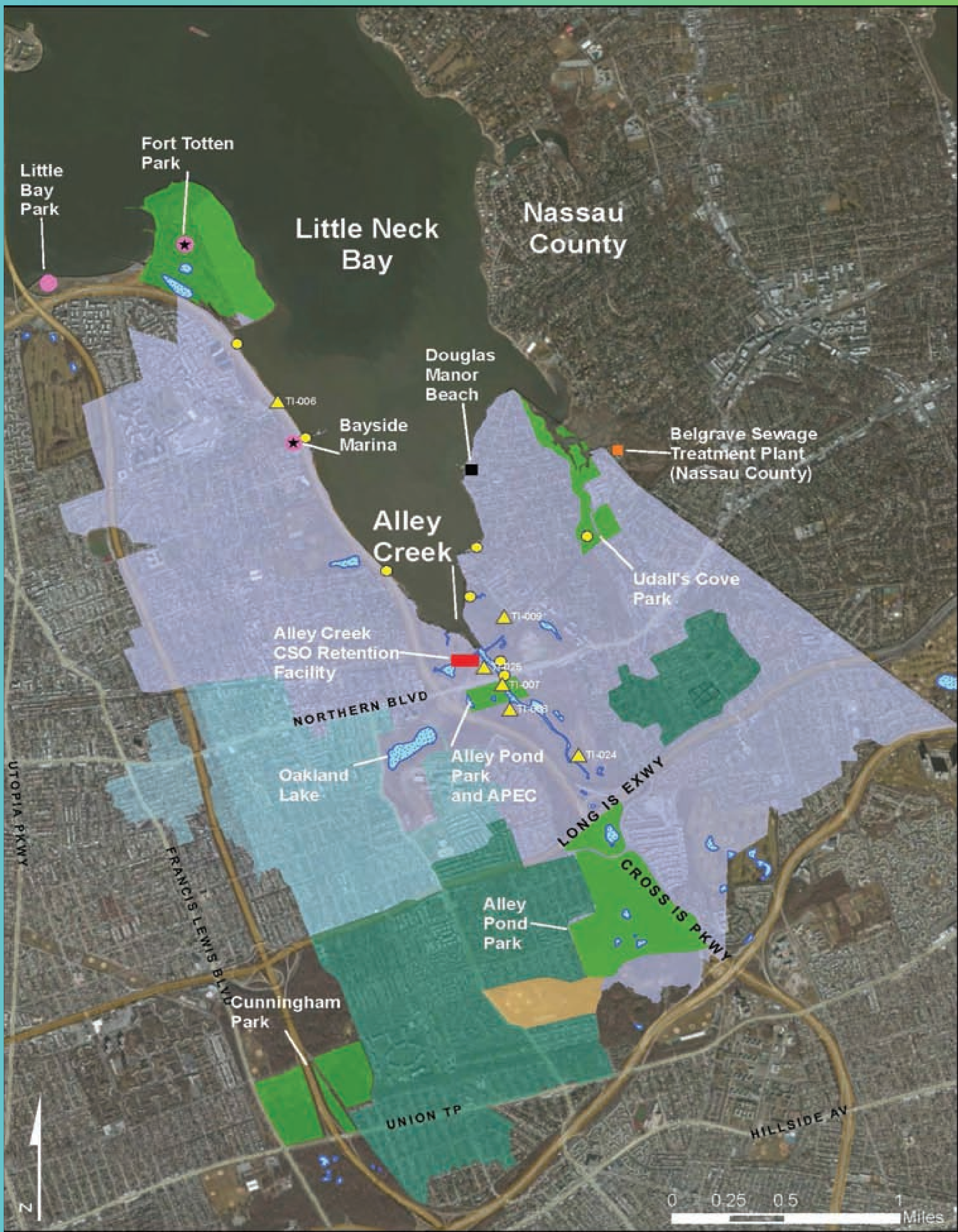
New York City Department of Environmental Protection

Capital Project No. WP-169
Long Term Control Plan II

Combined Sewer Overflow Long Term Control Plan for Alley Creek and Little Neck Bay



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The City of New York
Department of Environmental Protection
Bureau of Wastewater Treatment

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This Long Term Control Plan (LTCP) for Alley Creek and Little Neck Bay was prepared pursuant to the Combined Sewer Overflow (CSO) Order on Consent (DEC Case No. CO2-20110512-25) as modified, March 8, 2012 (2012 Order on Consent). Under the 2012 Order on Consent, the New York City Department of Environmental Protection (DEP) is required to prepare and submit 11 LTCPs to the New York State Department of Environmental Conservation (DEC) by December 2017. The Alley Creek LTCP is the first of those 11 LTCPs to be completed.

The goal of each LTCP, as described in the LTCP Goal Statement in the 2012 Order on Consent, is to identify, with public input, appropriate CSO controls necessary to achieve waterbody-specific water quality standards (WQS) consistent with the CSO Control Policy and water quality goals of the Federal Clean Water Act (CWA) and related guidance. Included in the 2012 Order on Consent Goal Statement is the following: *"Where existing water quality standards do not meet the Section 101(a)(2) goals of the Clean Water Act, or where the proposed alternative set forth in the LTCP will not achieve existing water quality standards or the Section 101(a)(2) goals, the LTCP will include a Use Attainability Analysis examining whether applicable waterbody classifications, criteria, or standards should be adjusted by the State."*

Regulatory Requirements

The waters of the City of New York are subject to Federal and New York State regulation. Particularly relevant to this LTCP is the U.S. Environmental Protection Agency (EPA) CSO Control Policy, which provides guidance on the development and implementation of LTCPs, and the setting of WQS for the waters of New York City (NYC). In New York State, CWA regulatory and permitting authority has been delegated to the DEC.

Under the BEACH Act of 2000, states with coastal recreation waters were to adopt new bacteria criteria for primary contact waters. For marine waters, like those in NYC, EPA proposed using enterococcus as the new indicator organism with a requirement that the geometric mean concentration of enterococci not exceed 35 col/100 ml. When this rule was promulgated, the EPA guidance document provided flexibility in the interpretation of the calculation of the geometric mean (GM). States were given the discretion by EPA to apply this new standard as either a seasonal GM, a monthly GM, or a rolling 30 day GM. Consistent with the DEC approved waterbody/watershed plans under the CSO Consent Order, DEP has revised the enterococci attainment calculations in the LTCP by applying a summer seasonal GM to calculate enterococci attainment. It should be noted that an earlier version of this LTCP, dated June 2013, had used a more stringent rolling 30-day GM. When using a summer seasonal GM, instead of a rolling 30-day GM, the short-term sources become less important and the constant sources become more important in terms of attainment of the standard.

DEC has adopted WQS for navigable waters, designating Little Neck Bay as a Class SB waterbody, which is defined as "suitable for fish, shellfish and wildlife propagation and survival." The best usages of Class SB waters are "primary and secondary contact recreation and fishing" (6 NYCRR 701.11). Class SB waterbodies include pathogen indicator standards that are currently in the NYSDEC WQS in addition to new pathogen indicator standards in the EPA 2004 BEACH Act Rule. DEC has designated Alley Creek as a Class I water body, defined as "suitable for fish, shellfish and wildlife propagation and survival". The best usages of Class I waters are "secondary contact recreation and fishing" (6 NYCRR 701.13).

The LTCP used the existing pathogen and DO criteria shown in Table ES-1 to evaluate the proposed alternatives. The LTCP also evaluates attainment based on potential future standards:

Table ES-1. Pathogen and DO Criteria

Class	Usage	Dissolved Oxygen (mg/L)	Fecal Coliform (MPN/100mL)	Enterococci (MPN/100mL)
SB	Primary and secondary contact recreation and fishing. Suitable for fish, shellfish and wildlife propagation and survival.	≥4.8 ≥3.0	≤ 200(1)	≤ 35(2,3)
I	Secondary contact recreation and fishing. Suitable for fish, shellfish and wildlife propagation and survival.	≥ 4.0	≤ 2,000(1)	N/A

(1) Both total and fecal coliform are based on a monthly GM that is supposed to consist of 5 samples or greater.
(2) The enterococci criterion was promulgated by the EPA 2004 BEACH Act Rule and attainment with this criterion is being assessed using a seasonal GM.
(3) For Douglaston Manner Association Beach, the DOHMH adopted a 30 day moving seasonal enterococci GM of 35 MPN/100 ml based on the 2004 BEACH Act.

LTCP Planning Approach

The LTCP planning approach includes several phases, including waterbody and watershed characterization, public participation, alternatives evaluation, phased and adaptive implementation strategies and post-construction monitoring. This LTCP builds upon DEP's prior efforts, most notably the June 2009 "Alley Creek and Little Neck Bay Waterbody/Watershed Facility Plan Report" (WWFP). Since the issuance of the WWFP, several important projects have been completed, including the 5-million gallon (MG) Alley Creek CSO Retention Tank, along with extensive improvements to the upstream combined and separate collections systems. DEP also implemented other collection system improvements to ensure that wet weather flows to the Tallman Island Wastewater Treatment Plant (WWTP) would be sustained at two times design dry weather flow (2xDDWF) during rain events. In addition, DEP completed a $20-million wetland restoration project for the 16-acre northern section of the Alley Pond Park.

The Alley Creek and Little Neck Bay LTCP planning process included extensive outreach to stakeholders. A public outreach participation plan was developed and implemented throughout the process.

Watershed Characteristics

The Alley Creek and Little Neck Bay watershed is comprised of approximately 4,879 acres along the north shore of eastern Queens County, adjacent to the Nassau County border. The land surrounding Alley Creek is mostly parkland, while the land surrounding Little Neck Bay is largely residential. Several parks are found within the watershed, the most notable of which is Alley Pond Park, which borders Alley Creek on its eastern, western, and southern shores. Current land uses for the watershed are shown in Figure ES-1.

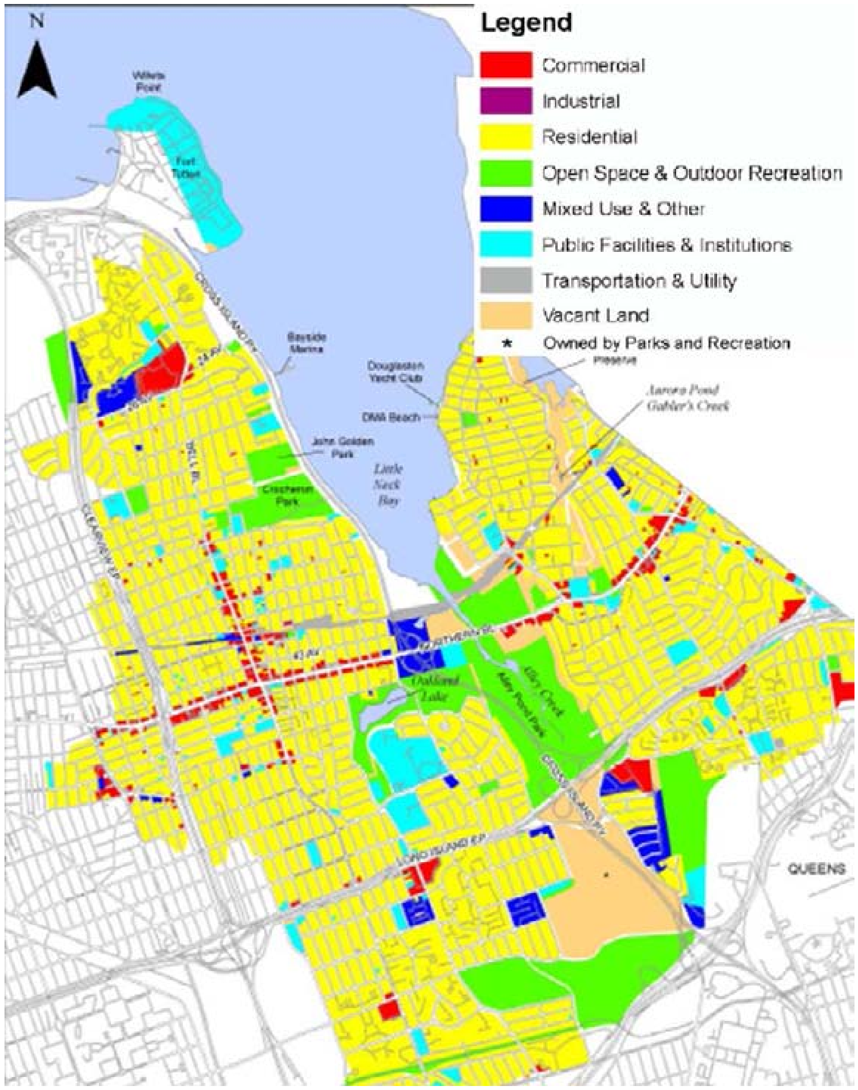


Figure ES-1. Alley Creek and Little Neck Bay Land Use

The Tallman Island WWTP, which has been providing full secondary treatment since 1978, has a design dry weather flow (DDWF) capacity of 80 million gallons per day (MGD), and is designed to receive a maximum wet weather flow of 160 MGD (2xDDWF), with 120 MGD (1.5xDDWF) receiving secondary treatment. Flows over 120 MGD receive primary treatment and disinfection. As shown on. Figure ES-2 the watershed, which is tributary to the Tallman Island WWTP, contains a complex wastewater system comprised of combined, separate, and storm sewers; interceptor sewers and pumping stations; several CSO and stormwater outfalls; and a CSO retention tank.

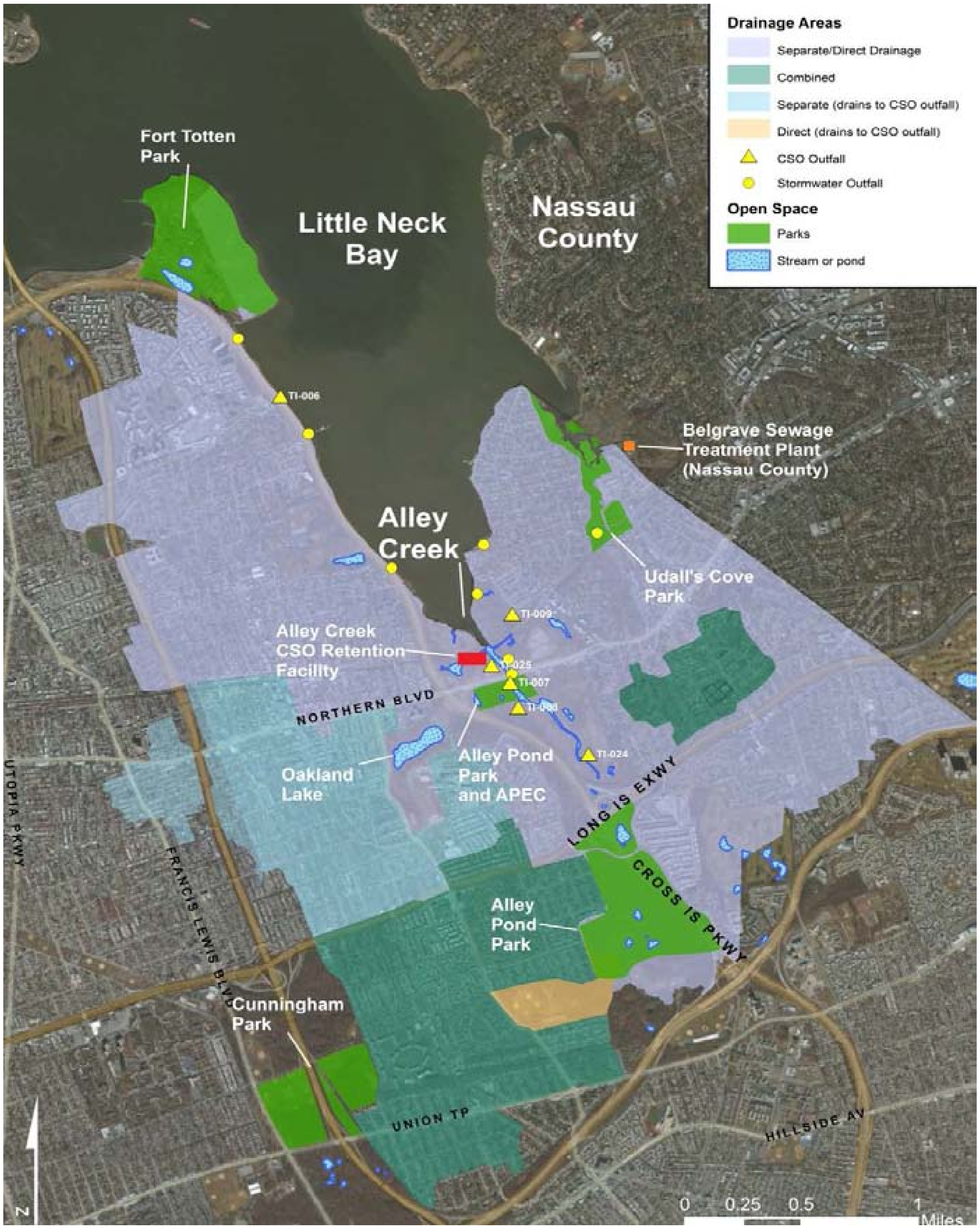
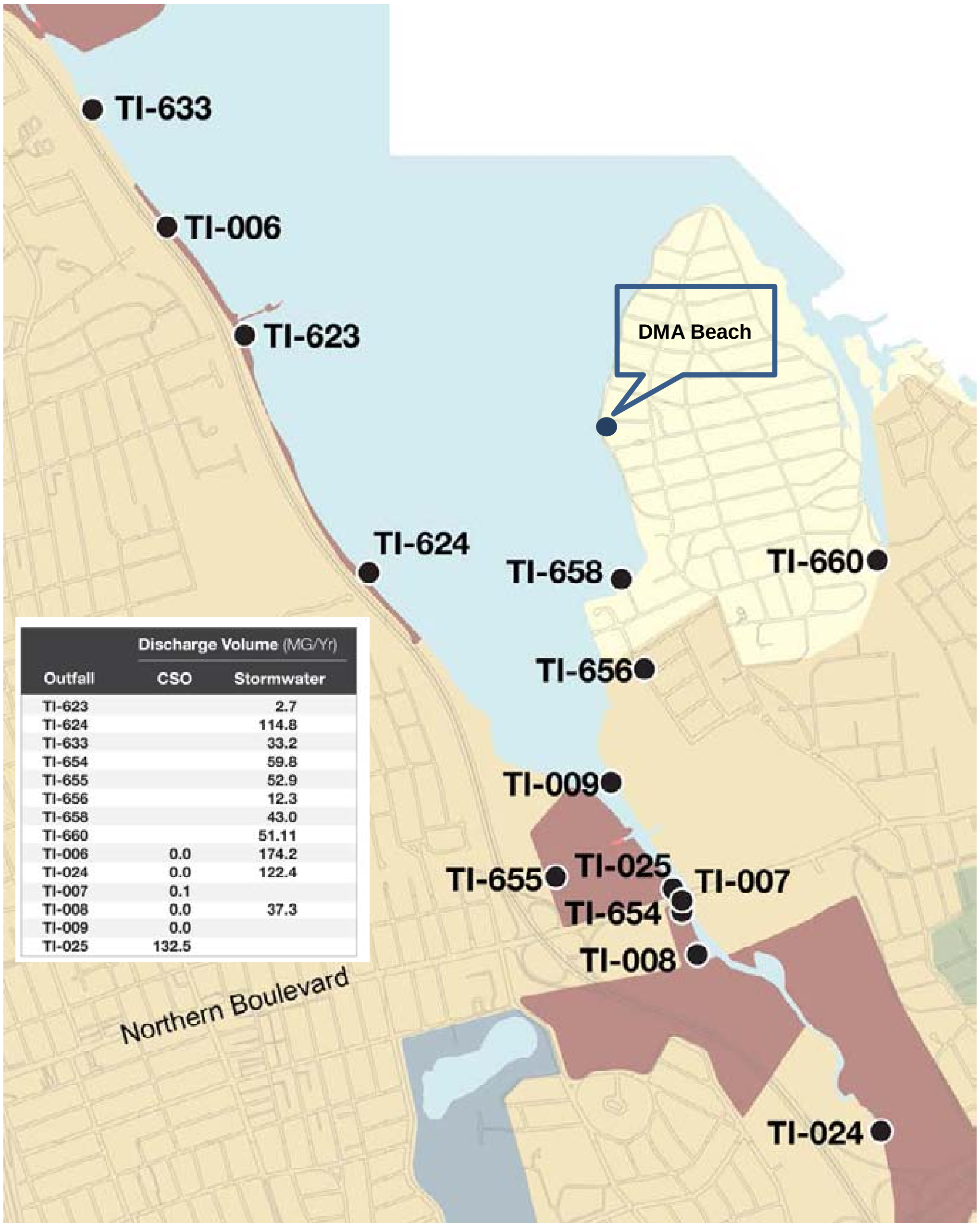


Figure ES-2. Watershed Characteristics

Several modifications have occurred within the collection system tributary to the Tallman Island WWTP since the InfoWorks (IW) model was calibrated in 2007. The IW model was subsequently revised accordingly. In addition to these model updates, DEP has made several other changes to the model as part of a citywide recalibration program, to reflect enhancements in runoff methodology, sediments, and other modeling inputs and parameters. These extensive efforts have resulted in more detailed and accurately calibrated watershed and water quality models that simulate the collection system and the receiving waterbody dynamics, for use in the Alley Creek and Little Neck Bay LTCP.

The Tallman Island SPDES-permitted CSO outfalls to Alley Creek, shown on Figure ES-3, include TI-007, TI-008, TI-009, TI-024 and TI-025; CSO outfall TI-006 discharges to Little Neck Bay. It should be noted that TI-025 is the outfall for the newly-constructed 5 MG Alley Creek CSO Retention Tank.



	Discharge Volume (MG/Yr)	
Outfall	CSO	Stormwater
TI-623		2.7
TI-624		114.8
TI-633		33.2
TI-654		59.8
TI-655		52.9
TI-656		12.3
TI-658		43.0
TI-660		51.11
TI-006	0.0	174.2
TI-024	0.0	122.4
TI-007	0.1	
TI-008	0.0	37.3
TI-009	0.0	
TI-025	132.5	

Figure ES-3. New York City Alley Creek and Little Neck Bay SPDES Permitted Outfalls

TI-008 and TI-025 also conveys and discharges a large portion of stormwater. In addition, outfalls TI-007, TI-006 and TI-024 serve as emergency bypasses for pump stations and are therefore designated as CSO outfalls. Under normal operating conditions, TI-006 and TI-024 discharge only stormwater; and TI-007 discharges CSO only during large precipitation events, typically less than once per year.

Also shown on Figure ES-3 are the nine permitted stormwater outfalls discharging to Alley Creek and Little Neck Bay: TI-623, TI-624, TI-633, TI-653, TI-654, TI-655, TI-656, TI-658 and TI-660. The figure displays the annual discharge volumes for the CSOs and stormwater outfalls for the baseline conditions defined later in this executive summary.

The area on the eastern shore of Little Neck Bay, known as Douglas Manor, is a private residential community. The neighborhood is predominantly composed of single-family residences served by on-site septic systems. Approximately 58 acres of drainage area generate runoff upstream of Shore Road, a waterfront roadway that follows the alignment of the eastern shore of Little Neck Bay. The Douglas Manor Association manages a permitted private community beach known as DMA Beach, along Shore Road. As seen in Figure ES-3, the DMA Beach is located approximately 0.7 miles north of the mouth of Alley Creek, and approximately one mile downstream from the principal CSO outfall on Alley Creek, TI-025.

Waterbody Characteristics

Alley Creek and Little Neck Bay have been classified by DEC as Class I and SB waterbodies, respectively. The WQS corresponding to these classifications are as shown in Figure ES-4. DEC uses dissolved oxygen (DO) as the numerical criterion to establish whether a waterbody supports aquatic life uses, while bacteria concentration is used to establish whether a waterbody supports recreational uses. In addition to numerical criteria, DEC has issued narrative criteria to protect aesthetics in all waters within its jurisdiction, regardless of classification.

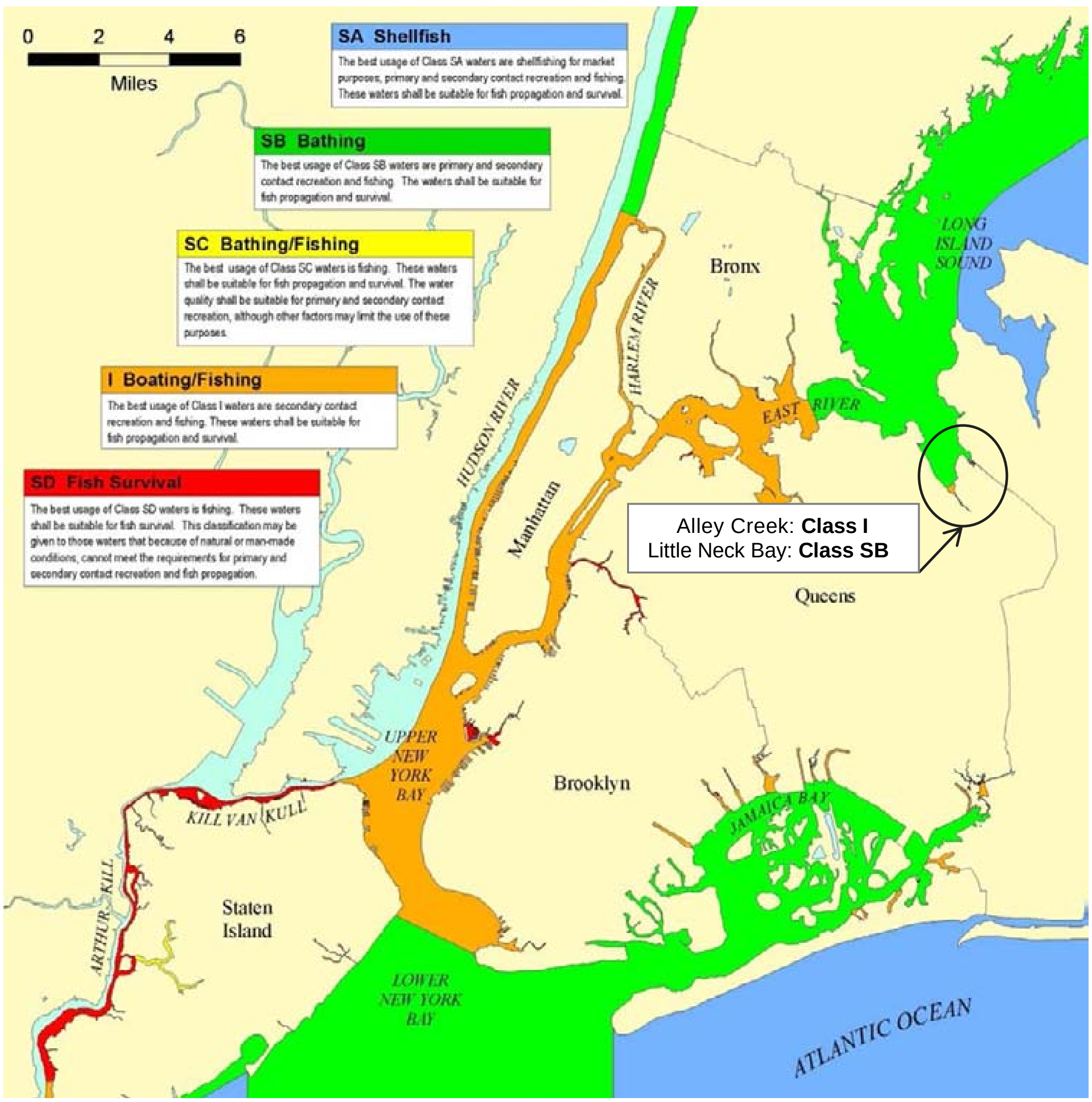


Figure ES-4. Surface Water Classifications and WQS

For designated bathing beach areas, the EPA 2004 BEACH Act Rule recommends a seasonal GM of 35 MPN/100 ml and also includes a single sample maximum enterococci value of 104 per 100 mL to be used by agencies for announcing bathing advisories or beach closings. The DMA Beach is permitted to operate by the NYC Department of Health and Mental Hygiene (DOHMH). DOHMH has adopted a seasonal 30 day GM of 35 enterococci per 100 mL that is used to trigger a beach closing. DOHMH also adopted the single sample maximum of 104 enterococci per 100 ml that is used to issue beach advisories. Although these are the existing DOHMH rules for bathing beaches, the operating criteria may change in the future as a result of recommendations provided in EPA's 2012 Recreational Water Quality Criteria (RWQC).

Alley Creek, its shoreline, areas immediately adjacent to the water, and much of the surrounding drainage area of the creek are within Alley Pond Park. Access to Alley Creek is provided by the park for passive, non-contact recreation, such as hiking trails, which offer views of the open waters and wetlands. Another significant passive use of Alley Creek is environmental education associated with wetlands habitat. The Alley Pond Environmental Center (APEC), located near the mouth of Alley Creek, offers an extensive naturalist program with outreach to local schools. As shown in Figure ES-5, the APEC is located southeast of the intersection between the Cross Island Parkway and Northern Boulevard, on the western shore of the creek.

Figure ES-5. Shoreline of Little Neck Bay and Alley Creek (Looking North)

The CSO Control Policy requires that the LTCP give the highest priority to controlling overflows to sensitive areas, which in the case of Little Neck Bay, is the DMA Beach. Accordingly, the LTCP devoted significant attention to this beach as part of the analysis of WQS attainment.

Analysis of WQS attainment in Alley Creek and Little Neck Bay was based on data collected from the DEP Harbor Survey between 2009 and 2012, and from sampling performed in late 2012 during the development of the Alley Creek and Little Neck Bay LTCP. The data indicate that pathogen concentrations within Alley Creek are elevated, with GMs for enterococci at approximately 500 MPN/100mL and fecal coliform bacteria near 2,000 MPN/100mL. These elevated pathogen values are attributable to illicit connections to the storm sewers that discharge out of TI-024. A portion of these illicit connections have been corrected and track-down efforts are still underway to ensure that all illicit connections are addressed.

Bacteria levels within Little Neck Bay are significantly lower, with GM concentrations of less than 10 MPN/100mL for enterococci and GMs between 10 and 100 MPN/100mL for fecal coliform bacteria during the sampling/survey period. Locally at DMA Beach, enterococci concentrations, as measured by the DOHMH, have a GM that is very close to the moving 30-day criterion of 35 MPN/100mL. Between 2009 and the end of 2012, the water quality at DMA Beach was in attainment with the seasonal rolling 30-day GM for enterococci, from a low of 5 percent of the time in 2011, to a high of 67 percent of the time in 2012.

As a result of the high concentrations of pathogens found in Alley Creek and at the DMA shoreline, additional targeted sampling was conducted as part of the Alley Creek and Little Neck Bay LTCP. This additional sampling was aimed at further evaluating the spatial extent of the area within the waterbodies that experience elevated pathogen concentrations. These sampling locations and a "synoptic" summary of results (i.e., conditions existing simultaneously over a broad area) are shown in Figure ES-6.

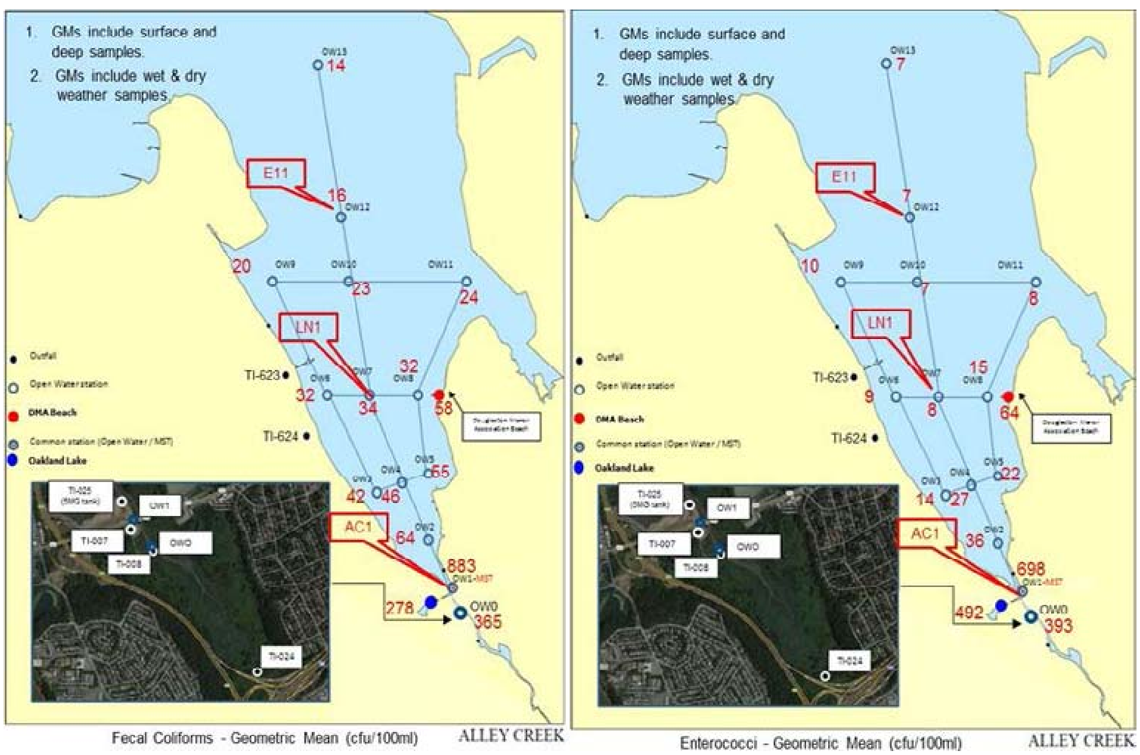


Figure ES-6. Synoptic Summary of LTCP Sampling Program

The results of this sampling program revealed the highest levels of bacteria concentrations in Alley Creek and in the transition zone area of inner Little Neck Bay. Localized contamination was also noted at the DMA Beach and in Alley Creek. As shown in Figure ES-6, the high concentrations drop significantly, moving from the mouth of Alley Creek to the open waters of the Bay this is also the case for the samples collected at DMA Beach.

As discussed above, the high bacteria concentrations in Alley Creek were associated with illicit discharges detected in TI-024 that essentially serves as a separate stormwater outfall. Those found in late 2012 were promptly corrected as outlined in a letter to DEC, dated November 7, 2012. This letter described the tracking and corrective actions taken as a result of this ongoing program. Follow-up investigations conducted in 2013, prompted by continued high bacteria levels, suggest that other illicit connections may still exist. Accordingly, DEP will continue to conduct water quality sampling and dye studies and work with relevant authorities to ensure that all illicit connections are tracked down and corrected. This is a high priority for DEP and continued sampling of the TI-024 outfall tributary area is included in Section 9 as one of the three follow-up water quality and pollution characterization investigations.

In addition to Alley Creek and lower Little Neck Bay, high pathogen concentrations were also found at the DMA beach. These are believed to be caused by highly localized source of contamination associated with septic systems in the drainage area. It should be noted that while these septic systems are not within DEP's jurisdiction, the matter has been brought to the attention of other agencies including the DEC, NYC Department of Buildings (DOB), and DOHMH.

Slightly elevated enterococci and fecal coliform values were also observed during dry weather conditions at the outlets of Oakland Lake and from a "Duck Pond", south of the Long Island Expressway. With regards to Oakland Lake, it is unclear if these elevated levels are from natural background conditions or if illicit connections are contributing to these slightly elevated pathogen values. With regards to the Duck Pond, high populations of waterfowl were observed in this dedicated Department of Transportation (DOT) stormwater impoundment. DEP intends to investigate and better characterize the pathogen loadings but does not anticipate that illicit connections are contributing to these slightly elevated pathogen levels in the Duck Pond or Oakland Lake. The sampling program associated with these efforts is also described in Section 9.

CSO Best Management Practices

In accordance with the SPDES permit requirements, annual reports summarizing the citywide implementation of the 14 Best Management Practices (BMPs) are required to be submitted to DEC annually on April 1st. To date, DEP has submitted annual reports covering calendar years 2003 through 2012. Typical reports are divided into 14 sections – one for each of the BMPs in the individual SPDES permits. Each section of the annual reports describes ongoing DEP programs, provides statistics for initiatives occurring during the preceding calendar year, and discusses overall environmental improvements.

Status of Grey Infrastructure Projects Recommended in the WWFP

The grey infrastructure elements of the 2009 WWFP included:

- New diversion chamber (Chamber 6) to direct CSO to the new Alley Creek CSO Retention Tank and to provide tank bypass to TI-008;
- New CSO Retention Tank (5 MG Alley Creek CSO Retention Tank);
- New 1,475 foot long multi-barrel outfall sewer extending to a new outfall on Alley Creek (TI-025);
- New CSO outfall, TI-025, for discharge from the Alley Creek Tank;
- Fixed baffle at TI-025 for floatables retention, minimizing release of floatables to Alley Creek; and
- Upgrade of Old Douglaston PS to empty tank and convey flow to Tallman Island WWTP after the end of the storm.

These WWFPs elements were all operational by mid-2011.

Post-Construction Monitoring

DEP conducted Post-construction Compliance Monitoring (PCM) for the Alley Creek CSO Retention Tank, consisting of sample collection at one location in Alley Creek (Station AC1) and another location in Little Neck Bay (Station LN1). In addition, DEP collected water quality samples at two other locations in the waterbody during November and December 2012, near the mouth of Alley Creek (Stations OW0 and OW1), and in Little Neck Bay near Station LN1 (Station OW2). Figure ES-6 showed these station locations. During the 25 events in 2012 when the tank did overflow, floatables removal at the tank was enhanced by means of an underflow baffle. Retained floatables are removed either at trash racks at the Old Douglaston PS or the influent screens at the Tallman Island WWTP. Overall, the facility performance has met or exceeded its predicted CSO volumetric control and the pollutant capture targets set forth in DEP's facility planning studies (1992).

Green Infrastructure

The Alley Creek and Little Neck Bay watershed has one of the smallest total combined sewer impervious areas among the list of New York City's managed watersheds, totaling 1,490 acres, which are significantly controlled by existing CSO facilities and sewer enhancements. Therefore, as part of this LTCP, DEP assumes no investment in green infrastructure (GI) implementation in the right-of-way or onsite public properties. This GI investment decision takes into account water quality with WWFP improvements in place, coupled with the potentially more effective allocation of GI resources in other priority watersheds in the City that can provide more water quality benefits for the same level of implementation. However, DEP does expect approximately 45 acres to be managed through onsite private GI implementation in the Alley Creek and Little Neck Bay watershed by 2030. This acreage would represent three percent of the total combined sewer impervious area in the watershed, and assumes new development or redevelopment, based on a detailed review of New York City Department of Buildings (DOB) building permit data from 2000 to 2011.

Baseline Conditions and Performance Gap

Key to development of the LTCP for Alley Creek and Little Neck Bay is the assessment of water quality within each waterbody. For this LTCP, water quality was assessed using the East River Tributary Model (ERTM), a water quality model that was created and calibrated during the development of the WWFP in 2007. The model was modified as part of the LTCP development to significantly increase the grid resolution in Little Neck Bay, and was recalibrated using DEP water quality monitoring data, DOHMH DMA Beach monitoring data, and the synoptic water quality sampling data collected in 2012 Model outputs for both fecal and enterococci bacteria as well as DO were compared with various monitored datasets during calibration in order to improve the accuracy and robustness of the models to adopt them for LTCP evaluations. The water quality model was then used to calculate ambient pathogen concentrations within the waterbodies for a set of baseline conditions. Baseline conditions were established in accordance with the guidance established by DEC to represent future conditions. These included the following assumptions: the design year was established as 2040; Tallman Island WWTP would receive peak flows at 2xDDWF; grey infrastructure would include those elements recommended in the 2009 WWFP; and waterbody-specific GI application rates would be based on the best available information. In the case of Alley Creek and Little Neck Bay, GI was assumed to have 3 percent coverage. In addition, the LTCP assumed future conditions with some amount of dry weather sources of bacteria in the upper portions of Alley Creek from Oakland Lake and the Duck Pond.

These water quality assessments were conducted using continuous water quality simulations – a one-year (2008 rainfall) simulation for bacteria and DO assessment to support alternatives evaluation, and a longer term, 10-year (2002 to 2011 rainfall) simulation for bacteria for attainment analysis for selected alternatives. The gaps between calculated baseline bacteria as well as DO were then compared to the applicable pathogen and DO criterion to quantify the level of non-attainment.

The results of the 10-year simulation, shown in Figure ES-7, indicate that the fecal coliform concentrations calculated for the baseline within Little Neck Bay would be in attainment with the existing monthly GM fecal coliform criteria a high percentage of the time (97 percent attainment or greater). The 10-year simulation also indicated that, for the baseline, Little Neck Bay (including DMA Beach) will be in 100 percent attainment with the 90-day summer recreation seasonal GM for enterococci. The DMA Beach area of the Bay was calculated to be in attainment with the DOHMH seasonal rolling 30-day GM for enterococci approximately 92 percent of the time. The projected DO attainment for Little Neck Bay is greater than 97 percent on an annual basis.

Alley Creek is essentially in full attainment with the existing DO and pathogen criteria for Class I. However, when Alley Creek was assessed against the Class SB standard for primary contact, it was projected to be able to be in attainment with the seasonal enterococci criteria only 30 percent of the time, for the 10 year period evaluated. Even with 100 percent control of all CSOs, through additional storage or disinfection of the existing tank effluent, the projected attainment with the seasonal enterococci criteria only increased to 40 percent of the time for the same 10 year period. Accordingly, DEP has prepared a Use Attainability Analysis (UAA) for Alley Creek, which is attached to this LTCP.

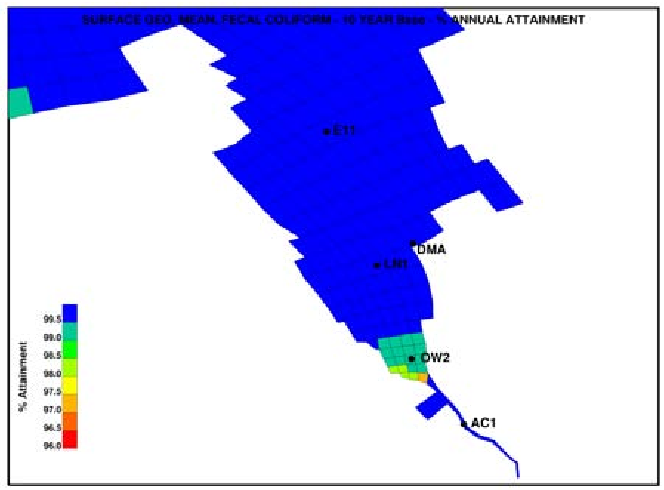


Figure ES-7. Fecal Coliform Annual Attainment

Public Outreach and Coordination

DEP followed a comprehensive public participation plan in ensuring engagement of interested stakeholders in the LTCP process. Stakeholders included both citywide and regional groups, a number of whom offered comments at public meetings held on the LTCP. DEP will continue to gather public feedback on waterbody uses, and will provide the public UAA-related information at the third Alley Creek and Little Neck Bay Public Meeting.

It should be noted that at the second of two public meetings conducted to date, there was a high degree of public support for DEP's findings that additional grey infrastructure based-CSO controls were not warranted, due to the water quality improvements achieved from implementation of the 2009 WWFP recommendations, as well as from the related additional enhancements to the area wetlands and habitat. This $130M in public investment was well-received, and no support was expressed for additional CSO controls or a higher standard for Alley Creek during public participation meetings.

Evaluation of Alternatives

This LTCP developed and evaluated various CSO control measures and watershed-wide alternatives using a three-step procedure:

Step 1: Screening of Potential Control Measures
Step 2: Development and Ranking of Control Measures
Step 3: Final Evaluation and Selection of Preferred Watershed-Wide Alternative

An overview of the three-step procedure is shown in Figure ES-8. Each alternative is evaluated considering several parameters, including: feasibility of construction and implementation; improvements to the waterbody in terms of water quality parameters and aesthetics; significant reductions in the number of CSO events and annual CSO volume; and construction costs. Overall, the methodology for ranking control measures transforms from being highly qualitative to more quantitative as the steps progress.

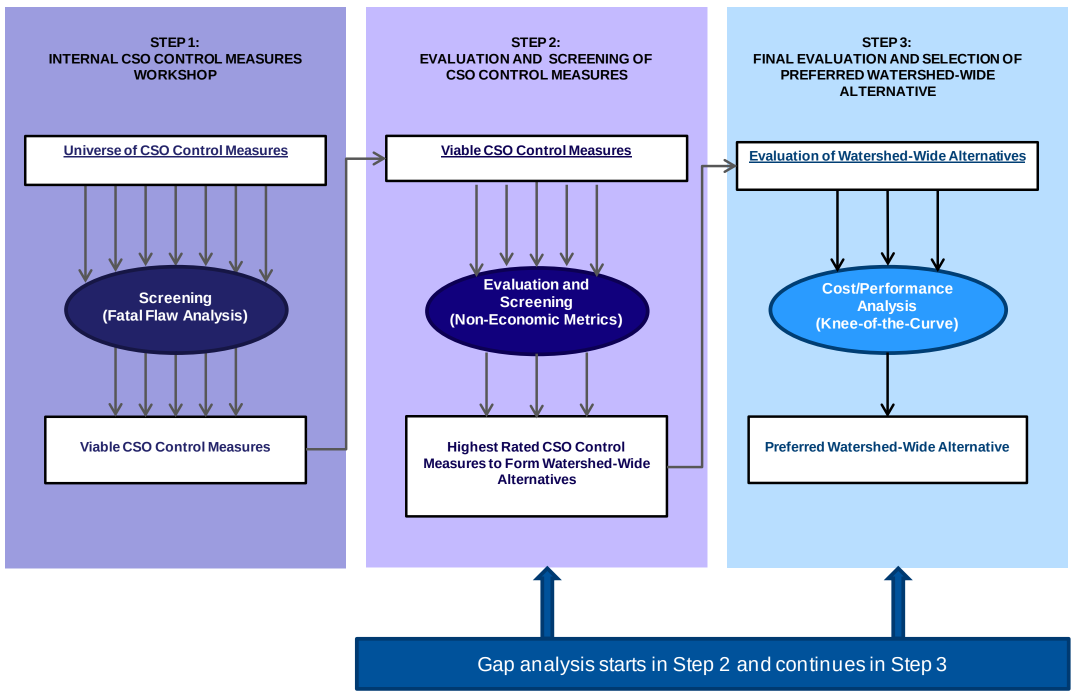


Figure ES-8. Three-Step LTCP Evaluation and Screening Alley Creek and Little Neck Bay Alternatives

Step 1 qualitatively judges the ability of control measures to meet the LTCP goals and identifies fatal flaws that could disqualify them. In Step 2, the resulting, most favorable control measures are then rated using non-economic criteria or metrics covering the following three categories:

- Environmental Benefits/Performance
- Community and Societal Impacts
- Implementation and O&M Considerations

The highest ranked control measures are then passed on to Step 3, where they are assembled to form watershed-wide alternatives, and are evaluated in greater detail using economic criteria and water quality attainment criteria, such as reductions of bacteria loading and CSO discharge volume and frequency. The cost and performance estimates are used to evaluate the cost performance and conduct knee-of-the-curve (KOTC) analysis.

Control measures that were evaluated through Step 3 are summarized in Table ES-1, along with associated volumetric and bacteria reductions and related costs.

Table ES-2. Alley Creek and Little Neck Bay Alternatives Summary

Alternative	CSO Volume (MGY)	AAOV Reduction[1] Percent	Fecal Coliform Reduction[2] Percent	Enterococci Reduction[2] Percent	May 2013 Present Worth ($M)[3]
Baseline Conditions	132	0	0	0	$0
1. HLSS (High Level Sewer Separation)	65	51	5.5	-5.4	$658
2A. 3.0 MG Additional Downstream Retention	98	25	12.5	10.5	$93
2B. 6.5 MG Additional Downstream Retention	65	50	25.1	21.1	$156
2C. 12 MG Additional Downstream Retention	33	75	37.8	31.8	$310
2D. 29.5 MG Additional Downstream Retention	0	100	50.1	42.2	$569
3A. 2.4 MG Additional Upstream Retention	98	25	19.2	15.0	$113
3B. 6.7 MG Additional Upstream Retention	65	50	36.2	28.5	$173
4. Disinfection in Existing Retention Tank	N/A	N/A	50.1	42.2	$550
5A. 10 percent Green Infrastructure	112	15	6.1	5.4	$63
6. Hybrid – HLSS plus 3.0 MG Retention	38	71	11.4	0.1	$751

[1] CSO Average Annual Overflow Volume (AAOV) reduction from baseline conditions.
[2] Includes both CSO and stormwater; reduction from baseline conditions.
[3] Based on Probable Bid Cost plus O&M cost for 20-year life, assuming 3 percent interest.

One high level sewer separation (HLSS) alternative was developed for the combined sewer system (CSS) that is tributary to Regulators 46 and 47. The CSS associated with these regulators is west of Alley Pond Park.

Retention alternatives reduce overflows by intercepting combined sewage in an offline or inline storage element during wet weather, for controlled release into the WWTP after the storm event. Two candidate locations for siting additional retention facilities were identified:

- Downstream, near the existing CSO Retention Tank (including both adjacent to the existing tank and to the south of Northern Boulevard); and
- Upstream of the existing tank, at the CSO regulators for the CSS area (within the interchange for the Long Island and Clearview Expressways).

Four retention alternatives near the downstream location were developed. Two alternatives were developed for the upstream location, both located within the interchange for the Long Island and Clearview Expressways, and designed to capture CSO flow from Regulators 46 and 47.

Because it is unlikely that HLSS alone would be capable of reducing CSO volume beyond 50 percent, a hybrid combination of HLSS with additional retention was developed. This hybrid HLSS-Retention alternative essentially combines HLSS for the areas upstream of Regulators 46 and 47 with a new retention tank located downstream at the Alley Creek Retention Tank site. It should also be noted that HLSS alone would increase the overall pollutant loading to the waterbodies (Alternative 1), since the flows and pollutant loads that were captured and sent to the WWTP for small to moderate storms would now be discharged directly into the waterbodies.

Initially, two alternatives that would employ additional GI beyond the baseline were identified, but one was subsequently determined to be infeasible due to siting difficulties. Only one GI alternative, sized for managing runoff from 10 percent of the impervious area within the combined sewer system within the Alley Creek and Little Neck Bay watershed, was carried through to the economic evaluation.

CSO Reductions and WQ Impact of Retained Alternatives

As presented in Table ES-1, the percent of CSO capture for the retained alternatives ranged from 0 (baseline) to 100 percent AAOV reduction (additional 29.5 MG downstream retention), with costs of up to $751M (additional 3.0 MG downstream retention with HLSS). With respect to the control of bacteria discharges, the best performing alternatives included 100 percent retention (Alternative 2D) and disinfection (Alternative 4), both of which would be implemented at TI-025, the CSO outfall for the existing Alley Creek Tank. These controls would reduce the overall fecal loading to the waterbodies by roughly 50 percent, and the enterococci loading by 42 percent, at a cost ranging from $550M to $569M, respectively. Because of the pollutants contained in stormwater, none of the CSO control alternatives could eliminate all of the bacteria discharged to Alley Creek and Little Neck Bay. HLSS (Alternative 1) was deemed the poorest performing alternative, yielding a net increase in enterococci. Although HLSS reduces CSO and its associated pollutants, they also significantly increase the volume of annual stormwater discharges; as a result, the increased pollutant loads associated with the increased stormwater would exceed the benefits from the reduced CSO.

Figures ES-9 and ES-10 show the present worth of the retained alternatives compared to annual total fecal coliform and enterococci loading reductions, respectively. The bacteria loadings are represented with two vertical axes. In both figures, the secondary vertical axis shows percent bacteria loading reductions at TI-025, and represents the reduction of enterococci from CSO sources. The primary vertical axis shows percent enterococci loading reduction based on all sources – CSO and stormwater. Because CSO is not the only source of bacteria, and some alternatives (notably HLSS) affect stormwater discharge volumes in addition to CSO volumes, attainment of standards cannot be evaluated based on bacteria discharged at TI-025 alone. The cost curve was based on selected alternatives determined to be the most cost-effective. The less cost-effective alternatives, shown in red, were excluded from the best-fit plot. The resulting plot does not show a clear knee-of-the-curve, but it does start to flatten as the bacteria reduction increases, indicating that, from this point on, increasing reductions would become even less cost-effective than the lower cost alternatives.

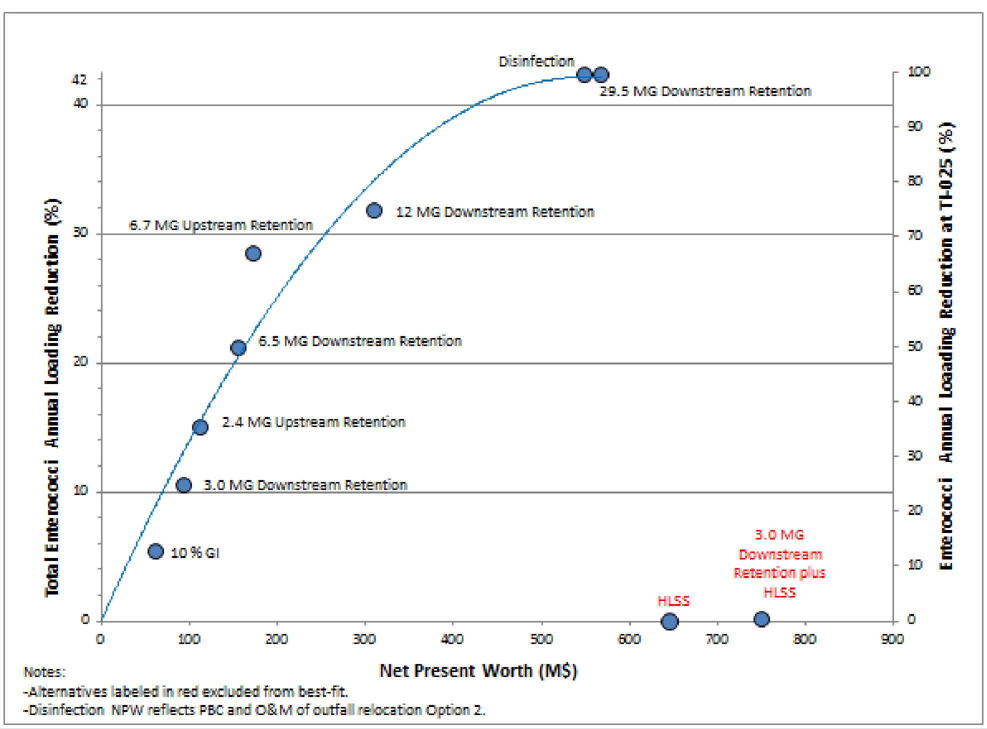


Figure ES-9. Cost vs. Total Enterococci Loading Reduction

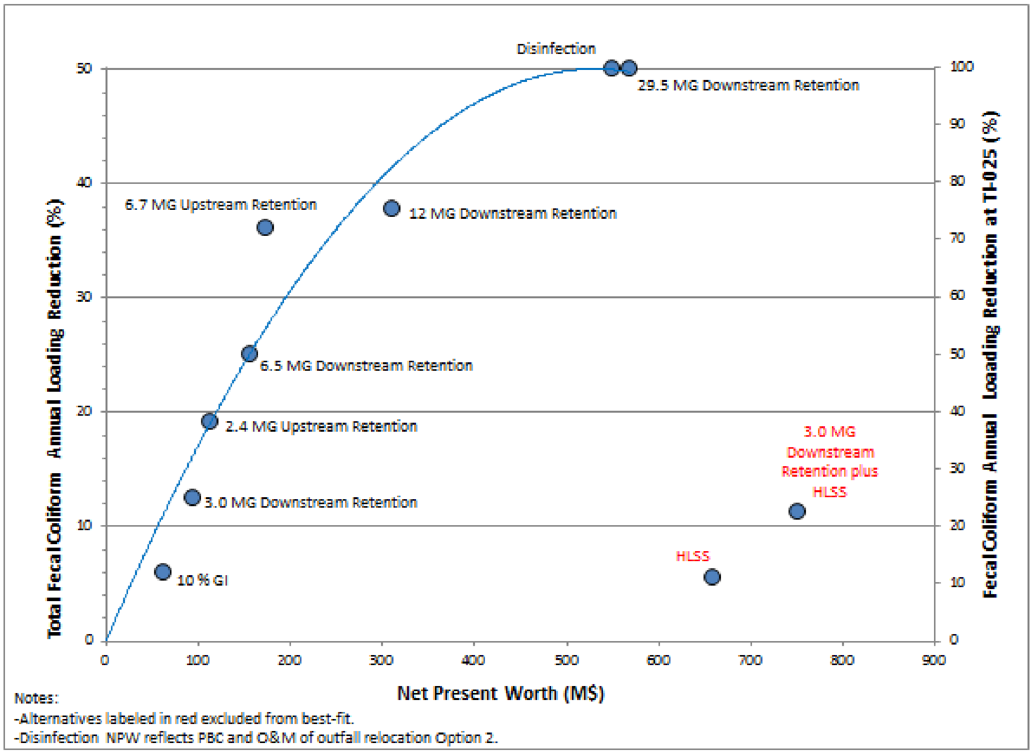


Figure ES-10. Cost vs. Total Fecal Coliform Loading Reduction

Plots showing WQS attainment assist in evaluating the performance of proposed alternatives. As demonstrated in Figure ES-11, attainment of existing applicable bacteria criteria, (i.e., Class I for Alley Creek and Class SB for Little Neck Bay) currently occurs essentially 100 percent of the time under baseline conditions. The figure includes predicted modeled improvement in bacteria criteria attainment versus net present worth at Stations E11, LN1, OW2 and AC1, and at DMA Beach, for each alternative. As previously noted, attainment of bacteria criteria for Little Neck Bay occurs essentially 100 percent of the time. At the southern end of the Bay, the bacteria criteria performance gap was very small, with attainment of fecal coliform criteria occurring 99.2 percent of the time at Station OW2 under baseline conditions. Predicted improvements at Station OW2 are marginal, rising just 0.8 percent for the 100 percent CSO control alternatives. At DMA Beach, baseline conditions are in attainment with Class SB standards and NYSDOH standards 100 percent of the time.

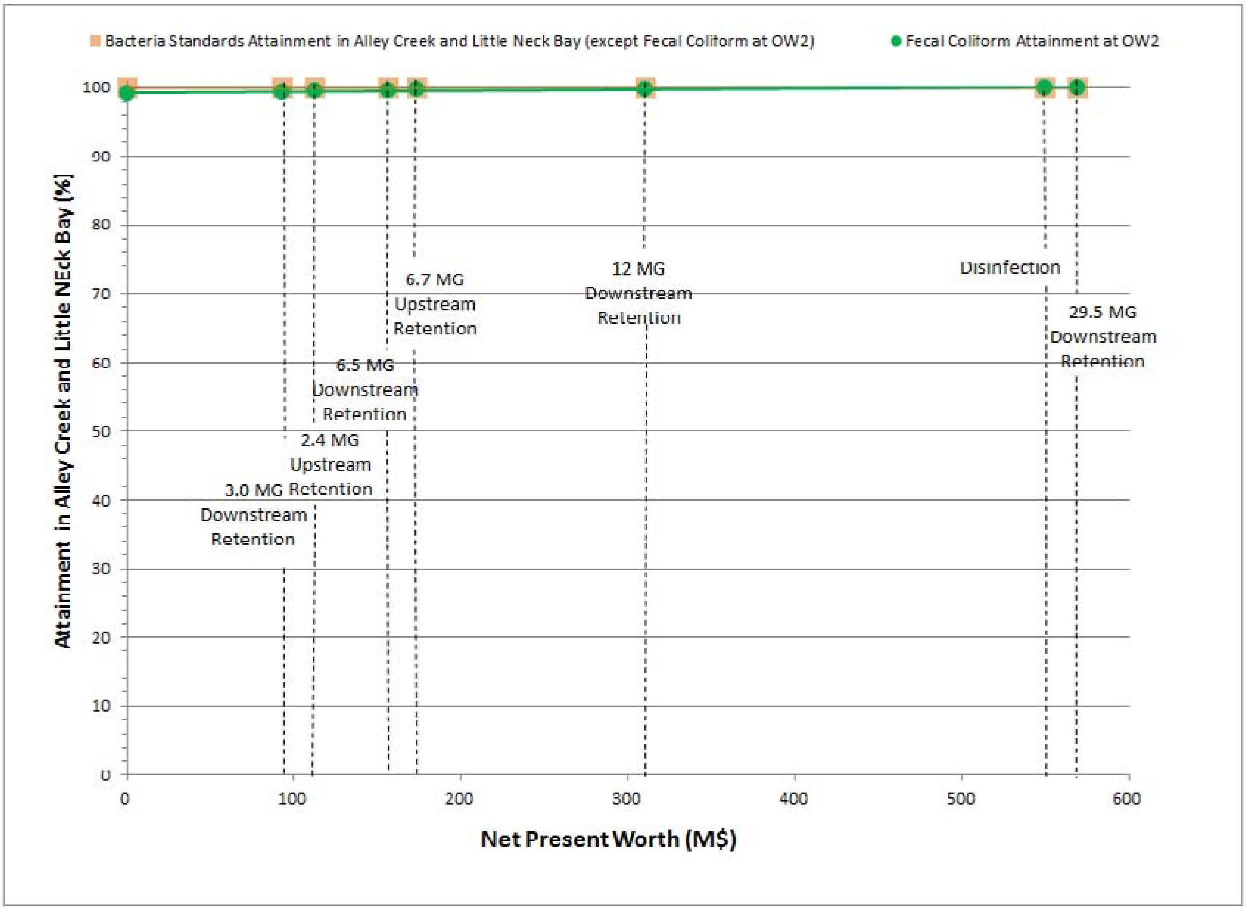


Figure ES-11. Alley Creek and Little Neck Bay WQS Attainment

Figure ES-11 also shows that capturing 100 percent of the CSO would result in only a 0.8 percent increase in an already high attainment, with all other alternatives having a lesser degree of improvement. Overall, results show that capturing additional volumes of CSO, regardless of the degree of capture, does not significantly improve attainment with the numerical criteria. These marginal improvements come at a significant cost – up to $569M for the 29.5 MG Downstream Retention alternative, because the remaining residual non-attainment of bacteria criteria is caused by other, non-CSO sources of pollutants. A similar extremely high cost is associated with the other 100 percent control alternative, Disinfection in the Existing CSO Retention Tank at $550M, also for marginal gain.

Throughout the LTCP process, it was understood that alternatives offering 100 percent CSO control, either through volumetric retention or 3- to 4-log bacteria loading reduction, could result in some negative environmental impacts. One such possible negative aspect of further CSO control is associated with Alternative 4, Disinfection, and the damage it would cause to the sensitive biota of the two waterbodies and tidal wetlands where DEP has recently restored 16 acres. Means to mitigate such damage, the construction of an effluent pumping station and force mains, made that alternative costly to implement and detrimental to the restored area adjacent to Alley Creek through its construction.

Furthermore, the public expressed their satisfaction with the current uses of Alley Creek and Little Neck Bay, made possible by DEP's $130M investments in grey infrastructure and related wetland restoration work. As such, the public was not in favor of additional construction in the watershed that could impact the restored area.

Long Term CSO Control Plan Implementation

Based on the outcome of the facility planning and water quality improvement evaluations completed as part of the LTCP, and the progress made from implementing the recommendations of the 2009 WWFP and earlier DEP facility plans, DEP does not recommend the implementation of new grey infrastructure to further address the CSO discharges in the watershed. As demonstrated throughout the LTCP, the remaining minor gaps in attaining WQS remaining are primarily due to non-CSO sources.

DEP will continue to investigate the localized, non-CSO sources of pollution in the upper Alley Creek watershed, including the direct drainage from Oakland Lake and other similar tributaries. While it is currently understood that waterfowl contribute a significant portion of these pollutant loadings, this will be quantified to the extent practical. A work plan for such investigations is being developed by DEP, complementing ongoing data collection programs such as the PCM, the Harbor Survey Monitoring (HSM) and Sentinel Monitoring (SM) programs, and enhancing the source characterization and supporting potential variations of designated uses in the future.

Use Attainability

The Alley Creek and Little Neck Bay LTCP was developed to comply with the requirements of the EPA CSO Control Policy and, including applicable related guidance documents, as well as the broader CWA goal that the waterbodies shall support fishable and swimmable water quality, where attainable. The LTCP reveals that Alley Creek currently meets the Class I bacteria criteria, but cannot support the next highest Class SB standard, even with 100 percent CSO control. It also shows, however, that Alley Creek is not suitable for contact recreation, due to several natural and manmade factors. As such, a UAA has been prepared and is attached to the LTCP as Appendix D as a means to formalize the suitability of continued Class I designation for Alley Creek. DEP is seeking a SPDES variance from the anticipated Water Quality Based Effluent Limitation (WQBEL) for the Alley Creek CSO Facility, and an application is attached as Appendix E of this report per DEC requirements.

SECTION 1.0
INTRODUCTION

1.0 INTRODUCTION

This Long-Term Control Plan (LTCP) for Alley Creek and Little Neck Bay was prepared pursuant to the Combined Sewer Overflow (CSO) Order on Consent (DEC Case No. CO2-20110512-25), as modified March 8, 2012 (2012 Order on Consent). Under the 2012 Order on Consent, the New York City Department of Environmental Protection (DEP) is required to prepare and submit 11 LTCPs for submittal to the New York State Department of Environmental Conservation (DEC) by December 2017. The Alley Creek LTCP is the first of these 11 LTCPs to be completed.

1.1 Goal Statement

The following is the LTCP Introductory Goal Statement, which appears as Appendix C in the 2012 Order on Consent. It is generic in nature, so that waterbody-specific LTCPs will take into account, as appropriate, the fact that certain waterbodies or waterbody segments may be affected by the City's concentrated urban environment, human intervention, and current waterbody uses, among other factors. DEP will identify appropriate water quality outcomes based on site-specific evaluations in the drainage basin specific LTCP, consistent with the requirements of the CSO Control Policy and Clean Water Act (CWA).

> *"The New York City Department of Environmental Protection submits this Long Term Control Plan (LTCP) in furtherance of the water quality goals of the federal Clean Water Act and the State Environmental Conservation Law. We recognize the importance of working with our local, State, and Federal partners to improve water quality within all City-wide drainage basins and remain committed to this goal.*
>
> *After undertaking a robust public process, the enclosed LTCP contains water quality improvement projects, consisting of both grey and green infrastructure, which will build upon the implementation of the U.S. Environmental Protection Agency's (EPA) Nine Minimum Controls and the existing Waterbody/Watershed Facility Plan projects. As per EPA's CSO Control Policy, communities with combined sewer systems are expected to develop and implement LTCPs that provide for attainment of water quality standards and compliance with other Clean Water Act requirements. The goal of this LTCP is to identify appropriate CSO controls necessary to achieve waterbody-specific water quality standards, consistent with EPA's 1994 CSO Policy and subsequent guidance. Where existing water quality standards do not meet the Section 101(a)(2) goals of the Clean Water Act, or where the proposed alternative set forth in the LTCP will not achieve existing water quality standards or the Section 101(a)(2) goals, the LTCP will include a Use Attainability Analysis, examining whether applicable waterbody classifications, criteria, or standards should be adjusted by the State. The Use Attainability Analysis will assess the waterbody's highest attainable use, which the State will consider in adjusting water quality standards, classifications, or criteria and developing waterbody-specific criteria. Any alternative selected by a LTCP will be developed with public input to meet the goals listed above.*
>
> *On January 14, 2005, the NYC Department of Environmental Protection and the NYS Department of Environmental Conservation entered into a Memorandum of Understanding (MOU), which is a companion document to the 2005 CSO Order also executed by the parties and the City of New York. The MOU outlines a framework for coordinating CSO long-term planning with water quality standards reviews. We remain committed to this process outlined in the MOU, and understand that approval of this LTCP is contingent upon our State and Federal partners' satisfaction with the progress made in achieving water quality standards, reducing CSO impacts, and meeting our obligations under the CSO Orders on Consent."*

This Goal Statement has guided the development of Alley Creek and Little Neck Bay LTCP and UAA.

1.2 Regulatory Requirements (Federal, State, Local)

The waters of the City of New York are subject to Federal and New York State regulation. The following sections provide an overview of the regulatory issues relevant to long term CSO planning. Detailed discussions of regulatory requirements are provided in the June 2009 Alley Creek and Little Neck Bay WWFP (DEP, 2009).

1.2.a Federal Regulatory Requirements

The Clean Water Act (CWA) established the regulatory framework to control surface water pollution, and gave EPA the authority to implement pollution control programs. The CWA established the National Pollutant Discharge Elimination System (NPDES) permit program. NPDES regulates point sources discharging pollutants into waters of the United States. CSOs and municipal separate storm sewer systems (MS4) are also subject to regulatory control under the NPDES program. In New York, the NPDES permit program is administered by the DEC, and is thus a State Pollution Discharge Elimination System (SPDES) program. New York City has had an approved SPDES program since 1975. Section 303(d) of the CWA and 40 CFR §130.7 (2001) require states to identify waterbodies that do not meet water quality standards and are not supporting their designated uses. These waters are placed on the Section 303(d) List of Water Quality Limited Segments (also known as the list of impaired waterbodies). The List identifies the pollutant or stressor causing impairment, and establishes a schedule for developing a control plan to address the impairment. Placement on this list can lead to the development of a Total Maximum Daily Load (TMDL) for each waterbody and associated pollutant/stressor on the list. Pollution controls based on the TMDL serve as the means to attain and maintain water quality standards for the impaired waterbody. Alley Creek was included in the 2010 list of impaired waterbodies for dissolved oxygen, and Little Neck Bay was included for pathogen impairments due to CSO discharges, storm discharges, and urban runoff. However, as shown in Table 1-1, these waterbodies, which are under the CSO Order, have been delisted from the 2012 303(d) list (updated February 2013) as a Category 4b waterbody for which required control measures other than a TMDL (i.e., consent order) are expected to restore uses. Furthermore, the Category 4a notation has been applied to Little Neck Bay, which indicates that the waterbody already has a TMDL (Long Island Sound TMDL).

Table 1-1. 2012 DEC 303(d) Impaired Waters Listed and Delisted (with Source of Impairment)

Waterbody	Pathogens	DO/Oxygen Demand	Floatables
Little Neck Bay	(1)Urban/Storm/CSO	(4a)Municipal, Urb, CSOs	--------
Alley Creek	---------	(4b)Urban/Storm/CSO	(4b)CSOs, Urban/Storm

Notes:

(1) Individual Waterbodies with Impairment Requiring a TMDL

(4a) Impaired Waters NOT INCLUDED on the NYS 2012 Section 303(d) List; TMDL development is not necessary, since a TMDL has already been established for the segment/pollutant.

(4b) Impaired Waters NOT INCLUDED on the NYS 2012 Section 303(d) List; a TMDL is not needed, since other required control measures are expected to result in restoration in a reasonable period of time.

1.2.b Federal CSO Policy

The 1994 EPA CSO Control Policy provides guidance to permittees and NPDES permitting authorities as to the development and implementation of a LTCP, in accordance with the provisions of the CWA. The CSO policy was first established in 1994 and codified as part of the CWA in 2000.

1.2.c **New York State Policies and Regulations**

The State of New York has established WQS for all navigable waters within its jurisdiction. Little Neck Bay is classified as an SB waterbody, defined as "suitable for fish, shellfish and wildlife propagation and survival." The best usages of Class SB waters are "primary and secondary contact recreation and fishing" (6 NYCRR 701.11). Alley Creek is classified as a Class I waterbody, which is defined as "suitable for fish, shellfish and wildlife propagation and survival." The best usages of Class I waters are "secondary contact recreation and fishing" (6 NYCRR 701.13), per the Interstate Environmental Commission (IEC).

The states of New York, New Jersey and Connecticut are signatories to the Tri-State Compact that designated the Interstate Environmental District and created the IEC. The Interstate Environmental District includes all tidal waters of greater New York City, including Alley Creek and Little Neck Bay. The IEC has recently been incorporated into and is now a district of the New England Interstate Water Pollution Control Commission (NEIWPCC), a similar multi-state compact of which NYS is a member. Both waterbodies are classified as Type A under the IEC system. Details concerning the IEC classifications are presented in Section 2.2.

1.2.d Administrative Consent Order

The City and DEC have entered into Orders on Consent to address CSO issues, including the 2005 CSO Order on Consent, which was issued to bring all DEP CSO-related matters into compliance with the provisions of the CWA and the New York State Environmental Conservation Law (ECL), and requires implementation of LTCPs. The 2005 Order on Consent required DEP to evaluate and implement CSO abatement strategies on an enforceable timetable for 18 waterbodies and, ultimately, for City-wide long-term CSO control, in accordance with the 1994 EPA CSO Control Policy. The 2005 Order on Consent was modified as of April 14, 2008, to change certain construction milestone dates. In addition, DEP and DEC entered into a separate Memorandum of Understanding (MOU) to facilitate WQS reviews in accordance with the EPA CSO Control Policy. The last modification prior to 2012 occurred in 2009, which addressed the completion of the Flushing Creek CSO Retention Tank.

In March 2012, DEP and DEC amended the 2005 Order to provide for incorporation of Green Infrastructure (GI) into the LTCP process, as proposed under the City's 2010 Green Infrastructure Plan, and to update certain project plans and milestone dates.

1.3 LTCP Planning Approach

The LTCP planning approach includes several phases. The first is the characterization phase – an assessment of current waterbody and watershed characteristics, system operation and management practices, the status of current green and grey infrastructure projects, and an assessment of current system performance. DEP is gathering the majority of this information from field observations, historical records, and analysis of studies and reports. The next phase involves the identification and analysis of alternatives to reduce the frequency of wet weather discharges and improve water quality. DEP expects that alternatives will include a combination of green and grey infrastructure elements that will be carefully evaluated using both the collection system and receiving waterbody models. Following the analysis of alternatives, DEP will develop a recommended plan, along with an implementation schedule and strategy. If the proposed alternative will not achieve existing WQS or the Section 101(a)(2) goals of CWA, the LTCP will include a UAA examining whether applicable waterbody classifications, criteria, or standards should be adjusted by the State.

1.3.a Integrate Current CSO Controls from Waterbody/Watershed Facility Plans (Facility Plans)

This LTCP builds upon prior efforts by capturing the findings and recommendations from the previous facility planning documents for this watershed, and integrating the findings into the LTCP.

In June 2009, DEP issued the Alley Creek and Little Neck Bay WWFP. The WWFP, which was prepared pursuant to the 2005 Order on Consent, includes an analysis and presentation of operational and structure modifications targeting the reduction of CSOs and improvement of the overall performance of the collection and treatment system within this watershed. Several of the recommended improvements, which were selected to target the attainment of existing WQS, were set forth in earlier facilities planning efforts and have since been completed; these include the 5-MG Alley Creek CSO Retention Tank, along with extensive improvements to the upstream combined and separate collections systems within the Alley Creek watershed.

Wet weather flows to the Tallman Island WWTP were limited to less than two times Design Dry Weather Flow (2xDDWF), due to certain characteristics of the associated conveyance system. These problems, however, were comprehensively examined in the *Facility Plan for Delivery of Wet Weather Flow to the Tallman Island WPCP* (HydroQual, 2005b). As a result of this examination, DEP modified Regulator TI-R09 (increased open area of side-overflow windows, raised weir), and Regulator TI-R10 was removed and replaced with a section of pipe. DEP incorporated these improvements into the baseline conditions for this LTCP.

1.3.b Coordination with DEC

As part of the LTCP process, DEP and DEC work closely together to share ideas, track progress, and work toward developing strategies and solutions to address wet weather challenges in the New York Harbor Complex.

Representatives from DEP and DEC, along with their technical consultants, conducted regularly-scheduled technical meetings during the development of the Alley Creek and Little Neck Bay LTCP. The purpose of these meetings was to discuss many of the plan components, including technical analysis, the proposed recommended plan, and resulting water quality benefits, as well as coordination for public meetings and other stakeholder presentations. On a quarterly basis, DEC, DEP, and outside technical consultants convene for a larger progress meeting that typically includes technical staff and representatives from DEP and DEC's legal departments, as well as department chiefs who oversee the execution of the program.

In addition to these structured meetings, DEP and DEC typically co-host LTCP-related public meetings, sharing the responsibility for presentation of material and execution of the workshop or event.

1.3.c Watershed Planning

DEP prepared its CSO WWFPs before the emergence of GI as an established method for reducing stormwater runoff; consequently, the WWFPs did not include a full analysis of GI alternatives for controlling CSOs. In comments on DEP's CSO WWFPs, community and environmental groups voiced widespread support for GI and urged that DEP place greater reliance upon that sustainable strategy. Including GI in the LTCPs is consistent with the 2012 Order and recent EPA guidance. To the extent that such installations are feasible in any given area, the use of GI will lead to the achievement of better water quality and sustainability benefits than using solely "grey" technologies. A sustainable approach includes the management of stormwater at its source, through the creation of vegetated areas and other GI, bluebelts and greenstreets, green parking lots, green roofs, and other technologies, as discussed in detail in Section 5 of this report.

1.3.d Public Participation Efforts

A concerted effort was made during the Alley Creek and Little Neck Bay LTCP planning process to involve all relevant and interested stakeholders, and keep the public and stakeholders informed about the project. A public outreach participation plan was developed and implemented throughout the process; the plan is posted and continuously updated on DEP's LTCP program website, www.nyc.gov/dep/ltcp.

Specific objectives of this initiative included the following:

- Develop and implement an approach that reaches all stakeholders;
- Integrate the public outreach efforts with all other aspects of the planning process; and
- Take advantage of other on-going public efforts being conducted by DEP and other City agencies as part of other related programs.

The public participation efforts for this Alley Creek and Little Neck Bay LTCP are discussed in detail in Section 7.

SECTION 2.0
WATERSHED/WATERBODY CHARACTERISTICS

2.0 WATERSHED/WATERBODY CHARACTERISTICS

This section summarizes the major characteristics of the Alley Creek and Little Neck Bay Watershed and Waterbody, building upon earlier documents that present a characterization of the area; these include the WWFP for Alley Creek and Little Neck Bay (DEP, 2009), which describes the characteristics of the watershed and waterbody.

2.1 Watershed Characteristics

The Alley Creek and Little Neck Bay watershed is urbanized and sub-urbanized, comprised primarily of residential areas with some commercial, industrial, and open space/outdoor recreation areas. The most notable outdoor recreation area within this watershed is the Alley Pond Park, located along the banks of Alley Creek, south of the Little Neck Bridge (Northern Boulevard).

This subsection contains a summary of the watershed characteristics as they relate to the sewer system configuration, performance, and impacts to the adjacent waterbodies, as well as the modeled representation of the collection system used for analyzing system performance and CSO control alternatives.

2.1.a Description of Watershed

The Alley Creek and Little Neck Bay watersheds comprise approximately 4,879 acres, located on the north shore of eastern Queens County, adjacent to the Nassau County border. The land surrounding Alley Creek is mostly parkland, while that surrounding Little Neck Bay is largely residential. Several parks are found within the watershed; most notable is the Alley Pond Park, which surrounds Alley Creek on its eastern, western, and southern shores. As described later in this section, the area is served by a complex wastewater system comprised of combined, separate, and storm sewers; interceptor sewers and pumping stations; several CSO and stormwater outfalls; and a CSO retention tank.

Although the watershed has undergone major changes as this part of the City has developed, significant effort and interest by the citizens living in the area and New York City agencies has resulted in recognition of the ecological, environmental and educational value of Alley Creek and its tidal wetlands. In contrast to the filling in of wetlands and "hardening" of the shoreline with bulkheads that characterizes most of New York City's pre-colonial wetlands, much of Alley Creek's wetlands and the Little Neck Bay wetlands in Udalls Cove are designated parks.

The urbanization of Alley Creek and Little Neck Bay has led to the creation of both a combined sewer system (CSS) and separate sewer system (SSS), including its companion stormwater systems that discharge to the two waterbodies. Combined sewage, which does not overflow through one of the CSO structures, is conveyed to the Tallman Island WWTP for treatment. As shown in Figure 2-1, Alley Creek and Little Neck Bay are located along the eastern edge of the Tallman Island WWTP tributary area.

As a residential community within New York City, several large and notable transportation corridors cross the watershed providing access between dense commercial and residential areas. These access routes include the Cross Island Parkway, the Long Island Expressway, the Grand Central Parkway, and the Long Island Railroad (Figure 2-2). These transportation corridors limit access to some portions of the waterbody, and must be taken into consideration when developing CSO control solutions.

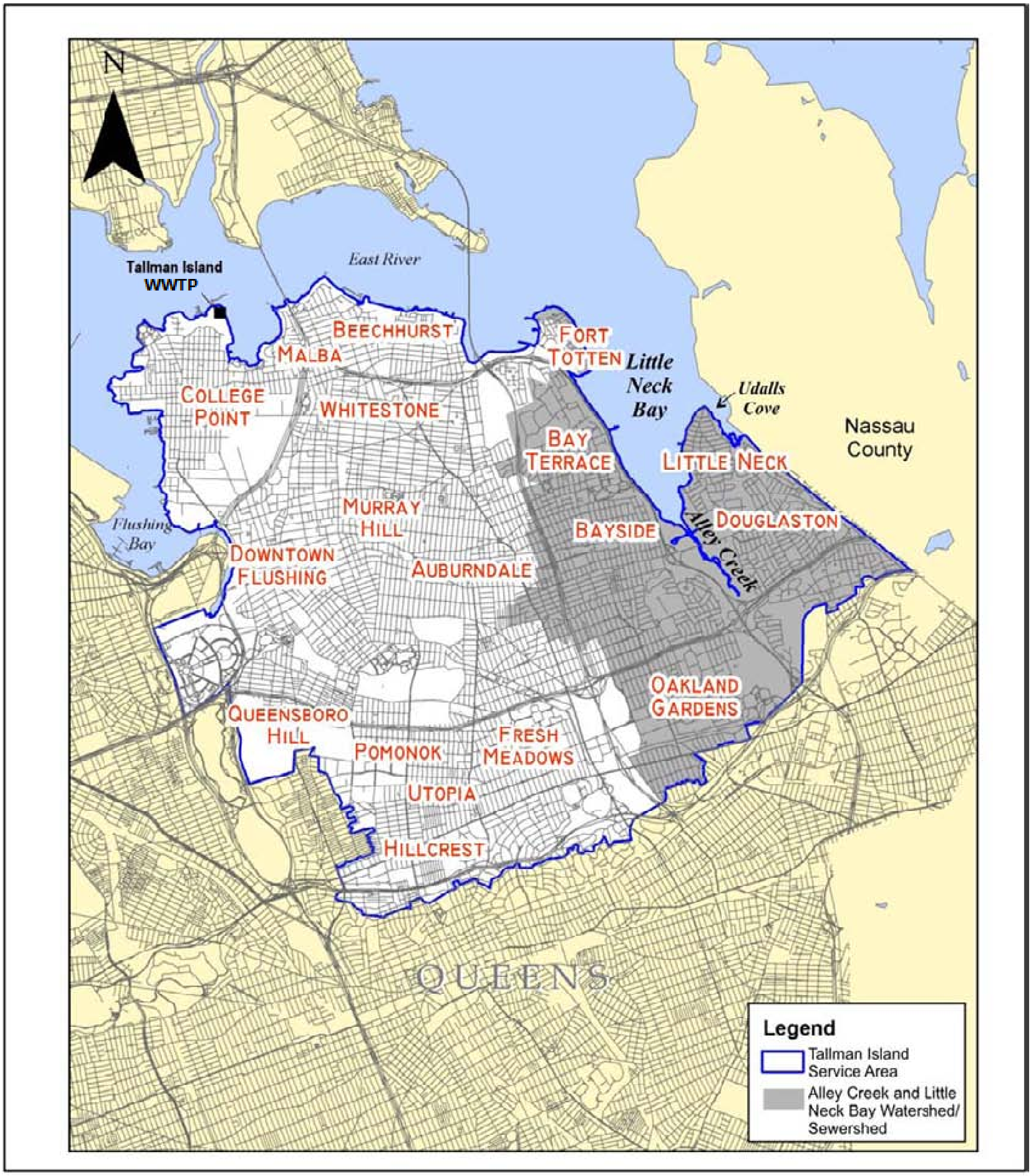


Figure 2-1. Alley Creek and Little Neck Bay Watershed within Tallman WWTP

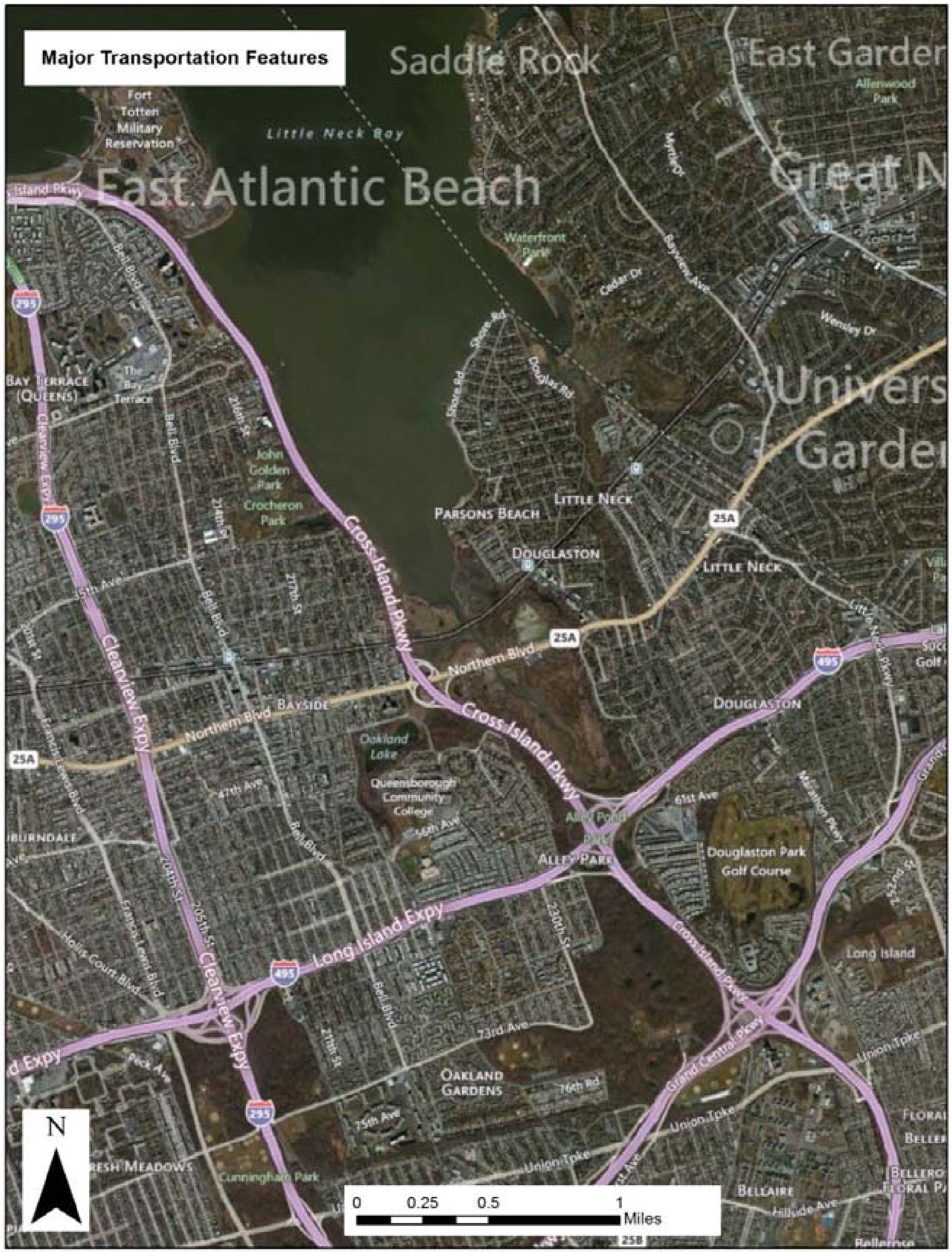


Figure 2-2. Major Transportation Features of Alley Creek and Little Neck Bay

2.1.a.1 Existing and Future Land Use and Zoning

Current land use for the watershed is shown in Figure 2-3**,** and generally aligns with the established zoning. Starting at the northeast edge of the waterbody within New York City, land immediately southeast of Udalls Cove is zoned C3 (commercial local retail), while surrounding land is zoned for low density residential, detached and attached (R1-2, R-2 and R3-1). The whole Douglaston Peninsula is zoned for detached housing on large lots (R1-2). The land immediately surrounding Alley Creek is designated parkland. The residential area to the east of the creek is R1-2, while that to the west is R2. Residential land on the western shore, north of the railroad tracks is zoned R3-2 and R2. Moving north, Crocheron Park and John Golden Park are designated parkland. The area between John Golden Park and Fort

Totten is known as Bayside. Previous zoning allowed R5 (mid-density, including multi-story rowhouses). The New York City Department of City Planning (DCP) rezoned 350 blocks in the Bayside area of northeastern Queens, Community District 11 (CD11). Much of the area is now rezoned to contextual districts, permitting development of only one- and two-family homes, to maintain Bayside's longstanding neighborhood character. To curb recent development trends toward unusually large single-family houses in areas currently zoned R2, DCP established a new low-density contextual zoning district, R2A. This new district limits floor area and height and other bulk regulations that are different from the former R2 district (DEP website 2005). Fort Totten is zoned R3-1, C3 and NA-4. The NA-4designation is a Special Natural Area District (SNAD). This protects the area by limiting modifications in topography, by preserving trees, plant and marine life, and natural water courses, and by requiring clustered development to maximize preservation of natural features. Generalized land use within the New York City portion of the Alley Creek and Little Neck Bay assessment area within the riparian area of ¼-mile of Alley Creek and Little Neck Bay shoreline is shown in Figure 2-4. Land use within the Alley Creek and Little Neck Bay drainage area is summarized in Table 2-1. The main land use is residential, with sizeable fractions of Open Space and Outdoor Recreation and Vacant Land.

Table 2-1. Land Use within the Alley Creek and Little Neck Bay Drainage Area

Land Use Category	Percent of Area	
	Riparian Area (1/4-mile radius) Percent	Drainage Area Percent
Commercial	1	4
Industrial	0	0
Open Space & Outdoor Recreation	29	15
Mixed Use & Other	2	3
Public Facilities	17	7
Residential	38	62
Transportation & Utility	2	1
Vacant Land	11	8

As of the report date, there are no proposed land use changes or major New York City development projects in the Alley Creek or Little Neck Bay assessment area.

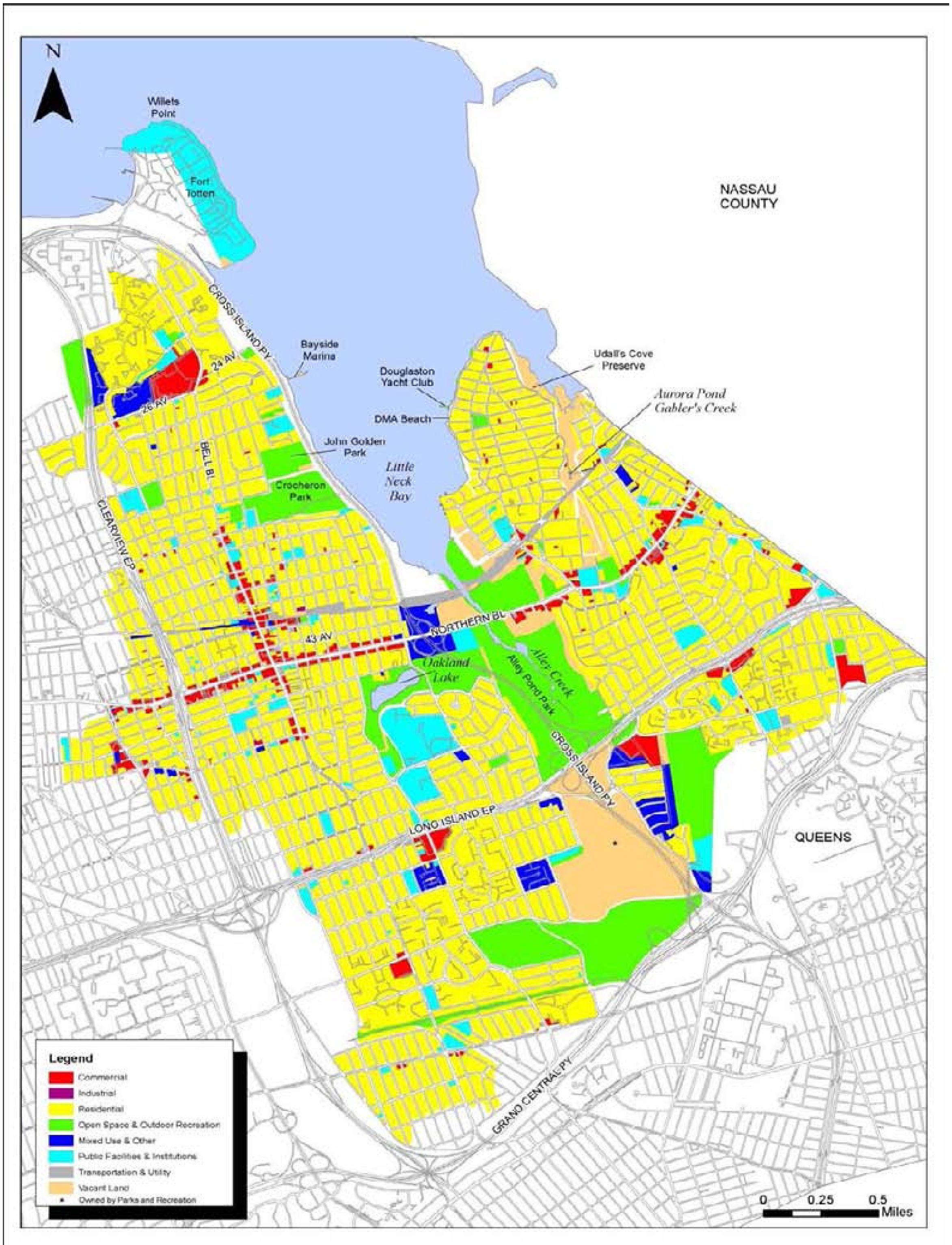


Figure 2-3. Land Use in Alley Creek/Little Neck Basin

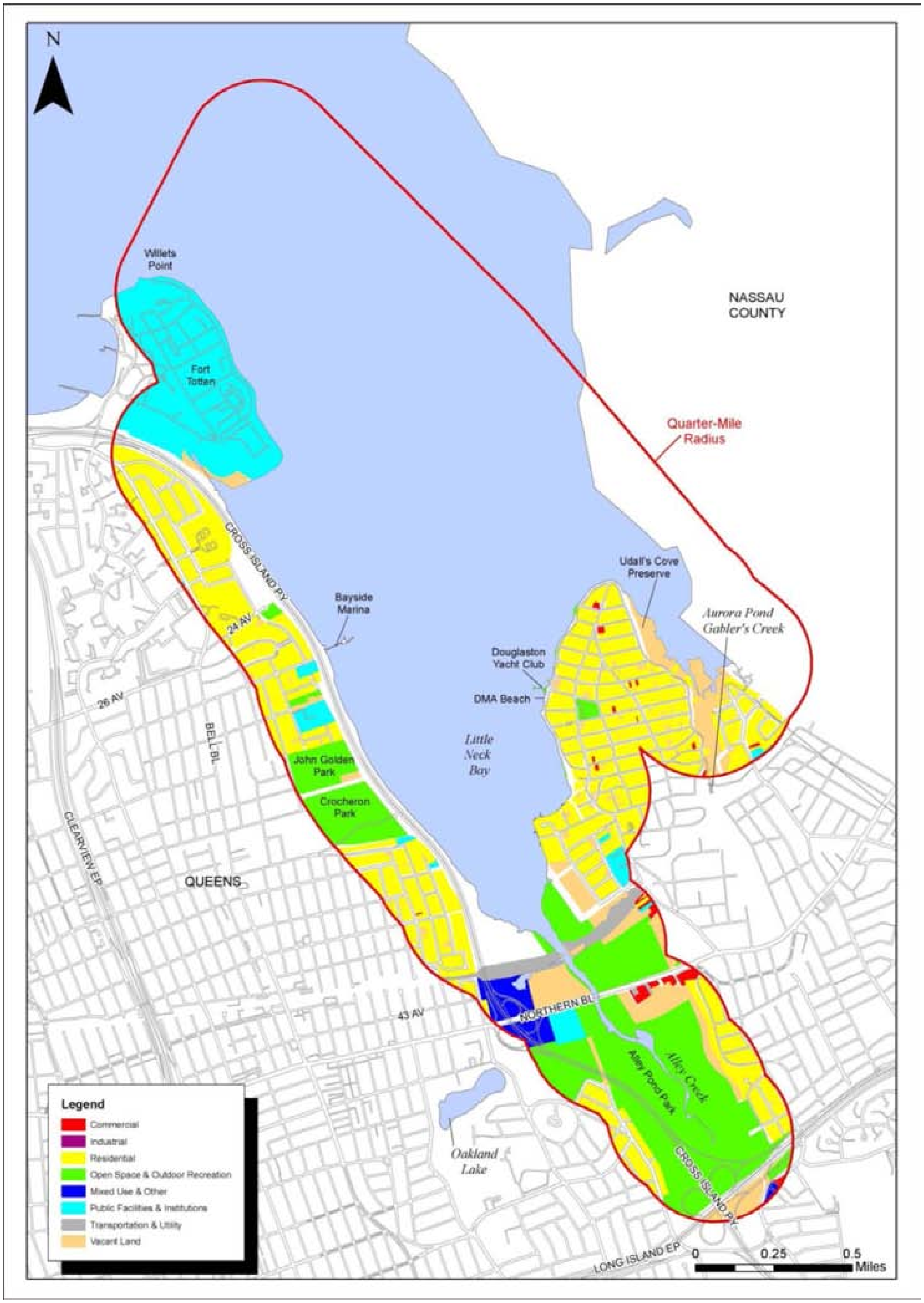


Figure 2-4.¼ Mile Land Use in Alley Creek and Little Neck Bay

2.1.a.2 **Permitted Discharges**

The Belgrave WWTP,SPDES NY-0026841, located in Great Neck, Nassau County, discharges to the head of Udalls Cove (Little Neck Bay), near 34thAvenue and 255th Street. The Belgrave WWTP is a 2.0-MGD wastewater treatment plant discharging an average of 1.3 MGD of secondary treated, disinfected effluent (Figure 2-5).

In addition to the Belgrave WWTP, there are several permitted stormwater discharge points. These are discussed in more detail in Section 2.1.c.

Figure 2-5. Location of the Belgrave WWTP, Adjacent to Udalls Cove

2.1.a.3 **Impervious Cover Analysis**

Impervious surfaces within a watershed are those characterized by an artificial surface, such as concrete, asphalt, rock, or rooftop. Rainfall occurring on an impervious surface will experience a small initial loss through ponding and seasonal evaporation on that surface, with the remaining rainfall volume becoming overland runoff that directly flows into the sewer system and/or separate stormwater system. The impervious surface is important when characterizing a watershed and CSS performance, as well as construction of hydraulic models used to simulate the performance of the CSS.

A representation of the impervious cover was made in the 13 WWTPs combined area drainage models developed in 2007 to support the WWFPs submitted in 2009. However, efforts to update the model and the impervious surface representation are ongoing.

As the City started to focus attention on the use of GI to manage street runoff by either slowing it down prior to entering the combined sewer network, or preventing it from entering the network entirely, it became clear that a more detailed evaluation of the impervious cover would be essential. In addition, the City realized that it would be important to distinguish between impervious surfaces that directly introduce runoff [Directly Connected Impervious Areas – (DCIA)] to the sewer system from those impervious surfaces that may not contribute any runoff to the sewers. For example, a rooftop with roof drains directly connected to the combined sewers (as required by the NYC Plumbing Code) would be an impervious surface that is directly connected. However, a sidewalk or pervious surface adjacent to a parkland may not contribute any runoff to the CSS.

In 2009 and 2010, DEP invested in the development of high quality satellite measurements of impervious surfaces required to conduct the analyses that improved the differentiation between pervious and impervious surfaces, as well as the different types of impervious surfaces. The data and the approach used are described in detail in the IW City-wide Model Recalibration Report (DEP, 2012a).

The result of this effort yielded an updated model representation of the areas that contribute runoff to the CSS. This improved set of data aided in model recalibration, and provided the DEP with a better idea where GI can be deployed to reduce the runoff contributions from impervious surfaces that contribute flow to the collection system. The result of the recalibration efforts was a slight increase in the amount of runoff that enters the Tallman Island WWTP CSS.

2.1.a.4 **Population Growth and Projected Flows**

The Bureau of Environmental Planning and Analysis (BEPA) of DEP routinely develops water consumption and dry weather wastewater flow projections for DEP planning purposes. Water and wastewater demand projections were developed by BEPA in 2012; an average per capita water demand of 75 gallons per capita per day was determined to be representative of future uses. The year 2040 was established as the planning horizon, and populations for that time were developed by the DCP and the New York Transportation Metropolitan Council.

The 2040 population projection figures were then used with the dry weather per capita sewage flows to establish the dry weather sewage flows contained in the IW model for the Tallman Island WWTP sewershed. This was accomplished by using GIS tools to proportion the 2040 populations locally from the 2010 census information for each landside subcatchment, tributary to each CSO. Per capita dry weather sanitary sewage flows for these landside model subcatchments were established as the ratio of two factors: the year per capita dry weather sanitary sewage flow, and 2040 estimated population for the landside model subcatchment within the Tallman Island WWTP service area.

2.1.a.5 **Updated Landside Modeling**

The Alley Creek and Little Neck Bay watershed is part of the overall Tallman Island WWTP system model (TI model). Several modifications to the collection system, which is tributary to the Tallman Island WWTP, have occurred since the model was calibrated in 2007. Since the TI model has been used for analyses associated with the annual reporting requirements of the SPDES permit BMPs and PCM for the Flushing Creek CSO Retention Tank, also known as Flushing Creek CSO Retention Tank, many of these changes have already been incorporated into the model. Major changes to the modeled representation of the collection system that have been made since the 2007 update include:

- Representation of the Flushing Creek CSO Retention Tank for model simulations after May, 2007.
- Representation of the Alley Creek CSO Retention Tank for model simulations after March 10, 2011.
- Inclusion of the Bowery Bay drainage areas that contribute CSOs to Flushing Creek CSO Retention Tank and to TI-010. Because the overflows from three of the Bowery Bay High Level sewershed are conveyed to this tank through Park Avenue outfall, this model update was performed to avoid the need to run the Bowery Bay model as precursor to every Tallman Island model run.

In addition to changes made to the modeled representation of the collection system configuration, several other changes have been made to the model, including:

- ***Runoff generation methodology***, including the identification of pervious and impervious surfaces. As described in Section 2.1.a.3 above, the impervious surfaces were also categorized into DCIAs and impervious runoff surfaces that do not contribute runoff to the collection system.

- ***GIS Aligned Model Networks.*** Historical IW models were constructed using record drawings, maps, plans, and studies. Over the last decade, the Bureau of Water and Sewer Operations (BWSO) of DEP has been developing a GIS system that will provide the most up-to-date information available on the existing sewers, regulators, outfalls, and pump stations. As part of the update and model recalibration, data from the GIS repository for interceptor sewers were used. The models will continue to evolve and be updated as more information becomes available from this source and any other field information.

- ***Interceptor Sediment Cleaning Data.*** DEP recently completed a City-wide interceptor sediment inspection and cleaning program. From April 2009 to May 2011, approximately 136 miles of the City's interceptor sewers were inspected. Data on the average and maximum sediment in the inspected interceptors were available for use in the model as part of the update and recalibration process. Multiple sediment depths available from sonar inspections were spatially averaged to represent depths for individual interceptor segments included in the model, for sections not yet cleaned.

- ***Evapotranspiration Data.*** Evapotranspiration (ET) is a meteorological input to the hydrology module of the IW model that represents the rate at which depression storage (surface ponding) is depleted and available for use for additional surface ponding during subsequent rainfall events. In previous versions of the model, an average rate of 0.1 inches/hour (in/hr) was used for the model calibration, while no evaporation rate was used as a conservative measure during alternatives analyses. During the update of the model, a review of hourly ET estimates obtained from four National Oceanic and Atmospheric Administration (NOAA) climate stations [John F. Kennedy (JFK), Newark (EWR), Central Park, and LaGuardia (LGA)] for an 11-year period. These data were used to calculate monthly average ETs, which were then used in the updated model. The monthly variations enabled the model simulation to account for seasonal variations in ET rates, which are typically higher in the summer months.

- ***Tidal Boundary Conditions at CSO Outfalls.*** Tidal stage can affect CSO discharges when tidal backwater in a CSO outfall reduces the ability of that outfall to relieve excess flow. Model updates took into account this variable boundary condition at CSO outfalls that were influenced by tides. Water elevation based on the tides was developed using a customized interpolation tool that assisted in the computation of meteorologically-adjusted astronomical tides at each CSO outfall in the New York Harbor complex.

- ***Dry Weather Sanitary Sewage Flows.*** Dry weather sewage flows were developed as discussed in Section 2.1.a.4 above. Hourly dry weather flow (DWF) data for 2011 were used to develop the hourly diurnal variation patterns at each plant. Based on the calibration period, the appropriate dry weather flows for 2005 or 2006 or another calendar year was used.

- ***Precipitation.*** A review of the rainfall records for model simulations was undertaken as part of this exercise, as discussed in Section 2.1.b below.

In 2012, 13 of the City's landside models underwent recalibration after the updates and enhancements were complete. This effort and calibration results are included in the IW City-wide Recalibration Report (DEP, June 2012) required by the updated Order on Consent. Following this report, DEP submitted to DEC a Hydraulic Analysis report in December 2012. The general approach followed was to recalibrate the model in a stepwise fashion beginning with the hydrology module (runoff). The following summarizes the overall approach to model update and recalibration:

- ***Site scale calibration (Hydrology)*** – The first step was to focus on the hydrologic component of the model, which had been modified since October 2007 using updated satellite data. Flow monitoring data were collected in upland areas of the collection systems, remote from (and thus largely unaffected by) tidal influences and in-system flow regulation, for use in understanding the runoff characteristics of the impervious surfaces. Data were collected in two phases – Phase 1 in the Fall of 2009, and Phase 2 in the Fall of 2010. These areas ranged from 15 to 400 acres in spatial extent. A range of areas with different land use mixes was selected to support the development of standardized set of coefficients that can be applied to other unmonitored areas of the City. The primary purpose of this element of the recalibration was to adjust pervious and impervious area runoff coefficients to provide the best fit of the runoff observed at the upland flow monitors.

- ***Area-wide recalibration (Hydrology and Hydraulics)*** – The next step in the process was to focus on larger areas of the modeled systems where historical flow metering data were available, and which were neither impacted by tidal backwater conditions nor subjected to any flow regulation. Where necessary, runoff coefficients were further adjusted to provide reasonable simulation of flow measurements made at the downstream end of these larger areas. The calibration process then moved downstream further into the collection system, where flow data were available in portions of the conveyance system where tidal backwater conditions could exist, as well as potential backwater conditions from throttling at the WWTPs. The flow measured in these downstream locations would further be impacted by regulation at in-system control points (regulator, internal reliefs, etc.). During this step in the recalibration, minimal changes were made to runoff coefficients.

The result of this effort is a model with better representation of the collection system and its tributary area for the Tallman Island WWTP basin, including Alley Creek and Little Neck Bay. This updated model is used for the alternatives analysis as part of this LTCP. A comprehensive discussion of the recalibration effort can be found in the IW City-wide Recalibration Report (June 2012).

2.1.b Review and Confirm Adequacy of Design Rainfall Year

DEP has been consistently applying the annual precipitation characteristics of 1988 to the landside models to develop pollutant loads from combined and separately sewered drainage areas. To date, 1988 has been considered to be representative of long-term average conditions, and therefore has been used for analyzing facilities where “typical” rather than extreme conditions serve as the basis of design, in accordance with federal CSO policy of using an “average annual basis” for analyses. The selection of 1988 as the average condition was re-considered, however, in light of the increasing concerns over climate change, with the potential for more extreme and possibly more frequent storm events. Recent landside modeling analyses in the City have used the 2008 precipitation pattern to drive the runoff-conveyance processes, along with the 2008 tide observations, which DEP believes to be more representative than 1988 conditions as a typical year, that includes some extreme storms also.

The Alley Creek WWFP was based on 1988 rainfall conditions, but future baseline/alternative runs are performed using 2008 as the typical precipitation year. A comparison of these rainfall years, which led to the selection of 2008, is provided in Table 2-2.

Table 2-2. Comparison of Rainfall Years to Support Evaluation of Alternatives

Parameter	WWFP JFK 1988	Present Day Average 1969-2010	Present Best Fit JFK 2008
Annual Rainfall (in)	40.7	45.5	46.3
July Rainfall (in)	6.7	4.3	3.3
November Rainfall (in)	6.3	3.7	3.3
Number of Very Wet Days (>2.0 in)	3	2.4	3
Average Peak Storm Intensity (in/hr)	0.15	0.15	0.15

2.1.c Description of Sewer System

The Alley Creek and Little Neck Bay watershed/sewershed is divided between two major political jurisdictions – the Borough of Queens (Queens County, within New York City), and Nassau County, Long Island. Most of the Queens County portion of the watershed is served by the Tallman Island WWTP and associated collection system, as shown on Figure 2-6. The Douglas Manor neighborhood, on the east bank of Little Neck Bay in Queens, is principally served by on-site septic systems. Wastewater management in the Nassau County portion of the watershed is accomplished by three sanitary sewer districts: the Belgrave Water Pollution Control District, the Great Neck Water Pollution Control District, and the Village of Great Neck. The treated effluent from the Belgrave WWTP discharges to Udalls Cove, on the east side of Little Neck Bay. The treatment plants for the other two districts discharge to Manhasset Bay, on the east side of the Great Neck Peninsula. In addition, many properties use on-site septic systems, which are not in the service areas of these three sewer districts. The locations of the three wastewater treatment facilities and the respective sewershed boundaries are as shown in Figure 2-6.

The following section describes the major features of the Tallman Island WWTP tributary area, including the Alley Creek and Little Neck Bay watershed.

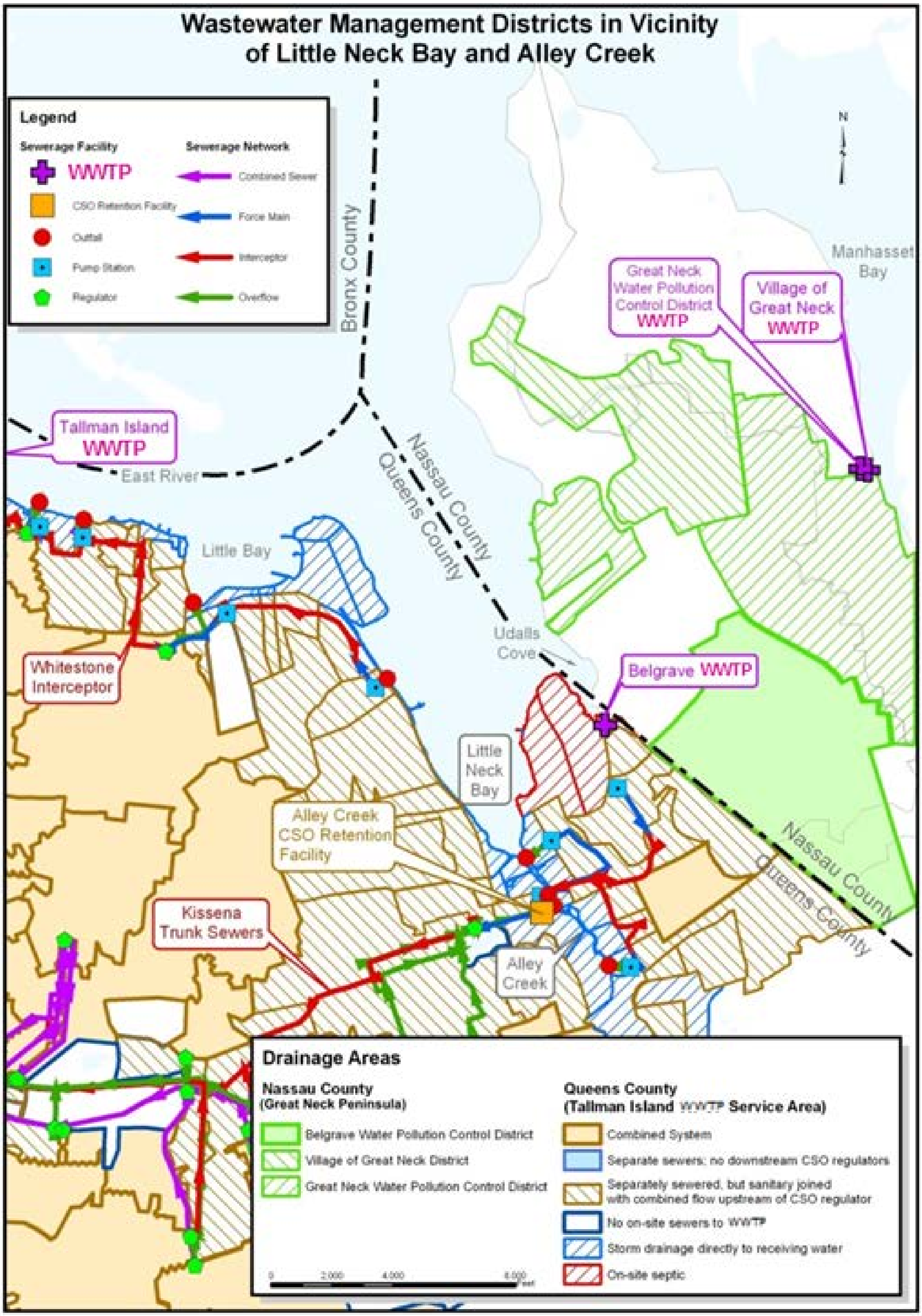


Figure 2-6. Alley Creek Wastewater Service Areas

2.1.c.1 Overview of Drainage Area and Sewer System

Alley Creek and Little Neck Bay are served by the Tallman Island WWTP. The Tallman Island sewershed includes sanitary and combined sewersheds, as summarized in Tables 2-3 and 2-4. The Tallman Island service area includes:

- Sixteen pumping stations, with five serving combined system areas;
- Forty-nine combined sewer flow regulator structures; and
- Twenty-four CSO discharge outfalls, two of which are permanently bulkheaded.

Table 2-3. Tallman Island WWTP Drainage Area(1): Acreage Per Sewer Category

Sewer Area Description	Area (acres)
Combined	**8,712**
Separate • Fully-separated • Watershed separately sewered, but with sanitary sewage subsequently flowing into a combined interceptor, and stormwater discharging either directly to receiving water or into a combined interceptor	**5,903** (923 acres) (4,980 acres)
Total	**14,615**

(1) An additional 3,080 acres of area, for facility planning and certain permitting purposes, are considered to be part of the Tallman Island drainage area, but do not contribute to the WWTP. These include areas with direct drainage of stormwater to water courses (either directly or via storm sewers), other areas not served by piped drainage systems (e.g., parks and cemeteries), and areas that use "on-site" septic systems (Douglas Manor on Douglaston Peninsula).

Table 2-4. Tallman Island WWTP Drainage Area: Acreage By Outfall/Regulator

Outfall	Outfall Drainage Area	Regulator	Regulator Drainage Area	Regulated Drainage Area Type	Receiving Water
East River					
TI-003	494.5	R10A	224.6	Separate	Powells Cove
		R10B	269.9	Combined	Powells Cove
		R10	114.2	Separate	Powells Cove
TI-004	68.1	R11	68.1	Combined	East River
TI-005	179.3	R12	179.3	Separate	East River
TI-019	27	R02	27	Combined	East River
TI-020	60.1	R01	60.1	Combined	East River
TI-023	769.9	R13	769.9	Combined	Little Bay
Alley Creek and Little Neck Bay					
TI-006	597.3	24th Ave PS	74.8	Separate	Little Neck Bay
		Clear View PS	522.5	Separate	Little Neck Bay
TI-007	1074.9	Old Douglaston PS	1074.9	Combined and Separate	Alley Creek
TI-008	1044.4	R46	404.4	Combined	Alley Creek
		R47	455.9	Combined and Separate	Alley Creek
		R49	80.5	Separate	Alley Creek
TI-024	376.2	New Douglaston PS	77.1	Separate	Alley Creek
TI-025	1550.7	Alley Creek Tank	1550.7	Combined and Separate	Alley Creek

Flushing Bay and Creek					
TI-010	6416.0	R29	122.9	Combined and Separate	Flushing Creek
		R30	787	Combined and Separate	Flushing Creek
		R31	503.4	Combined, Separate and Other	Flushing Creek
		R32	2.7	Combined	Flushing Creek
		R33	2.5	Combined	Flushing Creek
		R34	7.6	Combined	Flushing Creek
		R35	43.6	Combined	Flushing Creek
		R37	366	Combined	Flushing Creek
		R39	35.3	Combined	Flushing Creek
		R40	135.4	Combined	Flushing Creek
		R40A	119.8	Combined	Flushing Creek
		R41	529	Combined and Other	Flushing Creek
		R43	515.7	Combined, Separate and Other	Flushing Creek
		R44	141.4	Combined	Flushing Creek
		R45	613.1	Combined	Flushing Creek
		R45A	1043.3	Combined	Flushing Creek
		R50	343.6	Combined	Flushing Creek
		R59	68.6	Combined	Flushing Creek
TI-011	943.2	R09	278.2	Combined and Separate	Flushing Creek
		R51	369.4	Combined	Flushing Creek
		R52	16.3	Combined	Flushing Creek
		R53	46.3	Combined	Flushing Creek
		R54	28.1	Combined	Flushing Creek
TI-012	13	122nd St PS	13	Separate	Flushing Bay
TI-013	28.3	R08	Disconnected from R08	Separate	Flushing Bay
TI-014	18.5	R07	18.5	Combined	Flushing Bay
TI-015	18.6	R06	18.6	Combined	Flushing Bay
TI-016	73.5	R05	73.5	Combined	Flushing Bay
TI-017	3.5	R04	3.5	Combined	Flushing Bay
TI-018	30.9	R03	30.9	Combined	Flushing Bay

TI-022	308.2	R55	156.8	Combined	Flushing Creek
		R56	85	Combined	Flushing Creek
		R57	14.6	Combined	Flushing Creek
		R58	51.8	Combined	Flushing Creek

Note: For locations with regulators in series, the incremental regulator drainage area is listed

The Tallman Island WWTP is located at 127-01 134th Street, in the College Point section of Queens, on a 31-acre site adjacent to Powells Cove, leading into the Upper East River, and bounded by Powells Cove Boulevard. The Tallman Island WWTP serves a sewered area in the northeast section of Queens, including the communities of Little Neck, Douglaston, Oakland Gardens, Bayside, Auburndale, Bay Terrace, Murray Hill, Fresh Meadows, Hillcrest, Utopia, Pomonok, Downtown Flushing, Malba, Beechhurst, Whitestone, College Point, and Queensboro Hill, as shown on Figure 2-7. The total sewer length that feeds into the Tallman Island WWTP, including sanitary, combined, and interceptor sewers, is 490 miles.

The Tallman Island WWTP has been providing full secondary treatment since 1978. Processes include primary screening, raw sewage pumping, grit removal and primary settling, air-activated sludge capable of operating in the step aeration mode, final settling, and chlorine disinfection. The Tallman Island WWTP has a DDWF capacity of 80 MGD, and is designed to receive a maximum flow of 160 MGD (2xDDWF) with 120 MGD (1.5xDDWF) receiving secondary treatment. Flows over 120 MGD receive primary treatment and disinfection.

The Tallman Island WWTP includes four principal interceptors: the Main Interceptor, the College Point Interceptor, the Flushing Interceptor, and the Whitestone Interceptor.

- The Main Interceptor is directly tributary to the Tallman Island WWTP, and picks up flow from the other three interceptors.

- The College Point Interceptor carries flow from sewersheds to the west of the treatment plant, discharges in the Powell’s Cove Pump Station, which discharges into the Main Interceptor within the WWTP premises.

- The Flushing Interceptor can be considered an extension of the Main Interceptor south of the Whitestone connection, and serves most of the areas to the south in the system. The Flushing Interceptor also picks up flow from the southeast areas of the system, along the Kissena Corridor Interceptor (via trunk sewers upstream of the TI-R31 regulator), and from the Douglaston area. The Alley Creek area drains to Tallman Island WWTP via the Kissena Corridor Interceptor.

- The Whitestone Interceptor discharges to the Main Interceptor from the west side, shortly upstream of the College Point interceptor connection, via gravity discharge. The Whitestone conveys flow from the area east of the treatment plant along the East River.

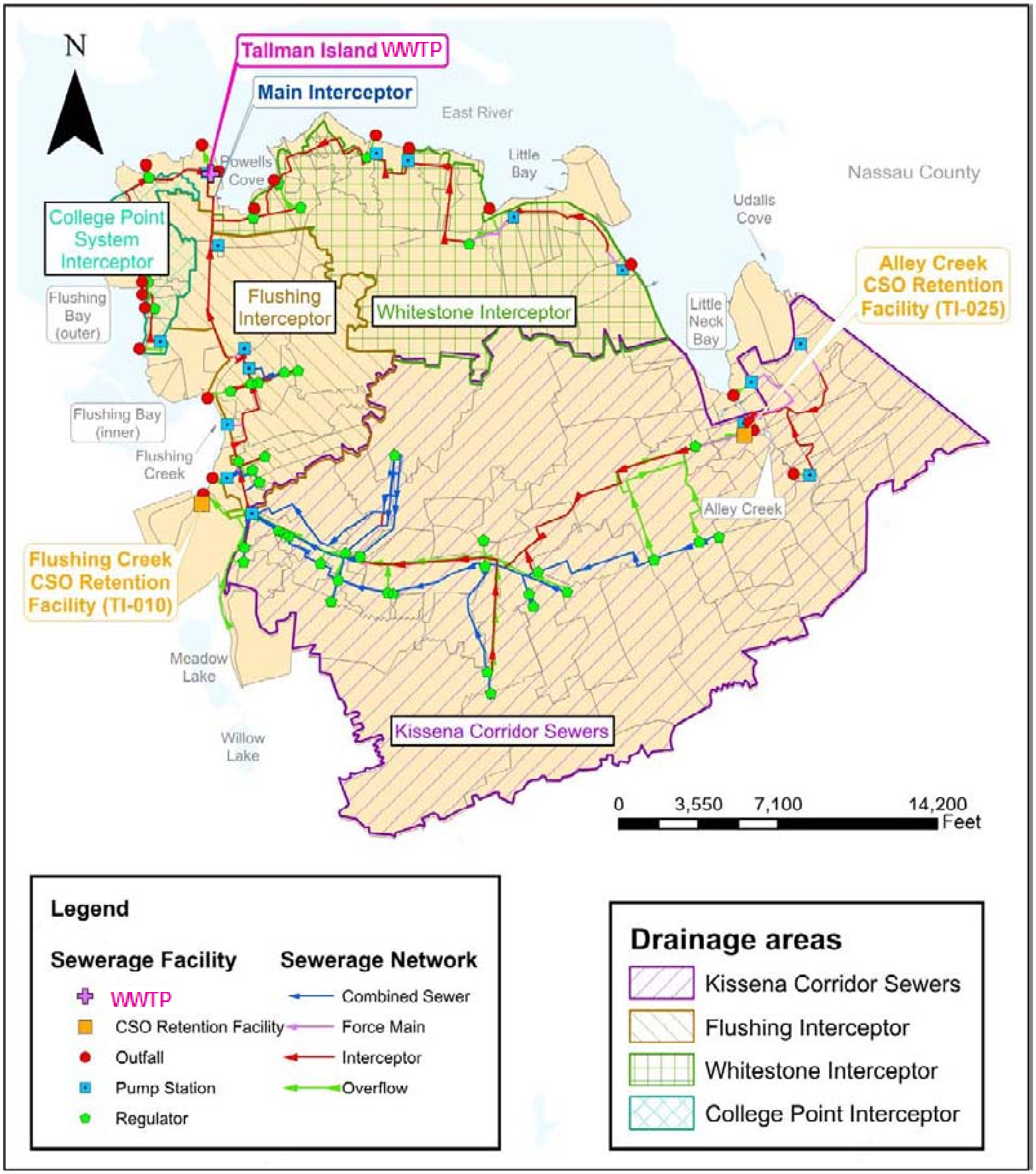


Figure 2-7. Tallman Island WWTP Service Area

The Tallman Island WWTP includes four principal interceptors: the Main Interceptor, the College Point Interceptor, the Flushing Interceptor, and the Whitestone Interceptor.

- The Main Interceptor is directly tributary to the Tallman Island WWTP, and picks up flow from the other three interceptors.
- The College Point Interceptor carries flow from sewersheds to the west of the treatment plant, discharges in the Powell's Cove Pump Station, which discharges into the Main Interceptor within the WWTP premises.
- The Flushing Interceptor can be considered an extension of the Main Interceptor south of the Whitestone connection, and serves most of the areas to the south and east in the system. The Flushing Interceptor also picks up flow from the southeast areas of the system, along the Kissena Corridor Interceptor (via trunk sewers upstream of the TI-R31 regulator), and from the Douglaston area. The Alley Creek area drains to Tallman Island WWTP via the Kissena Corridor Interceptor.
- The Whitestone Interceptor discharges to the Main Interceptor from the west side, shortly upstream of the College Point interceptor connection, via gravity discharge. The Whitestone conveys flow from the area east of the treatment plant along the East River.

This service area also includes two CSO retention facilities planned, designed and constructed based on the East River Facility Planning and WWFP. The first one is the Flushing Creek CSO Retention Tank, also referred to as Flushing Creek CSO Retention Tank, with a total capacity of 43.4 MG (28.4 MG of offline storage and 15 MG of inline storage in large outfall pipes). This facility has been operational since May 2007. Post event, retained flow is pumped to the upper end of the Flushing Interceptor, upstream of Regulator TI-009. This structure was reconstructed in 2005 to provide adequate capacity to convey both sanitary flows and dewatered flow from the retention tank subsequent to wet weather periods.

The second facility is the Alley Creek Retention Tank, built in 2010, which was operational as of March 11, 2011. This tank has an offline storage capacity of 5 MG. During wet weather, flows that reach the TI-008 CSO regulator are directed to the offline storage tank by the diversion weir in Chamber 6 of the Alley Creek CSO Retention Tank. When the storage tank reaches capacity, excess water overflows the storage basin and is discharged to Alley Creek through Outfall TI-025, after receiving floatables control. The retention tank provides some degree of primary settling. Post-event dewatering of this tank is accomplished through the upgraded Old Douglaston PS, which has a peak capacity of 8.5 MGD.

Tallman Island Non-Sewered Areas

Some areas within the Tallman Island service area are considered direct drainage areas and on-site septic areas, as shown in Figure 2-8 (next page), where stormwater drains directly to receiving waters without entering the CSS. Generally, these are shoreline areas adjacent to waterbodies, and were delineated based on topography and the resultant direction of stormwater sheet flow. In addition, the on-site septic areas, located in the northern portion of Douglaston Peninsula, are unsewered. Stormwater flows across lawns and down gutters to Little Neck Bay. Further, near surface groundwater flow is a potential source of pollutants to Little Neck Bay.

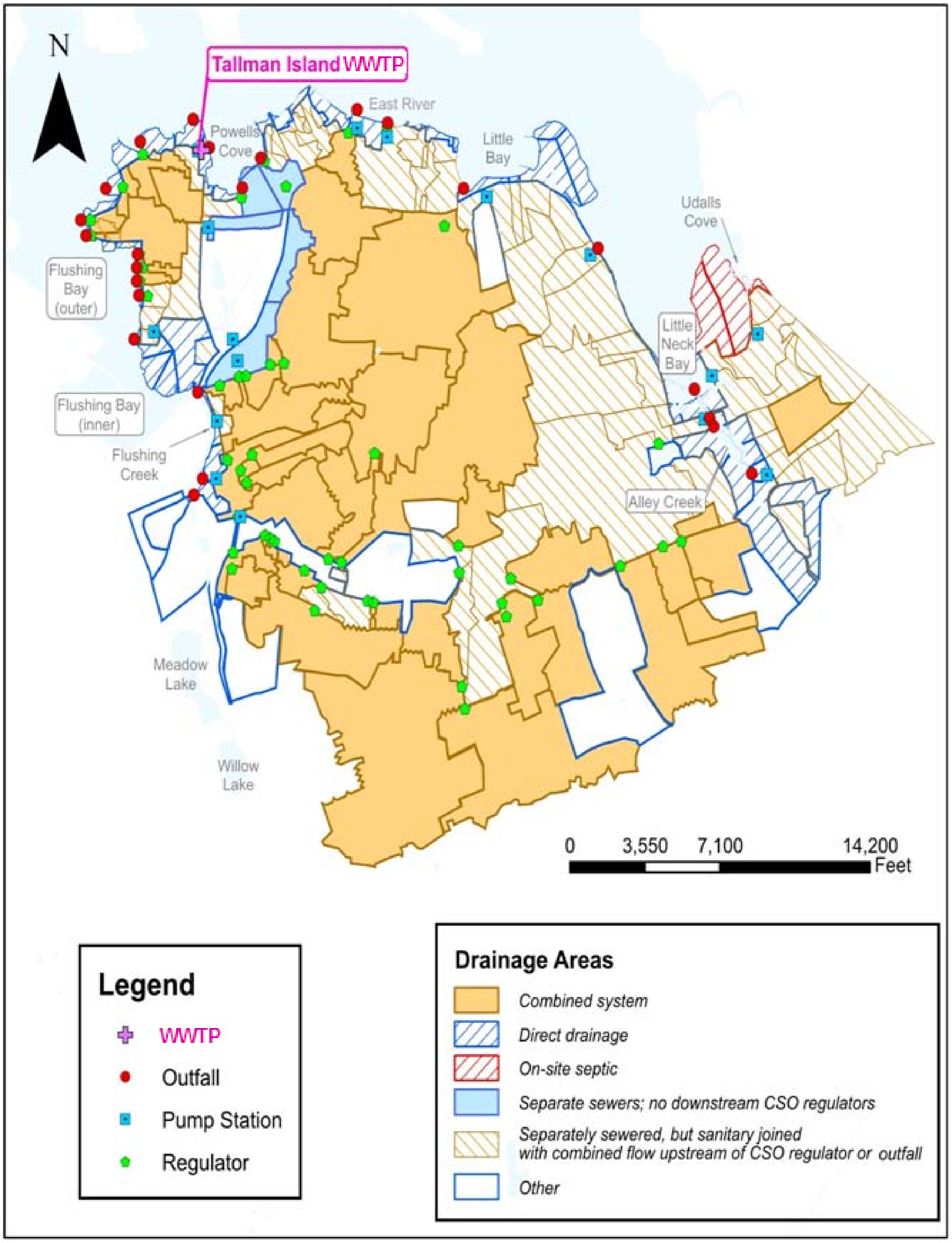


Figure 2-8. Tallman Island WWTP Drainage Area

Tallman Island Stormwater Outfalls

There are nine permitted stormwater outfalls discharging to Alley Creek and Little Neck Bay, as shown on Figure 2-9 (next page); these include TI-623, TI-624, TI-633, TI-653, TI-654, TI-655, TI-656, TI-658 and TI-660. These outfalls drain stormwater runoff from the separate sanitary sewer areas around Alley Creek and Little Neck Bay. While runoff from these areas does not enter the combined system, the direct stormwater discharges to Alley Creek and Little Neck Bay can impact water quality.

Tallman Island/Alley Creek CSOs

The Tallman Island SPDES permit CSO outfalls to Alley Creek are TI-007, TI-008, TI-009,TI-024 and TI-025. CSO outfall TI-006 discharges to Little Neck Bay. The locations of Alley Creek and Little Neck Bay SPDES CSO outfalls are shown on Figure 2-9. It should be noted that TI-025 is the CSO outfall for the Alley Creek CSO Retention Tank, and that TI-008 and TI-025 are used to convey and discharge a large portion of stormwater. In addition, outfalls TI-007, TI-006 and TI-024 serve as emergency bypasses for pump stations, and are therefore designated as CSO outfalls. Under normal conditions, TI-006 and TI-024 discharge stormwater from their tributary areas, and TI-007 can overflow during large precipitation events.

Wet weather flows in the CSS, with incidental sanitary and stormwater contributions as summarized above, result in overflows to the nearby waterbodies when the flows exceed the hydraulic capacity of the system, or the specific capacity of the local regulator structure.

Douglas Manor

The area on the eastern shore of Little Neck Bay known as Douglas Manor, The neighborhood is predominantly composed of single family residences served by on-site septic systems, built in individual lots zoned as R1-1 and R1-2, except for the Douglaston Club House, which is a three-story structure with a 17,100 sq. ft. building area, located on a 102,060 sq. ft. lot zoned for open space/outdoor recreation. Approximately 58 acres of drainage area generate runoff upstream of Shore Road, a waterfront roadway that follows the alignment of the eastern shore of Little Neck Bay. The Douglas Manor Association (DMA) manages a permitted private community beach known as DMA Beach, along Shore Road. The location of DMA Beach and Douglaston Club House, and photos depicting the overall residential land use of the neighborhood can be seen in Figure 2-10.

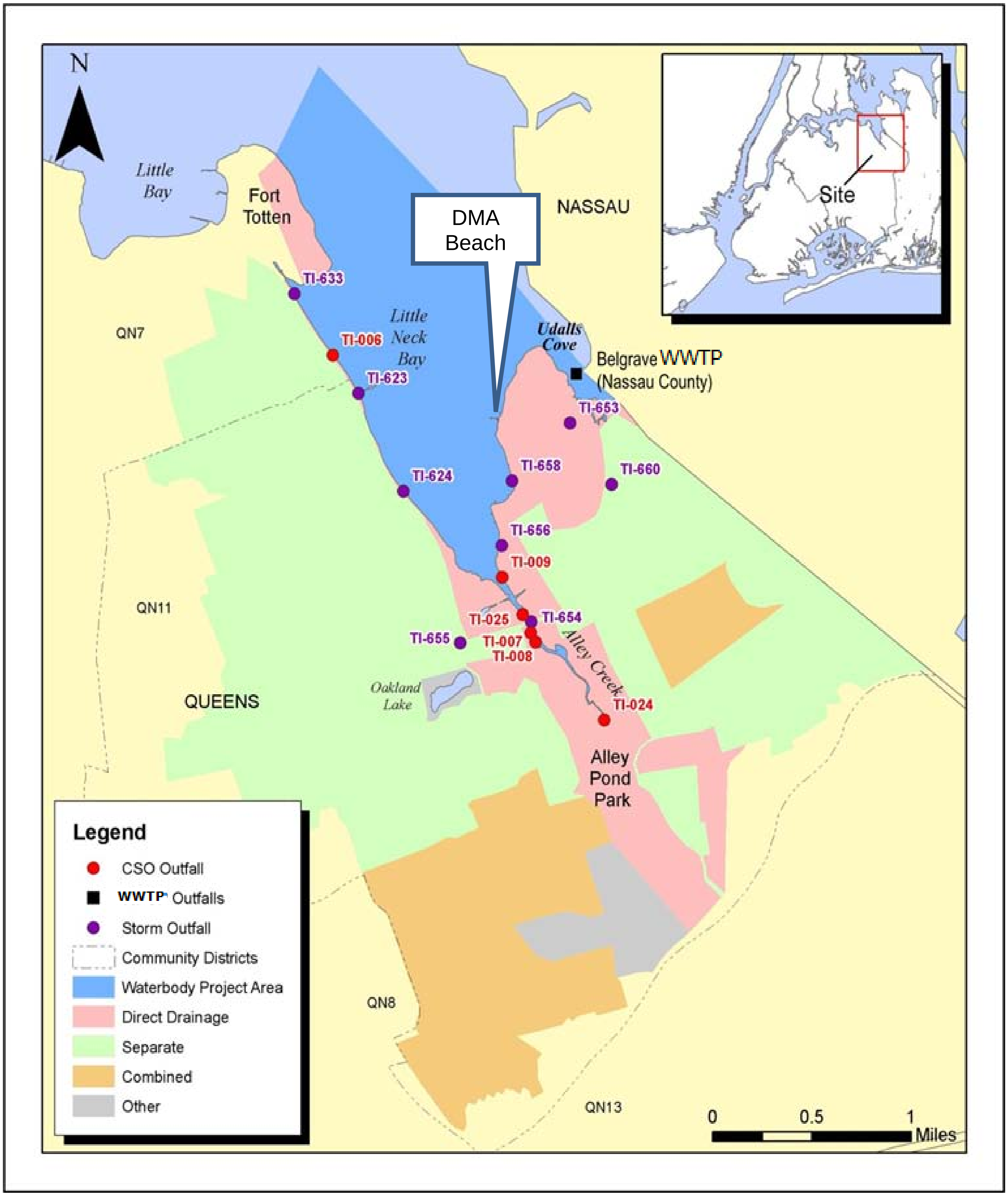


Figure 2-9. Alley Creek and Little Neck Bay SPDES Permitted Outfalls

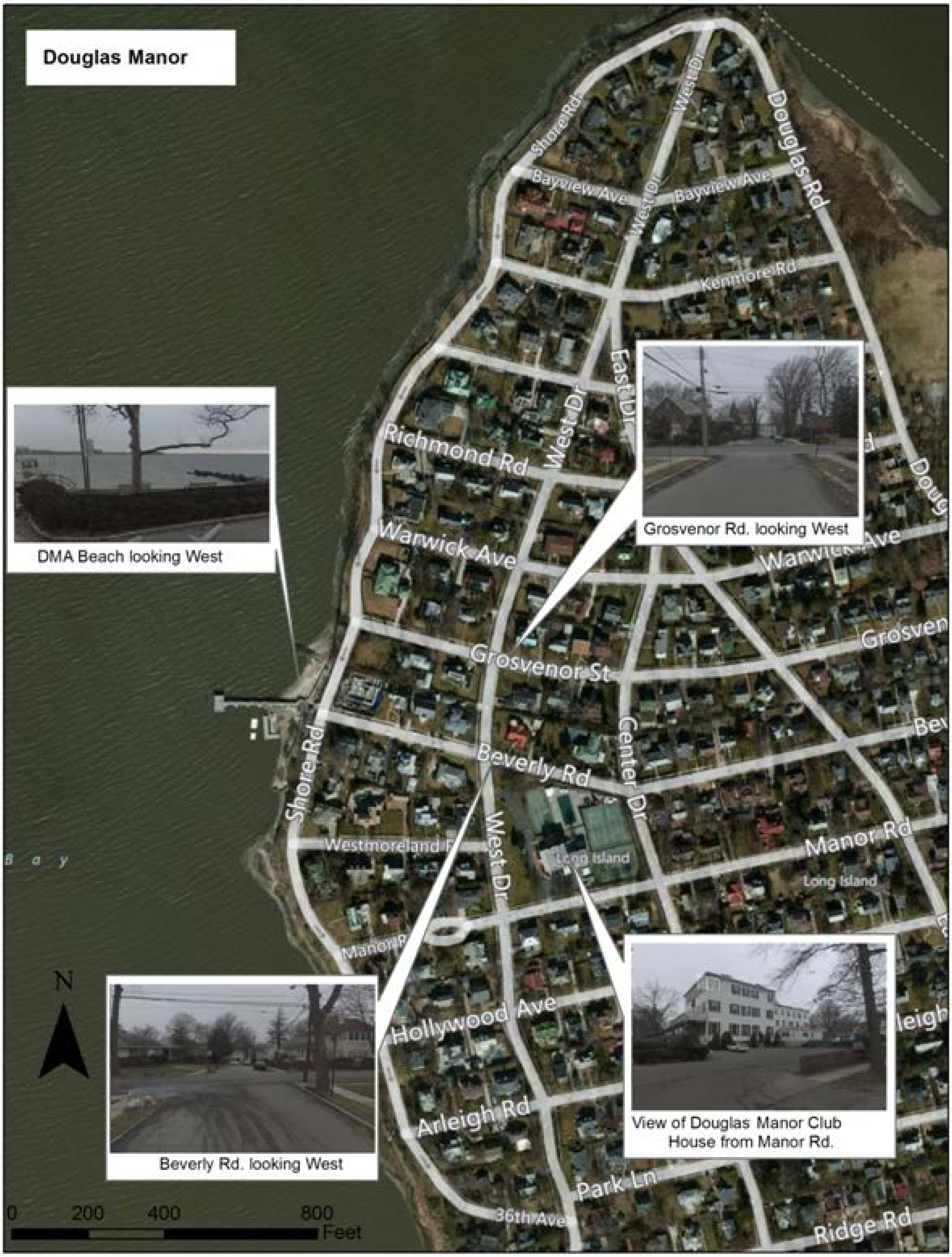


Figure 2-10. Douglas Manor Community

2.1.c.2 Stormwater and Wastewater Characteristics

The pollutant concentrations found in wastewater, combined sewage, and stormwater can vary based on a number of factors, including flow rate, runoff contribution, and the matrix of the waste discharged to the system from domestic and non-domestic customers. Since the matrix of these waste streams can vary, it can be challenging to identify a single concentration of pollutants to use for analyzing the impact of discharges from these systems to receiving waters.

To more effectively characterize pollutant loads from CSO discharges, the EPA's Nationwide Urban Runoff Program (NURP) developed the concept of the Event Mean Concentration (EMC). EMC is a function of total constituent mass, the total runoff volume, and percent amount of impervious cover in the sub-watershed (EPA, 1983).

Data collected from sampling events were used guide the selection of concentrations of CBOD, TSS, total coliform, fecal coliform, and enterococci to use in calculating pollutant loadings from various sources. Values noted below may not reflect actual measurements made in 2012, where there is reason to suspect the data as not being representative of actual conditions. Tables 2-5 and 2-6 show both the sanitary and stormwater concentrations for discharges to Alley Creek and Little Neck Bay from both the Tallman Island WWTP service area and Nassau County, respectively. Influent dry-weather samples at the WWTP were used to model sanitary concentrations (HydroQual, 2005b). Previously collected City-wide sampling data from Inner Harbor Facility Planning Study (DEP, 1994) was combined with data for the EPA Harbor Estuary Program (HydroQual, 2005a) to develop the stormwater concentrations.

Effluent data were taken from DEC discharge monitoring reports (DMR) submitted for the Belgrave WWTP by the Nassau County Department of Public Works, as shown on Table 2-7. The plant discharges an average of 1.3 MGD. Total coliform, fecal coliform, and enterococci are assumed to be negligible, since the facility provides disinfection.

Table 2-5. Sanitary and Stormwater Discharge Concentrations, Tallman Island WWTP

Constituent	Sanitary Concentration	Stormwater Concentration
$CBOD_5$ (mg/L) [(1)]	140	15
TSS (mg/L) [(1)]	130	15
Total Coliform Bacteria (MPN/100mL) [(2,3)]	$25x10^6$	150,000
Fecal Coliform Bacteria (MPN/100mL) [(2,3)]	$4x10^6$	35,000
Enterococci (MPN/100mL) [(2,3)]	$1x10^6$	15,000

[(1)] HydroQual, 2005b.
[(2)] Hydroqual Memo to DEP, 2005a.
[(3)] Bacterial concentrations expressed as "most probable number" (MPN) of cells per 100 mL.

Table 2-6. Stormwater Discharge Concentrations, Nassau County

Constituent	Stormwater Concentration
CBOD5 (mg/L) (1)	15
TSS (mg/L) (1)	15
Total Coliform Bacteria (MPN/100mL) (2,3)	50,000
Fecal Coliform Bacteria (MPN/100mL) (2,3)	25,000
Enterococci (MPN/100mL) (2,3)	15,000

(1) HydroQual, 2005b.
(2) Hydroqual Memo to DEP, 2005a.
(3) Bacterial concentrations expressed as "most probable number" (MPN) of cells per 100 mL.

Table 2-7. Belgrave WWTP (Nassau County) Discharge – Effluent[(1)]

Constituent	Concentration
$CBOD_5$ (mg/L)	10
TSS (mg/L)	10
Total Coliform Bacteria (MPN/100mL) [(2)]	<200
Fecal Coliform Bacteria (MPN/100mL) [(2)]	<200
Enterococci (MPN/100mL) [(2)]	<200

(1) DEC, DMR data, 475 MG/yr, at an average flow rate of 1.3 MGD.
(2) Disinfection practiced year-round.

A sampling program targeting CSO and other sources of pollutants contributing to Alley Creek and Little Neck Bay was implemented as part of this LTCP. Data were collected to supplement the flows/volumes and concentrations of various sources of pollutants to Alley Creek and Little Neck Bay. During dry weather, the flows and concentrations were collected from Oakland Lake and from a pond located south of the Long Island Expressway (LIE); these are continuous sources of flow and pollutants to Alley Creek. Both fresh water impoundments support recreational activities, such as bird-watching of diverse species of waterfowl that inhabit them, and as such, bacteria sampling was a vital element of this sampling program. Additionally, as identified by BWT's illicit sewer connection tracking and removal enforcement program, illegal connections to the stormwater sewers discharged through outfall TI-024 were detected and subsequently eliminated. These illicit connections generated a low flow contribution to upper Alley Creek with a high concentration of pollutants. Sampling of the sources above was conducted to provide information to the water quality modeling tasks, and the locations of these sources are depicted in Figure 2-11.

Sampling, data analyses, and water quality modeling calibration resulted in the assignment of flows and pollutant loadings to these sources of pollution for inclusion in the calibration of the water quality model for the 2011 and 2012 period.

Oakland Lake flows were determined based on three months of monitoring the lake outflow in the storm sewer that bypasses Chamber 6 upstream the Alley Creek CSO Retention Tank. The Duck Pond (pond south of LIE) flows were based on a few discrete measurements. Oakland Lake concentrations were based on a GM of dry-weather samples collected at the lake outlet during 2012. The Duck Pond concentrations were based on the dry-weather GM of samples collected during February 2013.

Figure 2-11. Upper Alley Creek Point – Source Locations

Data used during the calibration process for the years 2011 and 2012 suggested that constant sources of bacteria were located near the head of Alley Creek and near DMA Beach. High dry-weather concentrations could not be accounted for by the wet-weather CSO and stormwater sources. As part of the calibration process, dry-weather sources were added at TI-024 and DMA Beach. These sources were assigned the characteristics shown in Tables 2-8 and 2-9, respectively.

At TI-024, estimated groundwater infiltration (from short-term continuous metering of a 96 inch and 72 inch diameter storm sewers discharging through TI-024 during 2012) and suspected illicit connections were combined, to estimate flows and concentrations. The final concentrations were estimated as part of the calibration process. These loads were subsequently removed for the LTCP analysis, assuming that illicit discharges would be abated outside of the CSO LTCP process.

Table 2-8. Upper Alley Creek Source Loadings Characteristics

Source	Flow (MGD)	Enterococci (org./100 mL)	Fecal Coliform (cfu/100 mL)	BOD-5 (mg/L)
Oakland Lake flow through outfall TI-008	2.5	120	120	15
Upstream Pond	1.5	70	30	0
TI-024 Illicit Connections	0.04	1,000,000	4,000,000	15
TI-024 Infiltration	0.2	4,000	1,200	6.3
See Figures 2-9 and 2-11 for source locations				

Table 2-9. DMA Source Loadings Characteristics

Source	Flow (MGD)	Enterococci (org./100 mL)	Fecal Coliform (cfu/100 mL)	BOD-5 (mg/L)
DMA groundwater inflow (continuous)	0.06	50,000	100,000	0
DMA stormwater	Calculated from rainfall and runoff coefficient	300,000	700,000	15

During wet weather conditions, Alley Creek and Little Neck Bay receive flow contributions from multiple stormwater outfalls, CSO that exceeds the retention capacity of the 5 MG tank at TI-025, and direct runoff from unsewered drainage areas along the eastern shore of Little Neck Bay. In particular, at DMA, the runoff originated by the impervious surfaces of the lots and public roadways, along with the rainfall volume that exceeds the infiltration capacity of the pervious surfaces, is discharged to Little Neck Bay in the vicinity of DMA Beach, at the seven main locations depicted in Figure 2-12. Most of the runoff is conveyed as surface sheetflow or poorly-defined shallow surface flow, until crossing a concrete retaining wall between Shore Road and the beach. The main runoff drainage paths of the approximately 14 acres contributing directly to DMA Beach can be seen in Figure 2-12. The NYCDOT Capital Project HWQ-985, intended primarily to protect the concrete retaining wall from static force loads that compromise its stability, will divert runoff from the current discharge points on both sides of the pier at DMA Beach to a location farther south of the recreational area. The planned future configuration can be seen in Figure 2-13. This project is expected to be completed in 2016.

During dry weather, it is suspected that near surface groundwater flows downslope toward Little Neck Bay from DMA, carrying pathogens from septic systems with it. This suspected source of pollutants may also generate higher loadings during wet periods at a local geographical scale, when the ground water flow is higher. Groundwater flows were estimated by assuming 200 homes, with four persons per household contributing 75 gallons per capita per day. Concentrations were adjusted as part of the calibration process. These loads were subsequently removed from the LTCP analysis, assuming that this source would be abated outside of the CSO LTCP process.

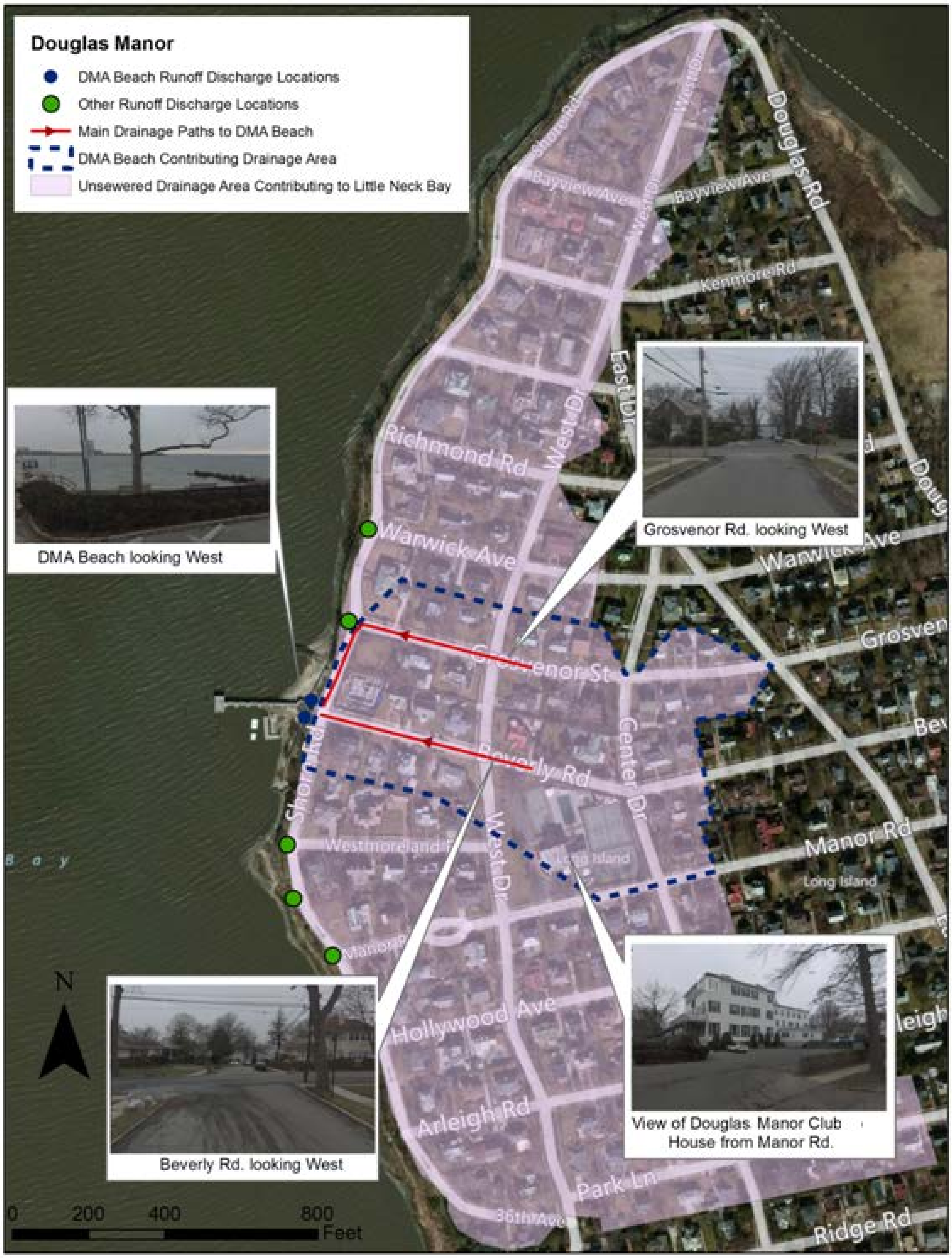


Figure 2-12. Little Neck Bay and DMA Beach Overland Drainage Characteristics

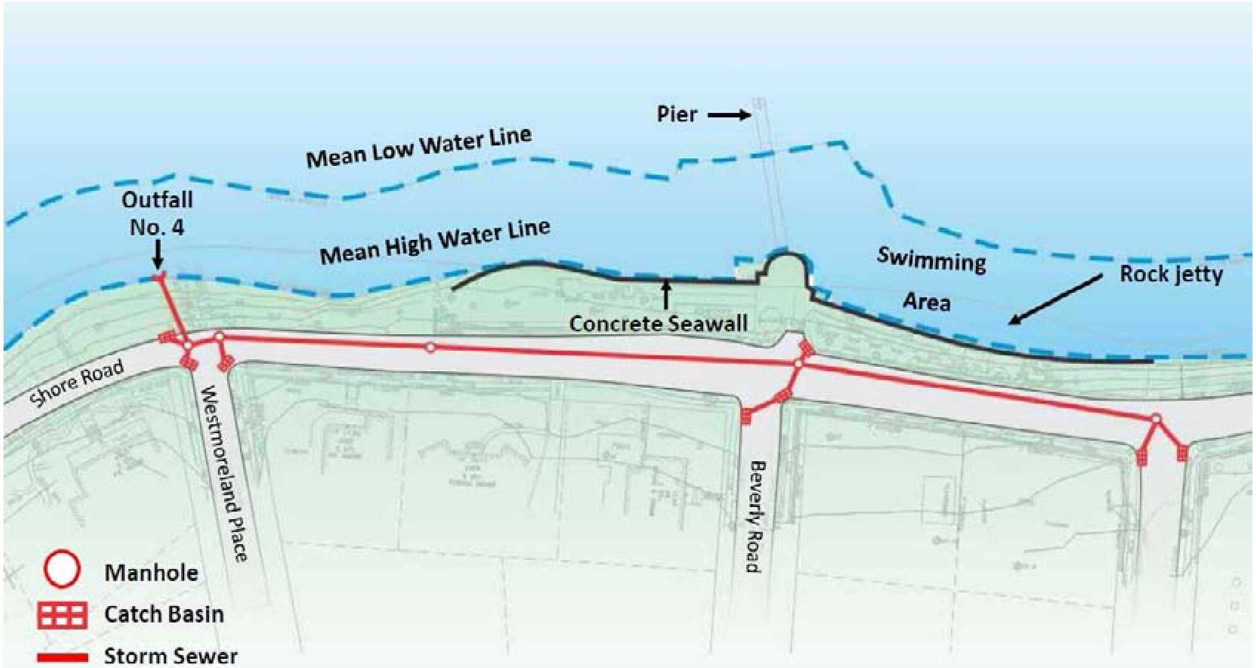


Figure 2-13. DMA Planned Drainage Improvements

The following characteristics were associated with the dry and wet weather sources of pollutants suspected to be associated with the septic systems in DMA.

2.1.c.3 **Hydraulic Analysis of Sewer System**

A City-wide hydraulic analysis was completed in December 2012 (an excerpt of which is included in this sub-section), to provide further insight into the hydraulic capacities of key system components and system responses to various wet weather conditions. Since the IW model was updated in the Alley Creek drainage area after this effort was completed, and in support of the development of this LTCP, the model results reported in this sub-section, while relevant for their intended use to document overall system-wide performance beyond the Alley Creek watershed, may differ slightly from volumes reported in the remainder of this LTCP report. The hydraulic analyses can be divided into the following major components:

- Annual simulations to estimate the number of annual hours that the WWTP is predicted to receive and treat up to 2xDDWFfor rainfall years 2008, and with projected 2040 DWFs; and
- Estimation of peak conduit/pipe flow rates that would result from a significant single event with projected 2040 DWFs.

A detailed presentation of the data were contained in the December 2012 Hydraulic Analysis Report submitted to DEC. The objective of each evaluation and the specific approach undertaken are briefly described in the following paragraphs.

Annual Hours at 2xDDWF for 2008 with Projected 2040 DWFs

Model simulations were conducted to estimate the annual number of hours that the Tallman Island WWTP would be expected to treat 2xDDWF for the 2008 precipitation year, which contained a total precipitation of 46.26 inches, as measured at the JFK Airport. These simulations were conducted using projected 2040 DWFs for two model input conditions – the re-calibrated model conditions as described in the June 2012 IW City-wide Recalibration Report, and the Cost-Effective Grey (CEG) alternative defined for the service area. The CEG elements represent the CSO controls that became part of the 2012 Order on Consent. For these simulations, the primary input conditions that applied were as follows:

- Projected 2040 DWF conditions.
- 2008 tides and precipitation data.
- WWTP at 2xDDWF capacity of 160 MGD.
- No sediment in the combined sewers (i.e., clean conditions).
- Sediment in interceptors representing the sediment conditions after the inspection and cleaning program completed in 2011 and 2012.
- No green infrastructure.

The CEG conditions applicable to the Tallman Island service area included the two CSO retention facilities and Whitestone Interceptor and associated sewer/regulator improvements. Due to the construction of Flushing Creek Retention Tank and associated Regulator TI-09 improvements in 2005, and completion of the Alley Creek Retention Tank in 2011, the recalibrated models include both of these facilities. The Whitestone Interceptor and associated sewer/regulator improvements therefore constitute the primary difference between pre-CEG and CEG scenarios. Key observations/findings are summarized below:

- Simulation of the 2008 annual rainfall year resulted in a prediction that the Tallman Island WWTP would operate at its 2xDDWF capacity for 49 hours under the no-CEG condition. When the CEG conditions were applied in the model, the annual number of hours at 2xDDWF increased to 99 hours.

- The total volume (dry and wet weather combined) treated at the plant annually for the 2008 non-CEG condition was predicted to be about 24,038 MG, while the 2008 with-CEG condition resulted in a prediction that 24,301 MG would be treated at the plant – an increase of 263 MG.

- The total Annual Average Overflow Volume (AAOV) predicted for the outfalls in the Tallman Island service area were as follows:
  - 2008 non-CEG: 2,163 MG
  - 2008 with CEG: 2,098 MG

The above results indicate an increase in the number of hours at the 2xDDWF operating capacity, an increased annual volume being delivered to the WWTP, and a decrease in AAOV from the outfalls in the service area.

Estimation of Peak Conduit/Pipe Flow Rates

Data tables containing information on several pipe characteristics were prepared, coupled with calculation of the theoretical, unsurcharged, full-pipe flow capacity of each sewer included in the model. To test the conveyance system response under what would be considered a large storm event condition, a single-event storm that was estimated to approximate a five-year return period (in terms of peak hourly intensity as well as total depth) was selected from the historical record.

The selected single event was simulated in the model for two conditions, the first being prior to implementation of CEG conditions, and the second with the CEG conditions implemented. The maximum flow rates and maximum depths predicted by the model for each sewer segment in the model were retrieved and aligned with the other pipe characteristics. Columns in the tabulations were added to indicate whether the maximum flow predicted for each conduit exceeded the unsurcharged, full-pipe flow, along with a calculation of the maximum depth in the sewer as a percentage of the pipe full height. It was suspected that potentially, several of the sewer segments could be flowing full, even though the maximum flow may not have reached the theoretical maximum full-pipe flow rate for reasons such as downstream tidal backwater, interceptor surcharge or other capacity-limiting reasons. The resulting data were then scanned to identify the likelihood of such capacity-limiting conditions, and also provide insight into potential areas of available capacity, even under large storm event conditions. Key observations/findings of this analysis are described below.

- Capacity exceedances for each sewer segment were evaluated in two ways for both interceptors and combined sewers:
  - Full flow exceedances, where the maximum predicted flow rate exceeded the full-pipe unsurcharged flow rate. This could be indicative of a conveyance limitation.
  - Full depth exceedances, where the maximum depth was greater than the height of the sewer segment. This could be indicative of either a conveyance limitation or a backwater condition.
- For the single storm event simulated, the model predicted that between 66 and 77 percent (by length) of the interceptor sewer segments would exceed full-pipe capacity flow for the non-CEG and CEG scenarios, respectively. About 30 to 37 percent (by length) of the upstream combined sewers would exceed their full-pipe flow under the same scenarios.
- Between 78 and 93 percent (by length) of the interceptors were predicted to flow at full depth or higher. Between 56and 59 percent (by length) of the combined sewers were also predicted to flow at full depth, and 72 percent of the combined sewers flowed at least 75 percent full.
- The results for the system condition with CEG improvements showed that the overall peak plant inflow and HGL near the plant improved, in comparison to the non-CEG conditions in the Tallman Island service area.
- About 72 percent of the combined sewers (by length) reached a depth of at least 75 percent under the CEG simulations. This indicates that little additional potential exists for in-line storage capability in the Tallman Island system.

Based on the review of various metrics, the Tallman Island system generally exhibits full or near-full pipe flows during wet weather, allowing little potential for inline storage capability.

2.1.c.4 **Identification of Sewer System Bottlenecks, Areas Prone to Flooding and History of Sewer Backups**

The DEP has made substantial improvements to the Alley Creek drainage system, in which over $90M was spent under Contract ER-AC1 to help eliminate some historical flooding issues. These drainage system improvements took place between from December 2002 through December 2006, and consisted of installing larger combined sewers in certain segments of the sewershed to increase conveyance capacity; constructing storm sewers in select drainage areas to reduce volume of storm water entering the combined system; and construction of associated combined and stormwater outfalls to discharge the excess wet weather flows. These drainage area improvements have substantially mitigated these historical flooding issues.

DEP maintains the operation of the collection systems throughout the five boroughs using a combination of reactive and proactive maintenance techniques. The City's “Call 311” system routes complaints of sewer issues to DEP for response and resolution. Though not every call reporting flooding or sewer backups (SBUs) correspond to an actual issue with the municipal sewer system, each call to 311 is responded to. Sewer functionality impediments identified during a DEP response effort are corrected as necessary.

2.1.c.5 **Findings from Interceptor Inspections**

In the last decade, DEP has implemented technologies and procedures to enhance its use of proactive sewer maintenance practices. DEP has many programs and staff devoted to sewer maintenance, inspection and analysis. GIS and Computerized Maintenance and Management System CMMS systems provide DEP with expanded data tracking and mapping capabilities, and can facilitate identification of trends to allow provision of better service to its customers. As referenced above, reactive and proactive system inspections result in maintenance including cleaning and repair as necessary. Figure 2-14 (next page) illustrates the interceptors that were cleaned for the Alley Creek sewershed.

DEP also conducted a sediment accumulation analysis to quantify levels of sediments in the combined sewer system and verify that the baseline assumptions are valid for this CSO LTCP. For this analysis, the normal approximation to the hypergeometric distribution was used to randomly select a sample subset of sewers representative of the modeled system as a whole, with a confidence level commensurate to that of the IW watershed model itself. Field crews investigated each location, and estimated sediment depth using a rod and tape. Field crews also verified sewer pipe sizes shown on the maps, and noted physical conditions of the sewers. The data were then used to estimate the sediment levels as a percentage of overall sewer area. The aggregate mean for the entire City was approximately 1.25 percent, with a standard deviation of 2.02 percent; the mean sediment accumulation in the Tallman Island drainage area was 1.00 percent, with a standard deviation of 1.63 percent. Table 2-10 shows the sediment depths for the interceptors in the Alley Creek sewershed.

Figure 2-14. Alley Creek Interceptor Inspection Cleaning Extents

Table 2-10. Alley Creek Interceptor Inspection-Cleaning Map, 2012

Pipe ID	Surveyed Length (ft)	Pipe Diameter (in)	Avg Sed. Depth (in)	Date Cleaning Completed
TI_S_188	176.7	60	3.9	
TI_S_189	186.5	60	4.2	
TI_S_190	138.8	60	2.5	
TI_S_191	136.7	60	4.7	
TI_S_192	141.1	60	1.7	
TI_S_193	138.2	60	3.1	
TI_S_194	140.9	60	4.3	
TI_S_195	19.3	60	10.7	7/11/2012
TI_S_195A	124.2	60	9.1	7/11/2012
TI_S_196	144.4	60	7.7	
TI_S_197	132.1	60	5.7	
TI_S_198	120.7	60	5.2	
TI_S_199	112.8	60	5.9	
TI_S_200	8.5	60	4.9	
TI_S_201	178.1	60	5	
TI_S_202	168.2	60	5.3	
TI_S_203	176.7	60	8.6	
TI_S_204	170.2	60	13	5/19/2012
TI_S_205	189.5	54	6.8	
TI_S_206	186.5	54	5.9	
TI_S_207	190.0	54	4.4	
TI_S_208	198.5	54	8.8	5/18/2012
TI_S_209	182.3	54	2.8	
TI_S_210	185.0	54	4	
TI_S_211	261.0	54	3.2	
TI_S_212	264.2	54	4.4	
TI_S_213	260.6	54	5.3	
TI_S_214	260.1	54	4.4	
TI_S_215	21.1	54	8.7	7/3/2012
TI_S_215A	255.0	54	5.4	
TI_S_216	40.4	54	5.3	
TI_S_216A	25.1	54	6	
TI_S_216B	43.2	54	7.7	
TI_S_217	177.6	54	9.5	5/7/2012
TI_S_217A	11.3	54	5.3	
TI_S_217B	36.4	54	8.2	
TI_S_218	241.0	54	10.3	5/7/2012

2.1.c.6 **Status of Receiving Wastewater Treatment Plants (WWTPs)**

The Alley Creek and Little Neck Bay basin is entirely within the Tallman Island WWTP service area. The Tallman Island WWTP is currently undergoing upgrades for Biological Nutrient Removal (BNR) and improvements that will enable the collection system and treatment facility to delivery, accept, and treat influent at twice the plant's design flow during any storm event.

2.2 Waterbody Characteristics

This section of the report describes the features and attributes of Alley Creek and Little Neck Bay. Characterizing the features of these waterbodies is important for assessing the impact of wet weather inputs and creating approaches and solutions that mitigate the impacts from wet weather discharges.

2.2.a Description of Waterbody

Alley Creek and Little Neck Bay are tidal waterbodies located in eastern Queens and western Nassau County, New York. Alley Creek is tributary to Little Neck Bay, and the Bay is tributary to the East River. Alley Creek and Udalls Cove, an embayment of Little Neck Bay, have major areas of watershed preserved as parkland adjacent to the water. However, water quality in Alley Creek and Little Neck Bay is influenced by CSO and stormwater discharges. The following section describes the present-day physical and water quality characteristics of Alley Creek and Little Neck Bay, along with their existing uses.

2.2.a.1 **Current Waterbody Classification(s) and Water Quality Standards**

New York State Policies and Regulations

In accordance with the provisions of the CWA, the State of New York has established WQS for all navigable waters within its jurisdiction. The State has developed a system of waterbody classifications based on designated uses that includes five saline classifications for marine waters. DEC considers the Class SA and Class SB classifications to fulfill the CWA goals. Class SC supports aquatic life and recreation, but the primary and secondary recreational uses of the waterbody are limited due to other factors. Class I supports the CWA goal of aquatic life protection as well as secondary contact recreation. SD waters shall be suitable only for fish, shellfish and wildlife survival because natural or man-made conditions limit the attainment of higher standards. DEC has classified Alley Creek as Class I, and Little Neck Bay as Class SB.

Numerical criteria corresponding to these waterbody classifications are as shown in Table 2-11 (next page). Dissolved oxygen (DO) is the numerical criterion that DEC uses to establish whether a waterbody supports aquatic life uses. Total and fecal coliform bacteria concentrations are the numerical criteria that DEC uses to establish whether a waterbody supports recreational uses. In addition to numerical criteria, New York State has narrative criteria to protect aesthetics in all waters within its jurisdiction, regardless of classification (see Section 1.2.c.). As indicated in Table 2-11, these narrative criteria apply to all five classes of marine waters. Narrative WQS criteria are presented in Table 2-12.

Table 2-11. New York State Numerical Surface WQS (Saline)

Class	Usage	Dissolved Oxygen (mg/L)	Total Coliform (MPN/100mL)	Fecal Coliform (MPN/100mL)	Enterococci (MPN/100mL)
SA	Shellfishing for market purposes, primary and secondary contact recreation, fishing. Suitable for fish, shellfish and wildlife propagation and survival.	≥ 4.8[1] ≥3.0[2]	≤ 70[3]	N/A	-------
SB	Primary and secondary contact recreation and fishing. Suitable for fish, shellfish and wildlife propagation and survival.	≥4.8[1] ≥3.0[2]	≤ 2,400[4] ≤ 5,000[5]	≤ 200[6]	≤ 35
SC	Limited primary and secondary contact recreation, fishing. Suitable for fish, shellfish and wildlife propagation and survival.	≥4.8[1] ≥3.0[2]	≤ 2,400[4] ≤ 5,000[5]	≤ 200[6]	N/A
I	Secondary contact recreation and fishing. Suitable for fish, shellfish and wildlife propagation and survival.	≥ 4.0	≤ 10,000[6]	≤ 2,000[6]	N/A
SD	Fishing. Suitable for fish, shellfish and wildlife survival. Waters with natural or man-made conditions limiting attainment of higher standards.	≥ 3.0	N/A	N/A	N/A

Chronic criterion based on daily average. The DO concentration may fall below 4.8 mg/L for a limited number of days, as defined by the formula:

It should be noted that the enterococci criterion of 35 MNP/100 mL listed in Table 2-11, although not promulgated by DEC, is now an enforceable standard in New York State as EPA established January 1, 2005, as the date upon which the criteria must be adopted for all coastal recreational waters. Further, DEP interprets that the criterion is applicable to summer seasonal GM.

Table 2-12. New York State Narrative WQS

Parameters	Classes	Standard
Taste-, color-, and odor-producing toxic and other deleterious substances	SA, SB, SC, I, SD A, B, C, D	None in amounts that will adversely affect the taste, color or odor thereof, or impair the waters for their best usages.
Turbidity	SA, SB, SC, I, SD A, B, C, D	No increase that will cause a substantial visible contrast to natural conditions.
Suspended, colloidal and settleable solids	SA, SB, SC, I, SD A, B, C, D	None from sewage, industrial wastes or other wastes that will cause deposition or impair the waters for their best usages.
Oil and floating substances	SA, SB, SC, I, SD A, B, C, D	No residue attributable to sewage, industrial wastes or other wastes, nor visible oil film nor globules of grease.
Garbage, cinders, ashes, oils, sludge and other refuse	SA, SB, SC, I, SD A, B, C, D	None in any amounts.
Phosphorus and nitrogen	SA, SB, SC, I, SD A, B, C, D	None in any amounts that will result in growth of algae, weeds and slimes that will impair the waters for their best usages.

Interstate Environmental Commission (IEC)

The States of New York, New Jersey, and Connecticut are signatory to the Tri-State Compact that designated the Interstate Environmental District and created the IEC. The IEC includes all tidal waters of greater New York City. Alley Creek and Little Neck Bay are interstate waters and are regulated by IEC as Class A waters. Numerical criteria for IEC-regulated waterbodies are shown in Table 2-13, while narrative criteria are shown in Table 2-14.

The IEC also restricts CSO discharges to within 24 hours of a precipitation event, consistent with the DEC definition of a prohibited dry weather discharge. IEC effluent quality regulations do not apply to CSOs if the CSS is being operated with reasonable care, maintenance, and efficiency. Although IEC regulations are intended to be consistent with State WQS, the three-tiered IEC system and the five New York State marine classifications in New York Harbor do not spatially overlap exactly.

Table 2-13. IEC Numeric WQS

Class	Usage	DO (mg/L)	Waterbodies
A	All forms of primary and secondary contact recreation, fish propagation, and shellfish harvesting in designated areas	≥ 5.0	East River, east of the Whitestone Br.; Hudson River north of confluence with the Harlem River; Raritan River. east of the Victory Bridge into Raritan Bay; Sandy Hook Bay; lower New York Bay; Atlantic Ocean
B-1	Fishing and secondary contact recreation, growth and maintenance of fish and other forms of marine life naturally occurring therein, but may not be suitable for fish propagation.	≥ 4.0	Hudson River, south of confluence with Harlem River; upper New York Harbor; East River from the Battery to the Whitestone Bridge; Harlem River; Arthur Kill between Raritan Bay and Outerbridge Crossing.
B-2	Passage of anadromous fish, maintenance of fish life	≥ 3.0	Arthur Kill north of Outerbridge Crossing; Newark Bay; Kill Van Kull

Table 2-14. IEC Narrative Regulations

Classes	Regulation
A, B-1, B-2	All waters of the Interstate Environmental District (whether of Class A, Class B, or any subclass thereof) shall be of such quality and condition that they will be free from floating solids, settleable solids, oil, grease, sludge deposits, color or turbidity to the extent that none of the foregoing shall be noticeable in the water or deposited along the shore or on aquatic substrata in quantities detrimental to the natural biota; nor shall any of the foregoing be present in quantities that would render the waters in question unsuitable for use in accordance with their respective classifications.
A, B-1, B-2	No toxic or deleterious substances shall be present, either alone or in combination with other substances, in such concentrations as to be detrimental to fish or inhibit their natural migration or that will be offensive to humans or which would produce offensive tastes or odors or be unhealthful in biota used for human consumption.
A, B-1, B-2	No sewage or other polluting matters shall be discharged or permitted to flow into, or be placed in, or permitted to fall or move into the waters of the District, except in conformity with these regulations.

EPA Policies and Regulations

For designated bathing beach areas, the EPA criteria require that an enterococci reference level of 104 cfu/100 mL to be used by agencies for announcing bathing advisories or beach closings in response to pollution events. DMA is a private club with a permit to operate a beach by DOHMH. DOHMH uses a 30-day moving GM of 35 cfu/100mL. If the GM exceeds that value, the beach is closed pending additional analysis. An enterococci of 104 cfu/100mL is an advisory upper limit used by DOHMH. If beach enterococci data are greater than 104 cfu/100 mL, a pollution advisory is posted on the DOHMH website. Additional sampling is initiated, and the advisory is removed when water quality is acceptable for primary contact recreation. Advisories are posted at the beach and on the agency web-site. In addition, there is a preemptive standing advisory for DMA Beach for no swimming for 48 hours after a rainfall of 0.2 inches in 2 hours, or a rainfall of 0.4 inches in 24 hours.

For non-designated beach areas of primary contact recreation, which are used infrequently for primary contact, the EPA criteria require that an enterococci reference level of 501cfu/100 mL be considered indicative of pollution events.

Little Neck Bay is classified SB (primary contact recreation use). With the exception of the DMA Beach, Little Neck Bay is used infrequently for primary contact recreation. These reference levels, according to the EPA documents, are not criteria, but are to be used as determined by the State agencies in making decisions related to recreational uses and pollution control needs. For bathing beaches, these reference levels are to be used for announcing beach advisories or beach closings in response to pollution events.

EPA released its Recreational Water Quality Criteria (RWQC) recommendations In December 2012 that are designed to protect human health in coastal and non-coastal waters designed for primary recreation use. These recommendations were based on a comprehensive review of research and science that evaluated the link between illness and fecal contamination in recreational waters. The recommendations are intended as guidance to states, territories, and authorized tribes in developing or updating WQS to protect swimmers from exposure to pathogens found in water with fecal contamination.

The 2012 RWQC offers two sets of numeric concentration thresholds, as listed in Table 2-15, and includes limits for both the GM (30-day) and a statistical threshold value (STV). The STV is a new limit, and is intended to be a value that should not be exceeded by more than 10 percent of the samples taken.

Table 2-15. 2012 RWQC Recommendations

Criteria Elements	Recommendation 1 (estimated illness Rate 36/1,000)		Recommendation 2 (estimated illness Rate 32/1,000)	
Indicator	**GM (cfu/100 mL)**	**STV (cfu/100 mL)**	**GM (cfu/100 mL)**	**STV (cfu/100 mL)**
Enterococci (marine and fresh)	35	130	30	110
E. coli (fresh)	126	410	100	320

While DEC is planning to adopt the RWQC by 2015, it is not known at this time how these recommendations will be used to update water quality criteria.

2.2.a.2 **Physical Waterbody Characteristics**

Alley Creek and Little Neck Bay are located in the northeastern corner of Queens, near the Nassau County border. Alley Creek opens into the southeast end of Little Neck Bay. Little Neck Bay opens to the East River, between Willets Point and Elm Point, near the western portion of the Long Island Sound. Udalls Cove, an embayment on the eastern shore of Little Neck Bay, spans the Queens/Nassau County border, between Douglas Manor and Great Neck Estates.

Alley Creek is located at the southern end of Little Neck Bay, and is contained within Alley Pond Park. The tidal tributary runs northward and its mouth opens to Little Neck Bay. The 624-acre park contains forests, several ponds, facilities for active landside recreation, salt marshes and wetlands, and the creek itself. The creek constitutes one of the few remaining undisturbed marsh systems in the City. The head of Alley Creek is near the intersection of the Cross Island Parkway and the Long Island Expressway. Freshwater flows to Alley Creek include stormwater and CSO discharge. Alley Creek water quality is also influenced by the saline water of Little Neck Bay.

Little Neck Bay comprises an area of approximately 1,515 acres. This open water fish and wildlife habitat extends to Fort Totten in the west, and the village of Elm Point, Nassau County in the east. The bay is bordered by residential development, Fort Totten and the Cross Island Parkway. According to the New York City Comprehensive Waterfront Plan entitled “Plan for the Queens Waterfront” issued by the DCP, Little Neck Bay is one of the major waterfowl wintering areas on Long Island’s north shore. In addition to waterfowl use, Little Neck Bay is a productive area for marine fish and shellfish. As a result of the abundant fisheries in the bay and its proximity to the metropolitan New York area, Little Neck Bay is a regionally important recreational fishing resource.

Udalls Cove is located in the northeastern corner of Queens and extends into Nassau County. The New York City portion comprises an area of approximately 52 acres, from Little Neck Bay to the vicinity of Northern Boulevard. Most of Udalls Cove is mapped as parkland and managed by DPR as the Udalls Cove Preserve.

Little Neck Bay, Alley Creek, and Udalls Cove are located within the Coastal Zone Boundary and within a Special Natural Waterfront Boundary as designated by the DCP. All three waterbodies are also located within Significant Coastal Fish and Wildlife Habitats, as designated by the New York State Department of State (DOS).

Shoreline Physical Characterization

Alley Creek is predominantly characterized by natural, vegetated shorelines, except for the footings of the bridges for the Long Island Railroad and Northern Boulevard. The Creek is contained within Alley Pond Park, except for the eastern shore north of the Long Island Railroad. Little Neck Bay is generally characterized by altered shorelines, mainly rip-rap, with some bulkhead from Bay Street to Shore Road and from Westmorland Drive to Bayview Avenue in Douglaston. Based on field observations, vegetation exists on the waterside of some of the altered areas of Parsons Beach and Douglaston. Natural, sandy and natural, vegetated areas exist along the shores of Little Neck Bay in the inlet on the southeastern portion of Fort Totten, near the mouth of Alley Creek, along the Parsons Beach and Douglaston shore, and in Udalls Cove. Most of the natural shoreline areas are within parkland. Small piers also exist along the shores, mainly along the Douglaston Peninsula.

Figures 2-15, 2-16 and 2-17 show shoreline typical for the regions of the study area. Figure 2-15 shows the rip-rap that typically fortifies much of the western shoreline of Little Neck Bay. Figure 2-16 shows the varied types of bulkheading, rip-rap and natural shoreline found along the eastern shoreline of Little Neck Bay. Figure 2-17 shows the natural shorelines typical around the southern end of Little Neck Bay and Alley Creek.

The shorelines of Udalls Cove, an embayment of Little Neck Bay, consist primarily of natural, vegetated areas. Intact, concrete bulkhead areas exist from Bayview Drive to the mouth of the cove. Along Virginia Point near the Nassau County border, dilapidated timber bulkheads exist among the wetland vegetation. Much of the shoreline along the western edge of the cove borders residential areas or the esplanade park that runs between Marinette Street and the water. These areas are natural in the sense that they lack riprap or bulkheading, although many of these areas are maintained by landscapers, and may have been modified during road and property development.

In Udalls Cove, from the Long Island Railroad in the south to north of Sandhill Road, Gablers Creek runs through the wetlands of Aurora Pond and the cove. The Gablers Creek in this area is contained within a cobble-lined ditch. Physical shoreline conditions and shoreline habitat are as shown in Figure 2-18.

Shoreline Slope

Shoreline slope has been qualitatively characterized along shoreline banks where applicable, and where the banks are not channelized or otherwise developed with regard to physical condition. Steep is defined as greater than 20 degrees, or 80-foot vertical rise for each 200-foot horizontal distance perpendicular to the shoreline. Intermediate is defined as 5 to 20 degrees. Gentle is defined as less than 5 degrees, or 18-foot vertical rise for each 200-foot horizontal distance. In general, the three classification parameters describe the shoreline slope well for the purposes of the LTCP project.

Gentle and intermediate slopes characterize the shorelines of Little Neck Bay, Alley Creek and Udalls Cove. The slope of the eastern shoreline of Little Neck Bay is generally characterized as intermediate. The slope of the western shoreline is generally characterized as gentle, with an area of intermediate shoreline located along Fort Totten. The slopes of both shorelines of Alley Creek are characterized as gentle. The slope of the eastern shoreline of Udalls Cove is characterized as gentle. The slope of the western shore is characterized as predominantly gentle, with one area of intermediate slope. The area of intermediate slope extends along the shoreline from Beverly Road to the mouth of the cove. Shoreline slopes are as shown in Figure 2-19.

Figure 2-15. Western Shoreline of Little Neck Bay Near 27th Ave. (Looking West)

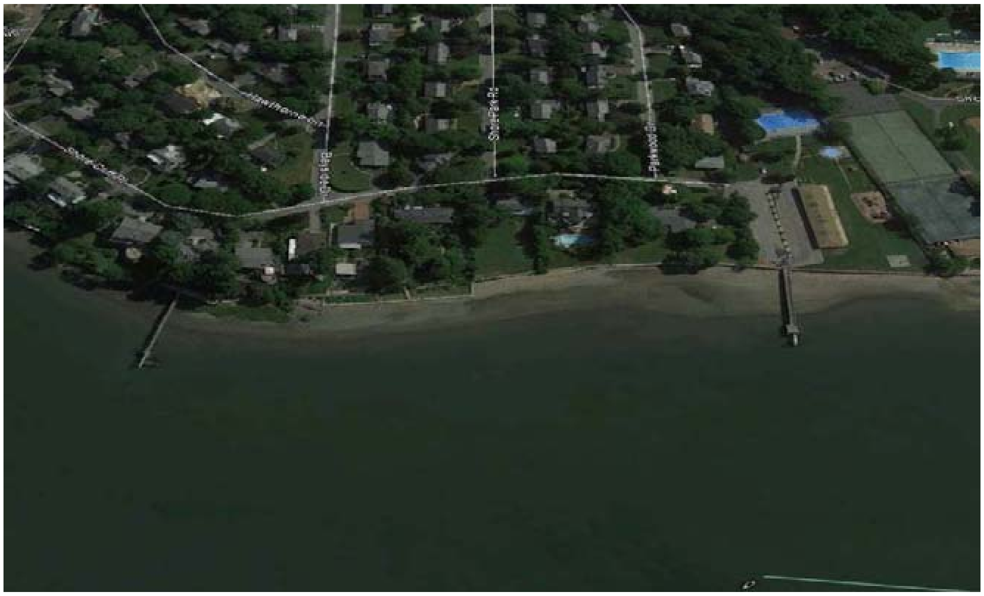


Figure 2-16. Eastern Shoreline of Little Neck Bay Near Shorecliff Place (Looking West)

Figure 2-17. Shoreline of Alley Creek (Looking North)

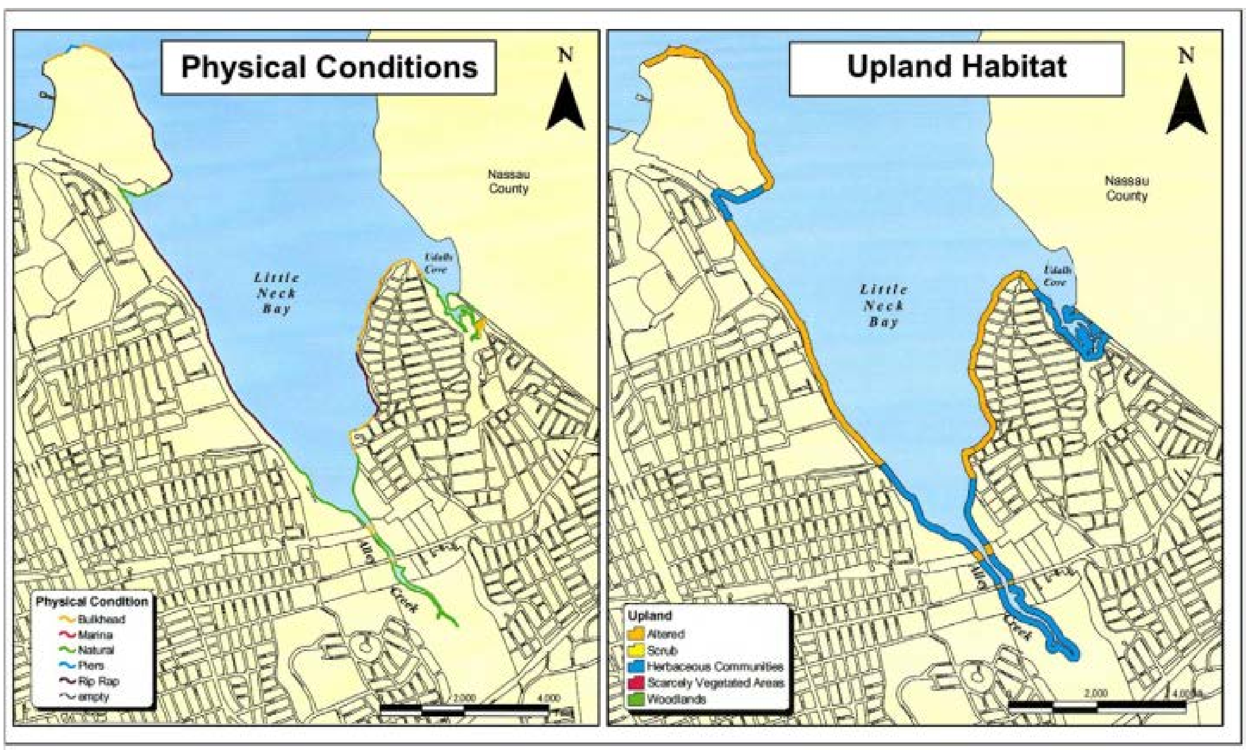


Figure 2-18. Shoreline Physical Conditions and Upland Habitat

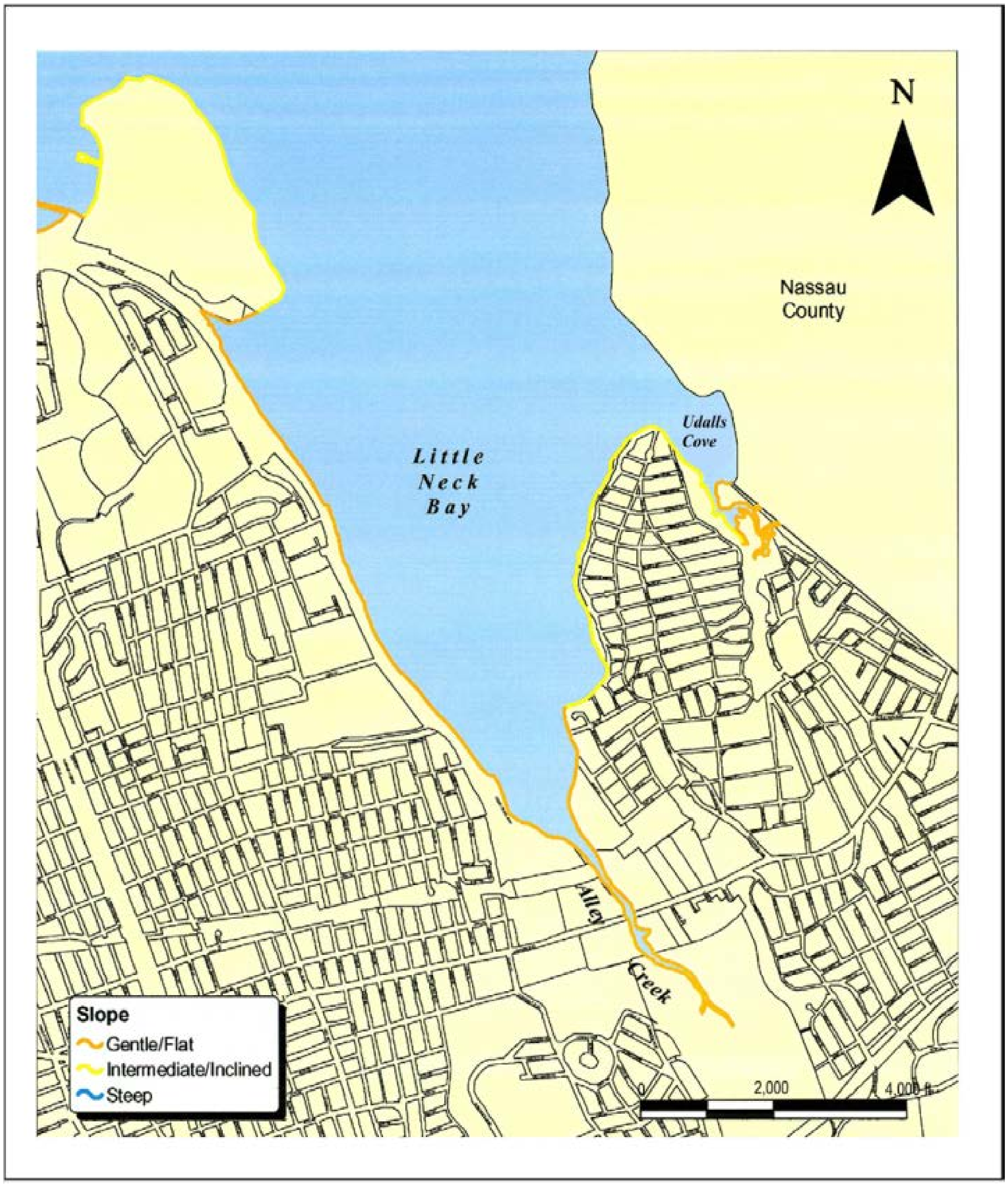


Figure 2-19. Alley Creek Existing Shoreline Slope

Waterbody Sediment Surficial Geology/Substrata

The waterbody bottom of Little Neck Bay is generally characterized as sand. The waterbody bottom of Alley Creek is generally characterized as mud/silt/clay. These classifications have been assigned based on the following two sediment sampling programs, which analyzed sediment grain size: grab samples taken at one HydroQual, Inc. sampling station in 2001; and grab samples taken at three HydroQual sampling stations in 2002. Both sampling programs were conducted as part of a Use and Standards

Attainment Study (USA) performed for DEP. For the purpose of defining surficial geology/substrata, those areas where bottom samples were more than 50 percent mud/silt/clay were designated as mud/silt/clay; those areas where bottom samples were more than 50 percent sand were designated as sand. Based on one Little Neck Bay grab sample taken by USA (2001), bottom mud/silt/clay composition was approximately 16.5 percent, while sand composition was 83.5 percent.

USA sediment sampling (July 2002) consisted of one grab collected at one station in Little Neck Bay and two in Alley Creek. For the sample obtained in Little Neck Bay, bottom mud/silt/clay composition was approximately 37.40 percent, and sand composition was approximately 62.6 percent. For the two samples obtained in Alley Creek, bottom mud/silt/clay composition ranged from approximately 61.38 to 85.15 percent, while sand composition ranged from approximately 14.85 to 38.62 percent.

Waterbody Type

Little Neck Bay and the mouth of Udalls Cove are classified as embayments. Alley Creek and the portion of Udalls Cover south of Knollwood Avenue are classified as tidal tributaries. Freshwater sources to Udalls Cove include Gablers Creek, the Belgrave WWTP discharge, and discharge from the freshwater wetlands located near the cove. Similarly, Alley Creek receives freshwater from stormwater and CSO discharge, from groundwater inflows, and from the freshwater wetlands located near the Creek. All of the waters in the Alley Creek and Little Neck Bay waterbody assessment area are tidal and saline.

Tidal/Estuarine Systems Biological Systems

Tidal/Estuarine Wetlands

Tidal/Estuarine generalized wetlands in the Alley Creek and Little Neck Bay watershed are shown in Figure 2-20 and are described in this section. According to the DEC tidal wetlands maps, there are numerous designated wetlands mapped throughout the study area. The western and eastern shorelines of Little Neck Bay support many areas of inter-tidal marshes from Willets Point to the mouth of Alley Creek, with an area of coastal shoals, bars and mudflats mapped to the south and southwest of Fort Totten. Extensive wetlands have been mapped by the DEC on both shores of Little Neck Bay south of Parsons Beach and Crocheron Park and throughout Alley Creek. These extensive wetlands tend to be mapped with high marsh or salt meadow wetlands inland of inter-tidal marsh wetlands, and in some areas, most notably north of the Long Island Railroad and surrounding the mouth of Alley Creek, the wetland areas are mapped on the order of 1,000 feet wide. Formerly connected wetlands are also mapped immediately south of the Long Island Railroad, inland from Alley Creek.

Udalls Cove, an embayment of Little Neck Bay, also supports extensive wetlands, generally with inter-tidal marsh wetlands and high marsh or salt meadow wetlands mapped inland of coastal shoals, bars and mudflats. The open waters of Little Neck Bay are generally mapped as littoral zone. The DEC maps designate three discontinuous inter-tidal wetland areas along the western bank of Little Neck Bay and Alley Creek, from roughly 1,500 feet southeast of Willets Point, along the east and south shorelines of Fort Totten, and south to 23rd Street. Three other areas of discontinuous inter-tidal marsh wetlands are mapped from 28th Road to Crocheron Park. A continuous inter-tidal wetland area is mapped from 35th Avenue to the Long Island Railroad. South of the Long Island Railroad, inter-tidal marshes are mapped roughly from 440 to 520 feet and 880 to 1,500 feet south of Northern Boulevard and 1,860 feet south of Northern Boulevard to the head of Alley Creek. High marsh or salt meadow wetlands are mapped from 37th Avenue to the Long Island Railroad, and from roughly 120 to 1,520 feet south of Northern Boulevard.

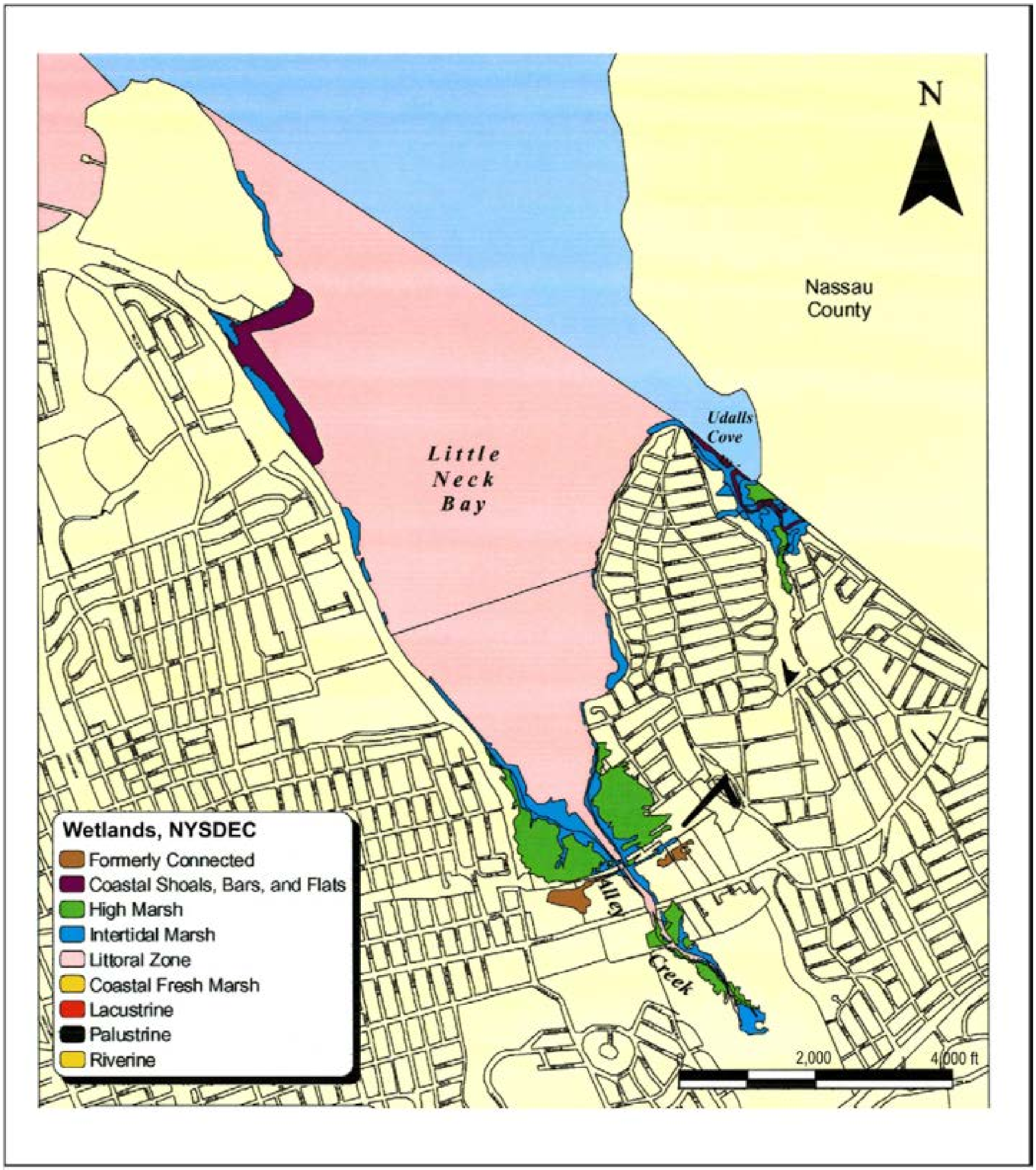


Figure 2-20. DEC Existing Mapped Wetlands. Source: WWFP, June 2009

The DEC maps also show inter-tidal marsh wetlands along the eastern shorelines of Little Neck Bay and Alley Creek. Two areas of inter-tidal marsh wetlands are mapped from the pier at Beverly Road to Manor Road. Other areas of inter-tidal marsh wetlands exist from Arleigh Road to 233rd Street, from Regatta Place to Bay Street, and from just south of Bay Street, to the Long Island Railroad. The DEC maps show inter-tidal marsh wetlands stretching along the eastern shore of Alley Creek, from the Long Island Railroad to Northern Boulevard. South of Northern Boulevard, the inter-tidal marsh wetlands are not contiguous and are interspersed along the eastern shoreline, from Northern Boulevard to the mouth of Alley Creek, from roughly 100 to 280 feet south of Northern Boulevard, from 360 to 1,380 feet south of Northern Boulevard, and from approximately 1,660 feet south of the boulevard to the head of the Creek. High marsh or salt meadow wetlands are also mapped as interspersed along the eastern shoreline of Little Neck Bay and Alley Creek, from Little Neck Road to the Long Island Railroad, adjacent to the south edge of the Long Island Railroad, from 100 to 720 feet south of Northern Boulevard, from approximately 780 to 800 feet south of Northern Boulevard, and from approximately 1,380 to 1,680 feet south of the boulevard.

Thin extensions of inter-tidal marsh wetlands, from about 20 to 60 feet wide, extend inland from both shorelines of Alley Creek, along the southern edge of the Long Island Railroad, parallel to the train tracks. To the east of Alley Creek, these inter-tidal marsh wetlands extend roughly 840 feet inland along the train tracks, and two areas of formerly connected wetlands are mapped to the south of these inter-tidal wetlands, approximately 300 and 560 feet inland of the Creek. To the west of Alley Creek, the inter-tidal wetlands extend inland approximately 240 feet along the railroad tracks, with a small break between them, and an area of formerly connected wetlands that extends inland for approximately another 1,000 feet.

In the New York City portion of Udalls Cove, the DEC has mapped inter-tidal marsh wetlands from the mouth to approximately 2,500 feet south of the mouth, along both east and west shorelines. High marsh or salt meadow wetland areas are mapped in the study area, from approximately 2,000 feet to 3,000 feet southeast of the mouth of the cove, along the western shoreline of the cove. Coastal shoals, bars and mudflats are mapped throughout the mouth, and along the open water portions of Udalls Cove within the study area. The wetlands of Udalls Cove extend up to 1,600 feet from the western shoreline in New York City to the eastern shoreline in Nassau County.

The United States Fish and Wildlife Service National Wetlands Inventory (NWI) maps show extensive wetlands throughout the Little Neck Bay, Alley Creek, and Udalls Cove study area. The NWI mapped wetlands are shown in Figure 2-21, and Table 2-16 summarizes the classification used. In the inlet between Forth Totten and Bay Terrace, three adjacent wetland areas – estuarine, inter-tidal, flat, regular (E2FLN); estuarine, inter-tidal, emergent persistent, irregular (E2EM1P); and palustrine, emergent, persistent, semi-permanent (PEM1F) – are mapped in series, stretching to the northwest from the mouth of the inlet on Little Neck Bay. Along the western shoreline of Little Neck Bay, there are two areas of estuarine, inter-tidal, beach/bar, regular (E2BBN) wetlands between 17th and 29th Avenues. Along the eastern shoreline of Little Neck Bay, the NWI has mapped E2BBN wetlands at 33rd Street, and estuarine, inter-tidal, emergent, narrow-leaved persistent, regular (E2EM5N) wetlands along Parsons Beach. South of Crocheron Park, on the western shoreline of Little Neck Bay and Alley Creek, and south of Parsons Beach, on the eastern shoreline of the bay and creek, the NWI has mapped multiple wetland areas along both shorelines that span the waterbodies.

Listed from north to south, these wetland areas include E2EM5N, estuarine, inter-tidal, emergent, narrow-leaved persistent, irregular (E2EM5P); E2EM1P; and another area of E2EM5P; stretching from southern Little Neck Bay to the head of Alley Creek. An area of estuarine, sub-tidal, open water/unknown bottom, sub-tidal (E1OWL) wetland is mapped inland, to the west of Alley Creek, northwest of the Cross Island Expressway cloverleaf, and south of the Long Island Railroad. The open waters of Alley Creek are mapped estuarine, inter-tidal, streambed, irregularly exposed (E2SBM) wetlands.

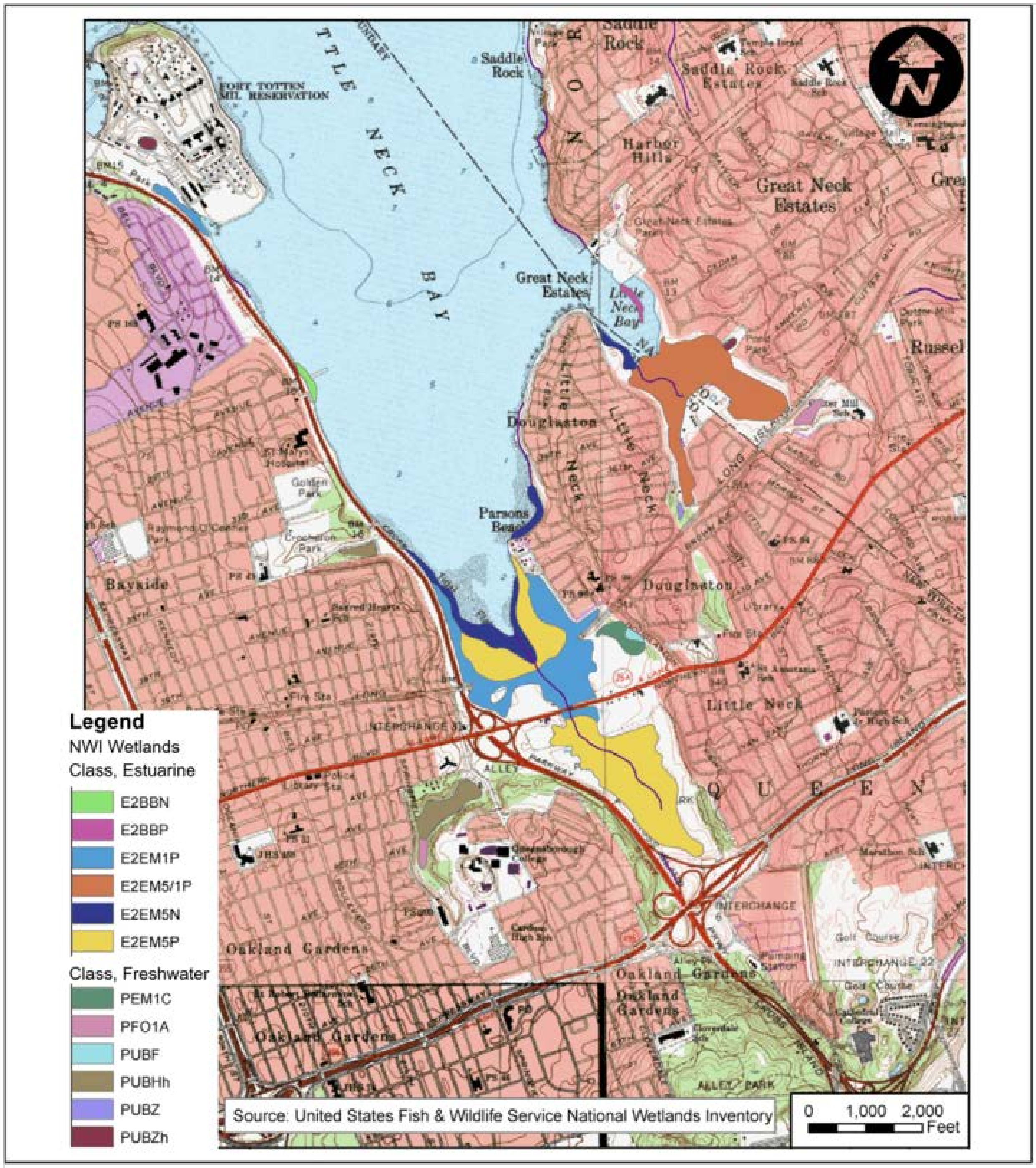


Figure 2-21. National Wetlands Inventory (NWI) Source: WWFP, June 2009

Table 2-16. NWI Classification Codes

NWI Classification	Description
E1OWL	Estuarine, sub-tidal, open water/unknown bottom, sub-tidal
E2BBN	Estuarine, inter-tidal, beach-bar, regular
E2BBP	Estuarine, inter-tidal, beach-bar, irregular
E2EM1P	Estuarine, inter-tidal, emergent-persistent, irregular
E2EM5/1P	Estuarine, inter-tidal, emergent, narrow-leaved persistent/persistent, irregular
E2EM5N	Estuarine, inter-tidal, emergent, narrow-leaved, persistent, regular
E2EM5P	Estuarine, inter-tidal, emergent, narrow-leaved, persistent, irregular
E2FLN	Estuarine, inter-tidal, flat, regular
E2SBM	Estuarine, inter-tidal, streambed, irregularly exposed
PEM1C	Palustrine, emergent, persistent, seasonal
PEM1F	Palustrine, emergent, persistent, semi-permanent
PFO1A	Palustrine, forested, broad-leaved deciduous, temporarily flooded
POWF	Palustrine, open water/unknown bottom, intermittently exposed/permanent
POWZ	Palustrine, open water/unknown bottom, intermittently exposed/permanent
PUBF	Palustrine, unconsolidated bottom, semi-permanent
PUBHh	Palustrine, unconsolidated bottom, permanent, diked/impounded
PUBZ	Palustrine, unconsolidated bottom, intermittently exposed/permanent
PUBZh	Palustrine, unconsolidated bottom, intermittently exposed/permanent, diked/impounded

The NWI mapped multiple wetlands along the shorelines of Udalls Cove. The open waters of the cove are mapped as E10WL. Within the New York City study area of Udalls Cove, the western shoreline north of 28th Avenue is mapped as E2EM5N. South of 28th Avenue, both shorelines of Udalls Cove within the study area are mapped as estuarine, inter-tidal, emergent, narrow-leaved persistent/persistent, irregular (E2EM5/1P) wetlands. The NWI has mapped the waters as E2SBM where the cove's open waters narrow into a tidal river.

Aquatic and Terrestrial Communities

The DCP Plan for the Queens Waterfront (DCP, 1993) reports a diverse range of species supported by the habitat in the Alley Creek and Little Neck Bay area. Little Neck Bay is a productive area for marine finfish and shellfish. The Bay serves as an important nursery and feeding area for striped bass and numerous other species. A variety of finfish species can be found in the tidal shallows and Alley Creek. Although its waters are not certified for commercial shellfishing, Little Neck Bay is a hard clam producing area. Alley Pond Park and Udalls Cove contain abundant shellfish and crustaceans. The habitats also serve as breeding areas for several species of birds, as a spring and fall stopover for several migratory species, and as avian wintering areas for several species. Shorebirds and wading birds use the Udalls Cove area extensively. The area also supports numerous terrestrial and amphibious wildlife species. A more detailed summary of the aquatic and terrestrial communities can be found in the June 2009 Alley Creek and Little Neck Bay WWFP.

Freshwater Systems Biological Systems

The generalized freshwater wetlands areas shown in Figure 2-20 are described in more detail in this section. The DEC Freshwater Wetlands Maps show seven areas of fresh water wetlands in the study area. The areas are mapped in the inlet between Fort Totten and Bay Terrace, extending along the Cross Island Parkway southeast of Totten Avenue; on the west shoreline of Alley Creek, extending south along the Cross Island Parkway from the cloverleaf at Northern Boulevard to the Creek, roughly 800 feet south of Northern Boulevard; inland from the eastern shoreline of Alley Creek, extending along the southern edge of the Long Island Railroad and the western edge of the Douglaston Parkway; in two discontinuous areas along both shorelines of Alley Creek, from roughly 600 feet south of Northern Boulevard to the head of thecreek; and in Udalls Cove, from Hollywood Avenue to Sandhill Road, and between Sandhill Road and the Long Island Railroad.

The NWI maps show three areas of freshwater (palustrine) wetlands in the Little Neck Bay, Alley Creek, and Udalls Cove study area, as indicated in Figure 2-21. In the inlet between Fort Totten and Bay Terrace, a palustrine, emergent, persistent, semi-permanent (PEM1F) wetland is mapped at the northeast edge of tidal wetlands, as described above. An area of palustrine, emergent, persistent, seasonal (PEM1C) is mapped inland of the eastern shore of Alley Creek adjacent, to the southern edge of the Long Island Railroad, with an area of palustrine, open water/unknown bottom, intermittently exposed/permanent (POWF) wetlands adjacent to the PEM1C wetlands. In addition, an area of palustrine, open water/unknown bottom, intermittently exposed/permanent (POWZ) is mapped to the west of Udalls Cove, between Sandhill Road and the Long Island Railroad.

2.2.a.3 **Current Public Access and Uses**

Alley Creek, its shoreline, areas immediately adjacent to the water, and much of the surrounding drainage area of the creek are within Alley Pond Park. Access to Alley Creek is provided for by the park but no facilities for primary contact recreation are available. The park does not provide any regular secondary contact recreation opportunities; however, the Urban Park Rangers do run structured programs. One such program, “Alley Pond Adventure”, is an overnight summer camping program that includes supervised canoeing (secondary contact recreation use) and fishing.

The major use of Alley Creek is passive, non-contact recreation. There are hiking trails that offer views of the water. Another significant, passive use of Alley Creek is for environmental education associated with wetlands habitat. The Alley Pond Environmental Center, located near the mouth of Alley Creek offers an extensive naturalist program with outreach to schools throughout the City.

Swimming (primary contact recreation use) is an existing use in Little Neck Bay at the privately owned bathing beach located on the eastern shore of the bay at Douglas Manor. As seen in Figure 2-9, the DMA Beach is located approximately 0.7 miles north of the mouth of Alley Creek, and approximately one mile downstream from the principal CSO outfall on Alley Creek, TI-025. DOHMH beach monitoring is conducted weekly during the bathing season from May through September. In addition to the supervised bathing at the DMA Beach, bathing has been reported to occur from the boating docks along this shoreline, but this is not a sanctioned use.

On the western side of Little Neck Bay, access to the water is limited by the Cross Island Parkway, which runs parallel to the shoreline. There is no swimming noted along this shoreline. Access to the Bay for boating (secondary contact recreation use) is provided at the public marina in Bayside, operated under a concession from the DPR. This facility is open seasonally between May 1 and October 31, and has accommodation for 150 boats. Fort Totten, located at the northeast point of Little Neck Bay, is also operated by DPR, and provides public access for canoeing and kayaking. In addition, fishing is allowed from the docks for special events.

Passive recreation is a major use of Little Neck Bay. There is also a hiking/bicycle path that runs between the shoreline of Little Neck Bay and the Cross Island Parkway, providing viewing of the Bay, and fishing takes place along this pathway. Another wetland area used for environmental education is Aurora Pond, adjacent to Udalls Cove, an eastern tributary to the Little Neck Bay. Environmental education, hiking, biking, and promenades are passive waterbody uses that do not involve either primary or secondary contact with the water. Fishing in Little Neck Bay may include limited contact with the water.

These locations are further discussed in Section 8.6.

2.2.a.4 **Identification of Sensitive Areas**

Federal CSO Policy requires that the LTCP give the highest priority to controlling overflows to sensitive areas. The policy defines sensitive areas as:

- Waters designated as Outstanding National Resource Waters (ONRW);
- National Marine Sanctuaries;
- Public drinking water intakes;
- Waters designated as protected areas for public water supply intakes;
- Shellfish beds;
- Water with primary contact recreation;
- Waters with threatened or endangered species and their habitat; and
- Additional areas determined by the Permitting Authority (i.e., DEC).

General Assessment of Sensitive Areas

An analysis of the waters of the Alley Creek and Little Neck Bay with respect to the CSO Policy was conducted and is summarized in Table 2-17.

Table 2-17. Sensitive Areas Assessment

CSO Discharge Receiving Water Segments	Current Uses Classification of Waters Receiving CSO Discharges Compared to Sensitive Areas Classifications or Designations[1]						
	Outstanding National Resource Water (ONRW)	National Marine Sanctuaries [2]	Threatened or Endangered Species and their Habitat [3]	Primary Contact Recreation	Public Water Supply Intake	Public Water Supply Protected Area	Shellfish Bed
Alley Creek	None	None	Yes	No[4]	None[5]	None[5]	None
Little Neck Bay	None	None	No	Yes	None[5]	None[5]	None

(1) Classifications or Designations per CSO Policy.
(2) As shown at http://www.sactuaries.noaa.gov/oms/omsmaplarge.html.
(3) DOS Significant Coastal Fish and Wildlife Habitats website (http://nyswaterfronts.com/water-front_natural_narratives.asp).
(4) Existing uses include secondary contact recreation and fishing, Class I.
(5) These waterbodies contain salt water.

This analysis identified two issues of potential concern:

- *Threatened or endangered species at Alley Creek.* The Coastal Fish and Wildlife habitat rating form indicates that the Northern harrier, a threatened (T) bird species, winters in Alley Pond Park.
- *Primary contact recreation in Little Neck Bay.* The DMA Beach, a private beach, is located on the western shore of the Douglaston Peninsula.

The Northern harrier (T) is a raptor whose diet consists strictly of land mammals (mice, voles and insects), and its presence is due to the relatively large protected wetlands in Alley Pond Park, however, and not the waters or aquatic life of Alley Creek. The presence of the Northern harrier therefore does not define Alley Creek as a sensitive area for threatened species, according to EPA CSO Policy. There are no threatened or endangered species present in Udalls Cove or Little Neck Bay.

Findings for Sensitive Areas

One sensitive area is located within Little Neck Bay – the DMA Beach (Figure 2-10), as defined by the EPA CSO Control Policy. Accordingly, the LTCP addresses the policy requirements, which include: (a) prohibit new or significantly increased overflows; (b) eliminate or relocate overflows that discharge to sensitive areas if physically possible, economically achievable, and as protective as additional treatment, or provide a level of treatment for remaining overflows adequate to meet standards; and (c) provide reassessments in each permit term based on changes in technology, economics, or other circumstances for those locations not eliminated or relocated (EPA, 1995a).

2.2.a.5 **Tidal Flow and Background Harbor Conditions and Water Quality**

DEP has been collecting New York Harbor water quality data since 1909. These data are utilized by regulators, scientists, educators, and citizens to assess impacts, trends, and improvements in the water quality of New York Harbor.

The Harbor Survey Monitoring Program (HSM) has been the responsibility of DEP's Marine Sciences Section (MSS) for the past 27 years. These initial surveys were performed in response to public complaints about quality of life near polluted waterways. The initial effort has grown into a survey that consists of 72 stations distributed throughout the open waters of the harbor and smaller tributaries within the City. The number of water quality parameters measured has also increased from five in 1909, to over 20 at present.

Harbor water quality has improved dramatically since the initial surveys. Infrastructure improvements and the capture and treatment of virtually all dry-weather sewage are the primary reasons for this improvement. During the last decade, water quality in NY Harbor has improved to the point that the waters are now utilized for recreation and commerce throughout the year. Still, impaired areas remain within the Harbor. The LTCP process has begun to focus on those areas within the Harbor that remain impacted; it will examine 10 waterbodies and their drainage basins, and develop a comprehensive plan for each waterbody.

The HSM program focuses on fecal coliform bacteria, DO, chlorophyll 'a,' and Secchi transparency as the water quality parameters of concern. Data are presented in four sections, each delineating a geographic region within the Harbor. Alley Creek and Little Neck Bay are located within the Upper East River – Western Long Island Sound (UER-WLIS) section. This area contains nine open water monitoring stations and five tributary sites. Figure 2-22 shows the location of Stations E11, LN1, and AC1 of the HSM program.

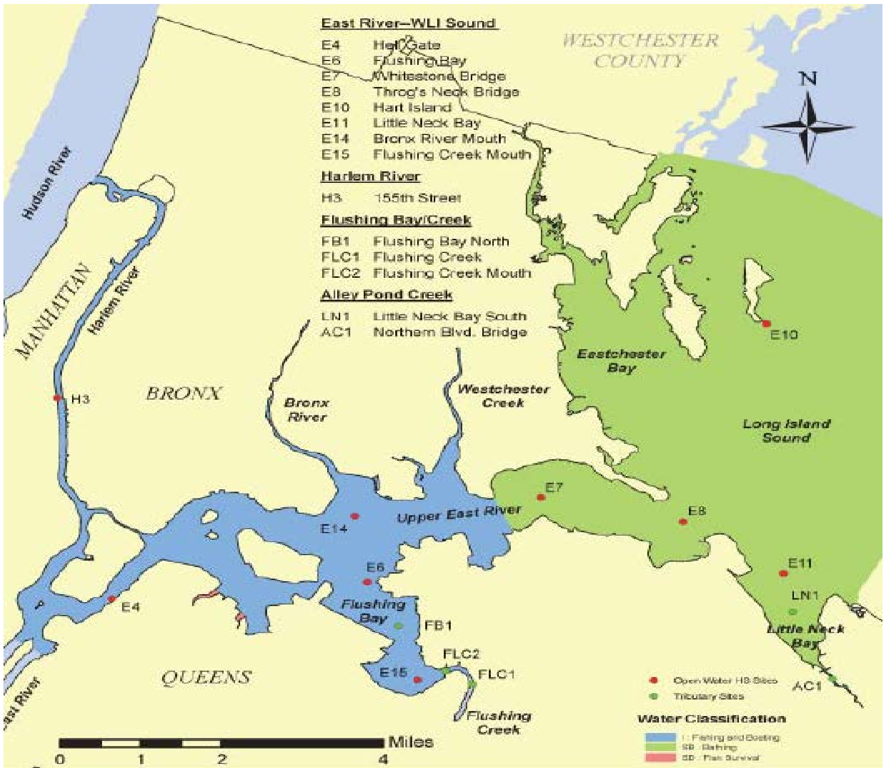


Figure 2-22. Harbor Survey UER-WLIS Region

Fecal coliform and enterococci are indicators of human waste and pathogenic bacteria. According to 2009 data, the UER-WLIS saw a rise in summer GM from 36 cells/100 mL to 43 cells/100 mL. However, fecal coliform and enterococcus concentrations continued to be in attainment with their respective classification standards for Stations E11, LN1, and AC1. Fecal coliform and enterococci levels have remained below the compliance criteria, due to a reduction in CSOs and upgrades to the WWTP.

Dissolved oxygen is the oxygen in a waterbody available for aquatic life forms. Average dissolved oxygen levels have exceeded the compliance requirement of 5.0 mg/L. In 2010, the average surface DO was measured at 5.6 mg/L, while the average bottom DO was measured at 5.2 mg/L. During summer months, all surface waters obtained their classification requirement, but bottom waters met their classification for only five out of eight sites. The "DO never-less-than" percentage for surface and bottom waters increased to 77 percent and 72 percent, respectively, in 2010, and from 74 percent and 66 percent in 2009. Hypoxia is another water quality condition associated with DO, and occurs when DO levels fall below 3.0 mg/L. Stations for Alley Creek and Little Neck Bay did not have any such incidents.

Chlorophyll 'a' is the green pigment in algae and plankton. The amount of chlorophyll 'a' is a gauge of primary productivity, which is used to measure ecosystem quality. A concentration of 20 µg/L or above is considered eutrophic. In a state of eutrophication, phytoplankton reproduction rates greatly increase, causing a depletion of DO. The average chlorophyll "a" reading for UER-WLIS was 9.5 µg/L in 2010. The general trend has remained close to 10 µg/L since chlorophyll 'a' level collection started in 1986. Little Neck Bay reported an average of over 20 µg/L. This is a common condition for confined bodies of water.

Secchi transparency is a measure of the clarity of surface waters. Clarity is measured as a depth when the Secchi disk blends in with the water. Clarity is most affected by the concentrations of suspended solids and plankton. Lack of clarity limits sunlight, which inhibits the nutrient cycle. The average summer

Secchi depth for UER-WLIS was 4.0 feet. No stations in Alley Creek and Little Neck Bay reported a low transparency (under 3.0 feet).

2.2.a.6 **Compilation and Analysis of Existing Water Quality Data**

More recent data collected within Alley Creek and Little Neck Bay are available from sampling conducted by DEP Harbor Survey between 2009 and 2012, and from sampling collected in late 2012 during the development of the LTCP. Figure 2-23 shows the GM of the data set over the period of record, along with data ranges (minimum to maximum and 25th percentile to 75th percentile). For reference purposes, the figure also shows the 30-day GM water quality criterion for enterococci and the 30-calendar day GM water quality criterion for fecal coliform.

Figure 2-24 (enterococci) and Figure 2-25 (fecal coliform) present bacteria data collected at locations AC1, LN1 and E11, in Alley Creek and Little Neck Bay, respectively, and at the DMA Beach. These data represent the period of January 2009 through April 2011, prior to when the Alley Creek CSO Retention Tank came on-line. Also shown on this figure are data from May 2011 through the end of 2012, the period for which the Retention Tank was online. These data indicate that the pathogen concentrations within Alley Creek are elevated with the data period GMs for enterococci at approximately 500 cfu/100mL and for fecal coliform bacteria near 2,000 cfu/100mL. The 75th percentile excursions above these values reach nearly 2,000 cfu/100mL for enterococci and exceed 5,000 cfu/100mL for fecal coliform bacteria. Figure 2-24 (enterococci) and Figure 2-25 (fecal coliform) present bacteria data collected at locations AC1, LN1 and E11, in Alley Creek and Little Neck Bay, respectively, and at the DMA Beach. These data represent the period of January 2009 through April 2011, prior to when the Alley Creek CSO Retention Tank came on-line. Also shown on this figure are data from May 2011 through the end of 2012, the period for which the Retention Tank was online. These data indicate that the pathogen concentrations within Alley Creek are elevated with the data period GMs for enterococci at approximately 500 cfu/100mL and for fecal coliform bacteria near 2,000 cfu/100mL. The 75th percentile excursions above these values reach nearly 2,000 cfu/100mL for enterococci and exceed 5,000 cfu/100mL for fecal coliform bacteria. While it is apparent that the GMs increased slightly from pre- to post-tank conditions, this is primarily due to the extreme amount of rainfall in 2011. All indications are that future sampling will show improvement in GMs for the post-tank conditions.

Pathogen levels within Little Neck Bay are significantly lower, where period GM concentrations are less than 10 cfu/100mL for enterococci and are between 10 and 100cfu/100mL for fecal coliform. Locally, at DMA Beach, enterococci concentrations, as measured by the DOHMH, have a period GM that is very close to the maximum 30-day GM criterion of 35 cfu/100mL. DMA Beach use is regulated by the DOHMH, who samples the beach routinely between late April and mid-September, in an effort to control when it can be used within the bathing season (approx. Memorial Day to Labor Day). Between 2009 and the end of 2012, the water quality was measured to be in attainment with the maximum 30-day GM enterococci criterion, from a low of 5 percent of the time in 2011, to a high of 67 percent of the time in 2012, as shown in Figure 2-24.

These sampling locations are depicted in Figure 2-26.

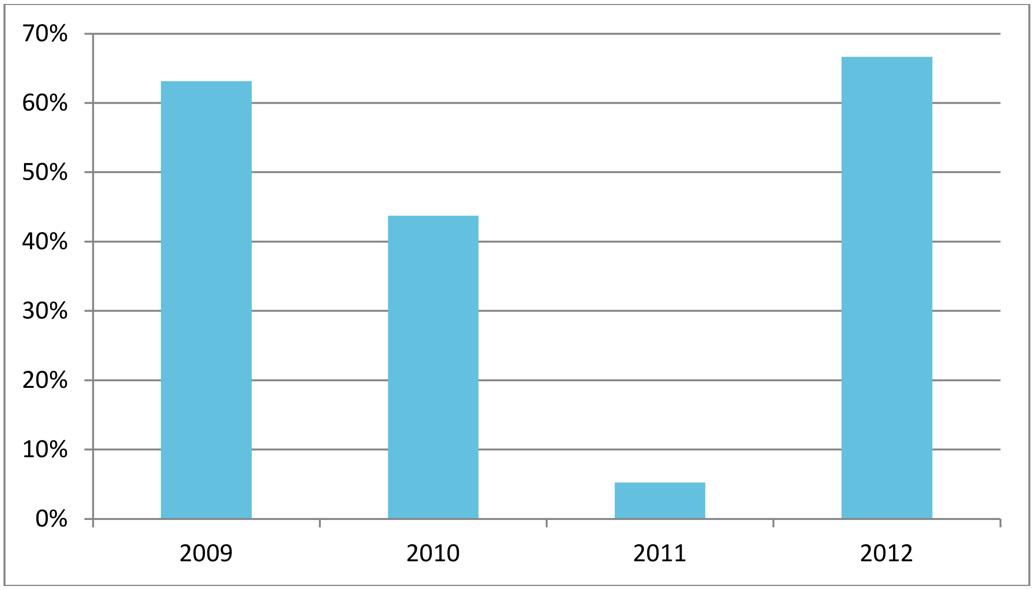


Figure 2-23. Percent of Enterococci Samples with 30-day GM<35 cfu/100mL

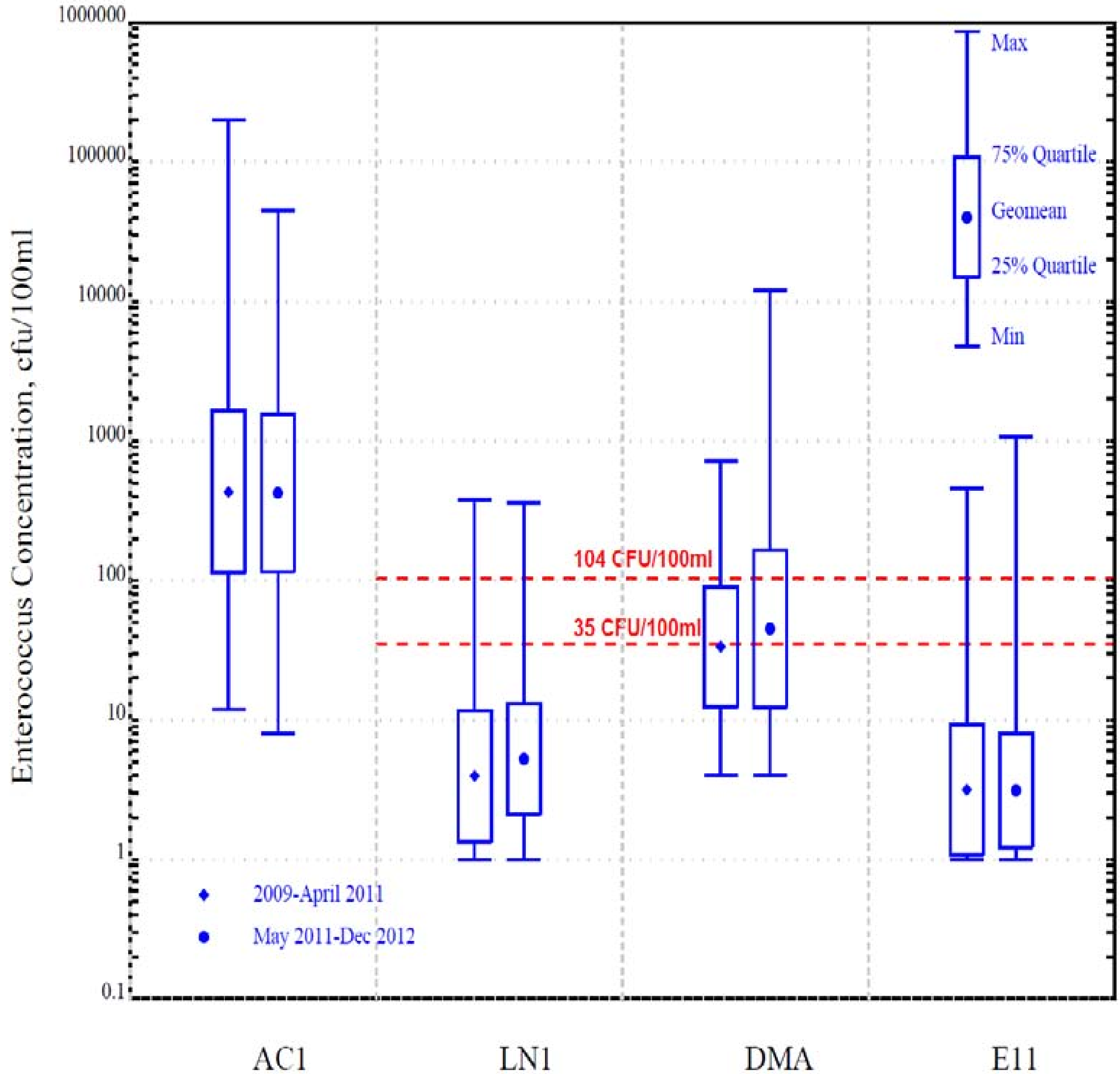


Figure 2-24. Enterococci Concentrations at Alley Creek and Little Neck Bay Monitoring Stations

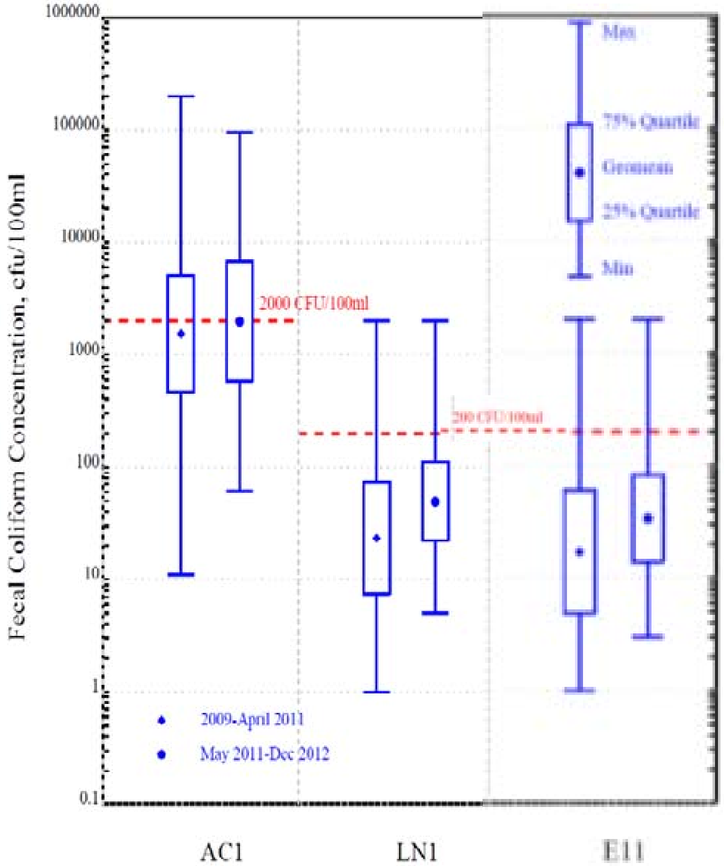


Figure 2-25. Fecal Coliform Concentrations at Harbor Survey Monitoring (HSM) Stations

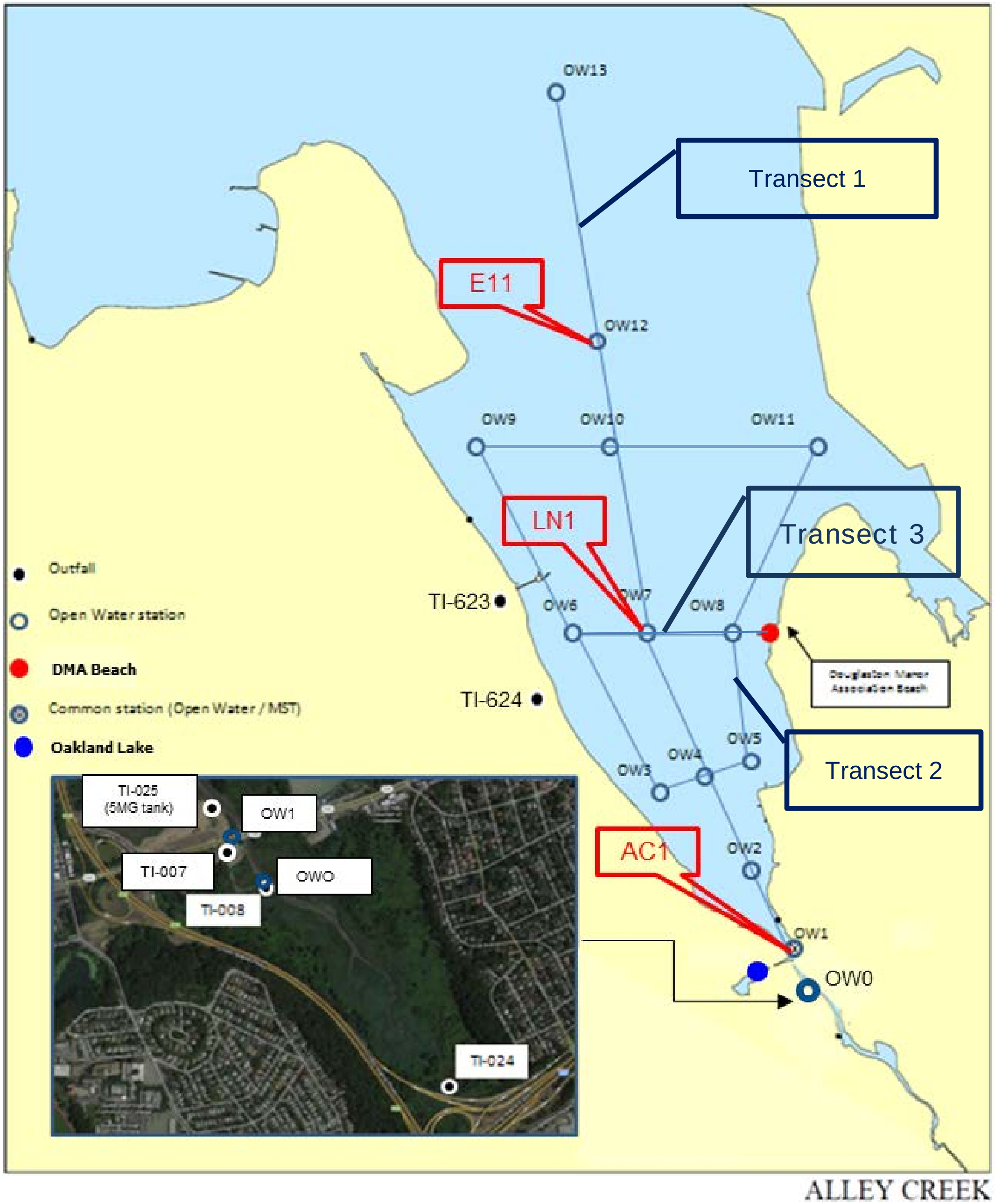


Figure 2-26. FSAP and HSM Locations

The results of this sampling effort are provided in Figures 2-27A and 2-27B for enterococci and fecal coliform in wet weather, and Figures 2-28A and 2-28B present these results for dry weather. As shown in Figures 2-27A and 2-27B, there appears to be a gradient of pathogens from Alley Creek to the center portion of Little Neck Bay along the Bay centerline (Stations OW2, OW4 and OW7), along the eastern shoreline (OW2, OW5 and OW8), and along the western shoreline (Stations OW2, OW3 and OW6). Locations further removed from Alley Creek (Stations OW9 through OW13) seem to have bacteria concentrations that are almost equal, and appear to be unrelated to the gradient of elevated bacteria emanating from the Creek. Although these outer stations are elevated above dry weather concentrations (Figures 2-28A and 2-28B), the lack of a gradient from the Creek outward indicates that these elevated concentrations above dry weather concentrations are likely associated with other sources of bacteria to the system that are impacting the greater East River and western Long Island Sound.

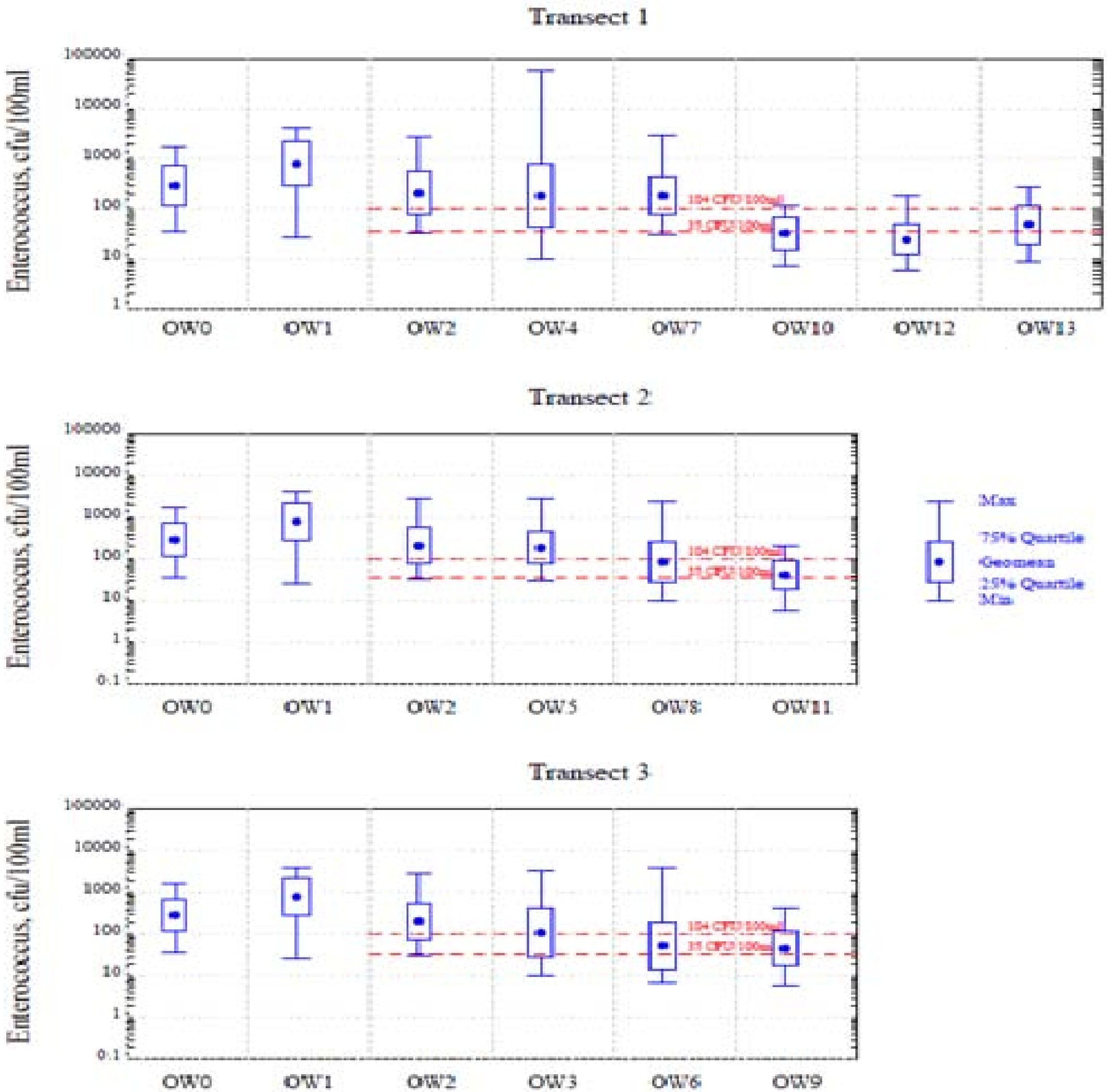


Figure 2-27A. FSAP Wet Weather Enterococci Concentrations

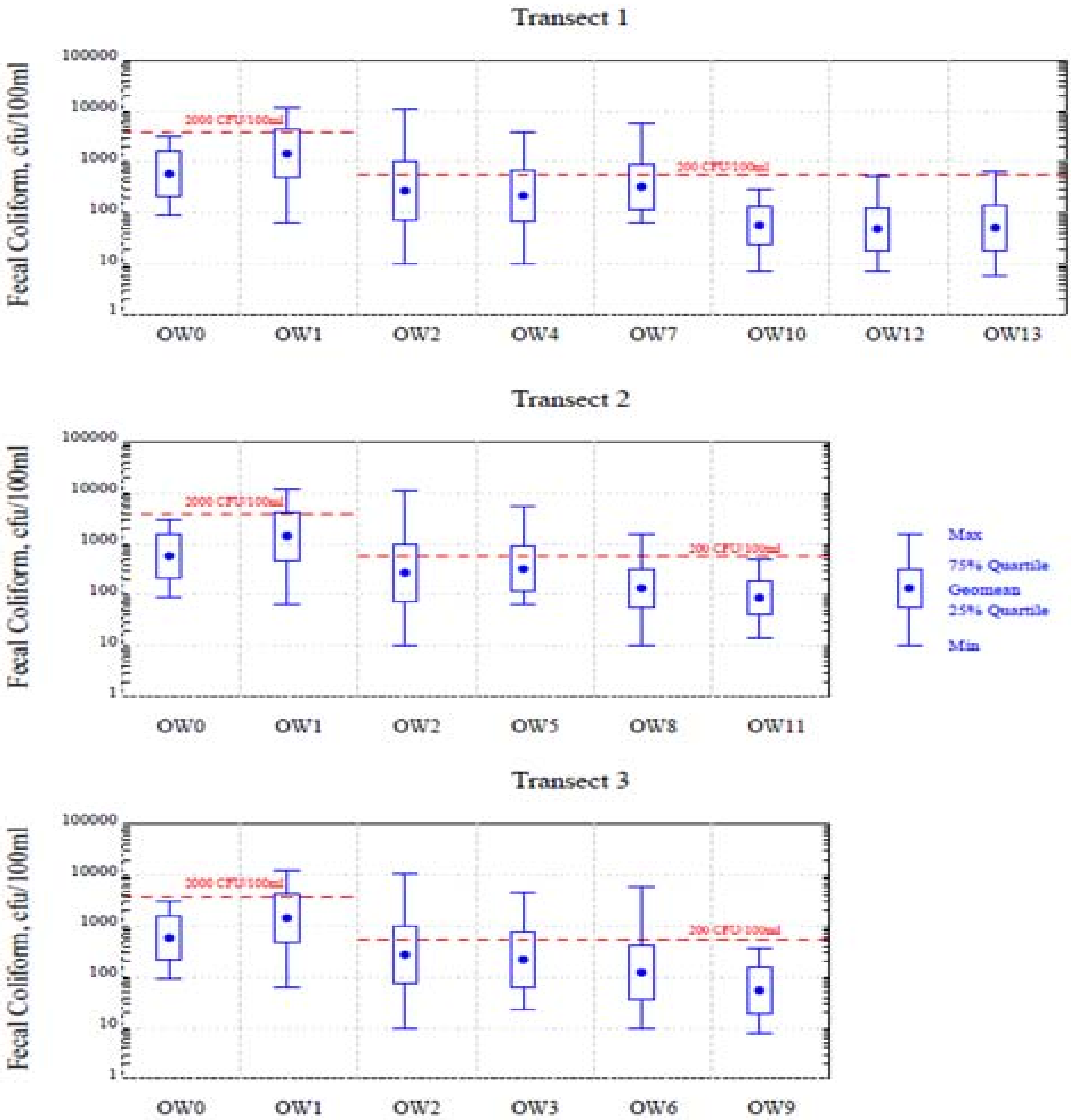


Figure 2-27B. FSAP Wet Weather Fecal Coliform Concentrations

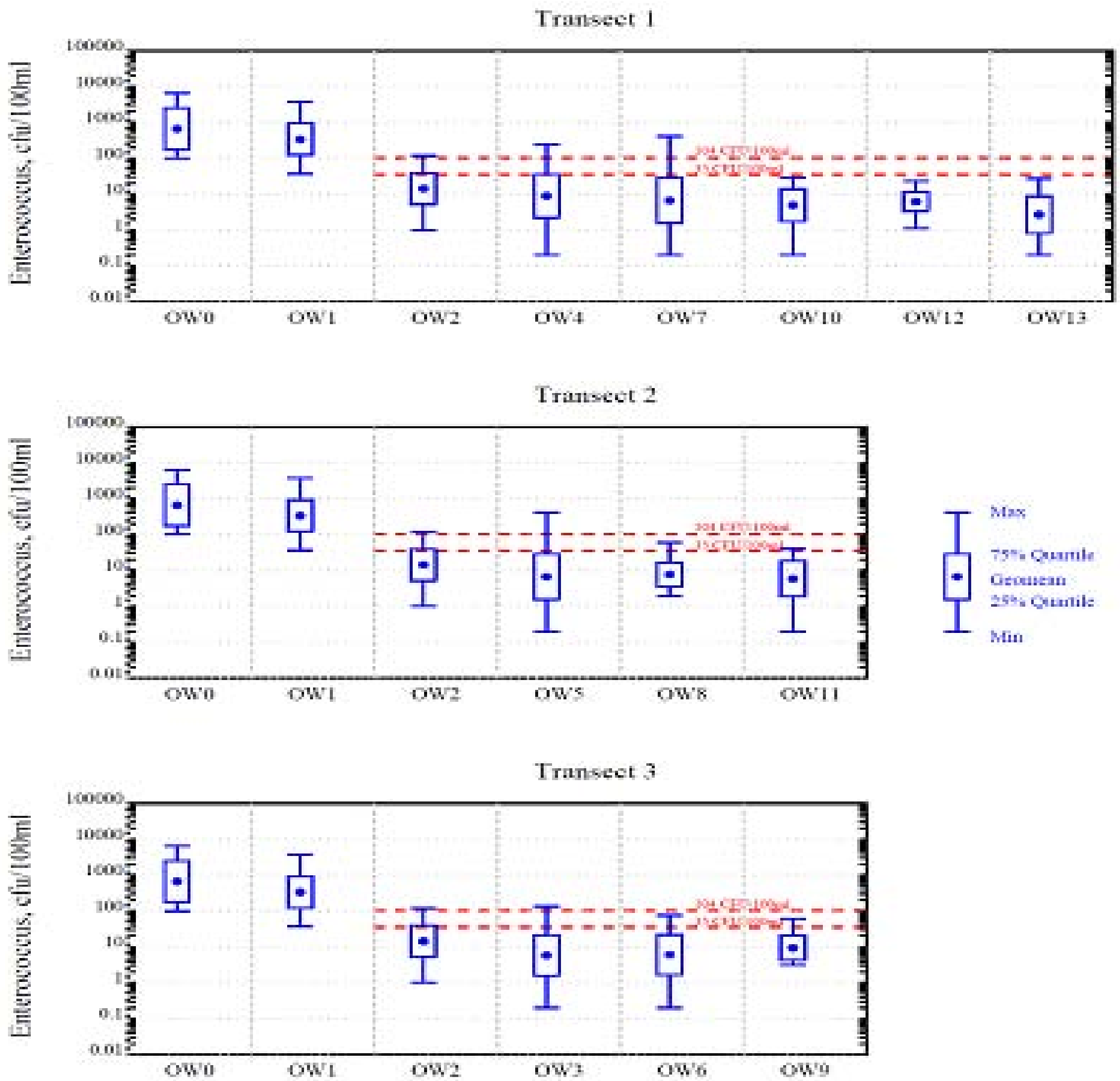


Figure 2-28A. FSAP Dry Weather Enterococci Concentrations

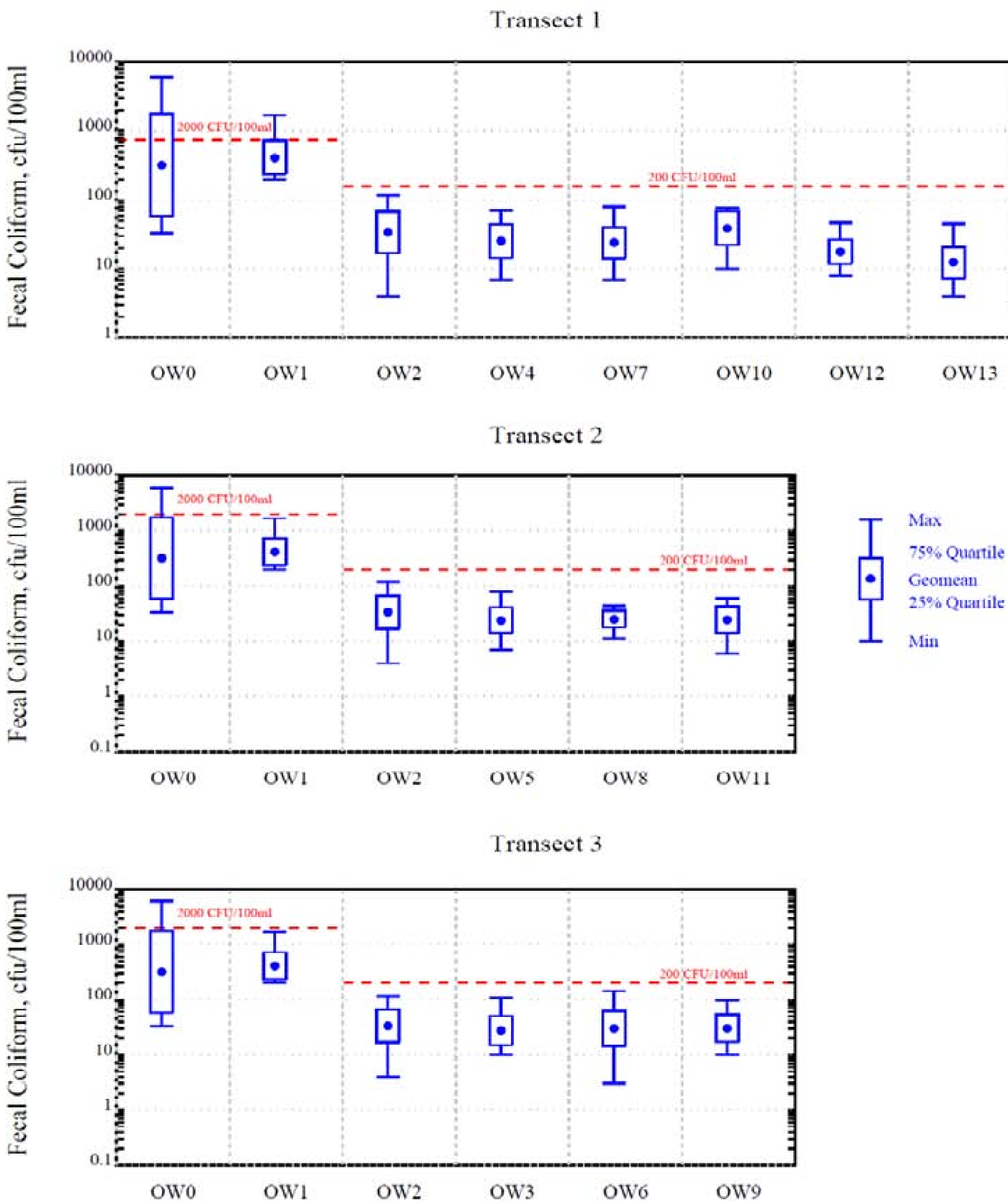


Figure 2-28B. FSAP Dry Weather Fecal Coliform Concentrations

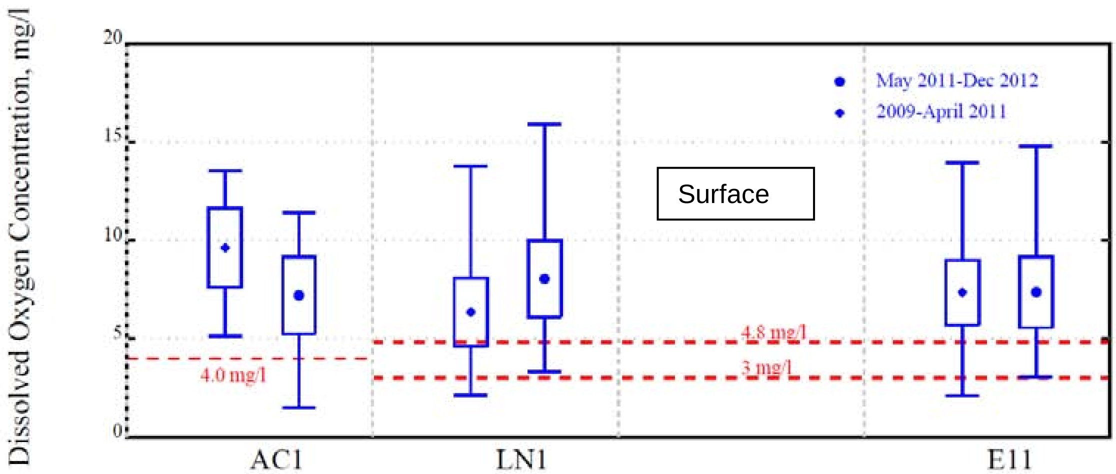
Similarly, the concentrations of pathogens at the DMA Beach shoreline that appear on Transect 3 (Stations OW6, OW7, OW8 and DMA Beach), in close vicinity to Station OW8, are higher in wet weather than the Station OW8 concentrations, suggesting a local source of bacteria in the DMA area.

DO concentrations for the period of 2009 through April 2011 and May 2011 through the end of 2012 for Alley Creek and Little Neck Bay areas summarized in Figure 2-29. The figure shows the surface DO concentrations in the upper panel, and the bottom level DO concentrations in the lower panel. For the Alley Creek sampling locations (Station AC1), there is only a single DO reading taken (mid-depth), which is displayed in the upper panel. DO concentrations are as shown as the period mean, the 25th percentile and 75th percentile concentrations, as well as the period minimum and maximum values.

Although there are some slight difference in the Bay samples between the surface and bottom, it does not appear that the Bay is stratified with respect to DO. The Bay also appears to be fairly uniform with respect to DO, with the inner location at Station LN1 and the outer Station E11 having very similar DO concentrations.

These data indicate that about 58 percent of the measured DO concentrations in the Bay at Station LN1 are greater than the Class SA chronic criteria of 4.8 mg/L, and 89 percent of the measured samples have DO concentrations greater than the 3.0 mg/L acute criteria, prior to May 2011. After May 2011, these values increase to 75 percent of the measurements being greater than 4.8 mg/L, and 100 percent of the measurements being greater than 3.0 mg/L. Further out into the Bay at Station E11, these data indicate that about 84 percent of the measured DO concentrations are greater than the chronic criteria of 4.8 mg/L, and 98 percent of the measured samples have DO concentrations greater than 3.0 mg/L, prior to May 2011. After May 2011, these values change to 73 percent of the measurements being greater than 4.8 mg/L, and 99 percent of the measurements being greater than 3.0 mg/L. It should be noted that the ERTM results confirmed that the low DO concentrations in Little Neck Bay are, in part, associated with the hypoxia and nutrient enrichment in western Long Island Sound, and are not a result of CSO or stormwater sources.

DO concentrations at Station AC1 are more limited, and prior to May 2011, all the data show concentrations greater than 4.0 mg/L. After May 2011, only 68 percent of the measurements were found to be greater than 4.0 mg/L.



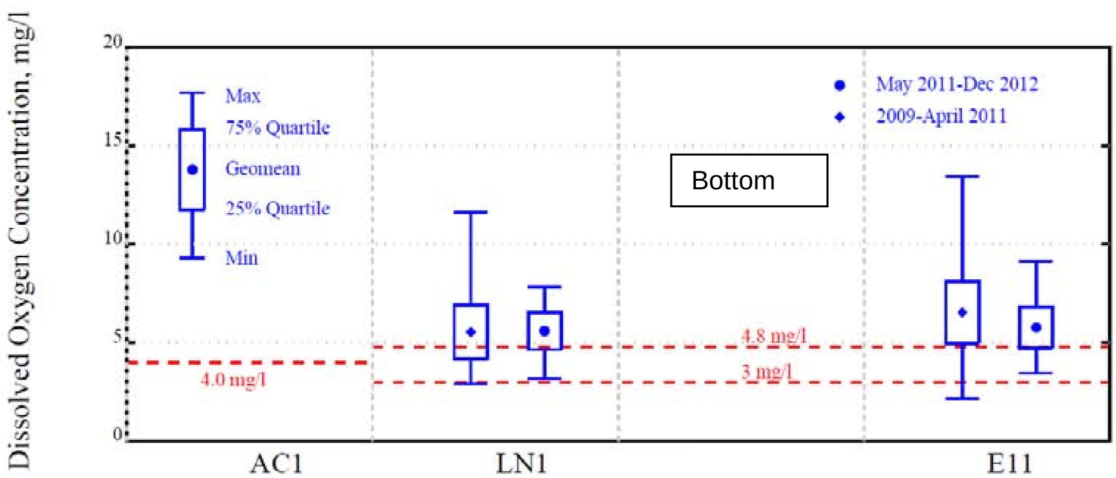


Figure 2-29. FSAP Dissolved Oxygen Concentrations

SECTION 3.0
CSO BEST MANAGEMENT PRACTICES

3.0 CSO BEST MANAGEMENT PRACTICES

The SPDES permits for all 14 WWTPs in New York City require DEP to report annually on the progress of the following 13 CSO BMPs:

1. CSO Maintenance and Inspection Program
2. Maximum Use of Collection Systems for Storage
3. Maximize Flow to POTW
4. Wet Weather Operating Plan
5. Prohibition of Dry Weather Overflow
6. Industrial Pretreatment
7. Control of Floatable and Settleable Solids
8. Combined Sewer System Replacement
9. Combined Sewer Extension
10. Sewer Connection & Extension Prohibitions
11. Septage and Hauled Waste
12. Control of Runoff
13. Public Notification

These BMPs are equivalent to the Nine Minimum Controls (NMCs) required under the EPA National Combined Sewer Overflow Policy, which were developed by the EPA to represent BMPs that would serve as technology-based CSO controls. They were intended to be “determined on a best professional judgment basis by the NPDES permitting authority,” and to be best available technology-based controls that could be implemented within two years by permittees. EPA developed two guidance manuals that embodied the underlying intent of the NMCs for permit writers and municipalities, offering suggested language for SPDES permits and programmatic controls that may accomplish the goals of the NMCs (EPA 1995a, 1995b). A comparison of the EPA’s NMCs to the 13 SPDES BMPs is as shown in Table 3-1.

This section is currently based on the practices summarized in the 2012 Best Management Practices Annual Report.

Table 3-1. Comparison of EPA Nine Minimum Controls Compared with SPDES Permit BMPs

EPA Nine Minimum Controls	SPDES Permit Best Management Practices
NMC 1: Proper Operation and Regular Maintenance Programs for the Sewer System and the CSOs	BMP 1: CSO Maintenance and Inspection Program BMP 4: Wet Weather Operating Plan BMP 8: Combined Sewer System Replacement BMP 9: Combined Sewer Extension BMP 10: Sewer Connection & Extension Prohibitions BMP 11: Septage and Hauled Waste
NMC 2: Maximum Use of the Collection System for Storage	BMP 2: Maximum Use of Collection Systems for Storage
NMC 3: Review and Modification of Pretreatment Requirements to Assure CSO Impacts are Minimized	BMP 6: Industrial Pretreatment
NMC 4: Maximization of Flow to the Publicly Owned Treatment Works for Treatment	BMP 3: Maximize Flow to POTW BMP 4: Wet Weather Operating Plan
NMC 5:Prohibition of CSOs during Dry Weather	BMP 5: Prohibition of Dry Weather Overflow
NMC 6: Control of Solid and Floatable Material in CSOs	BMP 7: Control of Floatable and Settleable Solids
NMC 7: Pollution Prevention to Reduce Contaminants in CSOs	BMP 6: Industrial Pretreatment BMP 7: Control of Floatable and Settleable Solids BMP 12: Control of Runoff
NMC 8: Public Notification	BMP 13: Public Notification
NMC 9: Monitoring to Effectively Characterize CSO Impacts and the Efficacy of CSO Controls	BMP 1: CSO Maintenance and Inspection Program BMP 5: Prohibition of Dry Weather Overflow BMP 6: Industrial Pretreatment BMP 7: Control of Floatable and Settleable Solids

This section presents brief summaries of each BMP and its respective relationship to the federal NMCs. In general, the BMPs address operation and maintenance procedures, maximum use of existing systems and facilities, and related planning efforts to maximize capture of CSO and reduce contaminants in the CSS, thereby reducing water quality impacts.

3.1 Collection System Maintenance and Inspection Program

This BMP addresses NMC 1 (Proper Operations and Regular Maintenance Programs for the Sewer Systems and CSOs) and NMC 9 (Monitoring to Effectively Characterize CSO Impacts and the Efficacy of CSO Controls). Through regularly-scheduled inspection of the CSOs and the performance of required repair, cleaning, and maintenance work, dry weather overflows and leakage can be prevented, and maximization of flow to the WWTP can be ensured. Specific components of this BMP include:

- Inspection and maintenance of CSO tide gates;
- Telemetering of regulators;
- Reporting of regulator telemetry results;
- Recording and reporting of events that cause discharge at outfalls during dry weather; and

- DEC review of inspection program reports.

Details of recent preventative and corrective maintenance reports can be found in the Appendices of the BMP Annual Reports.

3.2 Maximizing Use of Collection System for Storage

This BMP addresses NMC 2 (Maximum Use of the Collection System for Storage), and requires the performance of cleaning and flushing to remove and prevent solids deposition within the collection system, as well as an evaluation of hydraulic capacity, so that regulators and weirs can be adjusted to maximize the use of system capacity for CSO storage, thereby reducing the amount of overflow. DEP provides general information in the BMP Annual Report, describing the status of Citywide SCADA, regulators, tide gates, interceptors, in-line storage projects, and collection system inspections and cleaning.

3.3 Maximizing Wet Weather Flow to WWTPs

This BMP addresses NMC 4 (Maximization of Flow to the Publicly Owned Treatment Works for Treatment), and reiterates the WWTP operating targets established by the SPDES permits regarding the ability of the WWTP to receive and treat minimum flows during wet weather. The treatment plant must be physically capable of receiving a minimum of 2xDDWF through the plant headworks; a minimum of 2xDDWF through the primary treatment works (and disinfection works if applicable); and a minimum of 1.5xDDWF through the secondary treatment works during wet weather. The actual process control set points may be established by the Wet Weather Operating Plan (WWOP) required in BMP 4.

All of the City's WWTPs are physically capable of receiving a minimum of twice their permit-rated design flow through primary treatment and disinfection or their DEC-approved Wet Weather Operating Plans. The maximum flow that can reach a particular WWTP is controlled by a number of factors including: hydraulic capacities of the upstream flow regulators; storm intensities within different areas of the collection system; and plant operators, who can restrict flow using "throttling" gates located at the WWTP entrance, to protect the WWTP from flooding and process upsets. DEP's operations staff are trained as to how to maximize pumped flows without impacting the treatment process, critical infrastructure, or public safety. For guidance, DEP's operations staff follow their plant's DEC-approved WWOP, which specifies the "actual Process Control Set Points," including average flow, as per Section VIII (3) and (4) of the SPDES permits. Analyses presented in the 2012 BMP report indicate that DEP's facilities complied with this BMP during 2012.

3.4 Wet Weather Operating Plan

To maximize treatment during wet weather events, WWOPs were developed for each WWTP drainage area, in accordance with the DEC publication entitled, *Wet Weather Operations and Wet Weather Operating Plan Development for Wastewater Treatment Plants*. Components of the WWOPs include:

- Unit process operating procedures;
- CSO retention/treatment facility operating procedures, if relevant for that drainage area; and
- Process control procedures and set points to maintain the stability and efficiency of BNR processes, if required.

This BMP addresses NMC 1 (Proper Operation and Regular Maintenance Programs for the Sewer System and the CSOs) and NMC 4 (Maximization of Flow to the Publicly Owned Treatment Works for Treatment). The Tallman Island WWTP WWOP, which includes the Alley Creek CSO Tank WWOP, was approved by DEC in September 2011.

3.5 Prohibition of Dry Weather Overflows

This BMP addresses NMC 5 (Prohibition of CSOs during Dry Weather) and NMC 9 (Monitoring to Effectively Characterize CSO Impacts and the Efficacy of CSO Controls), and requires that any dry weather flow event be promptly abated and reported to DEC within 24 hours. A written report must follow within 14 days and contain information per SPDES permit requirements. The status of the shoreline survey, the Dry Weather Discharge Investigation report, and a summary of the total bypasses from the treatment and collection system are provided in the BMP Annual Report.

Dry weather overflows from the CSS are prohibited, and DEP's goal is to reduce and/or eliminate dry weather bypasses. An examination of the data for regulators, pump stations and WWTPs revealed that there were no dry weather bypasses to Alley Creek or Little Neck Bay during 2012.

3.6 Industrial Pretreatment Program

This BMP addresses three NMCs: NMC 3 (Review and Modification of Pretreatment Requirements to Assure CSO Impacts are Minimized); NMC 7 (Pollution Prevention Programs to Reduce Contaminants in CSOs); and NMC 9 (Monitoring to Effectively Characterize CSO Impacts and the Efficacy of CSO Controls). By regulating the discharges of toxic pollutants from unregulated, relocated, or new Significant Industrial Users (SIUs) tributary to CSOs, this BMP addresses the maximization of persistent toxics treatment from industrial sources upstream of CSOs. Specific components of this BMP include:

- Consideration of CSOs in the calculation of local limits for indirect discharges of toxic pollutants;
- Scheduled discharge during conditions of non-CSO, if appropriate for batch discharges of industrial wastewater;
- Analysis of system capacity to maximize delivery of industrial wastewater to the WWTP, especially for continuous discharges;
- Exclusion of non-contact cooling water from the CSS and permitting of direct discharges of cooling water; and
- Prioritization of industrial waste containing toxic pollutants for capture and treatment by the WWTP over residential/commercial service areas.

Since 2000, the average total industrial metals loading to NYC WWTPs has been declining. As described in the 2012 BMP Annual Report, the average total metals discharged by all regulated industries to the NYC WWTPs was 12.8 lb/day, and the total amount of metals discharged by regulated Industrial Users remained very low. Applying the same percentage of CSO bypass (1.5 percent) from the CSO report to the current data, it appears that, on average, less than 0.2 lb/day of total metals from regulated industries bypasses to CSOs in 2012 (DEP, 2012a).

3.7 Control of Floatable and Settleable Solids

This BMP addresses NMC 6 (Control of Solid and Floatable Material in CSOs), NMC 7 (Pollution Prevention Programs to Reduce Contaminants in CSOs), and NMC 9 (Monitoring to Effectively Characterize CSO Impacts and the Efficacy of CSO Controls), by requiring the implementation of the following four practices to eliminate or minimize the discharge of floating solids, oil and grease, or solids of sewage origin that cause deposition in receiving waters:

- Catch Basin Repair and Maintenance: This practice includes inspection and maintenance scheduled to ensure proper operation of basins.

- Catch Basin Retrofitting: By upgrading basins with obsolete designs to contemporary designs with appropriate street litter capture capability; this program is intended to increase the control of floatable and settleable solids, citywide.
- Booming, Skimming and Netting: This practice establishes the implementation of floatables containment systems within the receiving waterbody associated with applicable CSO outfalls. Requirements for system inspection, service, and maintenance are also established.
- Institutional, Regulatory, and Public Education: The report must also include recommendations for alternative City programs, and an implementation schedule that will reduce the water quality impacts of street and toilet litter.

3.8 Combined Sewer Replacement

This BMP addresses NMC 1 (Proper Operations and Regular Maintenance Programs for the Sewer System and CSOs), requiring all combined sewer replacements to be approved by the New York State Department of Health (DOH) and to be specified within DEP's Master Plan for Sewage and Drainage. Whenever possible, separate sanitary and storm sewers should be used to replace combined sewers. The BMP Annual Report describes the general citywide plan, and addresses specific projects occurring in the reporting year. No projects are reported for the Tallman Island WWTP service area in the Best Management Practices 2012 Annual Report.

3.9 Combined Sewer Extension

To minimize storm water entering the CSS, this BMP requires combined sewer extensions to be accomplished using separate sewers whenever possible. If separate sewers must be extended from combined sewers, analyses must be performed to demonstrate that the sewage system and treatment plant are able to convey and treat the increased dry weather flows with minimal impact on receiving water quality.

This BMP addresses NMC 1 (Proper Operations and Regular Maintenance Programs for the Sewer System and CSOs).A brief status report is provided in the Best Management Practices 2012 Annual Report, although no combined sewer extension projects were completed during that year.

3.10 Sewer Connection and Extension Prohibitions

This BMP addresses NMC 1 (Proper Operations and Regular Maintenance Programs for the Sewer System and CSOs), and prohibits sewer connections and extensions that would exacerbate recurrent instances of either sewer back-up or manhole overflows. Wastewater connections to the CSS downstream of the last regulator or diversion chamber are also prohibited. The BMP Annual Report contains a brief status report for this BMP and provides details pertaining to chronic sewer back-up and manhole overflow notifications submitted to DEC when necessary. For the calendar year 2012, conditions did not require DEP to prohibit additional sewer connections or sewer extensions.

3.11 Septage and Hauled Waste

The discharge or release of septage or hauled waste upstream of a CSO (e.g., scavenger waste) is prohibited under this BMP. Scavenger wastes may only be discharged at designated manholes that never drain into a CSO, and only with a valid permit. This BMP addresses NMC 1 (Proper Operations and Regular Maintenance Programs for the Sewer System and CSOs). The 2008 CSO BMP Annual Report summarizes the three scavenger waste acceptance facilities controlled by DEP, and the regulations governing discharge of such material at the facilities. The facilities are located in the Hunts Point, Oakwood Beach, and 26th Ward WWTP service areas. The program remained unchanged through the 2011 CSO BMP Annual report.

3.12 Control of Runoff

This BMP addresses NMC 7 (Pollution Prevention Programs to Reduce Contaminants in CSOs) by requiring all sewer certifications for new development to follow DEP rules and regulations, to be consistent with the DEP Master Plan for Sewers and Drainage, and to be permitted by DEP. This BMP ensures that only allowable flow is discharged into the combined or storm sewer system.

A rule to "reduce the release rate of storm flow from new developments to 10 percent of the drainage plan allowable or 0.25 cfs per impervious acre, whichever is higher (for cases when the allowable storm flow is more than 0.25 cfs per impervious acre)," was promulgated on January 4, 2012, and became effective on July 4, 2012.

3.13 Public Notification

BMP 13 addresses NMC 8 (Public Notification) as well as NMC 1 (Proper Operations and Regular Maintenance Programs for the Sewer System and CSOs) and NMC 9 (Monitoring to Effectively Characterize CSO Impacts and the Efficacy of CSO Controls).

This BMP requires easy-to-read identification signage to be placed at or near CSO outfalls, with contact information for DEP, to allow the public to report observed dry weather overflows. All signage information and appearance must comply with the Discharge Notification Requirements listed in the SPDES permit. This BMP also requires that a system be in place to determine the nature and duration of an overflow event, and that potential users of the receiving waters are notified of any resulting, potentially harmful conditions. The BMP does allow the NYC Department of Health and Mental Hygieneto implement and manage the notification program. Accordingly, the Wet Weather Advisories, Pollution Advisories and Closures are tabulated for all NYC public and private beaches. Douglas Manor Association Beach, a private beach on Little Neck Bay, was closed a total of 81 days and had Pollution Advisories posted for a further 23 days during the 2011 bathing season due to localized elevated bacteria levels.

3.14 Characterization and Monitoring

Previous studies have characterized and described the Tallman Island WWTP collection system and the water quality for Alley Creek and Little Neck Bay (see Chapters 3 and 4 of the Alley Creek and Little Neck Bay WWFP, 2009). Additional data were collected and are analyzed in this LTCP (see Section 2.2). Continuing monitoring occurs under a variety of DEP initiatives, such as floatables monitoring programs and DEP Harbor Survey, and is reported in the BMP Annual Reports under SPDES BMPs 1, 5, 6 and 7, as described above.

3.15 CSO BMP Report Summaries

In accordance with the SPDES permit requirements, annual reports summarizing the citywide implementation of the 13 BMPs described above are submitted to DEC. DEP has submitted ten annual reports to date, covering calendar years 2003 through 2012. Typical reports are divided into 13 sections – one for each of the BMPs in the SPDES permits. Each section of the annual reports describes ongoing DEP programs, provides statistics for initiatives occurring during the preceding calendar year, and discusses overall environmental improvements.