# A. INTRODUCTION

New York City's water and sewer network is fundamental to the operation, health, safety, and quality of life of the City and its surrounding environment, and it must be sized to provide clean drinking water and collect and deliver wastewater during dry and wet weather to protect water quality in and around New York City and public health. Ensuring these systems have adequate capacity to accommodate land use or density changes and new development is critical to avoiding environmental and health problems such as sewer back-ups, street flooding, or pressure reductions.

This chapter aims to analyze how the Proposed Actions would affect the water and sewer system, combined sewer overflow (CSO) volume discharges, and pollutant loads to the Gowanus Canal under the No Action and With Action conditions, including the Unified Stormwater Rule.

## EXISTING ON-SITE STORMWATER MANAGEMENT REQUIREMENTS AND PROPOSED UNIFIED STORMWATER RULE

In 2012, DEP promulgated a stormwater rule for new and redevelopment projects in combined sewer areas (2012 Stormwater Rule).[1] The 2012 Stormwater Rule, in place today, reduces peak discharges to the city's sewer system during large rain events by requiring greater on-site storage of stormwater runoff and slower release to the sewer system.

After ten years of implementation of the NYC Green Infrastructure Program, the New York City Department of Environmental Protection (DEP) is again updating on-site stormwater management requirements to apply lessons learned in designing, siting and constructing over 10,000 green infrastructure practices. DEP is proposing amendments to Chapters 31 and 19.1 of Title 15 of the Rules of the City of New York (RCNY) as part of a Unified Stormwater Rule. The Unified Stormwater Rule, to be administered citywide, will update and align Chapter 31 stormwater quantity and flow rate requirements with Chapter 19.1 Construction/Post-Construction permitting program water quality requirements. Under Chapter 31 amendments, the Unified Stormwater Rule increases the amount of stormwater required to be managed on-site and further restricts the release rates for all new and redevelopment projects that require a DEP House or Site Connection Proposal. Additionally, under Chapter 19.1 amendments, sites that disturb 20,000 square feet (sf) or more of soil or increase impervious surfaces by 5,000 sf or more will be required to manage the Water Quality Volume (WQv), currently defined as 1.5", using stormwater management practices (SMPs) dictated by DEP SMP hierarchies. DEP has developed hierarchies for both combined and separate sewer areas. The SMP hierarchies prioritize vegetated retention SMPs for both drainage areas with stormwater volume control and stormwater treatment communicated as the underlying

[1] Chapter 31 of Title 15 of the Rules of the City of New York, Rule Governing House/Site Connections to the Sewer System Standards for Release Rates

goals for combined and separate sewer areas, respectively. For sites that trigger the Chapter 19.1 component of the Unified Stormwater Rule, the hierarchy is mandatory, meaning that developers must start with the most preferred SMP and provide documentation of site constraints that prevent implementation in order to choose an alternate SMP. The combined sewer SMP hierarchy is shown in **Figure 11-1**. The priority level of each SMP group is indicated by tiers with different colors, where the darker shades of green indicate higher tier SMPs.

In August 2020, New York City Council passed Intro No. 1851,[2] enabling DEP to move forward with the Chapter 19.1 amendments necessary to package the Unified Stormwater Rule amendments. Draft rules are anticipated to be published by the end of 2021 and in effect no later than June 30, 2022. A new New York City Stormwater Management Guidance Manual will accompany the Unified Stormwater Rule to provide clear guidance on requirements and design options. The draft manual will be published along with the draft rules by the end of 2021.

The Unified Stormwater Rule is expected to lead to a substantial improvement in the way that individual new and redeveloped properties manage stormwater compared to the 2012 Stormwater Rule. In some cases, stormwater will be entirely prevented from entering the city sewer system through retention and, in most cases, stormwater that does enter the system will be reduced and/or treated and released at a much lower rate, allowing the existing sewer system to operate more efficiently during peak wet weather events. In combined sewersheds, such as the Gowanus Canal, the Unified Stormwater Rule is expected to lead to a reduction in CSO volume as more lots redevelop over time. The Unified Stormwater Rule is presented as part of this analysis due to the cumulative benefits in CSO volume reduction resulting from lots that are expected to be redeveloped, and therefore would be subject to the updated on-site stormwater management requirements, as part of the Proposed Actions. Given that the Unified Stormwater Rule is independent from the Proposed Actions, the Rule is additionally described in the No Action and With Action sections below. More details on the Unified Stormwater Rule and forthcoming outreach can be found on DEP's website: https://www1.nyc.gov/site/dep/water/unified-stormwater-rule.page.

## PRINCIPAL CONCLUSIONS

This chapter assesses the potential effects of the Proposed Actions on the City's water supply, wastewater treatment, and stormwater management infrastructure in accordance with the 2020 *City Environmental Quality Review (CEQR) Technical Manual*.

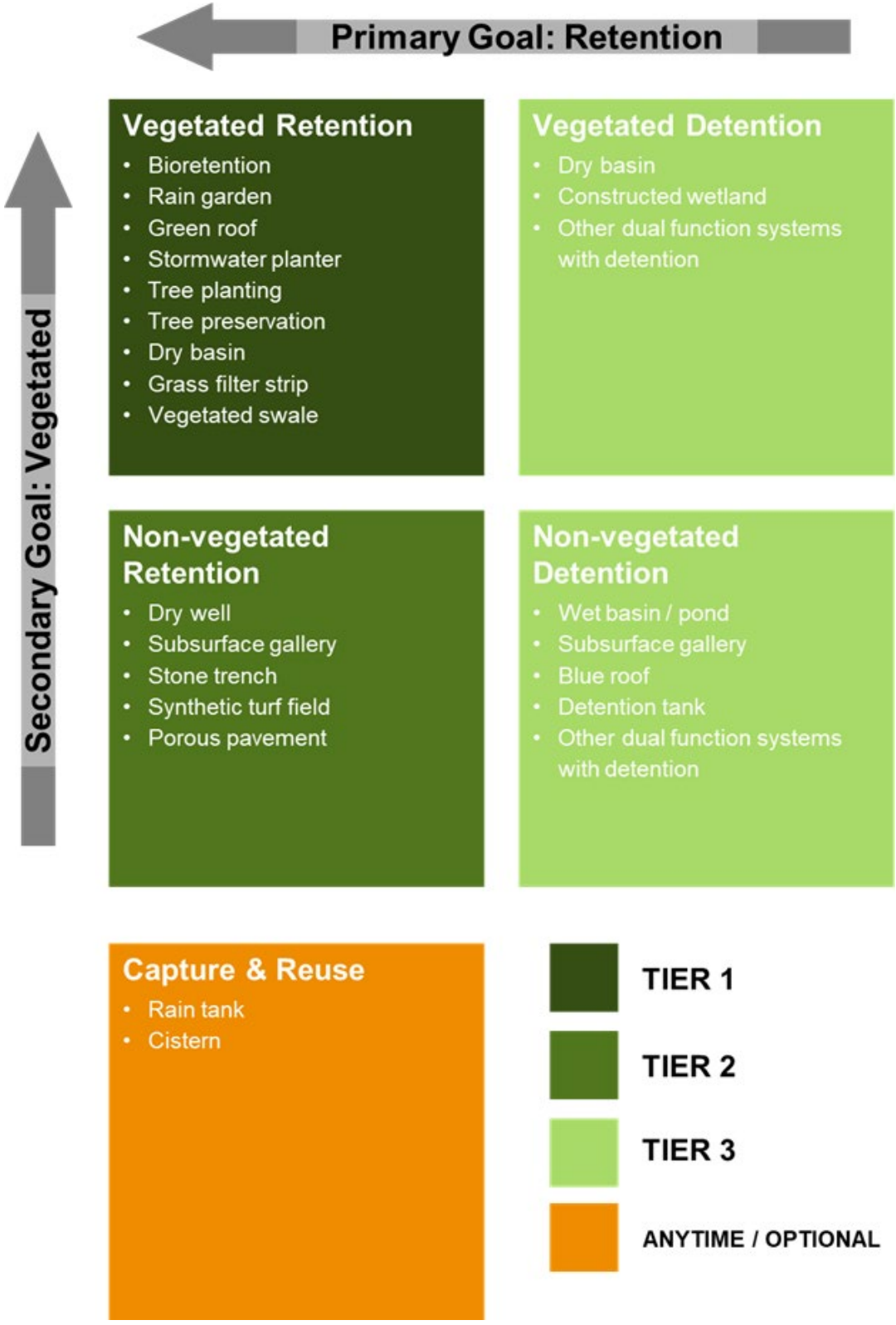
The Proposed Actions would not result in a significant adverse impact on the City's water supply, wastewater treatment, or stormwater management infrastructure, as described in the following screening and detailed analyses and summarized below.

### *WATER SUPPLY*

The Proposed Actions were assessed using the preliminary screening level standards in accordance with the *CEQR Technical Manual*. The Proposed Actions would not result in significant adverse impacts on the City's water supply system. Projected development resulting from the Proposed Actions would be expected to generate a water demand of approximately 4.3 million gallons per day (mgd) in the With Action condition, an increase of 3.5 mgd, compared with demand in the No

[2] Int 1851-2020 https://nyc.legistar.com/LegislationDetail.aspx?ID=4313347&GUID=37C19DB2-25C0-4D86-8231-50B86C3CB717&Options=&Search=%20November%2018,%202020,%2012:51%20PM

1.14.21




*Source: NYC Dept of Environmental Protection*

DEP Stormwater Management Practices Hierarchy

Action condition. Future incremental demand from the projected developments would be dispersed throughout the Project Area and would represent approximately 0.35 percent of the City's average daily water supply of approximately one billion gpd. This added demand would therefore not result in a significant impact on the City's water supply system.

*WASTEWATER TREATMENT*

The Proposed Actions were assessed using the preliminary screening level standards in accordance with the *CEQR Technical Manual.* The projected development sites are located within the Gowanus Canal sewershed. The Project Area is served by the Red Hook Wastewater Resource Recovery Facility (WRRF) and the Owls Head WRRF. Within the Project Area there are five subcatchment drainage areas for the Red Hook WRRF service area and one subcatchment area in the Owls Head WRRF service area. Development under the With Action condition is expected to generate a total of approximately 2.4 mgd of sanitary sewage of which 1.6 mgd would be directed to the Red Hook WRRF and the balance, approximately 0.8 mgd, would be directed to the Owls Head WRRF.

In the Red Hook WRRF service area, the With Action sanitary sewage generation of approximately 1.6 mgd would represent an increase of approximately 1.3 mgd over the No Action condition. With an existing flow of 27 mgd (below the maximum dry weather flow permitted capacity of 60 mgd) and the addition of approximately 1.3 mgd on the projected development sites, which represents 2.2 percent of the permitted capacity, the Red Hook WRRF would continue to have reserve capacity. Similarly, the With Action sanitary sewage generation in the Owls Head WRRF service area of approximately 0.8 mgd would represent an increase of approximately 0.6 mgd over the No Action condition. With an existing flow of 94 mgd (below the maximum dry weather flow permitted capacity of 120 mgd) and the addition of approximately 0.6 mgd on the projected development sites, which represents 0.5 percent of the permitted capacity, the Owls Head WRRF would also continue to have reserve capacity. Therefore, no significant adverse impacts to the City's wastewater treatment services would occur as a result of the Proposed Actions.

*STORMWATER AND DRAINAGE MANAGEMENT – DETAILED ANALYSIS*

Based on the guidance of the *CEQR Technical Manual*, a detailed analysis was performed to determine the potential for the Proposed Actions to affect CSO discharges to the Gowanus Canal as well as any other impacts to the City's sewer system.

The detailed analysis (see **Appendix F**) was based on hydrologic and hydraulic modeling utilizing the InfoWorks Integrated Catchment Models (ICM) developed for DEP's long-term control plan[3] (LTCP) and Superfund projects for the Red Hook WRRF and Owls Head WRRF service areas, and updated to incorporate the stormwater infrastructure improvements being undertaken and proposed by DEP for the Gowanus Canal drainage area and the forthcoming citywide Unified Stormwater Rule. Independent of the Proposed Actions, DEP has undertaken extensive stormwater infrastructure improvements in the Gowanus Canal sewershed to control CSOs being discharged into the waterbody, including an updated Gowanus Wastewater Pumping Station, High Level Storm Sewers (HLSS), and Green Infrastructure, as described below in the No Action condition. Future additional improvements are expected to be constructed, in particular

[3] https://www1.nyc.gov/site/dep/water/gowanus-canal.page

CSO control facilities mandated by the U.S. Environmental Protection Agency (EPA) in connection with the ongoing Superfund remediation of the Canal.

The analysis found that, under the With Action condition, with the additional development facilitated by the Proposed Actions, CSO volumes would decrease as compared with the No Action condition despite the increase to sanitary flows from new development. This reduction in CSO volumes is a result of the new on-site stormwater management volume requirements under the Unified Stormwater Rule, which increases the total volume of water that must be managed on new and redeveloped properties as well as updates the type and performance of on-site stormwater management practices that must be implemented. In the Project Area, the Unified Stormwater Rule ensures that redeveloped properties manage more total stormwater and manage it more efficiently than prior to redevelopment. This improved on-site stormwater management on the redeveloped properties is substantial enough that it would offset the increase in sanitary flow, so CSO volumes to the Canal would decrease overall. While the Proposed Actions are anticipated to add approximately 18,000 new residents to the Project Area on 63 projected development sites, generating additional sanitary flow of 1.29 mgd (see description of detailed analysis methodology below), the vast majority of this additional flow would be conveyed to the WRRF for treatment, with the exception of during more intense wet weather events. The Unified Stormwater Rule benefits in the Project Area more than offset the increase in sanitary flows and, even with the increased population and sanitary flow, would result in approximately 5 million gallons per year of CSO reduction to the Gowanus Canal. In addition, in the With Action condition, CSO volumes discharged to the Canal would remain well below existing conditions, and the Proposed Actions would not affect the City's ability to meet the EPA Superfund requirements.

A pollutant load assessment was also performed to analyze whether the Proposed Actions and associated development would result in greater pollutant loadings discharged to the Gowanus Canal. The assessment found that the estimated pollutant loads to Gowanus Canal decreased, due to the decrease in CSO volumes as described above. Therefore, the Proposed Actions are not projected to affect CSO discharges or water quality in the Gowanus Canal, and would not result in significant adverse impacts on DEP infrastructure in the Gowanus Canal drainage area.

## B. METHODOLOGY

According to the *CEQR Technical Manual***,** a preliminary water supply infrastructure analysis is needed if a project would result in an exceptionally large demand for water (e.g., more than one mgd) or is in an area that experiences low water pressure (e.g., areas at the end of the water supply distribution system). The Project Area is not in an area that experiences low water pressure; the Proposed Actions would result in net water demand of approximately 3.5 mgd (compared with the No Action condition). Therefore, an assessment of water supply is warranted.

The *CEQR Technical Manual* indicates that for wastewater and stormwater conveyance and treatment analyses, a preliminary assessment is needed if a project is in a combined sewer area and would exceed the following incremental development of residential units or commercial space above the No Action condition: (a) 1,000 residential units or 250,000 sf of commercial and/or community facility space in Manhattan; or (b) 400 residential units or 150,000 sf of commercial space in the Bronx, Brooklyn, Staten Island, or Queens. As the Proposed Actions would result in a net increase of more than 400 residential units and over 150,000 sf of commercial and community facility space in a section of Brooklyn, an assessment of wastewater and stormwater infrastructure is provided.

To assess the potential impacts of the Proposed Actions on water and sewer infrastructure, this chapter:

- Describes the existing water and sewer infrastructure serving the Project Area;
- Describes planned No Action infrastructure improvements in the Project Area, project components, and current schedules;
- Provides a preliminary analysis which estimates water demand and sewage generation on the projected development sites under Existing and No Action conditions based on use generation rates provided in the *CEQR Technical Manual* and the 2016 *East New York Rezoning Proposal Final Environmental Impact Statement (FEIS)*[4]. The preliminary analysis also calculates stormwater runoff and sanitary flows using the DEP Volume Calculation Matrix. The preliminary analysis then forecasts water demand and sewage and stormwater generation by the projected developments induced by the Proposed Actions under the Reasonable Worst Case Development Scenario (RWCDS) based on *CEQR Technical Manual* guidelines;
- Summarizes the detailed analysis of the Proposed Actions' potential effects on sewer infrastructure and CSO discharges performed by DEP using the InfoWorks Integrated Catchment Model developed for the Gowanus Canal CSO LTCP and Superfund projects (discussed in detail below);
- Assesses the effects of the With Action water demand and sewage and stormwater generation on the City's water and sewer infrastructure based on the preliminary and detailed analyses, pursuant to *CEQR Technical Manual* guidelines.

The DEIS included calculations using two different assumptions for per capita sanitary flow. Following the *CEQR Technical Manual* guidance, a preliminary screening level assessment was performed. In accordance with the *CEQR Technical Manual*, the screening assessment uses 100 gallons per day (gpd) sanitary flow. This flow rate is used for desktop evaluations in order to determine if a detailed analysis is warranted. The 100 gpd flow rate is a conservative estimate made at the time of the 2010 *CEQR Technical Manual*. However, based on the preliminary screening level assessment, a detailed analysis was performed, which determined that 73 gpd was appropriate for modeling evaluations for the Gowanus DEIS, as described below. Therefore, the preliminary screening analysis and generic *CEQR Technical Manual* rates have no bearing on the detailed analysis or on the findings of Chapter 11.

The 73 gpd was derived from citywide water demand data. DEP's Bureau of Environmental Planning and Analysis (BEPA) used the citywide automated meter reading (AMR) residential water demand data for Fiscal Year 2016-Fiscal Year 2019 and determined that the citywide 4-year residential water usage average was 73 gpd. For Brooklyn, the FY19 residential water usage is estimated to be only 65 gpd. BEPA's methodology was to isolate citywide residential consumption (AMR data) and divide that consumption by the number of housing units for each residential building in the city, as provided by MapPLUTO. BEPA then divided that by the average household size, according to US Census PUMA (population unit measurement area) district numbers.

As a conservative assumption, the citywide number of 73 gpd was selected for the EIS analysis in this Brooklyn neighborhood, instead of the 65 gpd appropriate for Brooklyn.

[4] The detailed CSO modeling analysis used 73 gpd/person

# C. PRELIMINARY ANALYSIS

## EXISTING CONDITIONS

### *WATER SUPPLY*

The New York City water supply system comprises a network of reservoirs, lakes, and aqueducts extending into the Catskill region and a pipe network that distributes water within the City. New York City obtains nearly all of its water from the Delaware, Catskill, and Croton watersheds, which are within 125 miles of the City. Water from the watersheds is stored at 19 reservoirs and 3 control lakes with a combined capacity of approximately 550 billion gallons. The water is then carried into the City by a number of aqueducts. The water enters the City via City Tunnel 1 (which runs through the Bronx, Manhattan, and Queens) and City Tunnel 2 (which runs through the Bronx, Queens, and Brooklyn). The partially completed City Tunnel 3 currently serves the Bronx, Manhattan, and Queens, and, when fully complete, will terminate in Brooklyn. Staten Island obtains its water via the Richmond Tunnel, which is an extension of City Tunnel 2.

Once in the City, the three aqueducts distribute water into a network of water mains. Water mains up to 96 inches in diameter feed smaller mains that deliver water to their final destination. Nearly all the water reaches its consumers by gravity alone, although some 4 percent (generally at the outer limits of the system where in-line pressure is lowest, at high elevations, or at a pressure extremity, such as Far Rockaway) is pumped to its final destination. Pressure regulators throughout the City monitor and control the water pressure.

As discussed in Chapter 1, "Project Description," a RWCDS has been developed in conjunction with the Proposed Actions. **Table 11-1** shows the existing uses on the 63 projected development sites and their associated water consumption and wastewater generation rates. Based on the presented water consumption rates, it is estimated that the existing uses on the projected development sites currently consume approximately 322,303 gpd, including approximately 189,308 gpd for domestic uses and approximately 132,995 gpd for air conditioning.

### *WASTEWATER TREATMENT*

According to the *CEQR Technical Manual*, wastewater is considered to include sanitary sewage, wastewater generated by industries, and stormwater. Water used for air conditioning generates a negligible amount of wastewater as it recirculates or evaporates in the cooling and heating process.

Much of New York City's wastewater treatment system comprises the sewer network underneath the streets and the 14 WRRFs throughout the City. Most of the City's sewers are combined sewers that collect both sanitary sewage and stormwater. In periods of dry weather, the combined sewers (sized to convey an amount of sanitary sewage that is based on density levels according to zoning regulations) convey only sanitary sewage. During and immediately after wet weather, combined sewers can experience a much larger flow due to stormwater runoff collection. To control flooding at the WRRFs, regulators built into the system serve as relief valves, allowing only approximately two times the amount of design dry weather flow into the interceptors (larger sewers that convey wastewater to the WRRFs). The interceptors then take the allowable flow to the WRRFs, while the excess flow is discharged untreated to the nearest waterbody as combined sewer overflow (CSO).

**Table 11-1**
**Existing Water Consumption**

| Land Use[1] | Water Consumption and Wastewater Generation Rates[2] | Area/Units | Domestic Water/Wastewater Generation (gpd) | Air Conditioning (gpd) |
|---|---|---|---|---|
| **Red Hook WRRF Service Area** | | | | |
| Residential | Domestic: 100 gpd/person[3]<br>A/C: 0.17 gpd/sf | 190,248 sf<br>(205 DU) | 44,900 | 32,342 |
| Commercial/Office | Domestic: 0.10 gpd/sf<br>A/C: 0.17 gpd/sf | 75,252 sf | 7,525 | 12,793 |
| Retail | Domestic: 0.24 gpd/sf<br>A/C: 0.17 gpd/sf | 65,560 sf | 15,734 | 11,145 |
| Auto-related | Domestic: 0.23 gpd/sf[4]<br>A/C: 0.17 gpd/sf | 35,901 sf | 8,257 | 6,103 |
| Hotel | Domestic: 120 gpd/person[5]<br>A/C: 0.17 gpd/sf | - | - | - |
| Community Facility | Domestic: 0.10 gpd/sf<br>A/C: 0.17 gpd/sf | 9,000 sf | 900 | 1,530 |
| Manufacturing | Domestic: 0.23 gpd/sf[4]<br>A/C: 0.17 gpd/sf | 87,276 sf | 20,073 | 14,837 |
| | | | **Red Hook WRRF—Total Water Demand** | **176,139** |
| | | | **Red Hook WRRF—Total Wastewater Generation** | **97,389** |
| **Owls Head WRRF Service Area** | | | | |
| Residential | Domestic: 100 gpd/person[3]<br>A/C: 0.17 gpd/sf | 14,590 sf<br>(18 DU) | 3,900 | 2,480 |
| Commercial/Office | Domestic: 0.10 gpd/sf<br>A/C: 0.17 gpd/sf | 12,967 sf | 1,297 | 2,204 |
| Retail | Domestic: 0.24 gpd/sf<br>A/C: 0.17 gpd/sf | 36,976 sf | 8,874 | 6,286 |
| Auto-related | Domestic: 0.23 gpd/sf[4]<br>A/C: 0.17 gpd/sf | 84,880 sf | 19,523 | 14,430 |
| Hotel | Domestic: 120 gpd/person[5]<br>A/C: 0.17 gpd/sf | 54,870 sf<br>(133 rooms) | 31,920 | 9,328 |
| Community Facility | Domestic: 0.10 gpd/sf[6]<br>A/C: 0.17 gpd/sf | - | - | - |
| Manufacturing | Domestic: 0.23 gpd/sf[4]<br>A/C: 0.17 gpd/sf | 114,806 sf | 26,405 | 19,517 |
| | | | **Owls Head WRRF—Total Water Demand** | **146,164** |
| | | | **Owls Head WRRF—Total Wastewater Generation** | **91,919** |
| | | | **Project Area—Total Water Demand** | **322,303** |
| | | | **Project Area—Total Wastewater Generation** | **189,308** |

**Notes:**
Totals may not sum due to rounding.
gpd = gallons per day; WRRF = wastewater treatment plant; DU = dwelling unit;
FEIS = Final Environmental Impact Statement

1. Projected development sites currently contain approximately 215,000 sf of storage uses in the Existing condition, which are assumed to not consume water or generate wastewater for purposes of analysis. Estimates also do not include vacant properties or parking areas.
2. Consumption rates from *CEQR Technical Manual* Table 13-2, "Water Usage and Sewage Generation Rates for Use in Impact Assessment," unless otherwise noted.
3. Assumes 2.19 residents per DU (2010 Census average household size for Brooklyn Community District [CD] 6).
4. Based on *East New York Rezoning Proposal FEIS* (equal to 10,000 gpd/acre); calculated based on total building floor area.
5. Assumes two occupants per hotel room, based on *East New York Rezoning Proposal FEIS.*
6. Assumes same rate as commercial/office, based on *East New York Rezoning Proposal FEIS.*

During the 1990s, the City instituted a range of water conservation measures in response to excess flows to the City's WRRFs that exceeded the dry weather flow allowed in accordance with their respective State Pollutant Discharge Elimination System (SPDES) permits. Measures included equipping fire hydrants with locks to prevent illegal uses and requiring that all new plumbing fixtures in the City (including replacements in existing structures and new fixtures in new structures) be of a low-flow design (Local Law No. 29, 1989). The City also implemented an AMR program, installing

water meters at thousands of properties where water fees had previously been based on property frontage rather than usage. This metering provided a new financial incentive to identify and repair leaks in the water distribution system. These programs have reduced water demand and load at the City's WRRFs. At many WRRFs, this reduction has been in the order of magnitude of several million gpd. Overall, actual water demand is down more than 30 percent since the 1990s, despite population growth. DEP projects that savings from the continued implementation of these and other conservation measures will exceed any increases in water demand from consumers.

The Project Area is within the Gowanus Canal sewershed[5] and is served by combined sewers that convey flows to the Red Hook (RH) and Owls Head (OH) WRRFs, two of the City's 14 WRRFs (see **Figure 11-2**); the majority of the projected development sites (40 out of 63 sites) is within the Red Hook WRRF service area. At the WRRFs, wastewater is fully treated by physical and biological processes before it is discharged as effluent. The quality of the effluent is regulated by a SPDES permit issued by the New York State Department of Environmental Conservation (DEC), which establishes limits for effluent parameters (i.e., suspended solids, fecal coliform bacteria, and other pollutants). Since the volume of flow to a WRRF affects the level of treatment a plant can provide, the SPDES permit also establishes a maximum permitted capacity. For the Red Hook WRRF, the maximum permitted dry weather flow capacity is 60 mgd; the average monthly flow to the Red Hook WRRF is 27 mgd,[6] which is approximately 45 percent of the permitted capacity. For the Owls Head WRRF, the maximum permitted dry weather flow capacity is 120 mgd; the average monthly flow is 94 mgd,[7] approximately 78 percent of the permitted capacity. Each WRRF is designed to treat up to twice the maximum dry weather flow capacity during wet weather.

As shown in **Figure 11-3**, the 63 projected development sites are served by five Red Hook WRRF subcatchment areas and one Owls Head WRRF subcatchment area. **Table 11-2** shows the estimated existing wastewater generated on the projected development sites within each of the affected subcatchment areas.

**Table 11-2**
**Existing Wastewater Generation on the Projected Development Sites by Subcatchment Area**

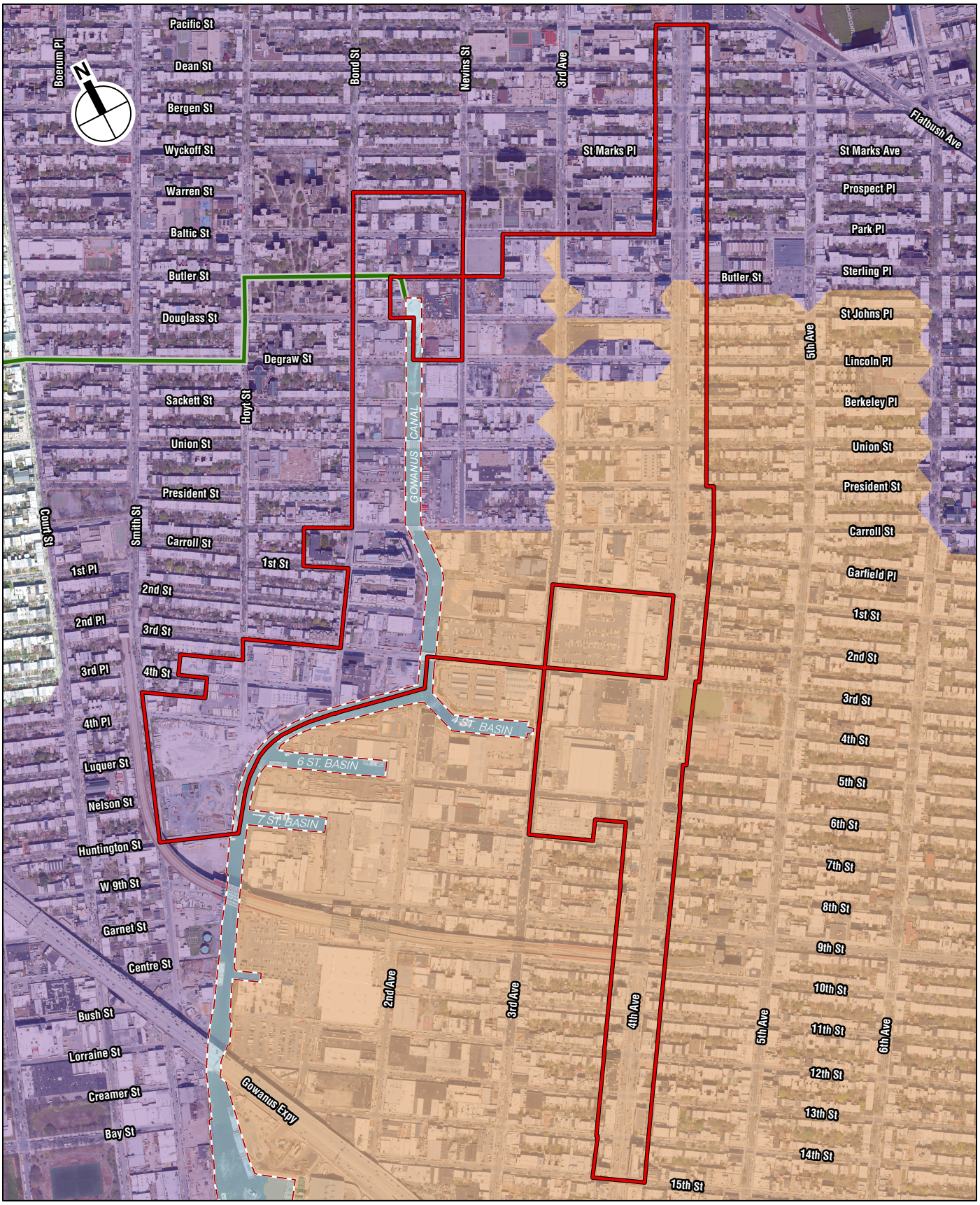
| Subcatchment Area | Domestic Water/Wastewater Generated on the Projected Development Sites (gpd)[1] |
|---|---|
| **Red Hook WRRF Service Area** | |
| RH-R2 | 79,123 |
| RH-R22 | 11,621 |
| RH-R23 | 535 |
| RH-R24 | 2,630 |
| RH-R25 | 3,480 |
| **Owls Head WRRF Service Area** | |
| OH-R7[2] | 91,919 |

**Note:** 1. See **Table 11-1** for domestic water/wastewater generation methodology.
2. Subcatchment area includes area served by regulators OH-R7, OH-R7A, and OH-R7B

[5] A sewershed typically describes a geographic region in which all wastewater flows converge at a single point, or outlet, before ultimately being conveyed to a WRRF

[6] Average monthly flow for the 12-month period through March 2017.

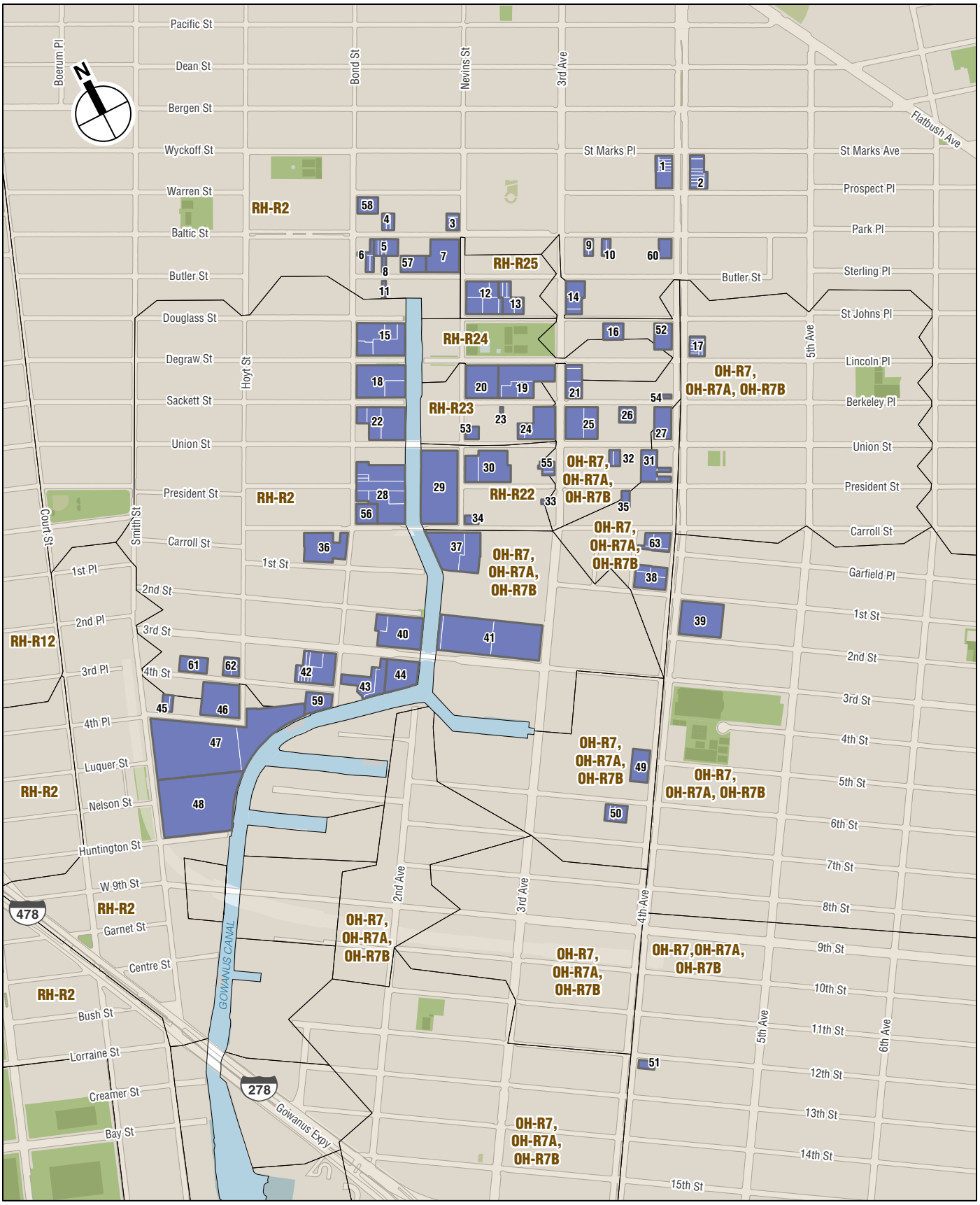
[7] Average monthly flow for the 12-month period through March 2017.




Project Area
Gowanus Canal Sewershed

**GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS**

**Figure 11-2**




# WWTP Subcatchment Areas

**GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS**

**Figure 11-3**

*STORMWATER AND DRAINAGE MANAGEMENT*

Stormwater runoff from impermeable surfaces on the projected development sites is collected and conveyed by the City's combined sewer system to the Red Hook and Owls Head WRRFs. As noted above, regulators allow only twice the dry weather design flow into interceptors. During storm events, excess flow is discharged as CSO. The analysis of stormwater management typically focuses on the body of water into which stormwater is discharged during a CSO event—in this case, CSO from the Project Area is discharged through outfalls to the Gowanus Canal.

The 63 projected development sites within the Project Area are a mix of buildings, paved areas (such as surface parking lots), and pervious unpaved or vegetated land. The combined total area of the projected development sites is approximately 47 acres. **Table 11-3** summarizes the surfaces and surface areas within each subcatchment area, as well as the weighted runoff coefficient (the fraction of precipitation that becomes surface runoff for each surface type).[8]

**Table 11-3**
**Existing Surface Coverage**

| Subcatchment Area | Surface Type | Roof | Pavement and Walkways | Other | Grass and Softscape | Total |
|---|---|---|---|---|---|---|
| **Red Hook WRRF Service Area** | | | | | | |
| RH-R2 | Area (percent) | 28% | 71% | 0% | 1% | 100% |
| | Surface Area (acres) | 7.58 | 19.01 | 0.00 | 0.22 | 26.81 |
| | Runoff Coefficient[1] | 1.00 | 0.85 | 0.85 | 0.20 | **0.89** |
| RH-R22 | Area (percent) | 50% | 47% | 0% | 3% | 100% |
| | Surface Area (acres) | 1.79 | 1.67 | 0.00 | 0.09 | 3.55 |
| | Runoff Coefficient[1] | 1.00 | 0.85 | 0.85 | 0.20 | **0.91** |
| RH-R23 | Area (percent) | 92% | 8% | 0% | 0% | 100% |
| | Surface Area (acres) | 1.02 | 0.08 | 0.00 | 0.00 | 1.10 |
| | Runoff Coefficient[1] | 1.00 | 0.85 | 0.85 | 0.20 | **0.99** |
| RH-R24 | Area (percent) | 22% | 8% | 0% | 71% | 100% |
| | Surface Area (acres) | 0.26 | 0.09 | 0.00 | 0.84 | 1.19 |
| | Runoff Coefficient[1] | 1.00 | 0.85 | 0.85 | 0.20 | **0.42** |
| RH-R25 | Area (percent) | 62% | 38% | 0% | 0% | 100% |
| | Surface Area (acres) | 0.90 | 0.55 | 0.00 | 0.00 | 1.45 |
| | Runoff Coefficient[1] | 1.00 | 0.85 | 0.85 | 0.20 | **0.94** |
| **Owls Head WRRF Service Area** | | | | | | |
| OH-R7[2] | Area (percent) | 50% | 49% | 0% | 1% | 100% |
| | Surface Area (acres) | 6.46 | 6.40 | 0.00 | 0.11 | 12.97 |
| | Runoff Coefficient[1] | 1.00 | 0.85 | 0.85 | 0.20 | **0.92** |

**Notes:** Totals may not sum due to rounding.
[1] Weighted Runoff Coefficient calculations based on the Flow Volume Calculation Matrix provided in the *CEQR Technical Manual*.
[2] Subcatchment area includes area served by regulators OH-R7, OH-R7A, and OH-R7B

Using the sanitary and stormwater flow calculations, the Flow Volume Calculation Matrix was completed for the Existing conditions for each subcatchment area. The calculations from the Flow Volume Calculation Matrix help to determine the wastewater flow volumes to the combined sewer system, and include four rainfall volume scenarios with varying durations. The summary tables of the Flow Volume Calculation Matrices for Existing conditions are included in **Table 11-4**.

[8] Lot coverage (rooftop, paved area, and unpaved softscape) for each development site was estimated using City land cover data and aerial photography.

**Table 11-4**
**Flow Volume Matrix: Existing Conditions**

| Subcatchment Area | Total Area (Acres) | Rainfall Volume (in.) | Rainfall Duration (hr.) | Weighted Runoff Coefficient | Runoff Volume to Direct Drainage (MG) | Runoff Volume to CSS (MG)* | Sanitary Volume to CSS (MG) | Total Volume to CSS (MG) |
|---|---|---|---|---|---|---|---|---|
| RH-R2 | 26.81 | 0.00 | 3.80 | 0.89 | 0.00 | 0.00 | 0.01 | **0.01** |
| | | 0.40 | 3.80 | | 0.00 | 0.26 | 0.01 | **0.27** |
| | | 1.20 | 11.30 | | 0.00 | 0.77 | 0.04 | **0.81** |
| | | 2.50 | 19.50 | | 0.00 | 1.61 | 0.06 | **1.68** |
| RH-R22 | 3.55 | 0.00 | 3.80 | 0.91 | 0.00 | 0.00 | 0.00 | **0.00** |
| | | 0.40 | 3.80 | | 0.00 | 0.04 | 0.00 | **0.04** |
| | | 1.20 | 11.30 | | 0.00 | 0.11 | 0.01 | **0.11** |
| | | 2.50 | 19.50 | | 0.00 | 0.22 | 0.01 | **0.23** |
| RH-R23 | 1.10 | 0.00 | 3.80 | 0.99 | 0.00 | 0.00 | 0.00 | **0.00** |
| | | 0.40 | 3.80 | | 0.00 | 0.01 | 0.00 | **0.01** |
| | | 1.20 | 11.30 | | 0.00 | 0.04 | 0.00 | **0.04** |
| | | 2.50 | 19.50 | | 0.00 | 0.07 | 0.00 | **0.07** |
| RH-R24 | 1.19 | 0.00 | 3.80 | 0.42 | 0.00 | 0.00 | 0.00 | **0.00** |
| | | 0.40 | 3.80 | | 0.00 | 0.01 | 0.00 | **0.01** |
| | | 1.20 | 11.30 | | 0.00 | 0.02 | 0.00 | **0.02** |
| | | 2.50 | 19.50 | | 0.00 | 0.03 | 0.00 | **0.03** |
| RH-R25 | 1.45 | 0.00 | 3.80 | 0.94 | 0.00 | 0.00 | 0.00 | **0.00** |
| | | 0.40 | 3.80 | | 0.00 | 0.01 | 0.00 | **0.02** |
| | | 1.20 | 11.30 | | 0.00 | 0.04 | 0.00 | **0.05** |
| | | 2.50 | 19.50 | | 0.00 | 0.09 | 0.00 | **0.10** |
| OH-R7 | 12.97 | 0.00 | 3.80 | 0.92 | 0.00 | 0.00 | 0.01 | **0.01** |
| | | 0.40 | 3.80 | | 0.00 | 0.13 | 0.01 | **0.14** |
| | | 1.20 | 11.30 | | 0.00 | 0.39 | 0.04 | **0.43** |
| | | 2.50 | 19.50 | | 0.00 | 0.81 | 0.07 | **0.88** |

**Notes:** * Assumes no on-site detention or BMPs for purposes of calculations.
CSS = Combined Sewer System; MG = Million Gallons.
Totals may not sum due to rounding.

The flow volume information presented above does not account for improvement projects recently undertaken or planned by the City of New York in the Gowanus Canal sewershed and that are aimed at reducing stormwater flows to the combined sewer system and CSO events in the Canal. In particular, as discussed further below, the City has made improvements to control CSO discharges to the Canal under the Gowanus Waterbody/Watershed Facility Plan (WWFP) and Long-Term Control Plan (LTCP)[9], and additional improvements are planned as part of the Superfund remediation of the Canal.

## THE FUTURE WITHOUT THE PROPOSED ACTIONS (NO ACTION CONDITION)

In the future without the Proposed Actions (No Action condition), the projected development sites are assumed to either remain unchanged from Existing conditions or become occupied by uses that are as-of-right under existing zoning. It is anticipated that, in the No Action condition, there would be a total of approximately 2.3 million square feet (msf) of built floor area on the 63 projected development sites. Under the RWCDS, the total No Action development would comprise approximately 800 DUs (about 100 affordable DUs), approximately 190,000 sf of medical office space, 27,000 sf of other community facility space, 241,000 sf of local retail space, 104,000 sf of

[9] https://www1.nyc.gov/site/dep/water/gowanus-canal.page

destination retail space, 375,000 sf of office space, 133 hotel rooms, 84,000 sf of auto-related commercial uses, and 415,000 sf of industrial space (including storage and warehouse space).

*INFRASTRUCTURE IMPROVEMENTS*

As discussed above, DEP has been implementing a number of CSO control projects to reduce CSO discharges over the years starting with the Gowanus WWFP and LTCP and most recently with the Gowanus CSO Control Facilities. The sequence of programs is described below and shown here. The benefits of these projects are also shown on **Figure 11-4**.

*WWFP/LTCP*

In 2008, DEP prepared the Gowanus WWFP to document baseline conditions and identify early action items for CSO abatement. The WWFP assessed compliance with New York State's water quality standards and evaluated alternatives for meeting those standards. As a result of the WWFP, DEP committed to capital upgrades: improvements included upgrading the Gowanus Wastewater Pumping Station (which pumps wastewater to the Red Hook WRRF), construction of a new mile-long force main from the pumping station to the Columbia Street/Red Hook Interceptor Sewer, and modernizing the Flushing Tunnel (a pumping system and mile-long tunnel that flushes stagnant water from the Canal by pumping more highly oxygenated water from Buttermilk Channel to the head end of the Canal). Concurrently with these upgrades, a Post Construction Compliance Monitoring (PCM) program was implemented to regularly collect samples from monitoring stations along the Canal and measure water quality. The monitoring program and subsequent LTCP analysis projected that water quality standards would be met as a result of the significant previous improvements by the City such as the operation of the reactivated Flushing Tunnel and upgraded Gowanus Wastewater Pumping Station, high level storm sewers and the green infrastructure that are discussed in greater detail below.

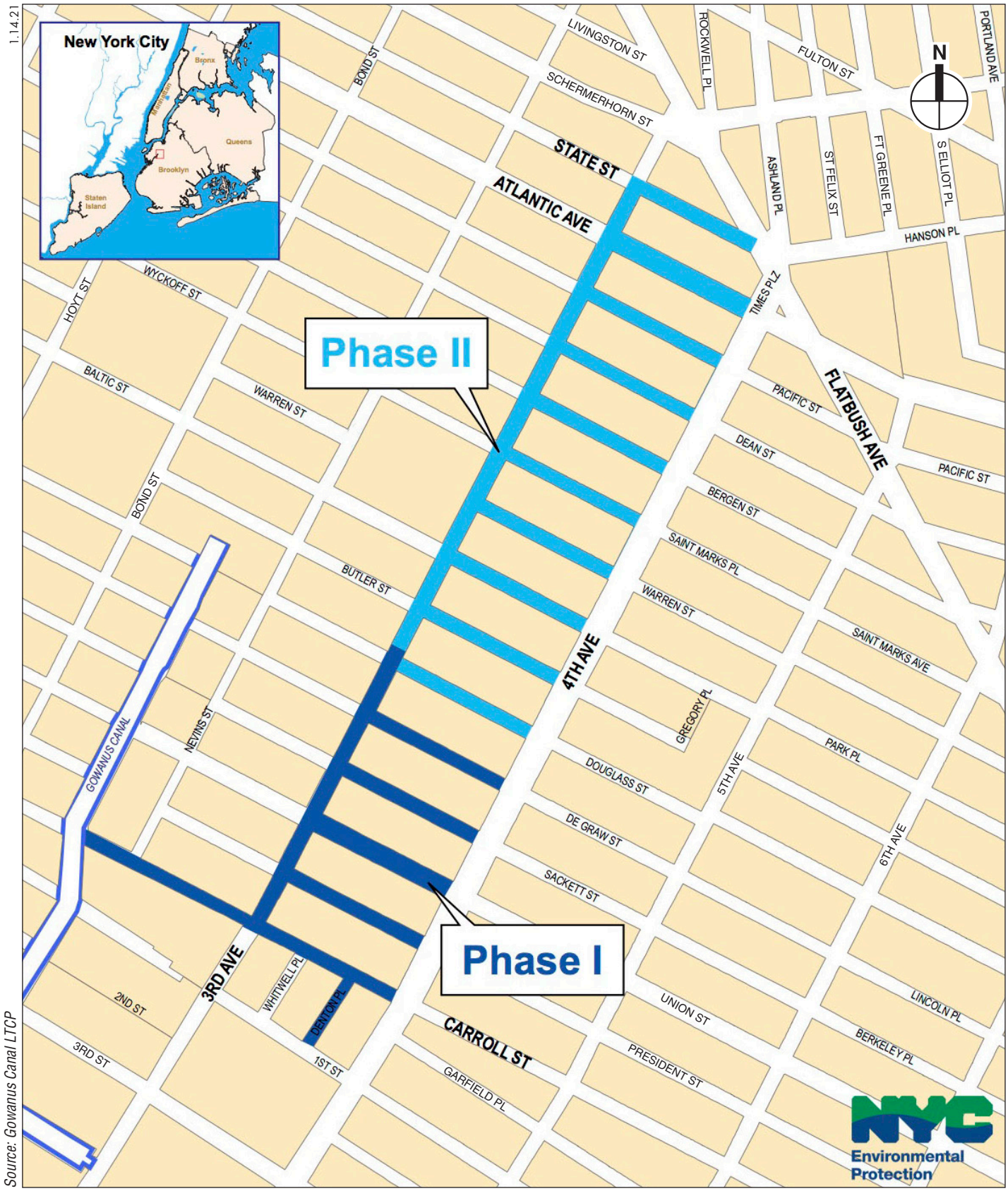
More recently, DEP has commenced construction and installation of High-Level Storm Sewers (HLSS) in the Gowanus watershed area, which are generally located between Carroll and State Streets near the northern end of the Canal, extending to 4th Avenue to the east (see **Figure 11-5**). Once completed, this HLSS project will create a separate stormwater discharge to the Canal through a stormwater outfall at Carroll Street and would reduce stormwater flows entering the combined sewer system, which would reduce the frequency and volume of CSO into the Canal. The HLSS is a form of partial separation that separates stormwater from streets or other public rights-of-way from combined sewers. This separation of sewers would help reduce the amount of CSO that is discharged to the Canal and would also reduce street flooding. The first phase of the project (completed in 2018) includes improvements to the area south of Douglass Street; the second phase of construction (expected to be completed in 2021) includes improvements to the area north of Douglass Street. As part of the HLSS project, 87 new catch basins will be installed to allow stormwater to drain from the streets into 14,000 linear feet of new high-level storm sewers. In addition, all existing catch basin drainage connections will be switched from the existing combined sewer to the new high-level storm sewers.

DEP has also invested in green infrastructure that has been constructed, is in construction, or is planned in the Gowanus watershed area, including bioswales in the right-of-way (ROWB) and stormwater greenstreets (SGSs) in the area north and east of the Canal (see **Figure 11-6)**. Green infrastructure uses vegetation, soils, and other elements and practices to capture, absorb, and filter stormwater and also reduce the amount of CSO that may reach the Canal.

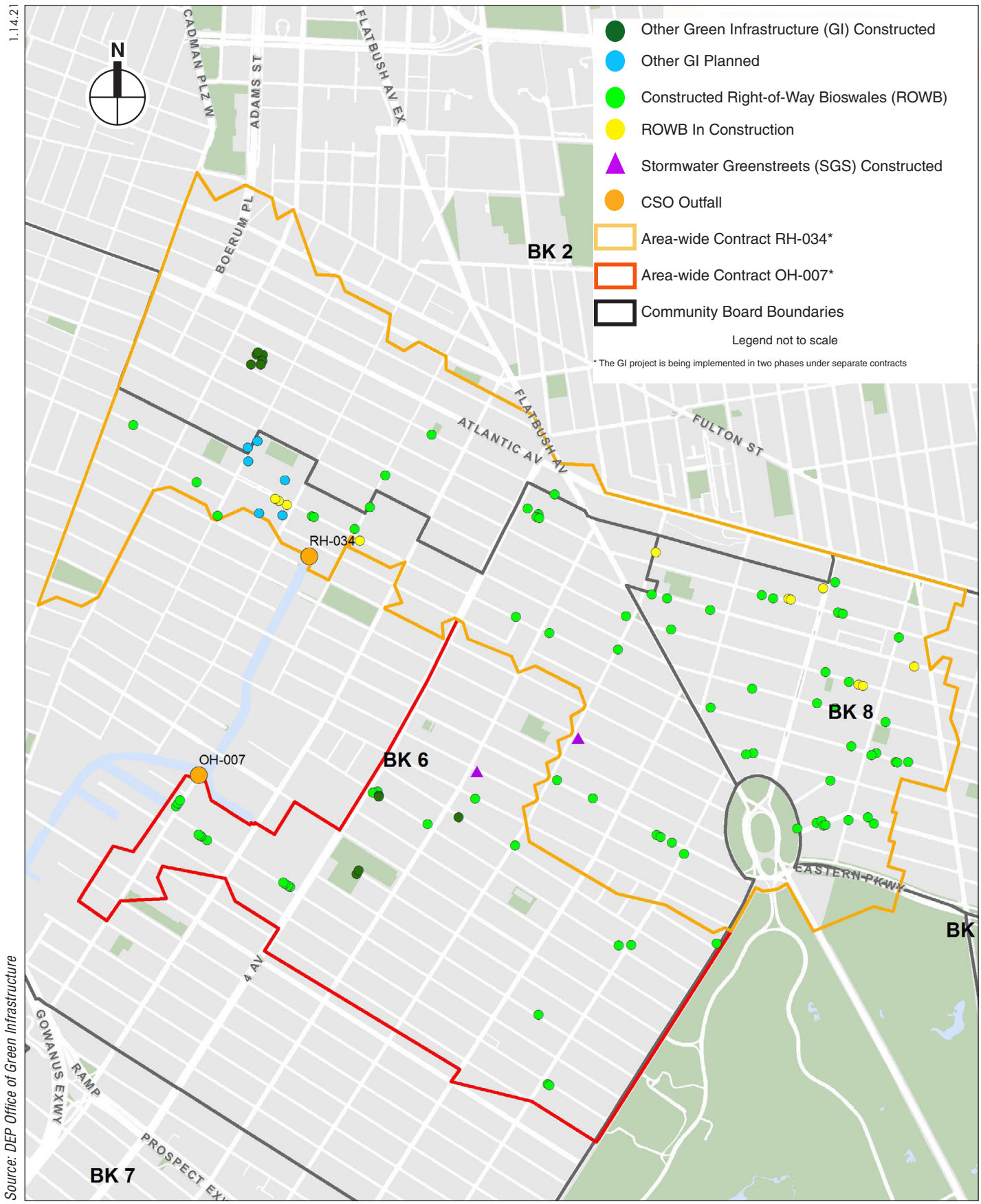
1.14.21


*Source: NYC Dept of Environmental Protection*

DEP Infrastructure Improvements




Gowanus Canal High Level Storm Sewers (HLSS)




Green Infrastructure (GI) Projects in Gowanus Canal Watershed

*Gowanus Canal CSO Facilities*

On March 2, 2010, the Gowanus Canal was designated a federal Superfund site under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and placed on the National Priorities List (NPL). CERCLA exists to address hazardous substances in the Canal sediments that accumulated over the Canal's long industrial history. On September 27, 2013, the U.S. Environmental Protection Agency (EPA) issued a Record of Decision[10] (EPA ROD) identifying actions to be undertaken by various parties to remediate contamination in the Canal. EPA's ROD included the requirement to reduce sediments from CSOs that would potentially re-contaminate the surface sediment preliminary remediation goals of PAH concentrations of 20 parts per million (PPM), along with other contaminants of concern such as PCBs and Copper. It was estimated that the two tanks of 8 and 4 million gallons for Red Hook (RH-034) and Owls Head (OH-007) would achieve reductions above the high end of the range. During certain wet weather events the combined sanitary and stormwater flow in the combined sewer system would be conveyed to the facilities and held in storage tanks until, or when, there is sufficient downstream capacity to convey the stored flow to the Red Hook or Owls Head WRRF.

The first facility (the "Head End Facility") would be located at the "head end," or northernmost portion of the Canal (near the intersection of Nevins Street and Butler Street) and is expected to include an 8 million gallon (MG) underground storage tank that would increase CSO capture for overflows that would otherwise be discharged from CSO outfall RH-034[11] (see **Figure 11-7**). The second facility (the "Owls Head Facility") would be located at the middle of the Canal near the northern terminus of 2nd Avenue and the 4th Street turning basin, and is expected to include a 4-MG tank that would increase CSO capture for overflows that would otherwise be discharged from CSO outfall OH-007.[12] DEP is expected to make additional infrastructure upgrades in the area in connection with the CSO facilities, to include constructing new sewers and other sewer modifications to route flow to the facilities, modifying regulator structures, closing and/or reconstructing outfalls, and eliminating and/or reconstructing pumping stations.

As discussed in the *Gowanus Canal CSO Facilities Final Environmental Impact Statement (FEIS)* (2018),[13] both CSO facilities are anticipated to be operational by the build year of 2035 and are therefore considered part of the no-build condition. As a result of the facilities, the CSO sediment reduction goals required by EPA's ROD are assumed to have a 1:1 ratio with volume. Therefore, the volume and sediment discharged from outfall RH-034 during a typical year is expected to be reduced by approximately 76 percent, from 137 MG to 33 MG; the CSO volume and sediment discharged from outfall OH-007 during a typical year is expected to be reduced by approximately 85

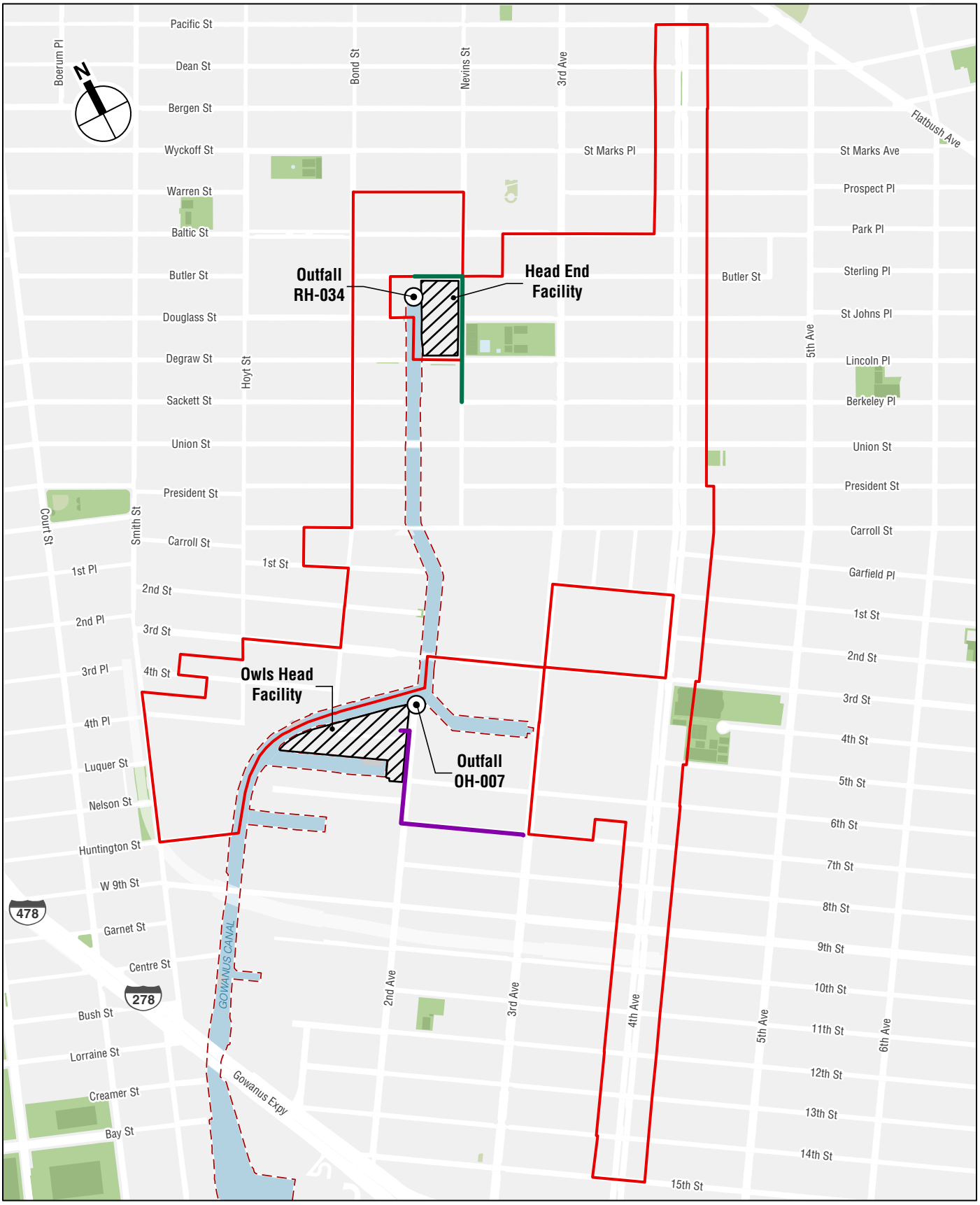
---

[10] https://cumulis.epa.gov/supercpad/SiteProfiles/index.cfm?fuseaction=second.scs&id=0206222&doc=Y&colid=34404&region=02&type=SC

[11] Outfall RH-034 is located at the northern end of the Canal and receives flows from the RH-R2 subcatchment area, which contains 31 of the 63 projected development sites.

[12] Outfall OH-007 is located at the northern terminus of 2nd Avenue as is one of the outfalls that receives flows from the OH-R7 subcatchment area, which contains 22 of the 63 projected development sites.

[13] CEQR No. 17DEP040K. https://www1.nyc.gov/site/dep/about/gowanus-canal-cso-facilities-project.page




# Gowanus Canal CSO Facilities

**GOWANUS NEIGHBORHOOD REZONING AND RELATED ACTIONS**

**Figure 11-7**

percent, from 58 MG to 9 MG. The cumulative CSO volume reductions to the Gowanus Canal are predicted to be on the order of 153 MG, with proportionally significant sediment reductions.

*WATER SUPPLY*

As indicated in **Table 11-5**, in the No Action condition, the total water consumption on the projected development sites would be approximately 812,826 gpd. This represents an increase of approximately 490,523 gpd over Existing conditions (see **Table 11-1**).

**Table 11-5**
**No Action Condition Water Consumption**

| Land Use[1] | Water Consumption and Wastewater Generation Rates[2] | Area/Units[3] | Domestic Water/Wastewater Generation (gpd) | Air Conditioning (gpd) |
|---|---|---|---|---|
| **Red Hook WRRF Service Area** | | | | |
| Residential | Domestic: 100 gpd/person[4]<br>A/C: 0.17 gpd/sf | 481,371 sf<br>(492 DU) | 107,800 | 81,833 |
| Commercial/Office | Domestic: 0.10 gpd/sf<br>A/C: 0.17 gpd/sf | 363,789 sf | 36,379 | 61,844 |
| Retail | Domestic: 0.24 gpd/sf<br>A/C: 0.17 gpd/sf | 226,596 sf | 54,383 | 38,521 |
| Auto-related | Domestic: 0.23 gpd/sf[5]<br>A/C: 0.17 gpd/sf | 41,286 sf | 9,496 | 7,019 |
| Hotel | Domestic: 120 gpd/person[6]<br>A/C: 0.17 gpd/sf | - | - | - |
| Community Facility | Domestic: 0.10 gpd/sf[7]<br>A/C: 0.17 gpd/sf | 178,466 sf | 17,847 | 30,339 |
| Manufacturing | Domestic: 0.23 gpd/sf[5]<br>A/C: 0.17 gpd/sf | 143,455 | 32,995 | 24,387 |
| | | | **Red Hook WRRF—Total Water Demand** | **502,843** |
| | | | **Red Hook WRRF—Total Wastewater Generation** | **258,900** |
| **Owls Head WRRF Service Area** | | | | |
| Residential | Domestic: 100 gpd/person[4]<br>A/C: 0.17 gpd/sf | 304,738 sf<br>(324 DU) | 71,000 | 51,805 |
| Commercial/Office | Domestic: 0.10 gpd/sf<br>A/C: 0.17 gpd/sf | 67,967 sf | 6,797 | 11,554 |
| Retail | Domestic: 0.24 gpd/sf<br>A/C: 0.17 gpd/sf | 169,954 sf | 40,789 | 28,892 |
| Auto-related | Domestic: 0.23 gpd/sf[5]<br>A/C: 0.17 gpd/sf | 82,180 sf | 18,901 | 13,971 |
| Hotel | Domestic: 120 gpd/person[6]<br>A/C: 0.17 gpd/sf | 54,870 sf<br>(133 rooms) | 31,920 | 9,328 |
| Community Facility | Domestic: 0.10 gpd/sf[7]<br>A/C: 0.17 gpd/sf | 71,162 sf | 7,116 | 12,098 |
| Manufacturing | Domestic: 0.23 gpd/sf[5]<br>A/C: 0.17 gpd/sf | 14,529 | 3,342 | 2,470 |
| | | | **Owls Head WRRF—Total Water Demand** | **309,983** |
| | | | **Owls Head WRRF—Total Wastewater Generation** | **179,865** |
| | | | **Project Area—Total Water Demand** | **812,826** |
| | | | **Project Area—Total Wastewater Generation** | **438,765** |

**Notes:** Totals may not sum due to rounding.

1. Projected development sites contain approximately 278,000 sf of storage and warehouse uses in the No Action condition, which are assumed to not consume water or generate wastewater for purposes of analysis. Estimates also do not include vacant properties or parking areas.
2. Consumption rates from *CEQR Technical Manual* Table 13-2, "Water Usage and Sewage Generation Rates for Use in Impact Assessment," unless otherwise noted.
3. Floor area estimates are based on RWCDS square footage calculations applying a 10% grossing factor for residential use and a 15% grossing factor for all other uses.
4. Assumes 2.19 residents per DU (2010 Census average household size for Brooklyn Community District [CD] 6).
5. Based on *East New York Rezoning Proposal FEIS* (equal to 10,000 gpd/acre); calculated based on total building floor area.
6. Assumes two occupants per hotel room, based on *East New York Rezoning Proposal FEIS.*
7. Assumes same rate as commercial/office, based on *East New York Rezoning Proposal FEIS.*

*WASTEWATER TREATMENT*

In the No Action condition, wastewater generated on the 63 projected development sites would total 438,765 gpd (see **Table 11-5**), an increment of 249,457 gpd over Existing conditions. This additional sanitary discharge to the Red Hook and Owls Head WRRFs would be well within the capacity available at the plants on average; therefore, the WRRFs would continue to operate within their respective design capacities.

*STORMWATER AND DRAINAGE MANAGEMENT*

In the 2035 No Action condition, stormwater runoff from the projected development sites would continue to be collected and directed through the combined sewer system and then conveyed to the Red Hook and Owls Head WRRFs for treatment. As new development is anticipated on several of the projected development sites under the No Action condition, the amount of lot area comprising roofs would increase in four of the six affected subcatchment areas, with corresponding decreases in the area comprised of pavement/walks and grass/softscape. As a result, the amount of stormwater runoff generated on the projected development sites would increase as compared with Existing conditions.

**Table 11-6** summarizes the surfaces and surface areas within each subcatchment area in the No Action condition, as well as the weighted runoff coefficient. As shown below, the runoff coefficient would increase in the RH-R2, RH-R22, and OH-R7 subcatchment areas compared with the Existing condition (there would also be a minor increase in rooftop area in the RH-R25 subcatchment area, which would not substantively increase the runoff coefficient).

**Table 11-6**
**No Action Condition Surface Coverage**

| Subcatchment Area | Surface Type | Roof | Pavement and Walkways | Other | Grass and Softscape | Total |
|---|---|---|---|---|---|---|
| **Red Hook WRRF Service Area** | | | | | | |
| RH-R2 | Area (percent) | 49% | 50% | 0% | 0% | 100% |
| | Surface Area (acres) | 13.26 | 13.43 | 0.00 | 0.12 | 26.81 |
| | Runoff Coefficient[1] | 1.00 | 0.85 | 0.85 | 0.20 | **0.92** |
| RH-R22 | Area (percent) | 53% | 47% | 0% | 0% | 100% |
| | Surface Area (acres) | 1.88 | 1.67 | 0.00 | 0.00 | 3.55 |
| | Runoff Coefficient[1] | 1.00 | 0.85 | 0.85 | 0.20 | **0.93** |
| RH-R23 | Area (percent) | 92% | 8% | 0% | 0% | 100% |
| | Surface Area (acres) | 1.02 | 0.08 | 0.00 | 0.00 | 1.10 |
| | Runoff Coefficient[1] | 1.00 | 0.85 | 0.85 | 0.20 | **0.99** |
| RH-R24 | Area (percent) | 22% | 8% | 0% | 71% | 100% |
| | Surface Area (acres) | 0.26 | 0.09 | 0.00 | 0.84 | 1.19 |
| | Runoff Coefficient[1] | 1.00 | 0.85 | 0.85 | 0.20 | **0.42** |
| RH-R25 | Area (percent) | 63% | 37% | 0% | 0% | 100% |
| | Surface Area (acres) | 0.91 | 0.54 | 0.00 | 0.00 | 1.45 |
| | Runoff Coefficient[1] | 1.00 | 0.85 | 0.85 | 0.20 | **0.94** |
| **Owls Head WRRF Service Area** | | | | | | |
| OH-R7[2] | Area (percent) | 56% | 44% | 0% | 0% | 100% |
| | Surface Area (acres) | 7.30 | 5.67 | 0.00 | 0.00 | 12.97 |
| | Runoff Coefficient[1] | 1.00 | 0.85 | 0.85 | 0.20 | **0.93** |

**Notes:** Totals may not sum due to rounding.
[1] Weighted Runoff Coefficient calculations based on the Flow Volume Calculation Matrix provided in the *CEQR Technical Manual*.
[2] Subcatchment area includes area served by regulators OH-R7, OH-R7A, and OH-R7B

Using the sanitary and stormwater flow calculations, the Flow Volume Calculation Matrix was completed for the No Action condition for each subcatchment area. The summary tables of the Flow Volume Calculation Matrices the No Action condition are included in **Table 11-7**.

**Table 11-7**
**Flow Volume Matrix: No Action Condition**

| Subcatchment Area | Total Area (Acres) | Rainfall Volume (in.) | Rainfall Duration (hr.) | Weighted Runoff Coefficient | Runoff Volume to Direct Drainage (MG) | Runoff Volume to CSS (MG)* | Sanitary Volume to CSS (MG) | Total Volume to CSS (MG) |
|---|---|---|---|---|---|---|---|---|
| RH-R2 | 26.81 | 0.00 | 3.80 | 0.92 | 0.00 | 0.00 | 0.03 | **0.03** |
| | | 0.40 | 3.80 | | 0.00 | 0.27 | 0.03 | **0.30** |
| | | 1.20 | 11.30 | | 0.00 | 0.80 | 0.10 | **0.91** |
| | | 2.50 | 19.50 | | 0.00 | 1.68 | 0.17 | **1.85** |
| RH-R22 | 3.55 | 0.00 | 3.80 | 0.93 | 0.00 | 0.00 | 0.00 | **0.00** |
| | | 0.40 | 3.80 | | 0.00 | 0.04 | 0.00 | **0.04** |
| | | 1.20 | 11.30 | | 0.00 | 0.11 | 0.01 | **0.12** |
| | | 2.50 | 19.50 | | 0.00 | 0.22 | 0.02 | **0.25** |
| RH-R23 | 1.10 | 0.00 | 3.80 | 0.99 | 0.00 | 0.00 | 0.00 | **0.00** |
| | | 0.40 | 3.80 | | 0.00 | 0.01 | 0.00 | **0.01** |
| | | 1.20 | 11.30 | | 0.00 | 0.04 | 0.00 | **0.04** |
| | | 2.50 | 19.50 | | 0.00 | 0.07 | 0.00 | **0.08** |
| RH-R24 | 1.19 | 0.00 | 3.80 | 0.42 | 0.00 | 0.00 | 0.01 | **0.01** |
| | | 0.40 | 3.80 | | 0.00 | 0.01 | 0.01 | **0.02** |
| | | 1.20 | 11.30 | | 0.00 | 0.02 | 0.03 | **0.05** |
| | | 2.50 | 19.50 | | 0.00 | 0.03 | 0.06 | **0.09** |
| RH-R25 | 1.45 | 0.00 | 3.80 | 0.94 | 0.00 | 0.00 | 0.00 | **0.00** |
| | | 0.40 | 3.80 | | 0.00 | 0.01 | 0.00 | **0.02** |
| | | 1.20 | 11.30 | | 0.00 | 0.04 | 0.00 | **0.05** |
| | | 2.50 | 19.50 | | 0.00 | 0.09 | 0.01 | **0.10** |
| OH-R7 | 12.97 | 0.00 | 3.80 | 0.93 | 0.00 | 0.00 | 0.03 | **0.03** |
| | | 0.40 | 3.80 | | 0.00 | 0.13 | 0.03 | **0.16** |
| | | 1.20 | 11.30 | | 0.00 | 0.39 | 0.08 | **0.48** |
| | | 2.50 | 19.50 | | 0.00 | 0.82 | 0.15 | **0.97** |

**Notes:** * Assumes no on-site detention or BMPs for purposes of calculations.
CSS = Combined Sewer System; MG = Million Gallons.
Totals may not sum due to rounding.

As discussed, DEP has proposed a Unified Stormwater Rule that increases the amount of stormwater to be managed on-site as part of new development, and further restricts the release rate for sites that require a connection to a city sewer. As a result of these requirements, given that the existing development sites do not provide the same level of retention or slow-release detention, it is expected that there would be a reduction in uncontrolled runoff on the projected development sites where new construction is anticipated in the No Action condition. No improvements to on-site stormwater detention or retention are expected on the projected development sites that are expected to remain unchanged in the No Action condition. The runoff calculations presented in **Tables 11-6 and 11-7** do not reflect the expected reduction in stormwater from new development due to on-site stormwater management requirements. In addition, the information presented above does not account for area-wide reductions in stormwater flows to the combined sewer system and CSO discharges to the Gowanus Canal that are expected to occur in the No Action condition as a result of the recently constructed and planned infrastructure improvements in the sewershed, in particular the HLSS, GI, and CSO facilities discussed above.

## THE FUTURE WITH THE PROPOSED ACTIONS (WITH ACTION CONDITION)

In the 2035 With Action Condition, under the Proposed Actions, the total development expected to occur on the 63 Projected Development Sites would consist of approximately 10.1 million sf of built floor area, including 9,300 DUs, approximately 89,000 sf of medical office space, 380,000 sf of other community facility space, 594,000 sf of local retail space, 20,000 sf of destination retail space, 937,000 sf of office space, 133 hotel rooms, and 99,000 sf of industrial space. The projected

incremental (net) change between the No Action and With Action conditions that would result from the Proposed Actions would be an increase of 8,500 DUs (a substantial proportion of which are expected to be affordable); approximately 353,000 sf of other community facility space; 353,000 sf of local retail space; 562,000 sf of office space; and a net loss of medical office space, industrial space, destination retail, and auto-related commercial space.

*WATER SUPPLY*

The preliminary analysis finds that the Proposed Actions would not result in significant adverse impacts on the City's water supply system. As indicated in **Table 11-8**, the Projected Development Sites are expected to generate a water demand of approximately 4,303,097 gpd in the With Action condition, an increase of 3,490,271 gpd, or approximately 3.5 mgd, compared with demand in the No Action condition. Future incremental demand from the Projected Development Sites in the With Action condition would be dispersed throughout the Project Area and would represent approximately 0.35 percent of the City's average daily water supply of approximately one billion gpd.

*WASTEWATER TREATMENT*

In the With Action condition, wastewater from the Projected Development Sites would continue to be treated at the Red Hook and Owls Head WRRFs. The capacity of the plants would not change as a result of the Proposed Actions, and the facilities would continue to operate within their SPDES-permitted dry weather flow capacities (60 mgd at the Red Hook WRRF and 120 mgd at the Owls Head WRRF, respectively).

As shown in **Table 11-5**, under the RWCDS, development on the Projected Development Sites is expected to generate a total of approximately 2.4 mgd of sanitary sewage, divided among the six affected subcatchment areas (summarized in **Table 11-9**). The majority of the sanitary sewage generation (approximately 1.6 mgd) would occur in the Red Hook WRRF service area, with the remainder (approximately 0.8 mgd) occurring in the Owls Head WRRF service area.

In the Red Hook WRRF service area, the With Action sanitary sewage generation (approximately 1.6 mgd) would represent an increase of approximately 1.3 mgd over the No Action condition (see **Table 11-5**). With an existing flow of 27 mgd (below the maximum permitted dry weather flow capacity of 60 mgd) and the addition of approximately 1.3 mgd on the Projected Development Sites, the Red Hook WRRF would continue to have reserve capacity. Similarly, the With Action sanitary sewage generation in the Owls Head WRRF service area of approximately 0.8 mgd would represent an increase of approximately 0.6 mgd over the No Action Condition. With an existing flow of 94 mgd (below the maximum permitted dry weather flow capacity of 120 mgd) and the addition of approximately 0.6 mgd on the Projected Development Sites, the Owls Head WRRF would also continue to have reserve capacity. Pursuant to *CEQR Technical Manual* guidelines, as the demand associated with the Proposed Actions would be well within the capacity of the affected treatment plants, the preliminary analysis finds that no significant adverse impacts to the capacity of the City's wastewater treatment services would occur as a result of the Proposed Actions.

## Table 11-8
## With Action Condition Water Consumption

| Land Use[1] | Water Consumption and Wastewater Generation Rates[2] | Area/Units[3] | Domestic Water/Wastewater Generation (gpd) | Air Conditioning (gpd) |
|---|---|---|---|---|
| **Red Hook WRRF Service Area** | | | | |
| Residential | Domestic: 100 gpd/person[4]<br>A/C: 0.17 gpd/sf | 5,870,283 sf<br>(6,251 DU) | 1,369,000 | 997,948 |
| Commercial/Office | Domestic: 0.10 gpd/sf<br>A/C: 0.17 gpd/sf | 727,625 sf | 72,763 | 123,696 |
| Retail | Domestic: 0.24 gpd/sf<br>A/C: 0.17 gpd/sf | 400,571 sf | 96,137 | 68,097 |
| Auto-related | Domestic: 0.23 gpd/sf[5]<br>A/C: 0.17 gpd/sf | - | - | - |
| Hotel | Domestic: 120 gpd/person[6]<br>A/C: 0.17 gpd/sf | - | - | - |
| Community Facility | Domestic: 0.10 gpd/sf[7]<br>A/C: 0.17 gpd/sf | 306,540 sf | 30,654 | 52,112 |
| Manufacturing | Domestic: 0.23 gpd/sf[5]<br>A/C: 0.17 gpd/sf | 85,903 sf | 19,758 | 14,604 |
| School | Domestic: 10 gpd/seat<br>A/C: 0.17 gpd/sf | 92,000 sf<br>(600 seats) | 6,000 | 15,640 |
| | | | **Red Hook WRRF—Total Water Demand** | **2,866,409** |
| | | | **Red Hook WRRF—Total Wastewater Generation** | **1,594,312** |
| **Owls Head WRRF Service Area** | | | | |
| Residential | Domestic: 100 gpd/person[4]<br>A/C: 0.17 gpd/sf | 2,861,082 sf<br>3,060 (DU) | 670,200 | 486,384 |
| Commercial/Office | Domestic: 0.10 gpd/sf<br>A/C: 0.17 gpd/sf | 190,042 sf | 19,004 | 32,307 |
| Retail | Domestic: 0.24 gpd/sf<br>A/C: 0.17 gpd/sf | 306,063 sf | 73,455 | 52,031 |
| Auto-related | Domestic: 0.23 gpd/sf[5]<br>A/C: 0.17 gpd/sf | - | - | - |
| Hotel | Domestic: 120 gpd/person[6]<br>A/C: 0.17 gpd/sf | 54,870 sf<br>(133 rooms) | 31,920 | 9,328 |
| Community Facility | Domestic: 0.10 gpd/sf[7]<br>A/C: 0.17 gpd/sf | 140,212 sf | 14,021 | 23,836 |
| Manufacturing | Domestic: 0.23 gpd/sf[5]<br>A/C: 0.17 gpd/sf | 60,506 sf | 13,916 | 10,286 |
| School | Domestic: 10 gpd/seat<br>A/C: 0.17 gpd/sf | - | - | - |
| | | | **Owls Head WRRF—Total Water Demand** | **1,436,688** |
| | | | **Owls Head WRRF—Total Wastewater Generation** | **822,516** |
| | | | **Project Area—Total Water Demand** | **4,303,097** |
| | | | **Project Area—Incremental Water Demand (No Action to With Action)** | **3,490,271** |
| | | | **Project Area—Total Wastewater Generation** | **2,416,828** |
| | | | **Project Area—Incremental Wastewater Generation (No Action to With Action)** | **1,978,063** |

**Notes:** Totals may not sum due to rounding.

1. Estimates do not include vacant properties or parking areas.
2. Consumption rates from *CEQR Technical Manual* Table 13-2, "Water Usage and Sewage Generation Rates for Use in Impact Assessment," unless otherwise noted.
3. Floor area estimates are based on RWCDS square footage calculations applying a 10% grossing factor for residential use and a 15% grossing factor for all other uses.
4. Assumes 2.19 residents per DU (2010 Census average household size for Brooklyn Community District [CD] 6).
5. Based on *East New York Rezoning Proposal FEIS* (equal to 10,000 gpd/acre); calculated based on total building floor area.
6. Assumes two occupants per hotel room, based on *East New York Rezoning Proposal FEIS*.
7. Assumes same rate as commercial/office, based on *East New York Rezoning Proposal FEIS*.

**Table 11-9**
**With Action Condition Wastewater Generation on the Projected Development Sites by Subcatchment Area**

| Subcatchment Area | Domestic Water/Wastewater Generated on the Projected Development Sites (gpd)[1] |
|---|---|
| **Red Hook WRRF Service Area** | |
| RH-R2 | 1,202,098 |
| RH-R22 | 177,290 |
| RH-R23 | 59,428 |
| RH-R24 | 69,495 |
| RH-R25 | 86,000 |
| Red Hook WRRF Service Area Total | 1,594,312 |
| **Owls Head WRRF Service Area** | |
| OH-R7 | 822,516 |

**Notes:** Totals may not sum due to rounding
1. See **Table 11-8** for domestic water/wastewater generation methodology.

*STORMWATER AND DRAINAGE MANAGEMENT*

In the With Action condition, it is anticipated that the amount of surface area comprised of roofs would increase over the No Action condition as vacant lots and underutilized properties are developed. As shown in **Table 11-10**, roof area is estimated to comprise between 68 and 93 percent of the Projected Development Sites' surface areas in the six affected subcatchment areas. On one site, Projected Development Site 47 (in subcatchment area RH-R2), a portion of the site is expected to be developed with public open space in addition to new mixed-use buildings. As the With Action open space on Projected Development Site 47 has not yet been designed, for the purposes of this analysis, it is assumed that this open space (calculated as the area that would not be occupied by new buildings) would be half vegetated/landscaped (softscape) area and half pavement area. Although some or all of the other projected developments would feature landscaped areas, the amount and location of landscaped areas is not known at this time; therefore, for the purposes of a conservative analysis, all lot area on the other development sites that is not rooftop area (such as side and rear yards) is assumed to be pavement area, which features a higher runoff coefficient than landscaped area (aka softscape). In addition, to be conservative and consistent with citywide CSO assessment modeling, the waterfront redeveloped sites were assumed to connect to the City sewers instead of discharging stormwater to the Canal. This could result in more conservative CSO discharges than may occur when sites are developed should some sites directly discharge their stormwater to the Canal. The analysis also does not take into account for the hundreds of new street trees that will be required under the Proposed Actions.

As a result of these anticipated surface area changes, the weighted runoff coefficients for the Projected Development Sites within most of the affected subcatchment areas are expected to increase over the No Action condition, however the increases would be minor (excepting in subcatchment area RH-R24, discussed further below). As shown in **Table 11-10**, the subcatchment areas are expected to have weighted runoff coefficients of between 0.92 and 0.99 in the With Action condition.

Using the sanitary and stormwater flow calculations, the Flow Volume Calculation Matrix was completed for the With Action condition for each subcatchment area. The summary tables of the Flow Volume Calculation Matrices are included in **Table 11-11**.

## Table 11-10
## With Action Condition Surface Coverage

| Subcatchment Area | Surface Type | Roof | Pavement and Walkways | Other | Grass and Softscape | Total |
|---|---|---|---|---|---|---|
| **Red Hook WRRF Service Area** | | | | | | |
| RH-R2 | Area (percent) | 68% | 26% | 0% | 6% | 100% |
| | Surface Area (acres) | 18.26 | 7.06 | 0.00 | 1.49 | 26.81 |
| | Runoff Coefficient[1] | 1.00 | 0.85 | 0.85 | 0.20 | **0.92** |
| RH-R22 | Area (percent) | 76% | 24% | 0% | 0% | 100% |
| | Surface Area (acres) | 2.71 | 0.84 | 0.00 | 0.00 | 3.55 |
| | Runoff Coefficient[1] | 1.00 | 0.85 | 0.85 | 0.20 | **0.96** |
| RH-R23 | Area (percent) | 93% | 7% | 0% | 0% | 100% |
| | Surface Area (acres) | 1.03 | 0.07 | 0.00 | 0.00 | 1.10 |
| | Runoff Coefficient[1] | 1.00 | 0.85 | 0.85 | 0.20 | **0.99** |
| RH-R24 | Area (percent) | 68% | 32% | 0% | 71% | 100% |
| | Surface Area (acres) | 0.81 | 0.38 | 0.00 | 0.84 | 1.19 |
| | Runoff Coefficient[1] | 1.00 | 0.85 | 0.85 | 0.20 | **0.95** |
| RH-R25 | Area (percent) | 88% | 12% | 0% | 0% | 100% |
| | Surface Area (acres) | 1.28 | 0.17 | 0.00 | 0.00 | 1.45 |
| | Runoff Coefficient[1] | 1.00 | 0.85 | 0.85 | 0.20 | **0.98** |
| **Owls Head WRRF Service Area** | | | | | | |
| OH-R7[2] | Area (percent) | 85% | 15% | 0% | 0% | 100% |
| | Surface Area (acres) | 11.05 | 1.92 | 0.00 | 0.00 | 12.97 |
| | Runoff Coefficient[1] | 1.00 | 0.85 | 0.85 | 0.20 | **0.98** |

**Notes:** Totals may not sum due to rounding.
[1] Weighted Runoff Coefficient calculations based on the Flow Volume Calculation Matrix provided in the *CEQR Technical Manual*.
[2] Subcatchment area includes area served by regulators OH-R7, OH-R7A, and OH-R7B

## Table 11-11
## Flow Volume Matrix: With Action Condition

| Subcatchment Area | Total Area (Acres) | Rainfall Volume (in.) | Rainfall Duration (hr.) | Weighted Runoff Coefficient | Runoff Volume to Direct Drainage (MG) | Runoff Volume to CSS (MG)* | Sanitary Volume to CSS (MG) | Total Volume to CSS (MG) |
|---|---|---|---|---|---|---|---|---|
| RH-R2 | 26.81 | 0.00 | 3.80 | 0.92 | 0.00 | 0.00 | 0.19 | **0.19** |
| | | 0.40 | 3.80 | | 0.00 | 0.24 | 0.19 | **0.43** |
| | | 1.20 | 11.30 | | 0.00 | 0.72 | 0.57 | **1.29** |
| | | 2.50 | 19.50 | | 0.00 | 1.50 | 0.98 | **2.48** |
| RH-R22 | 3.55 | 0.00 | 3.80 | 0.96 | 0.00 | 0.00 | 0.03 | **0.03** |
| | | 0.40 | 3.80 | | 0.00 | 0.03 | 0.03 | **0.06** |
| | | 1.20 | 11.30 | | 0.00 | 0.10 | 0.08 | **0.18** |
| | | 2.50 | 19.50 | | 0.00 | 0.21 | 0.14 | **0.35** |
| RH-R23 | 1.10 | 0.00 | 3.80 | 0.99 | 0.00 | 0.00 | 0.01 | **0.01** |
| | | 0.40 | 3.80 | | 0.00 | 0.01 | 0.01 | **0.02** |
| | | 1.20 | 11.30 | | 0.00 | 0.03 | 0.03 | **0.06** |
| | | 2.50 | 19.50 | | 0.00 | 0.07 | 0.05 | **0.11** |
| RH-R24 | 1.19 | 0.00 | 3.80 | 0.95 | 0.00 | 0.00 | 0.01 | **0.01** |
| | | 0.40 | 3.80 | | 0.00 | 0.01 | 0.01 | **0.02** |
| | | 1.20 | 11.30 | | 0.00 | 0.03 | 0.03 | **0.07** |
| | | 2.50 | 19.50 | | 0.00 | 0.07 | 0.06 | **0.13** |
| RH-R25 | 1.45 | 0.00 | 3.80 | 0.98 | 0.00 | 0.00 | 0.01 | **0.01** |
| | | 0.40 | 3.80 | | 0.00 | 0.01 | 0.01 | **0.03** |
| | | 1.20 | 11.30 | | 0.00 | 0.04 | 0.04 | **0.08** |
| | | 2.50 | 19.50 | | 0.00 | 0.09 | 0.07 | **0.16** |
| OH-R7 | 12.97 | 0.00 | 3.80 | 0.98 | 0.00 | 0.00 | 0.13 | **0.13** |
| | | 0.40 | 3.80 | | 0.00 | 0.12 | 0.13 | **0.25** |
| | | 1.20 | 11.30 | | 0.00 | 0.37 | 0.39 | **0.76** |
| | | 2.50 | 19.50 | | 0.00 | 0.77 | 0.67 | **1.44** |

**Notes:** * Assumes no on-site detention or BMPs for purposes of calculations.
CSS = Combined Sewer System; MG = Million Gallons.
Totals may not sum due to rounding.

As shown in **Table 11-11**, in all rainfall volume scenarios flow to the combined sewer system would increase as compared to the No Action condition (see **Table 11-7**). The largest increases would occur within subcatchment areas RH-R2 (up to 0.63 million gallons during storm events with up to 2.5 inches of rainfall) and OH-R7 (up to 0.47 million gallons).[14] The increases in flow are primarily attributable to the increase in sanitary flow resulting from denser development (particularly residential development) on the projected development sites with the Proposed Actions. As shown in **Tables 11-7** and **11-11**, there would a comparatively smaller increase in stormwater flows to the system as compared to the No Action condition. In most of the subcatchment areas, the With Action weighted runoff coefficient (which is related to the amount of pervious/impervious surface on each projected development site) would be equal to or slightly greater than the No Action weighted runoff coefficient.[15] Increased volumes and flows would be conveyed to the Red Hook and Owls Head WRRFs or discharged directly to the Gowanus Canal, depending on rainfall volume and duration.

Following the guidelines of the *CEQR Technical Manual*, a detailed analysis is warranted when the preliminary assessment finds that there would be increased sanitary or stormwater discharges which may impact capacity in the existing sewer system, exacerbate CSO volumes and/or frequencies, or contribute greater pollutant loadings in combined sewage discharged to receiving waterbodies. Based on the preliminary analysis of increased flows to the combined sewer system presented in the Flow Volume Calculation Matrix, DEP determined that a detailed analysis is necessary to determine the potential for the Proposed Actions to result in increased discharges of CSO to the Gowanus Canal as well as other impacts to the sewer system. Due to the location and topography of the study area surrounding the Gowanus Canal and subsequent sensitivity to CSO overflow, additional analysis was performed. This included additional consideration of net CSO increases by the build year and stormwater detention rates in addition to the storm event analysis matrix. Pollutant loadings were also analyzed in order to determine if any additional CSO volumes would occur that could result in significant adverse environmental impacts from increased pollutant loadings. This analysis was performed by DEP in connection with the Proposed Actions and is summarized below. This analysis used different, more detailed and refined, assumptions for sanitary and wastewater flows and accounted for the effect of completed and ongoing LTCP and Superfund projects, as described in Appendix F.

*ANALYSIS RESULTS WITH 2012 STORMWATER RULE*

As described above, DEP is proposing amendments to Chapters 31 and 19.1 of Title 15 of the Rules of the City of New York (RCNY) as part of a Unified Stormwater Rule. In August 2020,

[14] Totals represent the incremental increase in total volume discharged to the combined sewer system (CSS) during the largest storm scenario represented in the Flow Volume Calculation Matrix. In the With Action condition, there would be 2.48 million gallons discharged in subcatchment area RH-R2 during this storm scenario, compared to 1.85 million gallons discharged in the No Action condition. In subcatchment area OH-R7, there would be a total of 1.44 million gallons discharged during this storm scenario in the With Action condition, compared to 0.97 million gallons discharged in the No Action condition.

[15] There would only be a significant increase in the weighted runoff coefficient in subcatchment area RH-R24 (from 0.42 in the No Action condition to 0.95 in the With Action condition). However, this subcatchment area only contains one projected development site (Projected Development Site 19, with an area of 0.81 acres) and does not represent a substantial increase in impervious surface coverage in comparison to the projected development sites' combined total of approximately 35 acres of surface coverage.

New York City Council passed Intro No. 1851, enabling DEP to move forward with the Chapter 19.1 amendments necessary to package the Unified Stormwater Rule amendments. Draft rules are anticipated to be published in 2021 and in effect in 2022. Since the revised regulations would be in place in the No Action condition, the Unified Stormwater Rule is included in the analysis presented in this chapter. However, for more conservative CEQR analysis, a scenario without the implementation of the Unified Stormwater Rule by 2022 was also evaluated. This analysis examined what the effect would be under the current stormwater regulatory framework, the 2012 Stormwater Rule, labeled 2012 Rule in **Figure 11-8**. As shown, with the Proposed Actions, CSO volumes to Gowanus Canal would increase by 3 million gallons per year (MGY). This increase would also correspond with an increase in Total Suspended Solids (TSS) load to the Canal of 3,175 pounds per year or a 2.8 percent increase from the No Action condition. The Proposed Actions in this 2012 Stormwater Rule Analysis Scenario would result in a marginal increase in CSO volumes/frequencies. Therefore, the Proposed Actions are not projected to have significant impacts on water quality or to local water supply or wastewater and stormwater conveyance and treatment infrastructure.

Additionally, while this would be an increase, it is not anticipated that it would be substantive enough to cause the City to be inconsistent with the EPA's ROD. The CSO Tanks achieve a CSO volume and sediment reduction percentage greater than the 58-74 percent allowed for in the ROD (modeling shows reductions of approximately 80 percent) and it is not anticipated that the increase related to the rezoning would cause the CSO volume reduction to be reduced below those levels allowed for by the ROD.

Additionally, it should be noted that ROD-related reductions are mandated to be achieved with the completion of the CSO tanks, which are anticipated to both be operational by the Proposed Actions' build year.

In addition, with the existing stormwater regulatory framework, the number of flooded manholes and total surface flooding surface volume would be reduced between the No Action and With Action conditions for both the 2012 Stormwater Rule and the proposed Unified Stormwater Rule.

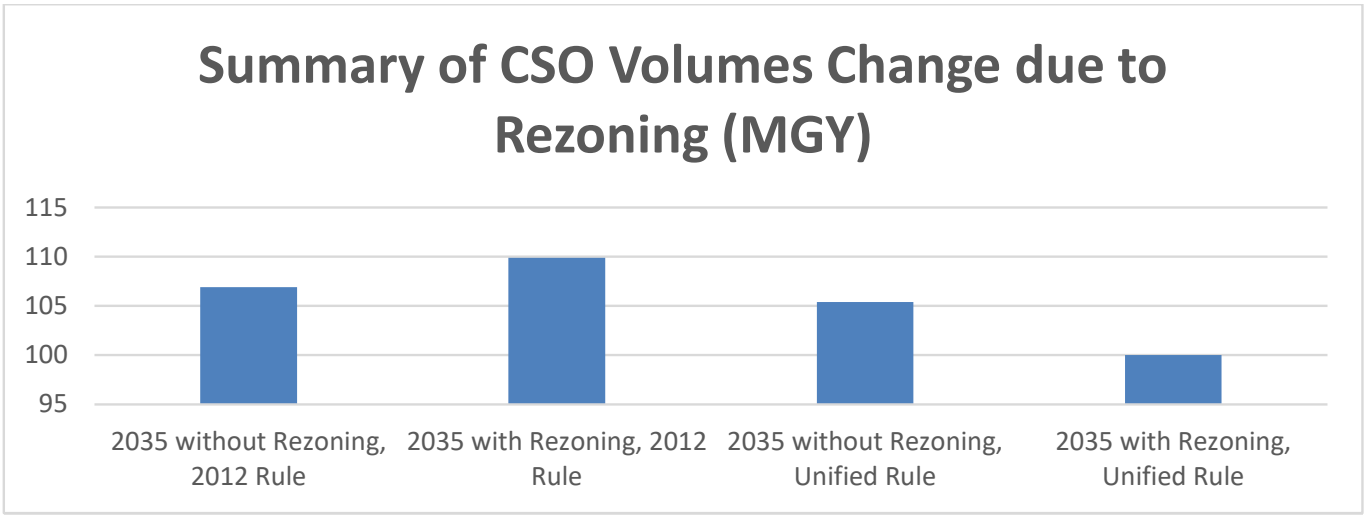
**Table 11-12**
**Number of Flooded Manholes and Total Surface Flooding Volume**

| Flooding | 2035 Without Proposed Actions 2012 Detention Rule | 2035 Without Proposed Actions 2021 Unified Rule | 2035 With Proposed Actions 2012 Detention Rule | 2035 With Proposed Actions 2021 Unified Rule |
|---|---|---|---|---|
| Number of Flooded Manholes | 39 | 39 | 34 | 34 |
| Total Surface Flooding Volume (MG) | 2.7 | 2.6 | 2.6 | 2.5 |

DEP is committed to finalize the Unified Stormwater Rule so that it will be in effect no later than June 30th 2022.

## D. DETAILED CSO AND FLOODING ANALYSIS

DEP performed a detailed drainage analysis and CSO assessment in connection with the Proposed Actions. The analysis is detailed in the *Gowanus Canal CSO and Flooding Assessment Technical*




*Source: NYC Dept of Environmental Protection*

Summary of CSO Volumes Change due to Rezoning (MGY)

*Memorandum* (September 2021), which is included in **Appendix F** and summarized in this section.

## DETAILED DRAINAGE ANALYSIS METHODOLOGY

### *BASELINE CONDITIONS*

The drainage analysis and CSO assessment was based on hydrologic and hydraulic modeling of the sewer system serving the Project Area. The modeling utilized the InfoWorks ICM developed in DEP's LTCP and Superfund projects for the Red Hook WRRF and Owls Head WRRF service areas. The LTCP models were refined to establish the baseline conditions of the sewer system in the Project Area; in particular, the baseline model included all sewers generally larger than 10 inches within the drainage areas that include the Project Area (referred to as the Amended Drainage Plan, or ADP, areas). These rainfall events (see **Table 11-13**) were designed to identify the "critical duration" rainfall intensity that would result in the highest flow at any given pipe in a drainage network (a short-duration high-intensity rainfall is likely to be critical at the most upstream portion of rainfall and the latter ones for the sewers downstream). Each storm was simulated to estimate the surcharging extents under the No Action and With Action conditions.

**Table 11-13**
**Detailed Analysis Modeling—Critical Duration Storms**

| Critical Duration # | Peak Intensity (in/hr) | Total Rainfall Depth (in) | Duration (Minutes) |
|---|---|---|---|
| 1 | 4.62 | 0.46 | 6 |
| 51 | 3.43 | 0.86 | 15 |
| 81 | 2.40 | 1.20 | 30 |

**Source:** DEP, *Gowanus Canal CSO and Surcharging Assessment Technical Memorandum* (September 2021)

In order to estimate CSO pollutant loads to Gowanus Canal as a result of the Proposed Actions, the detailed analysis utilized the event mean pollution concentration (EMC) method,[16] which is a methodology widely used nationally, and commonly reported in literature by various municipalities. Pollutant concentration varies throughout a wet weather event. The EMC is computed as a representative concentration for the entire event, using the total mass of a pollutant discharged during an event divided by the total discharge volume. With the EMC methodology, any changes in EMC concentrations for different evaluated alternatives are assumed to be negligible and the pollutant loading is proportional to the CSO volume. The representative EMC is applied to CSO discharges in the typical year to calculate the resulting pollutant load from CSOs. Similarly, the representative effluent concentrations for the wastewater streams are used to compute the loadings from WRRFs. In this analysis, sanitary flow effluent concentrations used for evaluating loadings to the Red Hook and Owls Head WRRFs were taken from the respective WRRFs, while CSO discharge concentrations used for evaluating loadings to the Gowanus Canal were gathered from

[16] Geosyntec Consultants (2015). Program Effectiveness Assessment and Improvement Plan Approach to Quantify Pollutant Loads and Pollutant Load Reduction. Last accessed in January 2021. https://geosyntec.com/pdf/PEAIP-Modeling-Approach.pdf

Shaver, E., R. Horner, J. Skupien, C. May, and G. Ridley (2007). Fundamentals of Urban Runoff Management: Technical and Institutional Issues. North American Lake Management Society, Madison, WI.

previous sampling and a literature review.[17] Total Suspended Solid (TSS) reductions to achieve PAH concentrations are required by EPA's ROD. It should be noted that with the EMC method, other pollutants in CSO discharges would be expected to show similar reductions in load to the Canal.

*NO ACTION CONDITION*

The hydrologic and hydraulic model incorporated the following elements to determine the future conditions absent the Proposed Actions for the 2035 analysis year (the No Action condition):

- Background dry weather sanitary flows to the sewer system in the ADP area were determined using DEP's projected sanitary flows to the Red Hook and Owls Head WRRFs for 2035, which were distributed through the sewer system in accordance with DEP's LTCP/Superfund modeling procedures.
- Additional dry weather sanitary flow was added to the model based on the projected no action residential population in the Project Area, assuming a per capita wastewater generation of 73 gpd.
- The high-level storm sewer (HLSS) and green infrastructure improvements to be made in the Project Area by 2035 (discussed above) were added to the model, as these improvements are expected to reduce stormwater flows to the sewer system.
- The Gowanus Canal CSO facilities expected to be constructed in the Project Area as part of the Superfund remedy were added to the model, as these facilities are expected to provide stormwater retention and reduce CSO volumes and frequency of discharges to the Canal. As discussed above, the CSO facilities would include an eight-MG underground tank at the northern end of the Canal (the Head End site) and a four-MG tank near the middle of the Canal (the Owls Head site).

*WITH ACTION CONDITION*

To evaluate the increase in dry weather sanitary flows to the sewer system resulting from the Proposed Actions, the RWCDS projected residential population was added to the model, assuming a per capita wastewater generation of 73 gpd. In addition, all new projected development was assumed to meet the stormwater retention requirements of the proposed Unified Stormwater Rule (discussed above).

## DETAILED ANALYSIS FINDINGS

The detailed analysis found that in the With Action condition, CSO volumes and street flooding conditions would decrease as compared to the No Action condition despite the increase in sanitary

[17] Geosyntec Consultants and Wright Water Engineers (2011). International Stormwater Best Management Practices (BMP) Database Pollutant Category Summary: Solids (TSS, TDS, and Turbidity, for Water Environment Research Foundation, Federal Highway Administration, and American Society of Civil Engineers, May 2011.

Pitt, R., Maestre, A., & Clary, J. (2018). The National Stormwater Quality Database (NSQD), Version 4.02. Department of Civil and Environmental Engineering, University of Alabama, USA. Last accessed in January 2021. https://www.bmpdatabase.org/nsqd.html

USEPA (1983), Results of the Nationwide Urban Runoff Program (NURP) – Volume 1, Final Report, December 1983.

flows from new development, due to increased on-site stormwater management volume requirements, more stringent release rate restrictions, and the number of retention practices implemented with new development in accordance with the proposed Unified Stormwater Rule. Overall, in the With Action condition, CSO volumes discharged to the Canal would be similar to those in the No Action condition, and the Proposed Actions would not affect the City's ability to meet the ROD CSO requirements. Therefore, based on the detailed analysis, the Proposed Actions are not projected to significantly affect CSO discharges or water quality in the Gowanus Canal.

In terms of pollutant loading, because CSO volumes in the Gowanus Canal are projected to decrease with the Proposed Actions due to the Unified Stormwater Rule, the estimated TSS pollutant loads (and contaminant loads) also decrease. With the Proposed Actions, the EMC method shows that TSS loads into Gowanus Canal are reduced by 5 percent, consistent with the same percentage reduction in CSO volumes. Specific findings from the analysis are summarized below:

- As shown in **Table 11-14**, in the With Action condition, there would be a decrease in surcharging extent (i.e., number of flooded manholes) and surface flooding in the modeled drainage area compared to the No Action condition.
- As shown in **Table 11-15**, in the With Action condition, CSO discharge events would be equal to or fewer than the No Action condition at all outfalls.

**Table 11-14**
**Detailed Analysis—**
**Number of Flooded Manhole and Total Surface Flooding volume**

| Variable | No Action Condition | With Action Condition |
|---|---|---|
| Number of Flooded Manholes | 39 | 34 |
| Total Surface Flooding Volume (MG) | 2.50 | 2.45 |

**Source:** DEP, *Gowanus Canal CSO and Surcharging Assessment Technical Memorandum* (January 2021)

**Table 11-15**
**Detailed Analysis—CSO Frequency**

| Outfall # | No Action Condition CSO Events | With Action Condition CSO Events | With Action Increment |
|---|---|---|---|
| OH-005 | 1 | 1 | - |
| OH-006 | 34 | 34 | - |
| OH-007 | 6 | 5 | -1 |
| RH-030 | 17 | 15 | -2 |
| RH-031 | 16 | 14 | -2 |
| RH-033 | 0 | 0 | - |
| RH-034 | 5 | 5 | - |
| RH-035 | 15 | 15 | - |
| RH-036 | 9 | 2 | -7 |
| RH-037 | 2 | 1 | -1 |
| RH-038 | 5 | 5 | - |

**Source:** DEP, *Gowanus Canal CSO and Surcharging Assessment Technical Memorandum* (January2021)

- As shown in **Table 11-16**, in the With Action condition, the total CSO volume discharged to the Canal would decrease as compared to the No Action condition despite the new development, due to increased on-site stormwater management volume requirements, updated release rate restrictions, and the number of retention practices implemented with new development in accordance with the proposed Unified Stormwater Rule.

**Table 11-16**
**Detailed Analysis—CSO Volume**

| Outfall # | No Action Condition CSO Volume—Tank (MG) | With Action Condition CSO Volume—Tank (MG) | With Action Increment (MG) |
|---|---|---|---|
| OH-005 | 0.9 | 0.9 | - |
| OH-006 | 18.4 | 18.3 | -0.1 |
| OH-007 | 10.2 | 9.9 | -0.3 |
| RH-030 | 17.1 | 16.2 | -0.9 |
| RH-031 | 19.4 | 18.2 | -1.2 |
| RH-033 | 0 | 0 | - |
| RH-034 | 29.9 | 28.5 | -1.4 |
| RH-035 | 8.1 | 7.0 | -1.1 |
| RH-036 | 0.4 | 0.1 | -0.3 |
| RH-037 | 0.04 | 0.02 | -0.02 |
| RH-038 | 1.0 | 0.9 | -0.1 |
| **Total** | 105.44 | 100.02 | -5.42 |

**Source:** DEP, *Gowanus Canal CSO and Surcharging Assessment Technical Memorandum* (January 2021)

As shown in **Table 11-17,** there would be a decrease in the TSS load into the Gowanus Canal in the With Action condition, as compared to the No Action condition. This is commensurate with the reduction of CSO volumes entering the Canal. While the loadings to the Owls Head and Red Hook WRRFs would increase, they would both remain below the permit limit.

**Table 11-17**
**Detailed Analysis—Total Suspended Solids (TSS) Loadings**

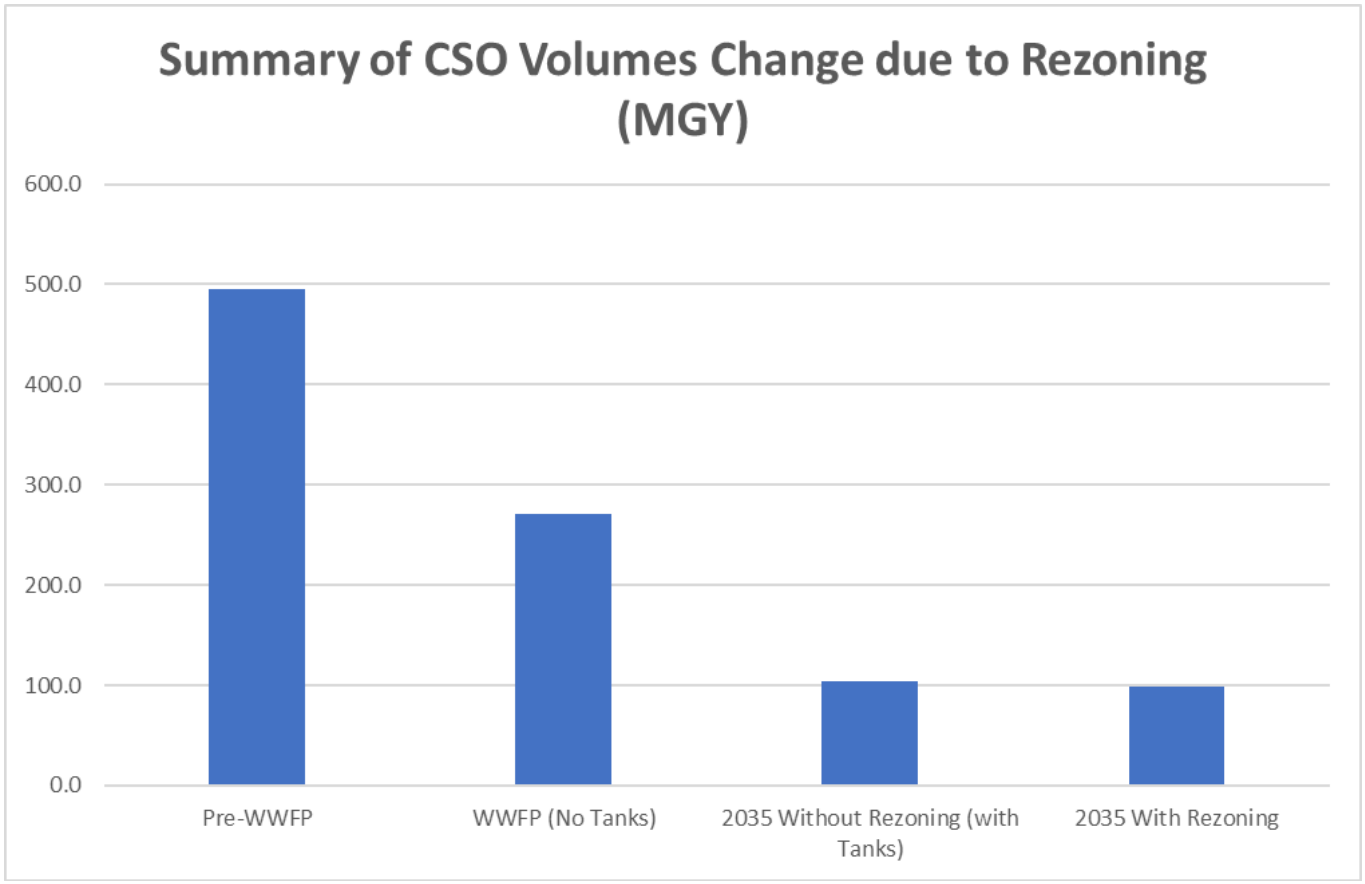
| Scenario | Location | TSS Load | Percent Increase Due to Action |
|---|---|---|---|
| 2035 No Action | Red Hook WRRF Effluent (lb/day) | 1,612 | - |
| | Owls Head WRRF Effluent (lb/day) | 13,398 | |
| | Gowanus Canal CSOs (lb/year) | 111,355 | |
| 2035 With Action | Red Hook WRRF Effluent (lb/day) | 1,659 | 2.9% |
| | Owls Head WRRF Effluent (lb/day) | 13,446 | 0.4% |
| | Gowanus Canal CSOs (lb/year) | 105,736 | -5.0% |

**Source:** DEP, *Gowanus Canal CSO and Surcharging Assessment Technical Memorandum* (January 2021)

As shown in **Figure 11-9**, CSO volumes have been decreasing over time, and the Proposed Actions would continue that trend due to the new on-site stormwater management requirements. In **Figure 11-9**, the pre-WWFP column shows the CSO discharge in million gallons per year (MGY) before the implementation of DEP's green infrastructure improvements in the area, HLSS, and the upgrades to the Gowanus pump station. The WWFP column shows the CSO levels with the project implementation, a more than 200 MGY improvement to the Canal. The 2035 Without Rezoning column shows the benefit with the implementation of the CSO tanks and the 2035 With Rezoning column shows that, with the Unified Stormwater Rule and the proposed new developments associated with the rezoning, the improvements to the Canal continue. As noted above, the Rezoning resulted in a 5 MGY reduction in CSO discharge to the Canal.

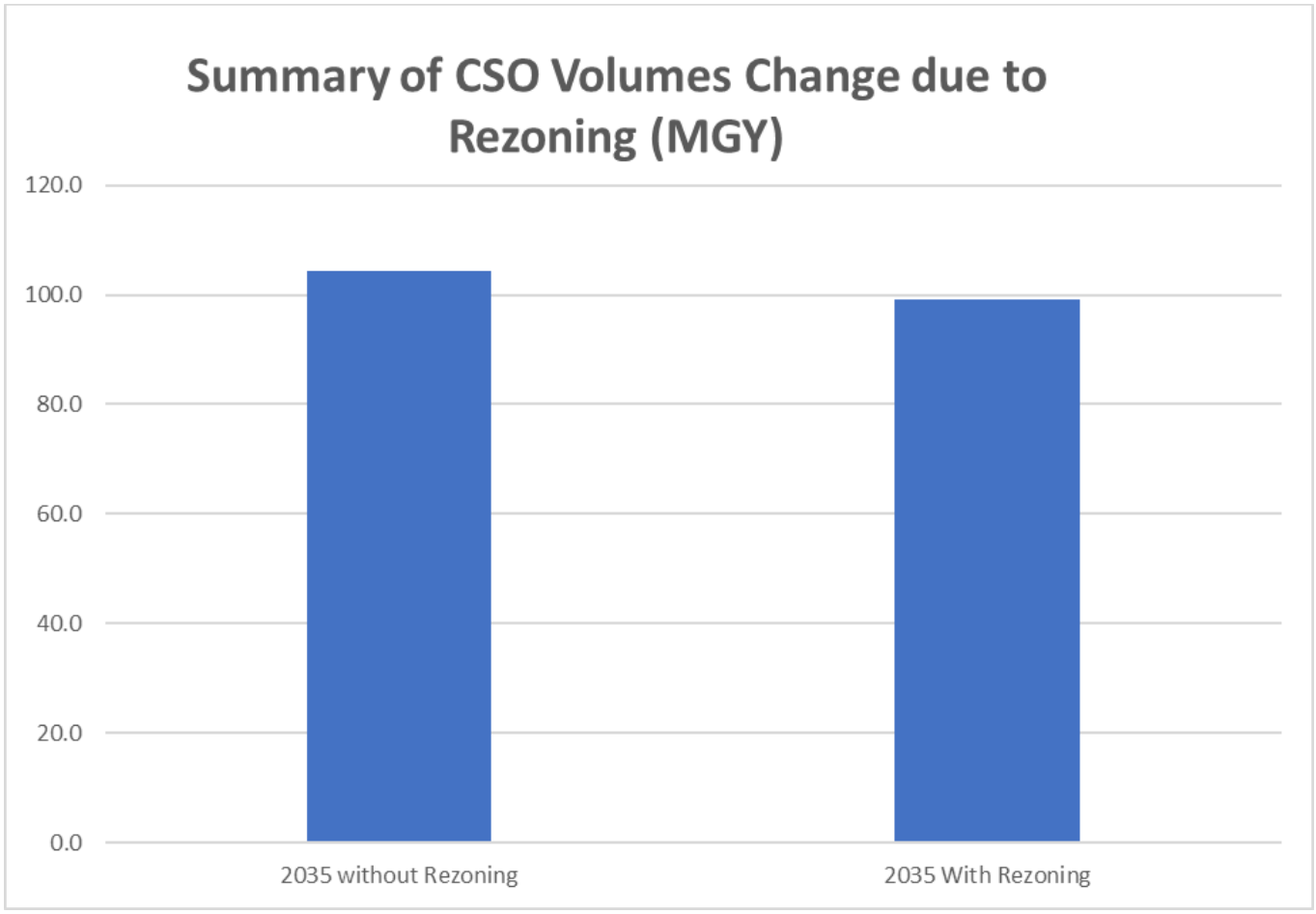
**Figure 11-10** zooms in on the last two columns of **Figure 11-9** to more clearly show the CSO reductions with the rezoning, due to the Unified Stormwater Rule requirements.

In response to comments received on the DEIS, and as part of the detailed infrastructure modeling, an interim year analysis was also performed to examine a future condition with substantial development generated by the Proposed Actions' expected to be operational and occupied, but prior to the CSO storage tanks coming online. While the build year for the tanks are part of ongoing




*Source: NYC Dept of Environmental Protection*

Summary of CSO Volume Change




*Source: NYC Dept of Environmental Protection*

Summary of CSO Volume Change



**Figure 11-10**

discussions independent of the Proposed Actions, for the purposes of a conservative analysis, a 2030 interim analysis year was selected. This analysis showed a decrease in CSO volumes projected in both the No Action and With Action conditions as compared to the baseline condition. Both the With Action and No Action conditions included green infrastructure assets, which were constructed, under construction, or in final design, along with the two phases of high-level storm sewers. The With Action condition included all projected development sites expected by DCP to be constructed by the end of 2030, and showed a volume reduction of 2.5 million gallons per year of CSO discharged into the Canal compared to No Action background growth projections in the rezoning area by 2030. This reduction is primarily due to onsite stormwater management in accordance with the proposed Unified Stormwater Rule. It should also be noted that the city is continuing discussions with EPA concerning any potential actions that EPA believes might be necessary to implement the Superfund remedy.

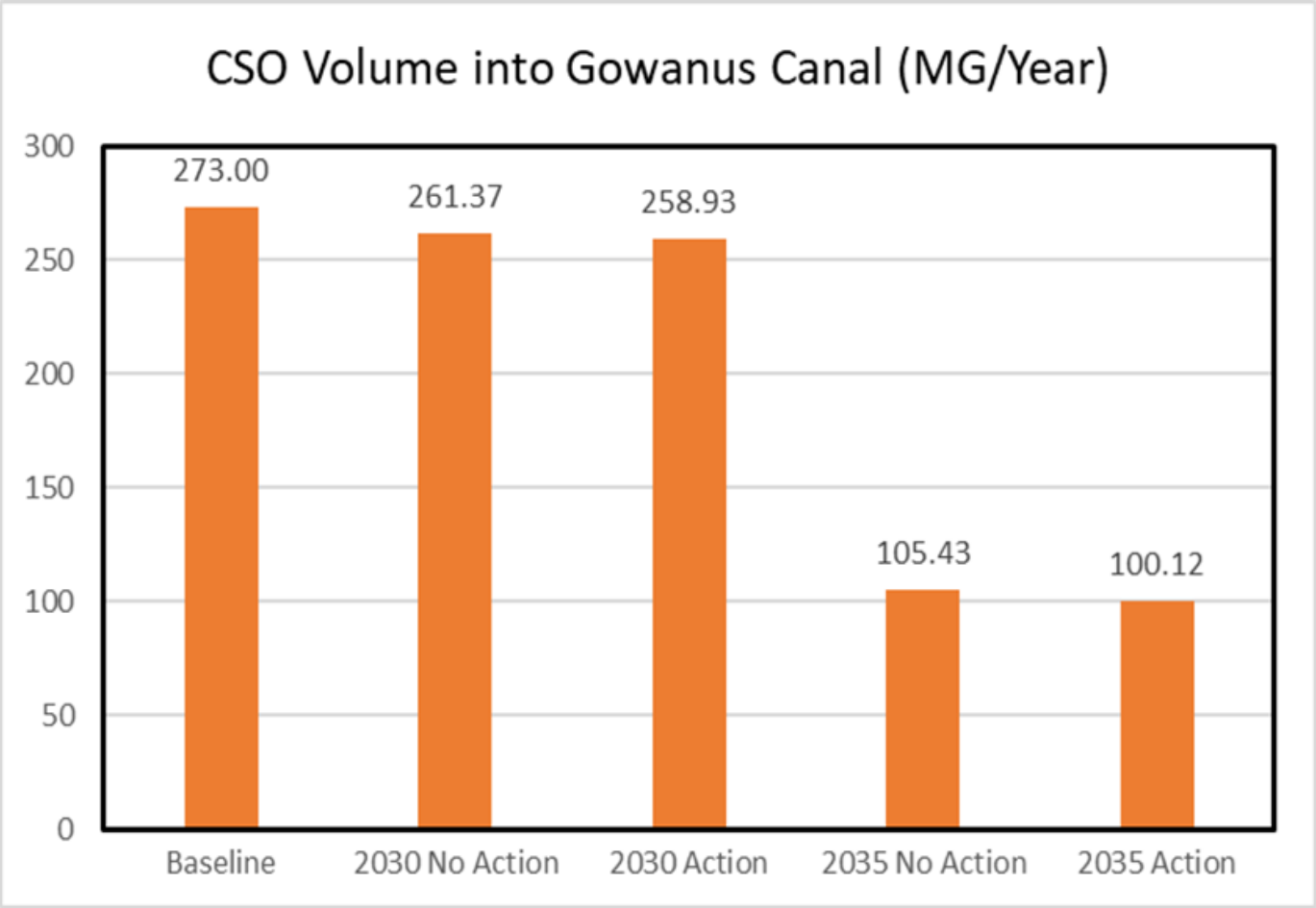
**Figure 11-11** compares the 2030 interim scenarios CSO discharges with the Baseline condition developed for this EIS (see above for a detailed discussion on development of the Baseline condition) and the 2035 build year scenarios.

As shown in the **Figure 11-11**, construction of the two tanks will reduce the overall CSO volume by about 160 million gallons per year in the 2035 No Action and Action conditions. There is a larger difference between the No Action and With Action conditions for 2035 as compared to 2030. The larger reduction of 5.3 million gallons in 2035, the Proposed Actions' build year, is (again) attributable to more new development capturing and holding more stormwater compared to No Action condition. In this interim time period before the CSO tanks come online, the Proposed Actions would result in a decrease in CSO volumes/frequencies and are not projected to have significant impacts on water quality in the Gowanus Canal. Therefore, it is concluded that the Proposed Actions would not result in a significant adverse impact.

## E. STORMWATER BEST MANAGEMENT PRACTICES

The proposed rezoning would result in increased development and population density which could require a hydraulic analysis of the existing sewer system when applicants seek sewer connections and an amended drainage plan for the area when improvements to the system are planned. The hydraulic analysis would be required prior to the submittal of a Site Connection Proposal (SCP) application to determine whether the existing sewer system is capable of supporting new development and related increase in wastewater flow. As part of the SCP permit approval processes, developments must be in compliance with the required on-site stormwater volume requirements and stormwater release rate as detailed in the Unified Stormwater Rule. Sewer improvements may also be required of the applicant at the time of the SCP. Each projected development site, regardless of lot size, will trigger the Chapter 31 component of the Unified Stormwater Rule and will be required to implement slow-release SMPs to meet updated release rate and volume requirements on-site. Projected development sites that also trigger the Chapter 19.1 component of the rule will implement SMPs based on the combined sewer area SMP hierarchy (**Figure 11-1**) previously described. The SMP hierarchy provides for design flexibility in selecting on-site SMPs by grouping SMPs by function in tiers, while also ensuring that vegetated and higher performing SMPs are evaluated first. There is no waiver to the SMP hierarchy available and site constraint documentation must be provided to move from a higher tier to a lower tier of the SMP hierarchy. The Unified Stormwater rule ensures that redeveloped properties manage more total stormwater and manage it more efficiently than prior to redevelopment.

*This figure is new to the FEIS.*




*Source: NYC Dept of Environmental Protection*

CSO Volume into Gowanus Canal



**Figure 11-11**

Trees planted per the Special Gowanus Mixed-Use District's street tree requirement could also be utilized to capture and store water below an enhanced tree pit. These SMPs, among other potential measures, would help to avoid an exacerbation of existing CSO discharge.

Enhanced stormwater management throughout the City is consistent with recent policies, including the NYC Green Infrastructure Plan and OneNYC. The NYC Green Infrastructure Plan, released in September 2010, includes a goal of reducing CSOs by 1.67 billion gallons per year by 2030 through the implementation of retention or detention practices.

Implementation of low-flow fixtures, as per the New York City Plumbing Code, Local Law 33 of 2007, and the United States Environmental Protection Agency's (EPA's) WaterSense Program, would also help to control sanitary flows.

The Proposed Actions would increase sanitary flows to the City's combined sewer system but would decrease the amount that may be discharged as CSOs into the Gowanus Canal during rain events due to the increased retention and detention of stormwater runoff to be implemented with the new development in accordance with the proposed Unified Stormwater Rule. Because of the available capacity at the Red Hook and Owls Head WRRFs, the projected increased flows to the combined sewer system would not have a significant adverse impact on the WRRFs. Based on detailed modeling, which reflects the types of SMPs that would be implemented on each Projected Development Site by its respective owner/developer to meet the Unified Stormwater Rule, the Proposed Actions would not result in an increase in surcharging/flooding conditions. Additionally, the Proposed Actions would result in a decrease in CSO volumes/frequencies and are not projected to have significant impacts on water quality in the Gowanus Canal. Therefore, it is concluded that the Proposed Actions would not result in a significant adverse impact to local water supply or wastewater and stormwater conveyance and treatment infrastructure. ✷