10.0 STORMWATER MANAGEMENT

Introduction

This DEIS section provides a summary of the preliminary stormwater management study undertaken for the project. In accordance with the applicable New York State regulations, this study is called a Stormwater Pollution Prevention Plan (SWPPP), which addresses pre- and post-development stormwater analyses, temporary stormwater management including soil erosion control measures to be implemented during construction, and permanent stormwater management measures to be built and maintained for the life of the project. Refer to Appendix E for the engineer's preliminary report.

The preliminary SWPPP will be amended and completed during the process of finishing the site development plans for this project, and will be subject to review per the requirements of the applicable General Permit (SPDES GP-0-20-001) of the New York State Department of Environmental Conservation (NYSDEC) and approvals by the Town of Southeast and the New York City Department of Environmental Protection (NYCDEP).

10.1 Existing Conditions

The project site is located on two parcels bordered by Interstate 84 to the east and Pugsley Road and Fields Corner Road to the west with a narrow road (variously referred to as Barrett Road or Zimmer Road) running east and west between the two parcels. Land cover at the site mainly consists of forested areas. NYSDEC wetland, LC-28 is located on the southern portion of the site. The site also consists of areas of steep slopes and Town of Southeast protected ridgeline on the northern end of the site.

Stormwater runoff across the project site generally flows from north to south from the highpoint at the ridgeline area to the NYSDEC wetland. Two Design Lines are utilized in the SWPPP to analyze the stormwater runoff both qualitatively and quantitatively. Design Line 1, which is located along the northern property line, is used to analyze the stormwater runoff that leaves the project site to the north. Design Line 2 is located along the onsite NYSDEC wetland.

The following is a general description of the input data used to calculate the pre- and post-development stormwater runoff values in accordance with NYSDEC design requirements. The precipitation values for the 1-Year, 10-Year, 25-year, and 100-Year 24-hour design storm events and rainfall distribution curves utilized for the SWPPP were obtained from information provided by the Northeast Regional Climate Center (NRCC) and the Natural Resources Conservation Service (NRCS) which is available online at *www.precip.eas.cornell.edu*.

The values used for the design storms analyzed are listed below.

Design Storm	24-Hour Rainfall
1-Year	2.76”
10-Year	4.94”
25-Year	6.21”
100-Year	8.77”

Runoff curve number (CN) values utilized in the SWPPP analyses, which are based on mapped soil types and actual land use/land cover, were referenced from the USDA, SCS publication *Urban Hydrology for Small Watersheds*.

The SWPPP provides complete engineering calculations to quantify existing stormwater flow rates and provide stormwater flow volumes and peaks in post-development conditions to demonstrate conformance with the applicable regulations.

10.2 Future Without the Proposed Project

The project site would remain in its current undeveloped condition and would not present any need for manmade stormwater management systems in the scenario of a future without the project.

10.3 Potential Impacts of the Proposed Project

The stormwater management system for the proposed project has been designed to meet the requirements of local, regional, and state stormwater ordinances and guidelines. Specifically, the following codes / regulations have been used to design the SWPPP for Brewster Yards:

- NYSDEC SPDES General Permit for Stormwater Discharges from Construction Activities, General Permit GP-0-20-001 (GP-0-20-001).
- NYCDEP Rules and Regulations for the Protection from Contamination, Degradation, and Pollution of the New York City Water Supply and its Sources (Rules and Regulations).
- Town of Southeast Town Code, Chapter 119 – Stormwater Management and Erosion and Sediment Control.

Since the subject project proposes disturbance of more than one acre, coverage under the State's General Permit No. GP-0-20-001 is required. To meet the requirements of this permit, the latest edition of the NYSDEC *New York State Stormwater Management Design Manual* (Design Manual) was referenced for the design of the proposed stormwater management system. The *Design Manual* specifies five design criteria that are discussed in detail the site-specific SWPPP prepared for this project. The criteria are Runoff Reduction Volume (RRv), Water Quality Volume (WQv), Stream Channel Protection Volume (CPv), Overbank Flood Control (Qf), and Extreme Storm Control (Qp). The first two requirements relate to treating water quality, while the latter pertain to stormwater quantity (peak flow) attenuation.

Further, being located within the New York City East of Hudson Watershed, the General Permit requires compliance with the Enhanced Phosphorus Removal Standards of the *Design Manual* since post-construction stormwater management practices are proposed.

The Runoff Reduction Volume (RRv) criterion is intended to replicate pre-development hydrology by maintaining preconstruction infiltration, peak flow runoff, discharge volume, as well as minimizing concentrated stormwater flow. This requirement has been achieved on the project by providing an infiltration practice which will capture runoff from a percentage of the impervious area in the project and remove it from the stormwater discharge from the site.

The stormwater infiltration practices have been sized to capture and treat the entire water quality volume (WQv) from the proposed project, in accordance with the *Design Manual*

including the standards for Enhanced Phosphorus Removal. The stormwater management practices have been designed to treat the runoff volume produced during the 1-year 24-hour design storm.

The Stream Channel Protection (CPv) criterion, which is intended to protect stream channels from erosion, is accomplished by the 24-hour extended detention of the 1-year, 24-hour storm event. The stormwater infiltration system has been designed with a storage volume greater than the volume of runoff from the 1-year storm to fully infiltrate the volume of runoff from the 1-year, 24-hour design storm. Thus, the CPv has been met for the project. Actual infiltration rates tested in the areas of the proposed infiltration practice were equal to or exceeded the minimum 0.5 inches/hour requirement.

The Overbank Flood Control (Qp) requirement is intended to prevent an increase in the frequency and magnitude of out-of-bank flooding events generated by urban development. Overbank control requires storage to attenuate the post-development 10-year, 24-hour peak discharge to pre-development rates. The Extreme Flood Control (Qf) requirement is intended to prevent the increased risk of flood damage from large storm events, maintain the boundaries of the pre-development 100-year floodplain, and protect the physical integrity of stormwater management practices. Extreme flood control requires storage to attenuate the post-development 100-year, 24-hour peak discharge to pre-development rates. As shown in the preliminary SWPPP and in Table 10-1, attenuation for both the 10-year and 100-year 24-hour storms has been provided, thus satisfying the Qp and Qf requirements.

Table 10-1
Existing and Proposed Conditions Peak Flows

24-HOUR DESIGN STORM PEAK FLOWS (c.f.s.)								
	1-YEAR		10-YEAR (Channel Protection Volume)		25-YEAR		100-YEAR (Extreme Flood Control)	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Design Line 1	3.02	1.84	23.34	15.04	38.30	24.81	72.15	70.44
Design Line 2	2.94	4.46*	28.52	27.38	49.12	43.48	96.74	93.70

*The post development peak flow for the 1-year, 24 hour storm has no design criteria requiring mitigation as outlined in the NYSSMDM. A decrease in Tc path length and duration for the subcatchment outside the project area resulted in an increase in peek flow and a decrease in total runoff volume. Additionally, CPv criterion for the design line have been achieved through complete infiltration of the 1-year, 24-hour storm within the project area.

The SWPPP also describes how the proposed project will meet the standards of the NYCDEP per Section 18-39 of the Rules and Regulations, where the following thresholds apply:

(i) Plans for development or sale of land that will result in the disturbance of five (5) or more acres of total land area.

(iii) Construction of a new industrial, institutional, municipal, commercial, or multi-family residential project that will result in the creation of an impervious surface totaling over 40,000 square feet in size.

(iv) A land clearing project, involving two or more acres, located at least in part within the limiting distance of 100 feet of a watercourse or wetland, or within the limiting distance of 300 feet of a reservoir, reservoir stem or controlled lake or on a slope exceeding 15 percent.

Given the project's location within the NYC East of Hudson Watershed, the stormwater design is developed in accordance with Chapter 10 (Enhanced Phosphorus Removal Supplement) of the *Design Manual* as well as NYCDEP Watershed Rules and Regulations. These enhanced design requirements require targeted practices which are larger and more efficient at the removal of phosphorus than standard practices. Per *Design Manual* Section 10.1.3 Treatment Performance Goals, (specifically goals 3 and 4), stormwater practices will be designed in accordance with Chapter 10 to meet the phosphorus removal goals. Specifically, the stormwater practices provide a minimum of 80% net removal of particulate phosphorus and 60% net removal of dissolved phosphorus.

Goals 3 and 4 cited below from the *Design Manual* identify metrics for determining appropriate criteria for enhanced phosphorus removal:

> Goal 3 - For flows that are treated by the system (i.e., flows that are not effectively bypassed), median effluent concentration of particulate phosphorus shall be at or below 0.1 mg/L. This effluent concentration of particulate phosphorus is equivalent to a net removal of particulate phosphorus of 80%, given a median influent concentration of 0.5 mg/L.
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> Goal 4 - For flows that are treated by the system (i.e., flows that are not effectively bypassed) the median effluent concentration of dissolved phosphorus shall be at or below 0.06 mg/L. This effluent concentration of dissolved phosphorus is equivalent to a net removal of dissolved phosphorus of 60%, given a median influent concentration of 0.15 mg/L.

Although design of enhanced stormwater practices in accordance with Chapter 10 is required per NYSDEC standards, supplemental simple method phosphorus loading calculations show that the pre-development phosphorus load is equivalent to the post-development phosphorus load from the completed project. The SWPPP calculations support the basis of Chapter 10 of the *Design Manual*, in that stormwater practices designed in accordance with the enhanced phosphorus standards will meet regional goals of not increasing phosphorus from new development.

In summary, the preliminary SWPPP in DEIS Appendix E employs hydrologic modeling software and methodologies used in contemporary engineering practice with the incorporation of recent rainfall data and distributions provided by the NRCC storm events in accordance with NYSDEC requirements. The study assesses the existing conditions and quantitatively describes the expected stormwater flows and peaks resulting from the proposed project. The SWPPP establishes that post-development stormwater peak flows will be below existing peak flows and includes measures to ensure that stormwater runoff from the site in the post-development condition will not adversely affect adjacent and downstream drainage systems. There are no adverse effects on quality and quantity of water resources identified to result from stormwater runoff and increased impervious surfaces in the project. The SWPPP demonstrates the project can comply with NYCDEP and NYSDEC stormwater requirements.

10.4 Mitigation Measures

The project permitting documents will be subject to review per the requirements of GP-0-20-001 and approvals by the Town of Southeast and NYCDEP.

The stormwater collection and conveyance systems for the project will consist of catch basins and HDPE pipe sized to collect and convey at minimum the 10-year, 1-hour design storm as required by the NYCDEP and NYSDEC regulations.

Erosion and sediment control during the construction operations are intended to accomplish four basic principles: diversion of clean water, containment of sediment, treatment of dirty water, and stabilization of disturbed areas with the overall purpose of minimizing or avoiding adverse effects on downgradient waters. The SWPPP includes measures for monitoring and maintaining temporary erosion and sediment controls throughout the construction process. In general, the following temporary methods and materials should be used to control erosion and sedimentation from the project site:

- Stabilized Construction Entrance
- Silt Fence Barriers
- Storm Drain Inlet Protection
- Temporary Soil Stabilization
- Temporary Sediment Trap

Permanent erosion and sediment control will be accomplished by diverting stormwater runoff from steep slopes, controlling/reducing stormwater runoff velocities and volumes, and vegetative and structural surface stabilization. All of the permanent facilities proposed are relatively maintenance free and will require periodic inspections.

The prior chapter of this DEIS, in section 9.6, includes additional descriptions of particular requirements of the NYS Standards and Specifications for Erosion and Sediment Control that will be incorporated into the project-specific stormwater management plan.

Construction phase best management practices associated with the implementation and maintenance of the overall project stormwater management plan will be specified in the project documents, including the following:

- Scheduling and sequencing of the construction work
- Minimizing periods of exposed soils
- Establishment and management of material and equipment staging areas
- Regular monitoring of stormwater management / erosion control practices
- Reporting on stormwater management / erosion control inspections
- Waste management and spill prevention plans
- Implementing appropriate soil restoration measures
- Regular monitoring and maintenance of vegetative stabilization areas until established

Post-construction green infrastructure / stormwater management practices listed in the table below from the SWPPP are proposed in the Brewster Yards project. Two conventional stormwater management practices, infiltration basin and dry extended detention basin, will also provide environmental benefits as green practices.

Table 10-2
Proposed Post-Construction Green Infrastructure

NYSDEC Chapter 5 Requirements	Remarks		
	Design Line 1	Design Line 2	
Practices			
Preservation of Undisturbed Areas	●	●	See Note #1
Preservation of Buffers	●	●	See Note #1
Reduction of Clearing & Grading	●	●	See Note #2
Locating Development in Less Sensitive Areas	●	●	See Note #1
Soil Restoration	●	●	See Note #3
Roadway Reduction	●	●	See Note #2
Sidewalk Reduction	●	●	See Note #2
Parking Reduction	●	●	
Conservation of Natural Areas	●	●	See Note #1

● = Practice Used in Accordance with Chapter 5 Requirements

Notes:

1. Although no formal calculations have been provided, the subject project has provided conservation of natural areas, development in less sensitive areas and preservation of buffers and undisturbed areas to the maximum extent practical.
2. The reduction in clearing and grading as well as the driveway and parking areas foot print reduction will be enforced with the approval of the project SWPPP. Notes on the project plans, establish that any changes in the project plans would require an amended approval from the necessary regulatory agencies.
3. Soil restoration notes have been provided on the project plans.
4. Two (2) infiltration practices have been designed as a standard stormwater management practice (SMP) and are proposed for treatment of the RRv and WQv from the proposed development.