	30.13	2.15
4	9.72	0.68	13.53	0.96	15.82	1.13
5	4.74	0.34	7.26	0.52	8.83	0.63
6	2.66	0.18	3.55	0.24	4.08	0.28
Total Peak Discharge [1]	51.96		71.85		81.83	
Total Runoff Volume [2]		3.68		5.15		6.05

Notes:
1. The total peak runoff rate is the peak inflow into a virtual pond (pond 1 in the model) that represents the Harlem River. The peak inflow indicates the peak of the combined runoff rates from all basins. It is not the sum of the peak runoff rates from all the sub-basins because individual basins would have peak flows at different times.
2. The runoff volume is the sum of the runoff from all basins combined.

7.15.2.1.3. Groundwater

The groundwater beneath the site originates either as precipitation that falls and infiltrates directly on the site and infiltrates as inflowing groundwater from topographically higher terrain to the east of the site. Infiltration from the adjacent Harlem River sets the low level of the range in normal groundwater elevations. It can also add to higher groundwater elevations during extremely high tides.

Geology. At the turn of the 20th century, much of what is now the site was beneath the eastern edge of the Harlem River covered by shallow water and organic mud deposits. Fill was subsequently placed on the river deposits to create land; as a result, the surficial materials at the site consist entirely of fill. In 2002, about 100 borings were drilled at the site and in the Harlem River adjacent to the site to determine subsurface conditions. The surficial layer of fill was found to be underlain by a sequence of strata that includes, in descending order, organic silts, clays, and peat of the river deposits; post-glacial and glacial alluvial sands; varved sands, silts, and clays; glacial till; weathered or decomposed rock; and bedrock.

The unconsolidated glacial soils and the post-glacial alluvium that underlie the fill at the site were deposited during and after the last episode of continental glaciation, which concluded about 10,000 years ago in this area. The bedrock that underlies the unconsolidated deposits is metamorphic rock of Cambrian or Ordovician age. Weathering has caused partial disintegration of the bedrock at and near the rock surface, along faults, and at the contact between different rock types. The drilling program revealed that the decomposed rock layer has a thickness of 100 feet or more beneath parts of the site.

The unconsolidated deposits at the site lie on a surface of bedrock or decomposed bedrock that slopes generally west, toward the Harlem River. The bedrock surface is highest, and the unconsolidated deposits are thinnest, beneath the southeastern part of the site. At borings HR-B83-02 and HR-B85-02 (about 750 feet north of the University Heights Bridge), the top of rock is within about 30 feet of the ground surface. In this area, the unconsolidated deposits consist of about 15 feet of silty granular fill, 10 feet of alluvial sands, and 5 feet of till. On the western side of the site in this area, the unconsolidated deposits thicken to 150 feet, consisting of about 20 feet of fill; 10 feet of organic river mud deposits; 25 feet of alluvial and glacial sands; 60 feet of varved silts, clays, and sands; and 35 feet of till.

Near the southern end of the site, the total thickness of the unconsolidated deposits varies from 85 feet on the east side to 125 feet at the River. The till is generally thicker in this area, comprising the lower 45 to 70 feet of the unconsolidated deposits.

In the northern half of the site, the till is generally thinner, typically being about 20 to 30 feet thick or less at many of the borings. Near the northern end of the site, the varved deposits thin, and the thickness of the alluvial and glacial sands increases to about 60 feet.

Two different bedrock formations, the Fordham Gneiss and the Inwood Marble, underlie the site. Competent bedrock was penetrated by many of the borings drilled along the southeastern side of the site, where the bedrock surface is closest to the surface. The bedrock beneath this part of the site was found to be almost exclusively gneiss. Marble was found interspersed with the gneiss in one boring (HR-B96-02) near the east central part of the site; apparently masses of marble occur within the gneiss near the contact of the two rock types.

A layer of decomposed rock was found to overlie the competent bedrock in almost all of the borings drilled at the site. The decomposed rock is typically less than 40 feet thick in the southeast part of the site and is absent where the bedrock surface is at its highest elevation (HR-B83-02 and HR-B85-02).

Competent bedrock was not encountered in the borings drilled beneath the northern part or most of the western side of the site, indicating that the depth to competent rock is greater than the depths (generally about 150 to 200 feet) to which the borings were drilled. As shown on Figure 7.15-3, the elevation of the competent bedrock surface is more than 180 feet below sea level in these parts of the site. Even though competent bedrock was not encountered, decomposed rock was penetrated in most cases. The decomposed rock was found to be at least 100 feet thick at several locations in the northern part and along the western side of the site.

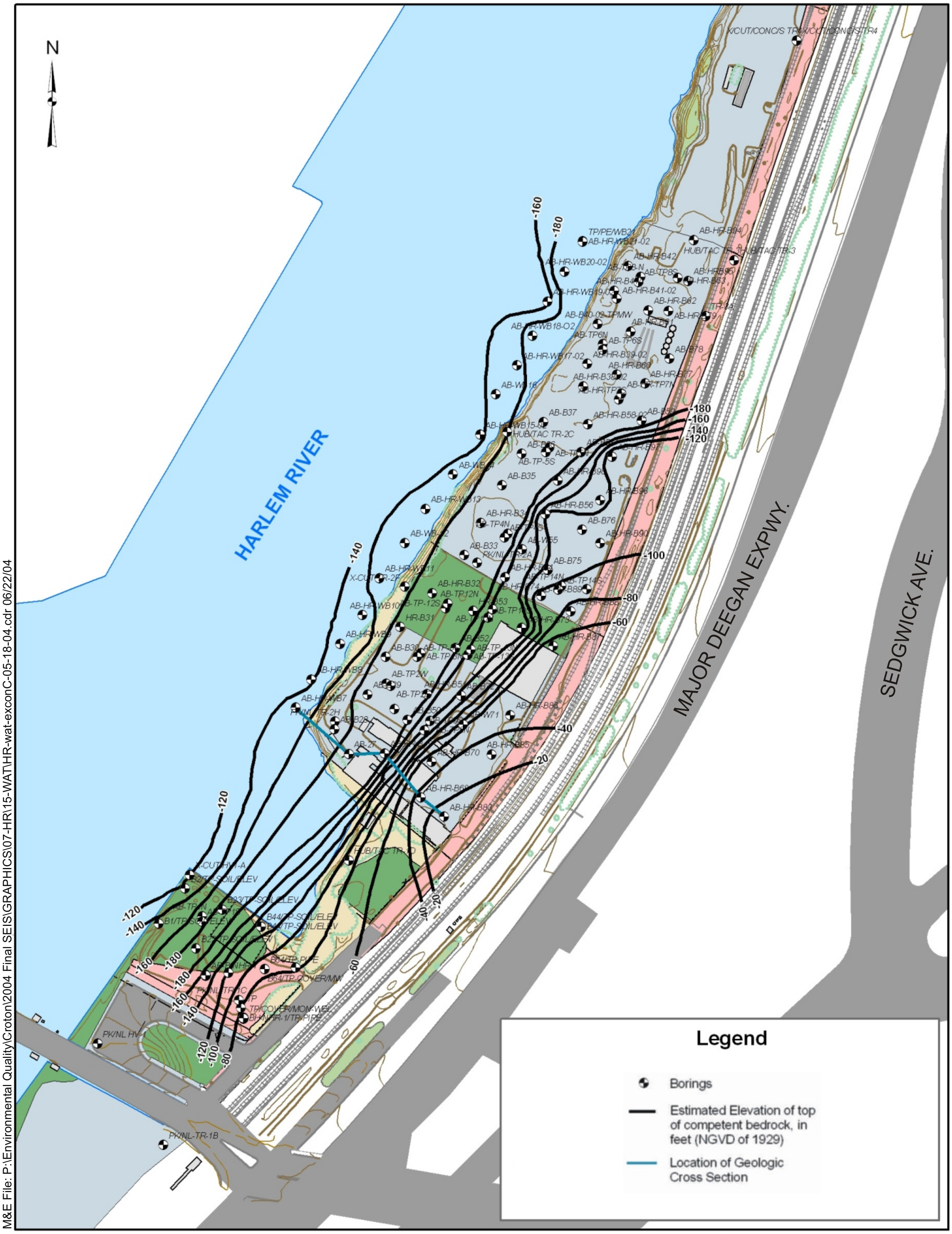
Just west of the site, competent bedrock was encountered in several of a series of borings that were drilled in the Harlem River. The rock encountered in these borings was either gneiss, marble, or a mixture of the two rock types. The interbedding of the rocks is a common feature along their contact. The great thickness of decomposed rock beneath much of the site is probably a result of the presence of the contact between the two rock types.

Groundwater Flow. Ten monitoring wells or piezometers were installed in borings drilled at the water treatment plant site to measure groundwater elevations (Figure 7.15-4). Some of the wells are screened in the shallow fill materials, while others are screened in the deeper unconsolidated deposits.

Due to the presence of the Harlem River directly adjacent to the water treatment plant site, groundwater levels in most of the wells exhibit tidal fluctuations. Water levels in several of the wells were monitored for one-half or one complete tidal cycle to characterize the fluctuations. In three deep (50 to 70 feet) wells (HR-B62-02, HR-B94-02, and HR-B95-02) at the north end of the water treatment plant site, the magnitudes of the groundwater fluctuations were similar to the tidal range in the Harlem River, and the time lags between the river fluctuations and the groundwater fluctuations were small. The groundwater levels in these wells were about 0.3 to 0.5 feet higher than the River at high tide, and about 0.7 to 1 foot higher than the River at low tide.

Conversely, in three shallow (20 to 25 feet) wells (HR-B40-02, HR-B64-02, and HR-B77-02) near the southern and northern ends of the water treatment plant site, the magnitudes of the groundwater fluctuations were about one-third or less of the tidal range in the Harlem River on the day that they were monitored. The time lags between the river fluctuations and the groundwater fluctuations in the shallow wells were as much as two to three hours.

In HR-B77-02, the groundwater level was about 3.5 feet higher than the River at low tide and about 1.3 feet higher than the River at high tide. At HR-B40-02, which is closer to the River than HR-B77-02, the water level was about 1.5 feet higher than the River at low tide, but was about 0.7 feet lower than the River at high tide. The water level in HR-B64-02 did not fluctuate significantly; as a result, while it was about 0.4 feet above the river level at high tide, it was almost four feet above the river level at low tide. Although the groundwater elevations at shallow depths beneath parts of the water treatment plant site are apparently lower than the adjacent Harlem River during the high part of the tidal cycle, on average the groundwater levels are higher than the River. All of the groundwater elevations in both the shallow and deep deposits are higher than the river elevation and indicate flow to the west, toward the River.



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SCALE IN FEET
1 INCH = 250 FEET

Boring Locations and Estimated Elevation of Top of Competent Bedrock Harlem River Site

Figure 7.15-3

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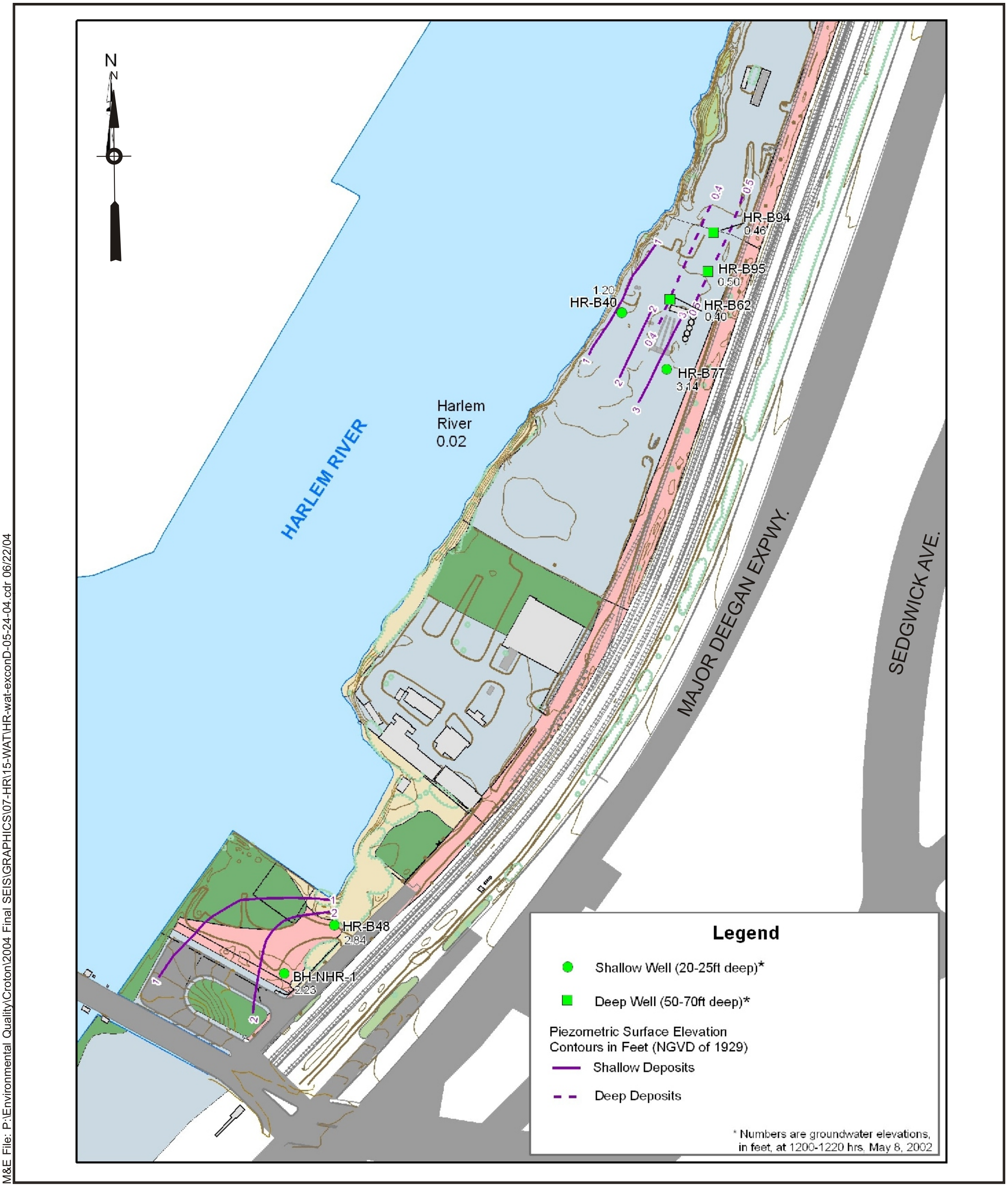

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1 INCH = 250 FEET

Piezometric Surface Elevations at Mid-Tide Harlem River Site

Croton Water Treatment Plant

Figure 7.15-4

7.15.2.2. Future Without the Project

The Future Without the Project considerations include the anticipated year of peak construction (2009) and the anticipated year of operation (2011) for the proposed plant. Without the construction of the proposed plant, the water resources conditions in the years 2009 and 2011 are anticipated to remain virtually identical to the existing conditions. Structures currently located on-site would remain, including the Con Edison cable house, the Storage Post self-storage facility, and the XCEL Ready-Mix concrete batch plant.

Property south of the University Heights Bridge, which is adjacent to the water treatment site, may be developed into a residential high-rise complex called Fordham Landing (also refer to Section 7.4, Community Facilities). The completion date has not been determined for this proposed project. Plans for utilities to be supplied to the new development are included in the Fordham Landing Final EIS released in 1988. The Fordham Landing stormwater drainage system would be connected to an existing City combined sewer. Since drainage from this site currently does not affect the water treatment plant site, no change in future conditions of water resources would occur as a result of the Fordham Landing development. Additionally, north of the project site, a shopping center is currently under construction. The shopping center, entitled River Plaza, is anticipated to open in 2004.

7.15.3. Potential Impacts

7.15.3.1. Potential Project Impacts

The anticipated year of operation for the proposed plant is 2011. Therefore, potential project impacts have been assessed by comparing the Future With the Project conditions against the Future Without the Project conditions for the year 2011.

The total water treatment plant site project impact area would be approximately 17.5 acres. The proposed plant at the Harlem River Site would occupy approximately 10.5 acres. The finished project impact area (operation year 2011) would include the proposed project area in the middle of the site, potential public open space in the north and south ends of the site, and a pedestrian walkway along the waterfront of the site. The proposed plant area includes the water treatment plant building, the pump station, parking lots, and site access roads.

7.15.3.1.1. Stormwater Runoff

The stormwater management plan would provide long-term control and treatment of stormwater runoff from the site, to the maximum extent practicable. This would include landscaping to stabilize the site and provide treatment of stormwater runoff from all impervious services, and maintain that flows to the Harlem River do not appreciably exceed existing conditions rates and volumes.

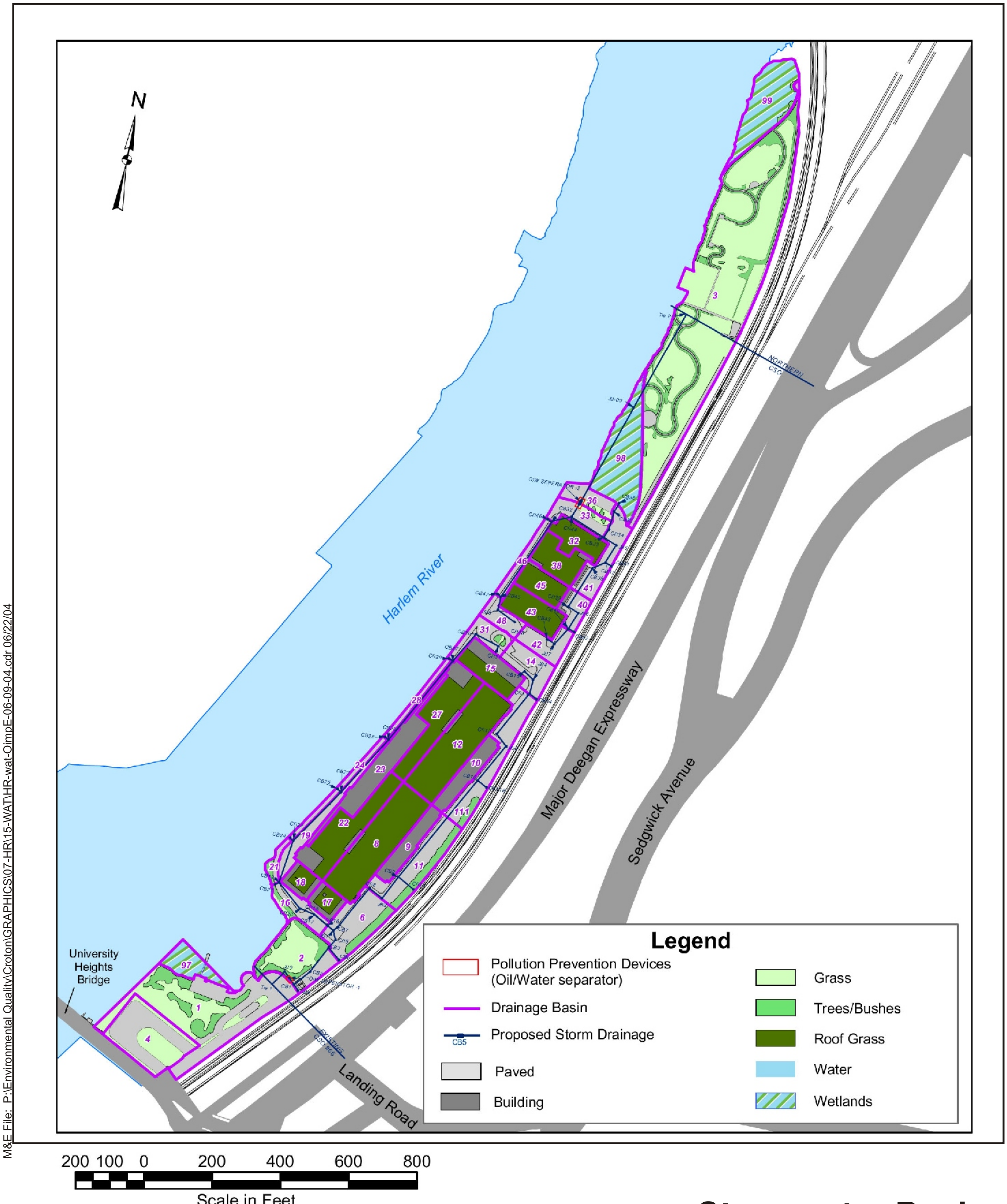
With the exception of the area located to the north of the proposed plant (Basin 3), which is planned for a public amenity area, all stormwater runoff from the Harlem River Site under operation conditions would be diverted to two existing combined sewer outfalls (CSO) (Figure 7.15-5). A 66-inch CSO downstream of regulator No. 66 discharges to the Harlem River from the southern portion of the site (southern CSO) and has an estimated full-flowing capacity of 210 cubic feet per second (cfs). Another 66-inch CSO is located on the northern section of the water treatment plant site (northern CSO) and discharges from a location adjacent to Basin 3 and has an approximate full-flowing capacity of 125 cfs.

Approximately 80 percent of Basin 3 groundcover would be made up of trees, bushes, and grass. The remaining 20 percent would consist of impervious surfaces associated with pedestrian walkways and possible public amenities. Runoff to the Harlem River from this area would be attenuated by grassed swales adjacent to all impervious surfaces. With the exception of grass cutting equipment and small vehicles to maintain the public open space, only pedestrians would access Basin 3. Therefore, there would be no long-term stormwater impacts to the Harlem River from this part of the site.

The buildings that make up the proposed plant at the Harlem River Site would be installed for the most part with a "green-roof" design. The green-roof design is a key component of the post-construction stormwater management system at the water treatment plant site. The roof surface of these buildings would be covered with about two inches of granular drainage media and two inches of enriched soil. Low maintenance ground cover plants would be planted and an irrigation system would be installed. Part of the precipitation falling on the roof would flow as runoff on the planted surface, and part would infiltrate the loam. A drainage board and membrane waterproofing would be placed above the roof slab and below the soil fills. The drainage board would carry any rainwater that penetrates the soil profile to a perimeter collection system.

Although the green-roof would generally have the ability to attenuate rainfall from smaller storms (3-month rain events and less), it was assumed during the modeling process that the soils on the roof would be saturated, resulting in maximum runoff. This is a conservative approach, which assumes a scenario of large back-to-back storms. Runoff from the main treatment building, as well as adjacent roadway and parking areas, would be collected and discharged to the Harlem River via the southern CSO (i.e. all basins south of and including Basins 31 and 14, with the exception of wetland Basin 97). Storm flows from the Pump Station and adjacent roadways and parking areas would be discharged from the northern CSO (i.e. all basins north of and including Basins 48 and 42, with the exception of wetland Basins 98 and 99, and Basin 3).

Model Description and Results. The HydroCAD® stormwater model was used to predict runoff from the water treatment plant site for similar design storms, as shown in the Existing Conditions, and also to size individual long-term pollution prevention devices, located to treat runoff from impervious areas. The future conditions at the water treatment plant site were simulated by modifying the curve numbers and acreages in the HydroCAD® model to reflect the conditions illustrated in Figure 7.15-5. Table 5.15-5 summarizes the input parameters used in the model to simulate future stormwater conditions.



Stormwater Basins Operating Conditions Harlem River Site

Croton Water Treatment Plant

Figure 7.15-5

TABLE 7.15-5. BASIN CHARACTERISTICS FOR HARLEM RIVER SITE – OPERATION CONDITIONS

	Grass		Trees		Trees/Bushes		Building/Paved		Wetlands		Composite		
Basin	**Area (acres)**	**CN**	**Area (acres)**	**CN**	**Area (acres)**	**CN**	**Area (acres)**	**CN**	**Area (acres)**	**CN**	**Total Area (acres)**	**CN**	**Tc (min)**
1	0.59	74	-	-	028	65	0.82	98	-	-	1.69	84	42.5
2	0.31	74	-	-	0.17	65	0.20	98	-	-	0.68	79	26.2
3	2.21	74	-	-	0.90	65	1.44	98	-	-	4.55	80	71.2
4	0.31	74	-	-	-	-	0.47	98	-	-	0.78	88	2.4
6	-	-	-	-	0.11	65	0.42	98	-	-	0.53	91	3.1
11	-	-	0.17	65	-	-	0.41	98	-	-	0.58	88	3.8
16	0.02	74	-	-	0.04	65	0.20	98	-	-	0.26	91	2.9
21	-	-	-	-	0.03	65	0.05	98	-	-	0.08	86	2.5
31	-	-	-	-	0.02	65	0.22	98	-	-	0.24	95	1.5
33	0.04	74	-	-	0.01	65	0.19	98	-	-	0.24	93	1.9
36	0.04	74	-	-	0.01	65	0.19	98	-	-	0.24	93	2.3
111	-	-	0.05	65	-	-	0.53	98	-	-	0.58	95	3.4
97,98,99									1.66	98	1.66	98	-
WTP	-	-	-	-	-	-	8.03	98	-	-	8.03	98	-

CN = Curve Number, a factor describing the surface permeability; higher numbers are assigned to areas of lower permeability.
Tc = Time of Concentration, the time in minutes required for a particle of water to flow from the most hydrologically remote point in the watershed to the receiving area

When compared to the existing conditions, the stormwater model during operations predicts a slight increase in peak runoff volumes to the Harlem River. These increases range from six percent during the 2-year 24-hour storm, to two percent during the 10-year 24-hour storm (see Table 7.15-6). The predicted peak flows to southern CSO and the northern CSO, during the 10-year storm, would be 39 cfs and 12 cfs, respectively. This represents 19 percent of the full-flowing capacity for the southern CSO, and eight percent of the full-flowing capacity for the northern CSO.

TABLE 7.15-6. RUNOFF CHARACTERISTICS IN 2-, 5-, 10-YEAR STORM

Basin	2-Year Storm		5-Year Storm		10-Year Storm	
	Peak Runoff Rate (cfs)	Runoff Volume (acre-ft)	Peak Runoff Rate (cfs)	Runoff Volume (acre-ft)	Peak Runoff Rate (cfs)	Runoff Volume (acre-ft)
Basins Discharging to the Harlem River from the existing southern CSO						
	25.2	2.6	33.6	3.5	38.7	4.0
Basins Discharging to the Harlem River from the existing northern CSO						
	8.1	0.7	10.6	0.9	11.9	1.1
Other Basins (northern recreation facility)						
3	3.1	0.6	4.6	0.9	5.6	1.1
Project Generated Flow		3.90		5.3		6.20
Total Existing Conditions (Table 7.15-4)		3.68		5.15		6.05

Structural BMPs. The runoff from the main treatment building, access roads, and parking area would be conveyed through two structural BMPs (one associated with each CSO) to remove oil and sediment before discharging to the Harlem River. These structural BMP units would be sized to treat the peak runoff from the 2-year storm (approximately 25 cfs and 8 cfs for the south and north CSOs, respectively). In addition, street sweeping would also be utilized to treat the new pavement. No significant adverse impacts are anticipated from the quality of the stormwater runoff into the Harlem River following the pre-treatment by the structural BMP.

The proposed plant finished grade would be at elevation 13 feet, which would be above the 11.7 feet MSL 500-year flood level reported by FEMA at the University Heights Bridge. Therefore, no flooding of the water treatment plant site is anticipated during the 100-year 24-hour storm.

7.15.3.1.2. Groundwater

Groundwater occurs within the pores of the unconsolidated soils, weathered bedrock, and within the fractures and cavities in the underlying competent bedrock beneath the site. The shallow groundwater has been shown to be contaminated in certain areas, as described in Section 7.13, Hazardous Materials. Waterproofed lining would be applied to the foundation levels of the proposed structures that are below the groundwater table to prevent infiltration of groundwater into the structures (i.e. prevent potential contamination of treated water). The deeper groundwater may be brackish or saline on the west side of the site, adjacent to the Harlem River. Monitoring of water levels at the site has shown that tidal fluctuations occur in both the deep and shallow groundwater.

The proposed plant would have only minor effects on the groundwater system. The effects on groundwater flow at the site would result from the elements of the proposed project that extend below the water table, including the main treatment building; below-grade structures immediately adjacent to the River; the pump station; and the shafts and pipelines for raw and finished water. The creation of large areas of impermeable surface would also affect the groundwater system somewhat, since water that would otherwise have infiltrated and recharged groundwater would instead be removed by the stormwater control system.

The bottom of the slabs for the proposed main treatment plant and the pump station are at an elevation of 13 feet MSL, which is approximately 1 foot below the 500-year flood water table elevation. Structures below the water table form a barrier to groundwater flow causing changes in flow paths and gradients to occur. Although the presence of the proposed structures beneath the water table would have minor effects on groundwater flow paths, the overall impacts of the project on groundwater and groundwater-related resources are not anticipated to be significant or adverse. The minor impacts would include a dampening of the tidal fluctuations in the shallow groundwater due to the presence of new structures along the riverfront; some fluctuation would most likely persist in the shallow groundwater. The 3.0 acres of mitigated wetlands (Section 9.3.7, Natural Resources and Water Resources Mitigation) would not be adversely affected by these smaller tidal fluctuations because water levels in the wetlands would be controlled directly by tidal fluctuations. Although the new bulkhead would have the potential to lengthen the flow path of groundwater that discharge to the River, groundwater build-up is anticipated to be minor behind the sheet pile wall because the joints between each sheet pile would allow water to flow relatively freely. The potential build up of groundwater behind the bulkhead would be offset further by the decrease in recharge to the groundwater system that would result from the new buildings and parking lots at the site. A slight dampening of the tidal fluctuations in the groundwater at the water treatment plant site could also result.

The construction of several tidal wetlands has been proposed to compensate for the elements of the proposed project that would impinge upon the Harlem River (see Section 7.14, Natural Resources). These tidal wetlands are proposed at the southern, central, and northern portions of the site. (See Potential Project Impacts, Surface Water above.) They would be linked to the tidal waters of the River and would not be dependent upon groundwater flow. Therefore, the minor alterations in the flow of groundwater beneath the site that might result from the proposed project would not affect these proposed wetlands.

7.15.3.1.3. Surface Water

As stated in the Existing Conditions, the Harlem River is the only surface water located along the western boundary of the Harlem River Site that could be affected by the proposed plant.

Two open space areas would be provided for recreational facilities. First, the existing 1.3-acre cove on the south section of the water treatment plant site could potentially be converted to include public amenities and 0.2 acres of constructed tidal wetland. (See Section 9.3.7 Natural Resources and Water Resources Mitigation, for details pertaining to the wetland mitigation plan.) The cove would continue to function as a tidal wetland. Second, the 4.5-acre area to the north adjacent to the proposed pumping station would be converted to a public open space that would include two constructed tidal wetlands (1.8 acres total area combined). An additional 1.2 acres of wetlands would be created off-site. The wetlands' project impacts are discussed in Section 7.14, Natural Resources. The existing water quality in the Harlem River adjacent to the tidal wetlands would be maintained and no significant adverse impacts are anticipated.

One emergency overflow pipe would be installed at the Harlem River Site and connected to an existing combined sewer outfall. This proposed overflow pipe would originate from the water treatment plant building and convey process water overflow from the backwash tanks, filter to waste tanks, and the waste backwash water tanks to the Harlem River in the event of an emergency shutdown of the process. Additionally, this pipe would convey raw water overflow from the pump station to the Harlem River from the raw water tunnel in the event that the turbines stop working abruptly. The Harlem River is a major tributary of the Hudson River that also receives runoff from sections of Manhattan and the Bronx through many combined sewer outfalls.

The maximum overflow rate from the backwash water tanks would be approximately 153 mgd under the maximum raw water inflow. The backwash water tanks contain filtered water prior to UV disinfection and the addition of sodium hypochlorite, corrosion inhibitor, and hydrofluorosilicic acid. No significant adverse impacts on the quality or the flow rate are anticipated to the Harlem River from the emergency overflow from the backwash water tanks.

The filter-to-waste water is the filtered water used for cleaning the filters, which would contain traces of solids. The volume of solids would be minimal and would not offset the existing total suspended solids (TSS) volume in the Harlem River. In the event of emergency overflow, the maximum overflow rate from filter-to-waste water tanks would be approximately 7.5 mgd. This water would be low in suspended solids. In addition, the waste backwash water tanks contain flow from the DAF (dissolved air floatation) process. The water would contain approximately 60 mg/L of suspended solids and the maximum overflow rate would be approximately 24 mgd. Under existing conditions, the Harlem River maximum bottom TSS is 55.2 mg/L and the average is 23.8 mg/L. The 60 mg/L of solids contained in the 24 mgd overflow would potentially increase TSS in the Harlem River but would only occur in an emergency situation and would disperse quickly when entering a much larger body of water. Therefore, it is not anticipated that the overflow would impact the already high level of TSS in the Harlem River.

Approximately 50 percent of the total solids may contain traces of aluminum hydroxide, which would be added to raw water to enhance solid removal during the DAF process prior to filtering. The potential impact of the aluminum composition in the process overflow is discussed in Section 7.13, Hazardous Materials. No impact is anticipated to the Harlem River water quality due to the minimal quantity of aluminum hydroxide, which would be utilized to aid flocculation of suspended solids. The chemical would be diluted rapidly upon entering the Harlem River and the residuals would form inert clusters of solids that would eventually settle to the bottom and be chemically indistinguishable from natural clay materials.

The potential flow from the raw water overflow would be approximately 290 mgd. The quality of Croton raw water would not significantly impact the existing water quality in the Harlem River and the anticipated flow rate would be minimal in comparison to the existing base flow in the Harlem River.

The existing stormwater surface runoff would continue to be discharged to the Harlem River. The proposed subsurface stormwater drainage system would direct runoff to the two existing combined sewer outfalls (Section 7.15.2.1.2, Stormwater Runoff and Section 7.16, Infrastructure and Energy) following treatments that include oil/grease and sediment removals. The pre-treated stormwater would add undetectable amount of suspended solids and carbon to the existing Harlem River water quality. Approximately 5.1 acre-feet of stormwater runoff from impervious surfaces, under the 10-year 24-hour storm, would be treated by a pollution prevention device prior to entering the Harlem River. The volume added to the Harlem River is minimal compared to the current river flow rate. No significant adverse impacts are anticipated to Harlem River water quality and flow rate due to the stormwater runoff from the water treatment plant site.

7.15.3.2. Potential Construction Impacts

The anticipated year of peak construction of the proposed project is 2009. Therefore, potential construction impacts have been assessed by comparing the Future With the Project conditions against the Future Without the Project conditions for the year 2009.

The potential construction impact area at the water treatment plant site, including the potential staging area would be 17.5 acres. Construction activities at the site are anticipated to begin in April 2005 following the issuance of the Notice to Commence Work. During construction at the Harlem River Site, areas within the potential area of construction impact would be cleared and graded as required to accommodate the storage and daily activities of construction vehicles and equipment.

7.15.3.2.1. Stormwater Runoff

The proposed stormwater controls incorporate measures specified by New York City,[5] New York State[6,7] and USEPA,[8] and the requirements of the NYSDEC general SPDES permit for stormwater discharges associated with industrial activity from construction activities[9]. Stabilization and structural best management practices (BMPs) would be included in the project

[5] City Environmental Quality Review (CEQR, 2001). CEQR Technical Manual.

[6] New York State Guideline for Urban Erosion and Sediment Control and New York State Soil and Water Conservation Committee (1997).

[7] New York State Stormwater Management Design Manual, New York City DEC, (NY, 2001)

[8] Storm Water Management for Construction Activities: Developing Pollution Prevention Plans and Best Management Practices (EPA B32-R-92-005)

[9] New York State Department of Environmental Conservation. State Pollution Discharge Elimination System (SPDES). 2003.

design to dissipate peak flows to avoid on-site erosion, and maintain total storm volumes to avoid impacts on surface water and wetland hydrology. Alternatively, contaminated groundwater or stormwater could be discharged to local sanitary sewers if preliminary on-site treatment is sufficient to meet pretreatment standards for the Ward's Island WPCP. However, the pretreated discharge volume to the sanitary sewer may have to be controlled during specific times to assist the WPCP in accommodating the flow.

Construction Sequencing. The anticipated construction period for the proposed project would be a five and a half year period from April 2005 through the start of operations by October 2011. Because this project has a lengthy construction period, stormwater management, erosion, and sedimentation control measures would be implemented in a phased approach. Phase I of the proposed project would include establishment of a bulkhead and docking facilities along the eastern bank of the Harlem River, demolition of existing facilities in the project area, installation of erosion and sedimentation controls, construction of site access roads, and site clearing and grubbing; Phase II would include building excavation; and Phase III would include building construction. For each phase of construction, the following topics are described: the sequence of construction and a summary of work to be conducted; erosion and sediment control measures to be implemented; and a description of on-site activities. Operation and maintenance of the proposed controls is described in Potential Project Impacts above.

<u>Phase I</u> (Initial Site Preparation). Early in the construction phase, the entire water treatment plant site would be fenced to demarcate the limits of construction. As described below, a double row of haybales would be installed inside the construction fence to assist in erosion and sedimentation control and would frequently be inspected and maintained. Temporary utilities, parking, and site offices would be installed in anticipation of the excavation work.

Prior to the start of the excavation process at the Harlem River Site, the bulkhead line along the Harlem River would be established and constructed along the west side of the water treatment plant site. The first step in the excavation process would include the clearing of existing structures and grubbing of vegetation within the construction and laydown areas, followed by the removal of soil from the building footprints. The permeable material (sand and gravel) would be stored on-site for use during construction. Stabilization of open soil surfaces would be implemented as soon as practicable, which would generally be no more than thirty (30) days after grading or construction activities have temporarily or permanently ceased. Stabilization of exposed areas and stockpiled soils would consist of hydroseeding, or straw or grass mulch.

Other Phase I features include construction of the site roadways, storm drainage, and vehicle inspection area, as well as the contractor laydown and storage areas. These areas would be covered with porous pavement. During this initial construction phase of the project, the site would be graded to direct stormwater runoff away from the facility footprint, via drainage swales, to temporary sedimentation/infiltration basins located in the north and south portions of the project area. This water would then be routed through portable oil/water separators and sediment removal devices before being discharged to the Harlem River. In addition to providing storage of storm runoff from the proposed project construction area, the temporary detention basins would also prevent flow to the Harlem River during construction, resulting from storm events, from exceeding the existing conditions.

Ensuring that the proposed temporary sedimentation/infiltration basins function as designed would be critical to the effective control of stormwater runoff from the site throughout the initial stages of construction. In order to make sure that the underlying soils do not get clogged with construction-site sediment, a regular cleaning and maintenance program would be implemented. All proposed catch basin inlets would be protected with hay bales and/or a sediment filter over the inlet. Dust generation would be minimized by the use of water trucks and street sweeping.

Phase II (Building Excavation). Excavation would occur as part of this phase. The proposed excavation for the proposed project would extend to an elevation approximately four to eight feet below the water table depending on the site location and the tidal stage (see Groundwater section below). Portable pumps would be used to remove groundwater and rainwater from the excavation pit as required. These pumps would convey water through hoses to a manifold system along the west and north side of the water treatment plant site. This excavation water would be pumped through a settling tank and oil/water separator prior to discharge to the Harlem River.

Once the permanent drainage system has been completed, stormwater runoff from the site would be collected and discharged to the Harlem River via the existing north and south 66-inch CSO outfalls (see Section 7.15.2.1.2, Stormwater Runoff & Section 7.16, Infrastructure and Energy). Pollution prevention devices would be included as part of the drainage system. In addition, as noted above, measures would be taken during construction to protect the permanent storm drainage system from sedimentation impacts, thus ensuring that the Harlem River would not be adversely affected by stormwater runoff during construction.

Phase III (Building Construction). After the excavation is completed, the building construction would proceed, with initial concrete construction (rebar and form placement at the foundation level). In general, building construction would proceed both horizontally and vertically starting at the northwest section, moving to the southeast section, and proceed in a similar fashion westward.

Erosion and Sediment Control Measures. During construction, the sedimentation and erosion controls and stormwater management practices described in this section would be employed to minimize erosion, and prevent sedimentation impacts to the Harlem River. However, the final design of the erosion and sedimentation control measures during construction of the proposed project at the Harlem River Site would be the responsibility of the contractor. Control measures would include stabilization for disturbed areas, and structural controls to divert runoff and remove sediment. In addition to managing stormwater runoff and erosion, BMPs would help to prevent accidental releases of fuels, lubricating fluids, or other hazardous materials. The ramp that would connect the barge to the shoreline would be designed to prevent debris from falling in the water. More detail related to stormwater management and erosion and sediment control, during construction and post-construction phases of the project, is provided in the Stormwater Pollution Prevention Plan (SWPPP) for the Harlem River site (Appendix G).

Phase I. The proposed erosion and sedimentation control plan has been developed to prevent waterborne sediment from entering the Harlem River during Phase I of construction. Before the Phase I of construction is initiated, BMPs would be installed at locations around the perimeter of the site to control sedimentation and erosion associated with stormwater runoff.

The location of erosion and sedimentation control measures would serve as an absolute limit of work. Under no circumstances would any work occur on the resource side of the erosion control barriers.

During this phase of construction, control of stormwater runoff to the Harlem River would be provided primarily using haybales, silt fences, and temporary sedimentation basins. A line of toed-in and staked silt fence and haybales would define the limits of work. Runoff from cleared areas would be collected via diversion berms and drainage swales, each leading to filtration devices. Check dams, hay bales or washed stone, would be placed in drainage swales to reduce stormwater runoff velocity. These check dams would be placed within the gutter of roadways where slopes are greater than five percent.

Construction laydown and staging, and truck queuing/turn around areas, would be surfaced with porous paving blocks where possible. All catch basins within the drainage system would be equipped with inlet protection. Structural BMPs would provide treatment of runoff from these impervious areas (access roadways, parking area). These pollution prevention devices would be designed to remove oil and sediment from stormwater during frequent wet weather events. They would be sized to treat the peak flow from the 2-year 24-hour storm, and would provide removal of approximately 80 percent of total suspended solids. The impervious areas during construction would be similar to the ground cover during existing conditions. Therefore, the potential stormwater runoff during construction would be similar to that shown in Table 7.15-2.

Phase II. The main activity during this phase of construction, which is excavation, would probably result in an increase in on-site traffic. The erosion and sediment control devices established in Phase I would remain in place. A regular program of inspections, maintenance, and spraying of trucks to control dust would be conducted.

Phase III. By Phase III of the proposed project, which is building construction, the site would be established and stabilized. The emphasis of stormwater management at this stage of the work would be on operation and maintenance of structural BMPs, and control of runoff from increased on-site activities.

7.15.3.2.2. Groundwater

Construction of the proposed project would not require extensive dewatering. However, many elements of the proposed project would be constructed partially or completely below the water table, including part of the buildings, new structures immediately adjacent to the River, and the water conveyance tunnels and associated vertical shafts. In all of these cases, the dewatering that would occur during construction would have only minor effects on the groundwater system. The creation of impermeable surfaces during construction would also affect the groundwater system somewhat, since water that would otherwise have infiltrated and become recharge would instead be removed by the stormwater control system.

Since the footprint of the proposed plant extends out into the Harlem River, a retaining system would be built along the new bulkhead line. Soil fill would then be placed between the current shoreline and the new bulkhead line. As noted in the potential project impacts discussion on groundwater, the new bulkhead and the fill could cause a minor rise in groundwater levels on the site because they would increase the length of the groundwater flow path to the River. A slight dampening of the tidal fluctuations in the groundwater at the site could also result. However, these minor effects on groundwater levels at the site would have no significant adverse impact on groundwater.

The excavations for construction of the proposed main treatment building and the pump station buildings would extend to an elevation of about minus five feet MSL, which is about four to eight feet below the water table depending on the location at the site and the tidal stage. As a consequence of the dewatering that would be required for construction, groundwater from the surrounding areas would flow toward the excavation and the dewatering system. Seepage of water from the Harlem River into the site would likely occur in response to the lowered groundwater levels. The amount of this seepage into the site would depend on the permeabilities of the subsurface materials and on the extent to which new and existing structures, such as bulkheads and excavation support systems, cut off the flow paths for the water. Supplementary cutoff walls could be constructed if dewatering rates would otherwise be excessive. In any event, since there are no groundwater-dependent water resources at or near the site, the temporary lowering of the water table and possible encroachment of water from the Harlem River would have no significant adverse impacts.

The shafts for the raw and finished water connections to the proposed plant would be 30 to 40 feet in diameter and would be constructed to depths of 70 to 80 feet. The shaft excavations would be supported with slurry walls; as a result, little dewatering would be required, since the slurry walls prevent the flow of groundwater laterally into the shaft excavation. As the excavation proceeds inside the slurry wall, the lowering of the water level would cause groundwater to seep upward into the shaft. However, upward flow of groundwater into the shaft would be limited, if necessary, by a jet-grouted plug in the bottom. The use of controls on groundwater inflow during shaft construction, rather than extensive dewatering, would limit drawdowns and impacts on groundwater at the site.

The raw and finished water tunnels would extend from the shafts at the proposed plant in an easterly direction, beneath the railroad tracks and the Major Deegan Expressway. At depths of about 70 to 80 feet MSL, the tunnels would be constructed in the unconsolidated deposits beneath and just east of the site before entering the bedrock beneath the highway. Since large inflows of groundwater into the tunnels must be prevented, the tunneling would be preceded by vertical and horizontal drilling and soil grouting along the tunnel alignments. One effect of the grouting would be to reduce the permeability of the soils and thereby limit groundwater flow into the tunnel. If necessary, supplementary grouting would be performed during tunnel advancement. The net effect of these ground preparations would be that little dewatering would occur, and the construction of the tunnels would have little or no impact on groundwater levels. As mentioned above, an alternative would be to discharge contaminated groundwater or stormwater to local sanitary sewers if preliminary on-site treatment is sufficient to meet pretreatment standards for the Ward’s Island WPCP. However, the pretreated discharge volume to the sanitary sewer may have to be controlled during specific times to allow the WPCP to accommodate the flow.

7.15.3.2.3. Surface Water

As mentioned above, the Harlem River is the only surface water that could be affected by the construction of the proposed project at this site. The period of construction that could have the greatest potential impacts on the Harlem River would be during the initial activities and peak excavation (see Section 7.14.3.2.3, Stormwater Runoff, construction phase I and II). Installation of erosion control measures and other stormwater BMPs early in the initial construction activities would prevent potentially untreated-stormwater runoff and equipment wash water to enter Harlem River. No significant adverse impacts are anticipated to the quality and flow of Harlem River due to the stormwater runoff.

No excavation would take place until the site is stabilized. Stabilization would involve the installation of sheet piling along the new bulkhead line and construction of a new permanent bulkhead. A portion of the shoreline (approximately 2,000 linear feet) would require filling to the new bulkhead line. This action is being proposed because portions of the proposed building footprint would be located in this area. Filling a portion of the Harlem River to the bulkhead line would require a retaining system. The retaining system used would be dictated by subsurface conditions at the site, space restrictions, schedule, and permit restrictions. The retaining structures would be designed as a permanent bulkhead structure. The total infill area along the bulkhead line would be approximately 1.5 acres, which would be mitigated with the creation of 3.0 acres of wetlands on and off-site. On average, the filling would extend approximately 30 to 40 feet into the River. Water trapped inside the bulkhead would be removed and passed through a sediment trap. The hole would be filled with stable material. These materials would not have an impact on the quality of water in the Harlem River because the sheet pile would isolate them from the river water. In addition, a silt curtain would be installed to prevent sediment from being transported outside of the proposed water treatment plant site. The dewatered water would also be treated in the same fashion as stormwater runoff prior to discharge to the Harlem River. No significant adverse impacts to the Harlem River from the fill operation are anticipated.

The three phases of excavation anticipated at the Harlem River Site involve: (1) the excavation of the building footprints; (2) the excavation of tunnels and shafts; and (3) the excavation of the proposed mitigation wetlands. The excavation of building footprints and foundation construction would require minimal dewatering due to the selected construction technique that would prevent groundwater infiltration into the excavation pit. The groundwater dewatered during this period of excavation would be minimal and the water would be pre-treated in the similar fashion as the stormwater runoff prior to discharge to the Harlem River. Construction of deep shafts and tunnels with the proposed slurry wall construction method would not require dewatering and therefore would have no impact on the Harlem River. The construction of three tidal wetlands would require excavation and modification of the river bank. These mitigation wetlands would be constructed at the end of the construction period, prior to final landscaping. The potentially contaminated soils that could be disturbed due to the construction are discussed in Section 7.13, Hazardous Materials.

Barges would be utilized to transport excavated materials from the water treatment plant site and construction and fill materials to the site. These barges would be routed to a high-traffic waterway, which includes the section of the Harlem River adjacent to the site. Approximately one barge trip per day during the peak excavation period would have no impact on Harlem River water quality. Spill plates would be installed between the barge and the bulkhead to prevent potential sediment runoff to the Harlem River from the uploading operation. The barge operator would be responsible for all permits regarding the operation of barges, including mitigation procedures for possible spills and other potential boating accidents (Section 7.9, Traffic and Transportation). For more barge operation detail refer to Section 7.1, Introduction and Project Description.

The existing concentration of total suspended solids at the bottom of the Harlem River is approximately 55 mg/L. The potential sediments from the construction activities and stormwater runoff from the water treatment plant site to the Harlem River are not anticipated to increase the total suspended solids in the River if the erosion control and other stormwater BMPs are appropriately installed and monitored. No significant adverse impacts to Harlem River water quality are anticipated during the proposed construction period at the Harlem River Site.