

A. INTRODUCTION AND SUMMARY OF FINDINGS

This chapter summarizes the drainage studies performed to analyze the pre- and post-development drainage conditions of the Project Sites and surrounding areas. The total watershed area that is subject to analysis under both pre- and post-development conditions is 1.15 acres on the Teutonia Site, 5.76 acres on the Chicken Island Site, and 2.26 acres on the North Broadway Site. The Proposed Project would utilize water quantity control techniques (e.g., Stormtrap vaults) to reduce the runoff rates and volumes from the pre-development conditions at each Project Site. In addition, soil erosion and sediment control measures, along with other mitigation measures, are proposed to improve the post-development conditions of the Sites. The Chicken Island and North Broadway Sites would also include water quality treatment practices.

The stormwater management design for each Project Site was prepared in accordance with the New York State Department of Environmental Conservation (NYSDEC) State Pollutant Discharge Elimination System General Permit for Stormwater Discharges from Construction Activities Permit No. GP-0-20-001 (SPDES Permit No. GP-0-20-001), the New York State Stormwater Management Design Manual (NYSSMDM) 2015 edition, the New York State Standards and Specifications for Erosion and Sediment Control (the “Blue Book”) 2016 edition, and requirements of the City. As the Proposed Project is considered both a new development and a redevelopment activity, the design of stormwater quality practices and peak flow controls are in accordance with Chapter 4, “Unified Stormwater Sizing Criteria,” for new development and Chapter 9, “Redevelopment Projects,” of the NYSSMDM.

A Stormwater Pollution Prevention Plan (SWPPP) was prepared for each Project Site in accordance with the requirements of the City and the SPDES Permit No. GP-0-20-001 (see **Appendices J-1, J-2, and J-3**). Construction of the Proposed Project would increase building coverage and impervious area on the Project Sites from the existing conditions. Implementation of the SWPPPs would reduce the rate and volume of stormwater runoff from the Project Sites, improve stormwater quality, and mitigate potential impacts of the increase in impervious surface area. The storm water management measures would include a detention system at the Teutonia Site, manufactured treatment devices and detention systems at the Chicken Island Site, and manufactured treatment devices and detention systems at the North Broadway Site.

The rate of stormwater runoff from the Project Sites would be reduced from the current condition in the future with the Proposed Project in each of the modeled storm events, with one exception. On the Teutonia Site, the total runoff rate for the 1-year storm would be slightly higher post-development compared to 2021 existing conditions (i.e., vacant lot). However, when compared to the 2013 conditions (prior to demolition of the former Teutonia Hall building), the 1-year storm runoff rate would be reduced. Therefore, stormwater discharge from the Proposed Project would not result in significant adverse impacts.

B. EXISTING CONDITIONS

The three Project Sites are located in the Pocantico & Saw Mill River drainage basin, which drains to the Hudson River. Existing drainage patterns and pre-development peak runoff rates for the 1-, 10-, and 100-year storm events are provided for each of the Project Sites below.

B.1. TEUTONIA SITE

The Teutonia Site is currently undeveloped. Demolished in 2014, the former Teutonia Hall included multiple buildings, pavement, some lawn space, and a sloped wooded area along the Metro-North Railroad (“MNR”) right-of-way. Remediation work under the State BCP took place on the Teutonia Site from 2014 to 2017 (see Chapter 14, “Hazardous Materials”). The Teutonia Site is currently vacant and, with the exception of a small gravel driveway, vegetated.

The existing topography of the Teutonia Site slopes down from an elevation of 50 feet above mean sea level in the southeast corner of the lot to a low elevation of approximately 20 feet along the western property line with the MNR right-of-way (see Figure 5-2). The closest natural water course or body to which stormwater runoff from the Teutonia Site ultimately drains is the Hudson River, which lies approximately 500 feet west of the Teutonia Site (see Figure 2-4). NYSDEC classifies streams in New York State according to their specified “best use.” This designation specifies certain water quality and purity standards that must be maintained. Use of surrounding land is planned accordingly. The Hudson River has a NYSDEC water quality classification of SB. Section 701.11 of the New York State Environmental Conservation Law identifies Class SB as saline waters that are best used for “...primary and secondary contact recreation and fishing. These waters shall be suitable for fish, shellfish and wildlife propagation and survival.”

The Saw Mill River is located approximately 400 feet north of the Teutonia Site and runs parallel to Dock Street/Larkin Plaza (see Figure 2-4). The Saw Mill River in this location was daylighted approximately eight years ago and is surrounded by a large public park. The river then flows underneath the MNR tracks and ultimately discharges into the Hudson River. Just west of the intersection of Woodworth Avenue and Dock Street/Larkin Plaza, the Saw Mill River is classified as a Class SB stream to the point where it empties into the Hudson River. Upstream of the intersection of Woodworth Avenue and Dock Street/Larkin Plaza, the Saw Mill River is classified as a Class C stream. Section 701.8 of the New York State Environmental Conservation Law identifies Class C streams as fresh surface waters best used for fishing.

In 2013, prior to demolition of Teutonia Hall and its associated improvements, stormwater runoff from the building and pavement drained towards Buena Vista Avenue where it then entered a combined sewer system. The stormwater generated from the wooded area behind the buildings discharged to the conveyance system in the MNR right-of-way. Currently, stormwater runoff from the remaining vegetated urban soils and small gravel areas is primarily conveyed via sheet and shallow concentrated flow to the MNR. An extremely small portion of the Teutonia Site located in the southeast corner along Buena Vista Avenue continues to discharge stormwater to the combined sewer system in Buena Vista Avenue (see **Appendix J-1**). An 18-inch combined sewer/stormwater pipe is located near the centerline of Buena Vista Avenue, which carries combined flow in a northerly direction toward Main Street. The stormwater generated from the Teutonia Site does not receive treatment and, therefore, contains typical pollutants of urban stormwater runoff.

The 2013 and 2021 existing conditions were analyzed for the Teutonia Site. A summary of pre-development peak discharge flow rates to each Point of Analysis (POA) is provided in **Table 9-1**. For the drainage analysis, POA-A is the combined sewer system in Buena Vista Avenue and POA-B is the system in the MNR right-of-way. Refer to **Figure 9-1 and 9-2** for Drainage Area Maps of the pre-development site conditions. Pre-development Hydrograph Calculations for the Teutonia Site are included in **Appendix J-1**.

Table 9-1
Teutonia Site 2013 and 2021 Pre-Development Peak Discharge Flow Rates

	1-year (cfs)	10-year (cfs)	100-year (cfs)
2013 Conditions			
POA-A (combined sewer)	1.59	3.01	5.23
POA-B (Overland to Railroad)	0.44	1.33	2.87
Total	2.02	4.34	8.10
2021 Conditions			
POA-A (combined sewer)	0.03	0.07	0.14
POA-B (Overland to Railroad)	1.15	3.38	7.17
Total	1.17	3.45	7.31
Note: cfs = cubic feet per second			
Source: Appendix J-1			

B.2. CHICKEN ISLAND SITE

Approximately 80 percent of the Chicken Island Site is impervious paved areas. The remaining 20 percent is vegetated urban land and lawn. There are retaining walls along New School Street, Nepperhan Avenue, and portions of John Street and Henry Herz Street that elevate the surrounding roads approximately 4 to 12 feet above the Getty Square Parking Area.

The closest natural water course or body of water to which stormwater runoff from the Chicken Island Site ultimately drains is the Saw Mill River (see Figure 2-4). On the Chicken Island Site, the Saw Mill River runs along the east and south and is culverted underneath New School Street and the existing parking area. As discussed further in Chapter 15, “Construction,” the existing Saw Mill River culvert on the Chicken Island Site is approximately 90 years old and its current structural condition is unknown. An inspection and evaluation program has been created with a third-party consultant and is currently underway. The Saw Mill River exits the culvert southwest of the Chicken Island Site in a newly daylighted section. Just north of Ann Street, the Saw Mill River continues to flow underground to the northwest, until reaching the daylighted section at Mill Street between North Broadway, Warburton Avenue, Manor House Square, and Main Street. This section was opened for public use in 2016 and is surrounded by buildings and walkway systems (see Figure 2-4). The Saw Mill River briefly flows underground again until reaching Woodworth Avenue, at which point it flows in a section parallel to Dock Street/Larkin Plaza that was also daylighted and opened in 2012 to the public. The river then flows underneath the MNR tracks and ultimately discharges into the Hudson River. The Saw Mill River in the vicinity of the Chicken Island Site is classified as a Class C stream, which are waters best used for fishing. The Hudson River lies approximately 0.4 miles west of the Chicken Island Site. As noted above, the Hudson River in this area has a NYSDEC water quality classification of SB.

Under existing conditions, stormwater runoff from the existing pavement and other surfaces on the Chicken Island Site is conveyed via sheet and shallow concentrated flow to either nearby stormwater infrastructure (both combined sanitary and storm and separate storm sewers) or directly to the Saw Mill River. Stormwater from the smaller parcel east of New School Street sheet flows over land directly to the above-ground portion of the Saw Mill River on the Site. In addition, approximately half of the stormwater in John Street and the entire Getty Square Parking Area is collected by stormwater conveyance systems that discharge to the culverted Saw Mill River. The balance of the stormwater from John Street and the small parking lot and grass field to the north of John Street are collected by a separate combined sewer system that ultimately discharges into the 48-inch brick combined sewer system in Palisade Avenue (see Chapter 8, “Infrastructure and Utilities,” for further detail on existing combined sanitary and storm sewer system infrastructure). The stormwater generated from the Chicken Island Site does not currently receive treatment and, therefore, contains typical pollutants of urban stormwater runoff.

A summary of pre-development peak discharge flow rates to each POA is provided in **Table 9-2**. For the drainage analysis, POA-A is the 48-inch brick combined sewer system in Palisade Avenue and POA-B is the Saw Mill River. Refer to **Figure 9-3** for a Drainage Area Map of the pre-development site conditions. Pre-development Hydrograph Calculations for the Chicken Island Site are included in **Appendix J-2**.

Table 9-2

Chicken Island Site Pre-Development Peak Discharge Flow Rates

	1-year (cfs)	10-year (cfs)	100-year (cfs)
POA-A (combined sewer)	4.34	8.68	15.53
POA-B (Saw Mill River)	7.91	15.39	27.18
Total	12.25	24.07	42.71
Note: cfs = cubic feet per second			
Source: Appendix J-2			

B.3. NORTH BROADWAY SITE

The North Broadway Site is partially developed with buildings, walls, fences, and other structures. It is generally bound by North Broadway to the West, Baldwin Place to the North, Locust Hill Avenue to the east, and Palisade Avenue and Getty Square to the south, with Overlook Terrace extending into the middle of the site. Most of the North Broadway Site is located on the top of a hill approximately 60 feet above the average grade of North Broadway.

The closest natural water course or body of water to the North Broadway Site is the Saw Mill River (see Figure 2-4). Part of the Site exists in a combined sewer area; however, the developer will investigate the possibility of separating the sewers where possible and allowing stormwater to drain to the Saw Mill River. The stormwater runoff from the upper portion of the North Broadway Site along Overlook Terrace and Locust Hill Avenue joins the combined sewer system and ultimately drains to the Hudson River after treatment at the Westchester County-owned Yonkers Joint Wastewater Treatment Facility via the North Yonkers Pump Station which lies west of the North Broadway Site on Alexander Street. As noted above, the Hudson River has a NYSDEC water quality classification of SB in this area.

To the immediate west of the North Broadway Site is the Mill Street section of the daylighted Saw Mill River (see Figure 2-4). As discussed above, downstream of this daylighted section, the Saw Mill River briefly flows underground again until reaching Woodworth Avenue, at which point flow is partially diverted to form a “daylighted” section of the river through van der donck Park, which was completed in 2012. The river then flows underneath the MNR tracks and ultimately discharges into the Hudson River. The Saw Mill River in the vicinity of the North Broadway Site is classified as a Class C stream, which are waters best used for fishing.

Stormwater is generated from the existing buildings and pavement of the North Broadway Site and drains to two POAs (see Figure 9-4). Roughly half of the North Broadway Site flows to the west down the hill and is collected by the stormwater system in North Broadway (POA-A) while the rest of the North Broadway Site drains to the east and is collected by the combined sewer system in Locust Hill Avenue (POA-B). Stormwater generated from the North Broadway Site does not receive treatment and, therefore, contains typical pollutants of urban stormwater runoff.

A summary of pre-development peak discharge flow rates to each POA is provided in Table 9-3. For the drainage analysis, POA-A is the storm sewer system in North Broadway and POA-B is the combined sewer system in Locust Hill Avenue. Refer to Figure 9-4 for a Drainage Area Map of the pre-development site conditions. Pre-development Hydrograph Calculations for the North Broadway Site are included in Appendix J-3.

Table 9-3
North Broadway Site Pre-Development Peak Discharge Flow Rates

	1-year (cfs)	10-year (cfs)	100-year (cfs)
POA-A (North Broadway storm sewer)	1.91	4.50	8.78
POA-B (Locust Hill combined sewer)	1.87	3.84	6.97
Total	3.78	8.34	15.74
Note: cfs = cubic feet per second			
Source: Appendix J-3			

C. FUTURE WITHOUT THE PROPOSED PROJECT

The Project Sites currently have no stormwater quality treatment or stormwater quantity control practices. Stormwater runoff from the Project Sites sheet flows to the MNR tracks, and enters the City’s combined storm and sanitary sewer system, the separate City storm sewer system, and the Saw Mill River, un-detained and untreated, which creates a high potential for pollutants to enter the Saw Mill River and Hudson River. Drainage patterns, systems, and runoff rates are not anticipated to change in the future without the Proposed Project. In the future without the Proposed Project, stormwater runoff would continue to enter the City drainage system and Saw Mill River and Hudson River un-detained and untreated.

Development of the Project Sites under the existing zoning, as discussed more fully in Chapter 17, “Alternatives,” would be subject to the same stormwater detention and treatment requirements to prevent adverse impacts to the City’s combined storm and sanitary sewer system, the separate storm sewer system, and the Saw Mill River. Additional background growth and development within the Downtown Yonkers area would also be subject to the same stormwater detention and treatment requirements.

D. FUTURE WITH THE PROJECT (BUILD CONDITION)

The following sections describe the proposed post-completion stormwater management systems and changes to drainage patterns and subsurface conveyance systems for each Project Site. Proposed changes to lot and building coverage are described, along with post-development peak runoff rates for the 1-, 10-, and 100-year storm events for each of the Project Sites. Water quality volume calculations, where required, are also provided.

D.1. TEUTONIA SITE

The Teutonia Project would redevelop the Teutonia Site with two residential towers above a six-story podium. The Teutonia Project would result in an increase to the Teutonia Site’s impervious coverage from both the 2013 and 2021 conditions (see **Table 9-4**). To mitigate this increase in impervious coverage, the Teutonia Project would include a stormwater management infrastructure design that would mimic pre-development drainage patterns and that would control the peak flow rates of project-generated runoff. Under post-development conditions, stormwater generated from newly constructed impervious surfaces would be directed to the combined sewer system and, therefore, would not receive water quality treatment prior to leaving the Teutonia Site.

Table 9-4
Teutonia Site Existing and Proposed Drainage Area Coverage

	2013 Coverage	Existing Coverage	Proposed Coverage
Total Site Area (acres)	1.15	1.15	1.15
Total Impervious Area (acres)	0.64	0.00	1.10
Total Pervious Area (acres)	0.51	1.15	0.05
Percent Impervious	55%	0%	96%
Total Building Area (acres)	0.55	0.00	1.06
Percent Building Coverage	48%	0%	92%

Stormwater quantity would be addressed by providing a 43-foot-by-16-foot-by-8-foot (LxWxH) Stormtrap vault with an outlet control in the building’s below-grade garage, which would detain the building’s roof runoff. The proposed Stormtrap vault detention system would be located in the northern portion of the parking structure (see **Figure 9-5**), which is on the downstream end of the existing combined sewer in front of the Teutonia Site to which Site runoff would connect. As the detention system would be installed during Phase 1 and would account for runoff and peak flow attenuation of the entire Teutonia Project, no considerations would be needed for phased or temporary detention controls.

By providing detention, the post-development peak discharge flow rates would be decreased from pre-development conditions, with one exception. Although the total Teutonia Site runoff rate for the 1-year storm would be approximately 32 percent higher post-development compared to 2021 existing conditions (i.e., vacant lot), when compared to the 2013 conditions (prior to building demolition), the 1-year storm runoff rate would be reduced by 23 percent. A summary of the post-development peak discharge flow rates to each Point of Analysis for the Teutonia Site and a comparison of pre- vs post-development peak flows is provided in **Table 9-5**. Refer to **Figure 9-5** for a Drainage Area Map of the post-development site conditions. Post-development Hydrograph Calculations for the Teutonia Site are included in **Appendix J-1**.

Table 9-5

Teutonia Site Pre- vs Post-Development Peak Discharge Flow Rates Comparison

	POA-A (combined sewer)	POA-B (overland to railroad)	Total
1-year (cfs)			
Pre-Development 2013	1.59	0.44	2.02
Post-Development	1.47	0.06	1.51
Reduction	8%	86%	25%
10-year (cfs)			
Pre-Development 2013	3.01	1.33	4.34
Post-Development	2.42	0.16	2.52
Reduction	20%	88%	42%
100-year (cfs)			
Pre-Development 2013	5.23	2.87	8.10
Post-Development	5.11	0.33	5.33
Reduction	2%	89%	34%
Note: cfs = cubic feet per second			
Source: Appendix J-1			

Stormwater quality would not need to be addressed for the Teutonia Project as stormwater runoff from the Project’s impervious surfaces would be directed to the combined sewer system in Buena Vista Avenue and would ultimately be treated at the Yonkers Joint Wastewater treatment facility. The nearest separate storm sewers to the Teutonia Site exist on the opposite (west) side of the MNR tracks and at the north end of Buena Vista Avenue at its intersection with Main Street. The Metropolitan Transportation Authority has not allowed for installation of utilities underneath their railroad tracks in the past, which prevents a connection to that separate system for the Teutonia Project. In review with Yonkers Department of Engineering, significant utility infrastructure upgrades have recently been constructed within the Buena Vista Avenue right-of-way, mainly from Con Edison. Based on record drawings and other available information, there are a multitude of existing utility crossings along the approximately 400 linear feet of Buena Vista Avenue that would make a connection to the Main Street existing storm sewer impractical.

As discussed in Chapter 8, “Infrastructure and Utilities,” the existing combined sewer in Buena Vista Avenue from Prospect Street to Main Street may need to be replaced. In order to confirm this and appropriately size any new, larger, pipe that may be required, a video inspection and flow monitoring program was created with the City’s Engineering Department, as discussed more fully in Chapter 8, “Infrastructure and Utilities.”

D.2. CHICKEN ISLAND SITE

The Chicken Island Project would redevelop the Chicken Island Site with a five-building mixed-use development, resulting in an increase to the Chicken Island Site’s impervious coverage (see **Table 9-6**). The Chicken Island Project would include stormwater management infrastructure that would mimic the pre-development conditions drainage patterns, improve stormwater quality, and control the peak discharge flow rates generated by the proposed improvements.

Table 9-6

Chicken Island Site Existing and Proposed Drainage Area Coverage

	Existing Coverage	Proposed Coverage
Total Site Area (acres)	5.76	5.76
Total Impervious Area (acres)	4.58	5.43
Total Pervious Area (acres)	1.18	0.33
Percent Impervious	80%	94%
Total Building Area (acres)	0	3.64
Percent Building Coverage	0%	63%
Note: Total site area evaluated for the Chicken Island watershed analyses includes all disturbance areas, which includes areas in the right-of-way, and therefore is larger than the 5.25-acre Chicken Island Site.		

Stormwater quantity control would be addressed by providing detention systems on below-grade levels of each of the proposed buildings, with the exception of the small retail building (Building 1A), which would detain the roof runoff. By providing detention, the post-development peak discharge flow rates are decreased from pre-development conditions. A total of four detention systems would be necessary to achieve the peak flow reduction requirements for the drainage areas analyzed within the Chicken Island Project. As the detention systems provided for each building account for the peak flow reductions in each individual building, no additional calculations or detention controls are required for phasing considerations over the lifespan of the Chicken Island Project.

The detention system in Building 1 would be located in the below-grade levels of the parking garage near the intersection of James Street and Centre Street allowing discharge into a new, separate storm system that will connect to the Saw Mill River culvert underneath Ann Street through an existing pipe and manhole (POA-B) (see **Figure 9-6**). The detention system would be a 49-foot-by-16-foot-by-8-foot (LxWxH) Stormtrap Vault with an outlet control to reduce flows (see **Figure 9-6**).

The system in Building 2 would be located below-grade in the southwest corner of the building and discharge to the proposed storm sewer in Centre Street. The Centre Street storm sewer, which also conveys stormwater from John Street, would be constructed by the Applicant and connected to an existing manhole at the intersection of Ann Street, James Street, and Centre Street. From there, the stormwater would enter the existing storm sewer system and discharge into the Saw Mill River (POA-B). Locating the detention system in the southwest corner would allow for Building 3 to connect to the system, when it is constructed. The detention system would be designed for the full build out of Buildings 2 and 3 and would be a 49-foot-by-16-foot-by-8-foot (LxWxH) Stormtrap Vault with an outlet control to reduce flows (see **Figure 9-6**).

Building 4 would include a detention system located below-grade in the northeast corner of the building and discharge to the nearby Saw Mill River culvert that runs underneath the Chicken Island Site (POA-B). The detention basin in Building 4 would be a 23.5-foot-by-16-foot-by-7-foot (LxWxH) Stormtrap vault with an outlet control to reduce flows (see **Figure 9-6**).

The detention system in Building 5 would be located below-grade in the southwest corner of the building and discharge to the adjacent Saw Mill River prior to entering the culvert underneath New School Street (POA-B). The detention basin would be a 23.5-foot-by-

16-foot-by-8-foot (LxWxH) Stormtrap vault with an outlet control to reduce flows (see Figure 9-6).

A summary of the post-development peak discharge flow rates to each POA and a comparison of pre- vs post-development peak flows is provided in Table 9-7. Refer to Figure 9-6 for a Drainage Area Map of the post-development site conditions. Post-development Hydrograph Calculations for the Chicken Island Site are included in Appendix J-2.

**Table 9-7
Chicken Island Site Pre- vs Post-Development
Peak Discharge Flow Rates Comparison**

	POA-A (combined sewer)	POA-B (Saw Mill River)	Total
1-year (cfs)			
Pre-Development	4.34	7.91	12.25
Post-Development	1.29	7.31	8.60
Reduction	70%	8%	30%
10-year (cfs)			
Pre-Development	8.68	15.39	24.07
Post-Development	2.40	15.15	17.45
Reduction	72%	2%	28%
100-year (cfs)			
Pre-Development	15.53	27.18	42.71
Post-Development	4.13	26.25	30.39
Reduction	73%	3%	29%
Note: cfs = cubic feet per second			
Source: Appendix J-2			

The existing Saw Mill River culvert, which extends underneath New School Street and the existing Chicken Island parking lot, and the City park adjacent to the southern corner of the Chicken Island Site are within close proximity to the Chicken Island Project’s proposed construction, in particular Building 3 and Building 4. The existing river culvert is approximately 90 years old. As discussed in Chapter 15, “Construction,” adequate shoring and bracing would need to be designed and provided by a structural engineer at those building locations to protect the existing Saw Mill River facilities. Table 9-8 shows the proposed storm drain connections from the buildings for the Chicken Island Project.

**Table 9-8
Chicken Island Project Proposed Storm Lateral Connections**

Building	Storm Service Size	Connection Location	Connecting Storm Main Size/Material	Connecting Storm Main Depth
Building 1	18-inch HDPE	James St	20-inch	12 ft
Building 1A	15-inch HDPE	James St	24-inch	7 ft
Building 2	18-inch HDPE	Centre St	18-inch	5 ft
Building 3	18-inch HDPE (same pipe as Building 2)	Centre St	18-inch	5 ft
Building 4	15-inch HDPE	Saw Mill Culvert	-	-
Building 5	15-inch HDPE	Saw Mill Culvert	-	-
Note: HDPE = high-density polyethylene				
Source: Appendix C-3				

The Chicken Island Project would be designed such that stormwater quality would meet the stormwater rules and regulations of NYSDEC and the City. A combination of tree pits, stormwater planters, and manufactured treatment devices would provide treatment for stormwater from the redeveloped areas that would ultimately discharge to the Saw Mill River under post-development conditions. The preliminary Water Quality Volume (WQv) associated with the new development areas of the Chicken Island Site would be 5,069 cubic feet and the WQv associated with redeveloped areas of the Chicken Island Site would be 20,255 cubic feet (see **Appendix J-2**). The water quality volume is intended to improve water quality by capturing and treating runoff from frequent small storm events that tend to contain higher pollutant levels. The calculation for new development activities assumes that the site was previously undeveloped and requires a stricter treatment volume rate, whereas for redevelopment activities it is assumed that the site was currently developed with impervious coverage and the treatment requirements are lessened. Calculations for the water quality volume rates are included in **Appendix J-2**.

Stormwater quality would not need to be addressed for the portion of Site, mainly frontage along Palisade Avenue and James Street, that would discharge to the 48-inch brick combined sewer system under post-development conditions, since the water in this system would be treated at the public wastewater treatment facility.

As discussed in Chapter 8, “Infrastructure and Utilities,” the additional sanitary sewer flow from the Chicken Island Project may require the replacement or relining of the combined sanitary sewers in James Street, John Street, and New School Street. In order to confirm this, as well as identify the location and extent of existing sewer pipes that could be relined as part of the Applicant’s overall mitigation program, a video inspection and flow monitoring program was created with the City’s Engineering Department. Proximate to the Chicken Island Site, the combined sanitary and storm sewers being analyzed are the following:

- Separate storm sewers at the intersection of James Street and Ann Street, which discharge to the Saw Mill River culvert under Ann Street. Pipe sizes vary between 12 and 30 inches.
- Combined brick sewer in New Main Street which discharges to the flow vault in Getty Square. Pipe size varies between 36 and 48 inches along New Main Street.
- Combined brick sewers in Nepperhan Avenue which flows to New Main Street and ultimately discharges to the flow vault in Getty Square. Pipe sizes vary between 30 inches and 24x36 inches.
- Combined sewer in the intersection of Nepperhan Avenue and New School Street and a small section of combined sewer at the south end of New School Street. Pipe sizes vary between 12 and 18 inches.
- Combined 48-inch brick sewer in Palisade Avenue which discharges to the flow vault in Getty Square.
- Combined 18-inch sewer in James Street which flows to Palisade Ave and ultimately discharges to the flow vault in Getty Square.
- Combined 18-inch sewer in John Street.
- Section of 12-inch combined sewer in New School Street extending north from John Street.
- Section of 15-inch combined sewer in New School Street extending south from John Street.

D.3. NORTH BROADWAY SITE

The North Broadway Project would redevelop the North Broadway Site with two residential towers, a parking garage, and commercial spaces fronting North Broadway. Building 1 would be on the south side of Overlook Terrace and Building 2 and the parking garage would be to the north (see **Figure 9-7**). Also proposed is a stair plaza at the end of Overlook Terrace that vertically connects to North Broadway. The North Broadway Project would result in an increase to the North Broadway Site’s impervious coverage (see **Table 9-9**). To mitigate this increase in impervious coverage, the North Broadway Project would include stormwater management infrastructure that would mimic the pre-development conditions drainage patterns, improve stormwater quality, and control the peak discharge flow rates of the runoff generated by the North Broadway Project.

Table 9-9
North Broadway Site Existing and Proposed Drainage Area Coverage

	Existing Coverage	Proposed Coverage
Total Site Area (acres)	2.26	2.26
Total Impervious Area (acres)	1.00	2.16
Total Pervious Area (acres)	1.26	0.10
Percent Impervious	44%	96%
Total Building Area (acres)	0.54	1.56
Percent Building Coverage	24%	69%

Note: The total site area evaluated for North Broadway watershed analyses includes all disturbance areas, which includes areas in the right-of-way, and therefore is larger than the North Broadway Site property.

Under post-development conditions, stormwater generated by the roofs of the residential towers and parking garage, and their associated pavement areas, would be collected and conveyed to two Stormtrap vaults with outlet control. One would be a 30-foot-by-30-foot-by-2.5-foot (LxWxH) vault located under the vehicular turnaround and Building 1 entrance and the other would be a 65-foot-by-30-foot-by-5.5-foot (LxWxH) vault located below the entrance of the parking garage and Building 2 (see **Figure 9-7**). Stormwater would discharge from the detention systems and would connect to the combined sewer system in Locust Hill Avenue via a new storm sewer installed by the Applicant in Overlook Terrace. Conveyance of post-detention stormwater to the separate storm system in North Broadway is impractical as it would need to be piped down through the lobby and retail spaces in order to connect. Stormwater generated from the stair plaza, which represents a small portion of the North Broadway Site, would flow towards North Broadway undetained. As the detention systems provided for each building account for the peak flow reductions in each individual building, no additional calculations or detention controls are required for phasing considerations over the lifespan of the North Broadway Project.

A summary of the post-development peak discharge flow rates to each POA and a comparison of pre- vs post-development peak flows is provided in **Table 9-10**. Refer to **Figure 9-7** for a Drainage Area Map of the post-development site conditions. Post-development Hydrograph Calculations for the North Broadway Site are included in **Appendix J-3**.

Table 9-10
North Broadway Site Pre- vs Post-Development
Peak Discharge Flow Rates Comparison

	POA-A (North Broadway storm sewer)	POA-B (Locust Hill combined sewer)	Total
1-year (cfs)			
Pre-Development	1.91	1.87	3.78
Post-Development	0.81	1.73	2.54
Reduction	58%	8%	33%
10-year (cfs)			
Pre-Development	4.50	3.84	8.34
Post-Development	1.53	3.61	5.05
Reduction	66%	6%	39%
100-year (cfs)			
Pre-Development	8.78	6.97	15.74
Post-Development	2.66	6.53	9.19
Reduction	70%	6%	52%
Note: cfs = cubic feet per second			
Source: Appendix J-3			

For the storefronts, lobbies, etc. located along North Broadway at lower elevations on the North Broadway Site, there would be roof and area drain inlets that would discharge the collected runoff to the existing separated storm sewer in North Broadway. These separated storm sewers discharge to the nearby Saw Mill River. No detention would be provided for this portion of the proposed drainage system.

Stormwater quality would only need to be addressed for stormwater generated by the stair plaza, as the other stormwater generated by the proposed improvements would be discharged to the combined sanitary and storm sewer in Locust Hill Avenue. A combination of tree pits and a manufactured treatment device would provide treatment for stormwater from the areas that would ultimately discharge to the Hudson River under post-development conditions. The pedestrian stair plaza and neighboring building would be both new development and redevelopment activities. In accordance with the NYSDEC Stormwater Management Design Manual, new and redevelopment areas must be provided with water quality treatment as determined by a calculated water quality volume (WQv) to minimize impacts of runoff pollutants in the nearby sewer systems. The preliminary WQv associated with new development activities would be 574 cubic feet and the WQv associated with redevelopment activities would be 1,138 cubic feet (see **Appendix J-3**). The calculation for new development activities assumes that the site was previously undeveloped and requires a stricter treatment volume rate, whereas for redevelopment activities it is assumed that the site was currently developed with impervious coverage and the treatment requirements are lessened. Calculations for the water quality volume rates are included in **Appendix J-3**.

As discussed in Chapter 8, “Infrastructure and Utilities,” the additional sanitary sewer flow from the North Broadway Project may require the replacement of the combined sanitary sewer in Locust Hill Avenue from Overlook Terrace to Palisade Avenue and in Baldwin Place from Locust Hill Avenue to its terminus at North Broadway. In order to confirm this and appropriately size the new, larger, pipe that may be required, a video inspection and flow monitoring program was created with the City’s Engineering

Department. Proximate to the North Broadway Site, this program includes the combined sanitary and storm sewers in the following locations:

- Approximately 250 linear feet of 18-inch combined sewer in Locust Hill Avenue, extending from Overlook Terrace to the intersection between Palisade Avenue and Locust Hill Avenue.
- Approximately 300 linear feet of 12-inch combined sewer in Baldwin Place, extending west to North Broadway.
- Approximately 450 linear feet of 18-inch combined sewer in North Broadway, extending north and south from Manor House Square.
- Approximately 200 linear feet of combined sewer in Manor House Square, extending from North Broadway to Warburton Avenue.

E. MITIGATION MEASURES PROPOSED

The Proposed Project would implement temporary mitigation measures during construction to reduce erosion and sedimentation, as discussed in Chapter 15, “Construction.” These measures are detailed in the Soil Erosion and Sediment Control (SESC) Plan included within the preliminary SWPPP for each Project Site (**Appendices J-1, J-2, and J-3**). The SESC Plans identify the location, type, and sizing of SESC measures. Additional detail regarding these measures would be provided in the final SWPPP as part of the Site Plan Approval process.

The Proposed Project would include permanent measures to mitigate impacts to downstream flooding conditions. These measures include a detention system at the Teutonia Site, four individual detention systems at the Chicken Island Site, and two individual detention systems at the North Broadway Site. The detention systems at all three Sites would provide stormwater discharge control, which would assist in reducing the downstream flooding effects during larger storm events, as well as impacts that occur during more frequent small storm events to the combined sanitary and storm systems throughout the City.

The Proposed Project would also include permanent measures to provide water quality treatment to the stormwater runoff generated from each of the three sites. These measures consist of a combination of both Green Infrastructure (GI) techniques, which could include planting of tree pits along the public roads and rights-of-way, green roofs and stormwater planters, and alternative proprietary practices for redevelopment areas, which include manufactured treatment devices (MTDs). MTDs used for redevelopment areas are all State-approved devices as manufactured by Contech Engineered Solutions, Hydroworks, or others, and are designed to meet the treatment criteria for pollutant removal as specified in the NYSDEC Stormwater Management Design Manual. These water quality treatment measures at each of the Project Sites would provide treatment to some of the stormwater runoff from these Sites prior to discharge, which would improve the downstream water quality.

As discussed in Chapter 8, “Infrastructure and Utilities,” in order to accommodate the increased sanitary flow from the Proposed Project, portions of the combined sewer within Buena Vista Avenue, Locust Hill Avenue, Baldwin Place, James Street, John Street, and New School Street may need to be replaced with new, larger, pipes. In order to confirm this and appropriately size the new, larger, pipe that may be required, a sewer televising and flow monitoring program has been developed in collaboration with Yonkers Engineering Department. This program will also assist the City in identifying the location and extent of existing sewer pipes that could be relined

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as part of the Applicant's overall mitigation program. Inflow and infiltration into the combined sewer system would also be reduced, as discussed in Chapter 8, "Infrastructure and Utilities." Specifically, the entirety of the stormwater runoff from the Chicken Island Site and from some of the surrounding roadways will be separated from the combined sewer system and will now be conveyed to the nearby Saw Mill River, reducing approximately 1.5 acres of drainage area runoff from the combined sewer. *