Appendix B
Water Quality Data Analysis

Evaluation of Water Quality Technical Memorandum

TECHNICAL MEMORANDUM

Newport CSO LTCP Implementation (Project #10-039) Evaluation of Water Quality

PREPARED FOR: City of Newport

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DATE: May 17, 2012

PROJECT NUMBER: 401892.P2.19.A1

1. Introduction

An evaluation of water quality was performed for Task 19A of the Newport CSO LTCP Implementation Project. The evaluation consisted of a review of available water quality data, combined sewer overflow (CSO) discharge statistics, and collection system model calculations to characterize the effects of CSOs on water quality and to assess the potential benefits of implementing additional CSO controls. The review addressed the following:

- Existing classifications, designated uses, and water quality standards for Newport Harbor
- Receiving water quality characterization - review of data collected in the vicinity of Newport's CSOs
- Effects and trends related to CSO volumes, frequencies and pollutant loads

1.1 Purpose

The purpose of the present analysis is to review available water quality data and CSO discharge statistics in order to characterize the effects of CSOs on water quality and to assess the potential benefits of implementing additional CSO controls.

1.2 RIDEM Water Quality Standards and LTCP Requirements

Water quality standards define the goals for a waterbody by designating its uses, setting criteria to protect those uses, and establishing provisions to protect water quality from pollutants (CALM, 2009). As the permitting authority, RIDEM sets these standards. CSOs are not to degrade water quality such that they fail to meet water quality standards. All discharges to the harbor must be "treated discharges." Additionally, if the system is combined, the discharges should meet the CSO policy requirements for CSO control, assuming the facilities reliably provide "equivalent primary treatment" (EPA, 1994).

In addition to considering sensitive areas, a long-term CSO control plan should adopt either a *presumption* or *demonstration* approach. Under a presumption approach, a program is presumed to provide an adequate level of control to meet the water quality-based requirements of the Clean Water Act (CWA) by meeting quantifiable criteria, such as limiting the number of overflow events per year (4) or capturing a minimum percent (85%) of the combined sewage volume. Demonstration approaches show that while not meeting ancillary objectives (such as eliminating CSOs), water quality-based requirements are still met.

The NPDES (National Pollutant Discharge Elimination System) permit requirements to ensure protection of water quality consist of demonstrating the implementation of the Nine Minimum Controls and Development of the Long-Term CSO Control Plan (EPA, 1994). Appropriate documentation should be submitted showing:

1. proper operation and regular maintenance programs for the sewer system and the CSOs;
2. maximum use of the collection system for storage;
3. review and modification of pretreatment requirements to assure CSO impacts are minimized;
4. maximization of flow to the POTW for treatment;

5. prohibition of CSOs during dry weather;
6. control of solid and floatable materials in CSOs;
7. pollution prevention;
8. public notification to ensure that the public receives adequate notification of CSO occurrences and CSO impacts;
9. and monitoring to effectively characterize CSO impacts and the efficacy of CSO controls

1.3 Technical Memorandum Organization

This technical memorandum first describes the water quality goals for Newport Harbor, including the current waterbody classifications and corresponding water quality standards. CSO facilities and discharge specifications are described for both Wellington Avenue and Washington Street facilities. The resulting receiving water quality is then discussed in terms of water quality standard exceedances. Finally, an overall summary is provided, including the future direction of the program.

2 Newport Harbor Water Quality Goals

The Newport Harbor water quality goals support the attainment of State water quality standards and comply with EPA CSO policy. The specifics of these standards are described herein.

2.1 Waterbody Classifications

According to RIDEM, seawater is classified as follows:

SA = These waters are designated for shellfish harvesting for direct human consumption, primary and secondary contact recreational activities, and fish and wildlife habitat. They shall be suitable for aquacultural uses, navigation and industrial cooling. These waters shall have good aesthetic value.

SB = These waters are designated for primary and secondary contact recreational activities; shellfish harvesting for controlled relay and depuration; and fish and wildlife habitat. They shall be suitable for aquacultural uses, navigation, and industrial cooling. These waters shall have good aesthetic value.

SB1 = These waters are designated for primary and secondary contact recreational activities and fish and wildlife habitat. They shall be suitable for aquacultural uses, navigation, and industrial cooling. These waters shall have good aesthetic value. Primary contact recreational activities may be impacted due to pathogens from approved wastewater discharges. However all Class SB criteria must be met.

SC = These waters are designated for secondary contact recreational activities, and fish and wildlife habitat. They shall be suitable for aquacultural uses, navigation, and industrial cooling. These waters shall have good aesthetic value. (This standard is not applied in Newport waters.)

Other partial use designations: SA{b}, SB{a}, SB1{a}

Partial use denotes specific restrictions of use assigned to a waterbody or waterbody segment that may affect the application of criteria. Note that partial use designations are represented by the lower case letters, "a" or "b," which appear in brackets {} next to the classification.

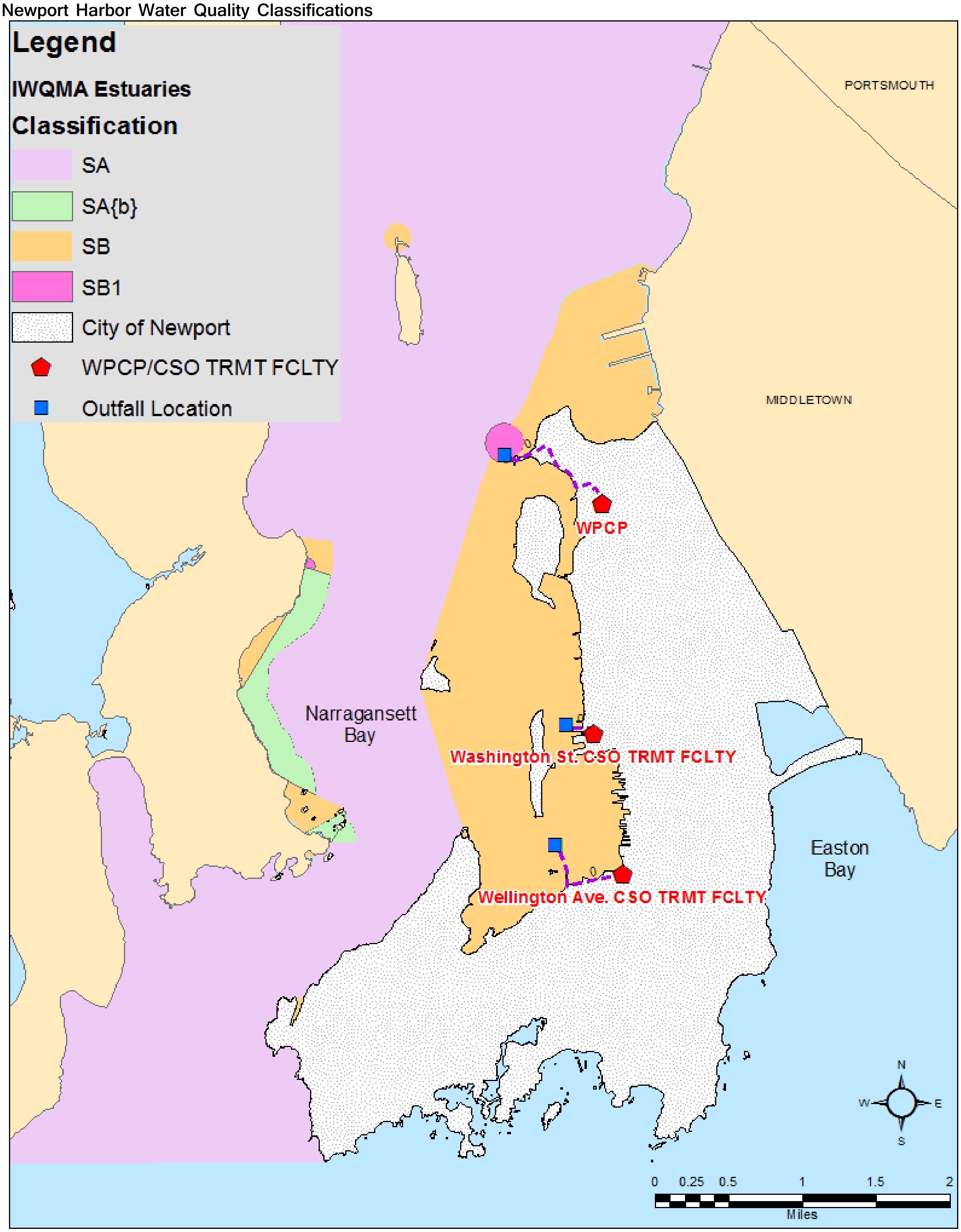
(a). CSO - These waters will likely be impacted by combined sewer overflows in accordance with approved CSO Facilities Plans and in compliance with rule 19.E.1 of these regulations and the Rhode Island CSO Policy. Therefore, primary contact recreational activities; shellfishing uses; and fish and wildlife habitat will likely be restricted.

(b). Concentration of Vessels - These waters are in the vicinity of marinas and/or mooring fields and therefore seasonal shellfishing closures will likely be required as listed in the most recent (revised annually) RIDEM document entitled Shellfish Closure Areas. Nevertheless, all Class SA criteria must be attained.

Note: *Italicized* apply to Newport Harbor/Coddington Cove.

Newport Harbor is mapped according to these classifications in Exhibit 1. Notice that designation SB applies to nearly all immediate Harbor locations.

EXHIBIT 1
Newport Harbor Water Quality Classifications



2.2 Designated Uses

Designated uses are defined by RIDEM as *those uses specified in water quality standards for each waterbody or segment whether or not they are being attained. In no case shall assimilation or transport of pollutants be considered a designated use*. Exhibit 2 lists designated uses for surface waters as described in RI Water Quality Regulations.

EXHIBIT 2
Designated uses for surface waters
Source: RIDOH 2010 CALM 305(b)/303(d)

305(b) Designated Use	RI WQ Regulations Designated Use	Applicable Classification of Water	Designated Use Definition
Drinking Water Supply	Public Drinking Water Supply	AA	The waterbody can supply safe drinking water with conventional treatment.
Swimming/ Recreation	Primary Contact Recreation	AA*, A, B, B1, B{a}, B1{a}, SA, SA{b}, SB, SB{a}, SB1, SB1{a} (all surface waters)	Swimming, water skiing, surfing or other recreational activities in which there is prolonged and intimate contact by the human body with the water
Swimming/ Recreation	Secondary Contact Recreation	AA*, A, B, B1, B{a}, B1{a}, SA, SA{b}, SB, SB{a}, SB1, SB1{a}, SC (all surface waters)	Boating, canoeing, fishing, kayaking or other recreational activities in which there is minimal contact by the human body with the water and the probability of ingestion of the water is minimal
Aquatic Life Support/ Fish, other Aquatic Life, and Wildlife	Fish and Wildlife Habitat	AA, A, B, B1, B{a}, B1{a}, SA, SA{b}, SB, SB{a}, SB1, SB1{a}, SC (all surface waters)	Waters suitable for the protection, maintenance, and propagation of a viable community of aquatic life and wildlife
Shellfishing/ Shellfish Consumption	Shellfish harvesting for direct human consumption	SA, SA{b}	The waterbody supports a population of shellfish and is free from pathogens that could pose a human health risk to consumers.
Shellfish Controlled Relay and Depuration	Shellfish harvesting for controlled relay and depuration	SB, SB{a}	Waters are suitable for the transplant of shellfish to Class SA waters for ambient depuration and controlled harvest.
Fish Consumption	No specific analogous use, but implicit in "Fish and Wildlife Habitat"	AA, A, B, B1, B{a}, B1{a}, SA, SA{b}, SB, SB{a}, SB1, SB1{a}, SC (all surface waters)	The waterbody supports fish free from contamination that could pose a human health risk to consumers.

2.3 Sensitive Areas

Sensitive areas are determined by the NPDES authority in coordination with State and Federal agencies. These areas include designated Outstanding National Resource Waters, National Marine Sanctuaries, waters with threatened or endangered species and their habitat, waters with primary contact recreation, public drinking water intakes or their designated protection areas, and shellfish beds (RIDEM, 2011). Newport Harbor's sensitive areas are mapped according to this definition in Exhibit 13. Shellfishing locations and King Park Beach are of primary concern.

2.4 Water Quality Standards and Policies

The water quality standards that are protective of the aforementioned designated uses are summarized in Exhibit 3. While DO is a useful measure of the health of aquatic life, Enterococci (or fecal coliform when adequate Enterococci data are not available) is the pathogenic indicator used due to the recreational nature of the harbor.

EXHIBIT 3
Seawater Class-Specific Water Quality Standards
Source: RIDEM 2009 Water Quality Regulations

Classification	Enterococci	Fecal Coliform (Shellfishing)	Fecal Coliform (Primary Contact Recreational)	DO
SA	Geometric Mean Density: 35 colonies/100 mL	Geometric Mean: 14 MPN 10% of Samples: 49 MPN	Geometric Mean: 50 MPN/100 mL	Varies from 2.9 to 4.6 mg/L daily based on Seasonal Pycno-cline
SB, SB1	Single Sample Maximum: 104/100 mL		10% of Samples: 400 MPN/100 mL	
SC	None in such concentrations that would impair any usages specifically assigned to this class			

2.5 Regulatory Assessment of Harbor Water Quality Compliance

As specified by the 2010 Consolidated Assessment and Listing Methodology (CALM), sections 305(b) and 303(d) of the federal Clean Water Act direct states to monitor and report the condition of their water resources. Since 2001, the United States Environmental Protection Agency (USEPA) has recommended that states integrate their 305(b) water quality assessment report with their 303(d) List of Impaired Waters into an Integrated Water Quality Monitoring and Assessment Report. As of 2008, the 305(b) Report was integrated with the 303(d) List of Impaired Waters and published as the *Integrated Water Quality Monitoring and Assessment Report*.

305(b) = Section 305(b) of the Federal Clean Water Act requires states to assess the health of their surface waters and submit biennial reports describing the water quality conditions. In Rhode Island, this was known as the State of the State's Waters Report, which provided information on the quality of all assessed waters in the state relative to their designated uses and the water quality criteria established in the Rhode Island Water Quality Regulations.

303(d) = Section 303(d) of the Federal Clean Water Act requires that each state identify waters for which existing required pollution controls are not stringent enough to achieve State water quality standards. Any waterbody or waterbody segment that is assessed as not meeting its water quality standards under the 305(b) assessment process is placed on the 303(d) List of Impaired Waters.

Once a waterbody is identified as impaired, Section 303(d) requires that a Total Maximum Daily Load (TMDL) be developed. TMDLs describe the amount of a given pollutant that a waterbody can receive and still meet water quality standards. The TMDL process provides an analysis of the sources causing the impairment and where possible, the specific actions necessary to achieve the required pollutant reductions needed to meet allocations set by the TMDL.

Based on the state's consolidated assessment and listing methodology (CALM), each surface water body of the state is placed into an assessment category. The attainment status of meeting water quality standards at Newport Harbor is presented in Exhibit 4.

EXHIBIT 4
Newport Harbor and Coddington Cove Designated Uses and Status
Source: Rhode Island July 2011 List of Impaired Waters

Use Description	Use Attainment Status
Fish and Wildlife Habitat	Not Supporting (Coddington Cove sediments)*
Fish Consumption	Fully Supporting
Primary Contact Recreation	Fully Supporting
Secondary Contact Recreation	Fully Supporting
Shellfish Controlled Relay and Depuration	Fully Supporting

*Hazardous waste site remediation underway

3 CSO Treatment and Discharge Characterization

A brief description of the Wellington Avenue and Washington Street facilities is provided herein along with their discharge statistics and resulting water quality at their outfall locations.

3.1 Wellington Avenue CSO Treatment Facility

The Wellington Avenue Pumping Station was designed in 1974, commissioned in 1978, and receives flow from the southern portion of the City. The facility was designed to provide screening and pumping of wastewater flows, treatment using microstrainers, and chlorination of CSOs during wet weather events.

3.1.1 Facility Characteristics

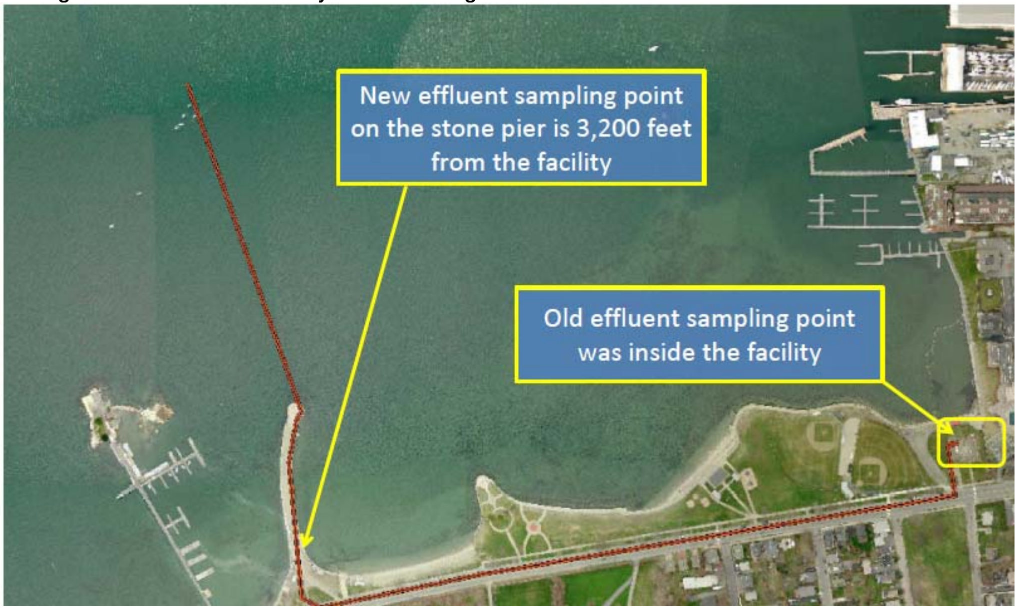
The original coarse screen channel trash racks were replaced in 2003 with Parkson Hycor mechanically cleaned finescreen units with solids conveyor and dewatering press. The microscreen basins provide for approximately 77,000 gallons of wet weather storage. The current 0.25" mechanical fine screen units provide a high level of solids removal with performance reliability (Wright-Pierce, 2010).

3.1.2 Treatment Performance Monitoring

For monitoring purposes, an overflow is defined as any occurrence of a discharge from a CSO to the receiving water with a minimum duration of 15 minutes. Overflows shall be considered to be separate if they are separated by at least six hours. During months of no overflow, DMRs are marked as "no discharge." All flows created by the greater than 1-year 6-hour storm (depth = 1.95 inches) and all storms occurring less frequently are not subject to these limitations. Dry weather overflows are prohibited. Any discharge from a CSO to the receiving water, regardless of duration, must be reported as a CSO to the DEM's Operations and Maintenance Program (RIDEM, 2007).

The NPDES requires sampling the Wellington Avenue outfall for every wet weather event during the CSO occurrence. The Wellington Avenue stormwater overflow pumping system discharges through an approximately 3,000 foot 36" force main to an outfall location approximately 400 feet in Newport Harbor east of Ida Lewis Rock near King Park Beach, as shown in Exhibit 5. The effluent sampling point changed on 11/15/10 in order to obtain more representative samples, as this change allows for increased mixing time so that the chlorine is able to disinfect the pathogens before recording a value. Readings prior to this date are likely overestimates.

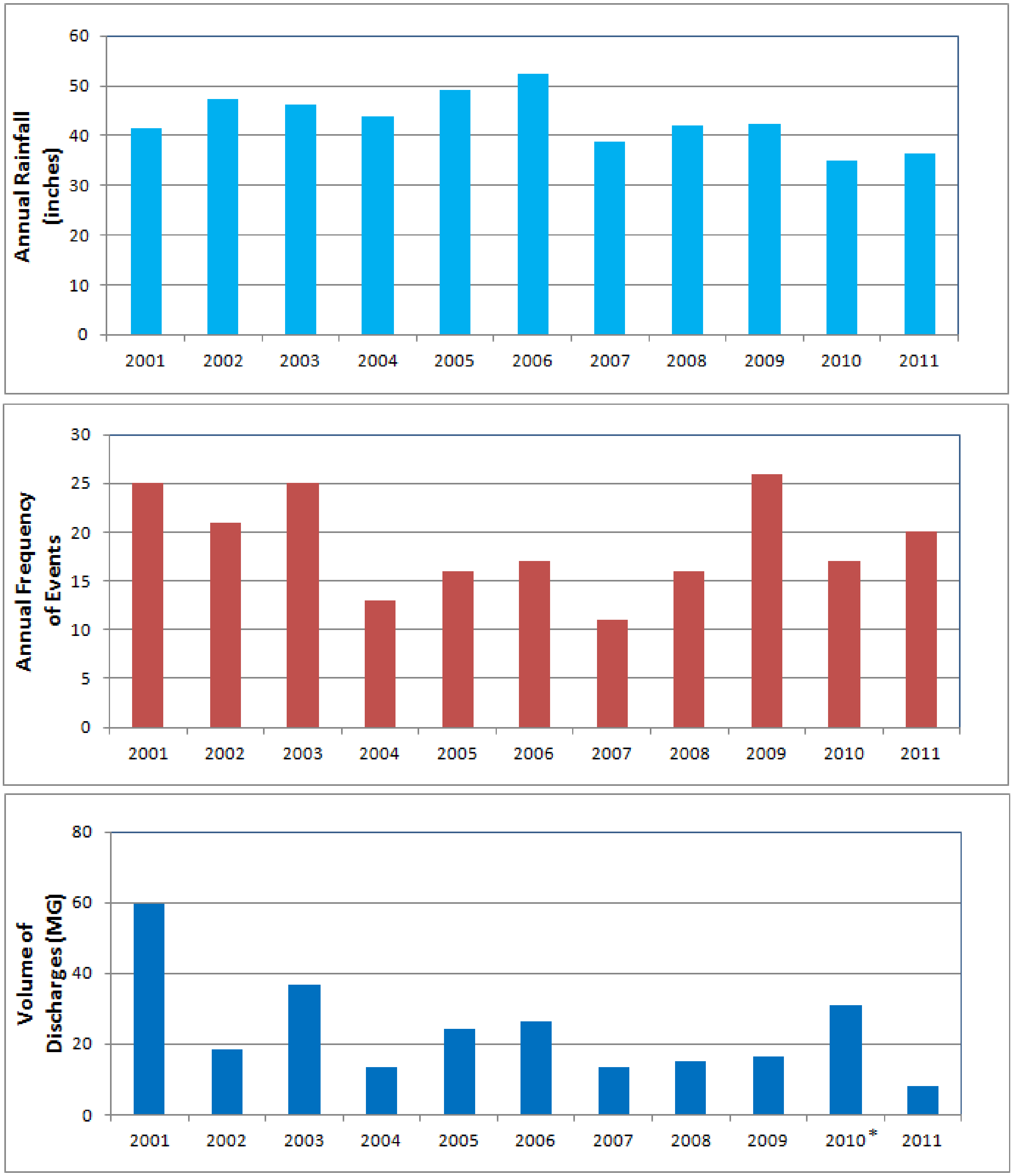
EXHIBIT 5
Wellington Avenue CSO Facility and Discharge Location



3.1.3. CSO Frequency and Volume of Discharges

A CSO discharge characterization was performed for Wellington Avenue, including both CSO frequency and volume, along with the corresponding recorded rainfall on location (the last two years of which are included for reference in Attachment A). Discharge volumes are calculated by multiplying pump run times by the pump capacity. Exhibit 6 summarizes these frequency and volume statistics for 2001 to 2011. Many small CSO events were observed in 2009, whereas 2010 had fewer but more extreme events in terms of total volume discharged (as evidenced by the single 14.3 MG discharge that occurred on 03/29/10).

EXHIBIT 6
Wellington Avenue CSO Frequency, Volume Statistics



* March 29, 2010 - 14.3 million gallons in one event

3.1.4. CSO Discharge Quality Characterization

The following effluent water quality parameters are monitored twice a month: biochemical oxygen demand (BOD_5), total suspended solids (TSS), fecal coliform, total residual chlorine, oil and grease, and settlEable solids. Fecal Coliform at the Wellington Avenue facility upon effluent discharge and mixing is shown in Exhibit 7. Notice that the fecal coliform count drops over the sampling period, particularly after 11/15/10 when the sampling location moved further away from the facility. When allowing for adequate mixing time, the average fecal coliform concentration drops from 295,000 (prior to 11/15/10) to 57,000 MPN/100 mL (after 11/15/10), as demonstrated in Exhibit 8. While these parameters must be monitored and reported, no maximum limits have been established for fecal coliform at present (RIDEM, 2007).

EXHIBIT 7
Wellington Avenue Effluent Samples

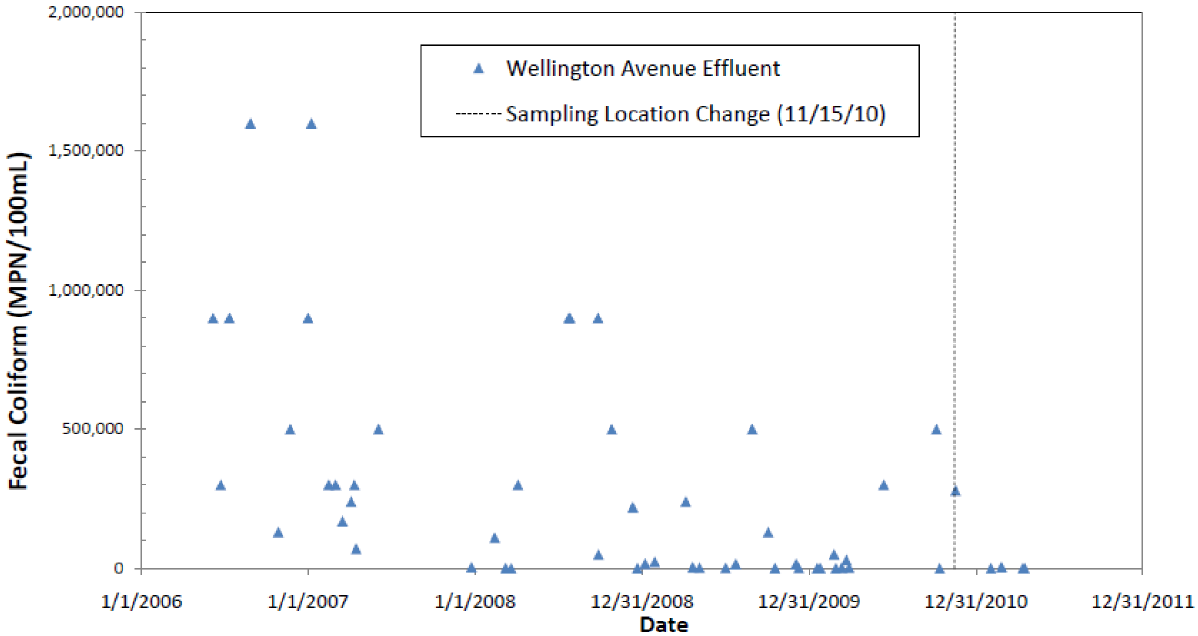


EXHIBIT 8
Wellington Avenue Effluent Fecal Coliform Statistics

Parameter (MPN/100 mL)	Before Sampling Location Change	After Sampling Location Change
Max	1,600,000	280,000
Min	20	2
Average	294,589	57,002

3.2 Washington Street CSO Treatment Facility

The Washington Street Treatment Facility, constructed in 1991, was designed for screening, disinfection, pumping and below ground storage totaling approximately one million gallons.

3.2.1 Facility Characteristics

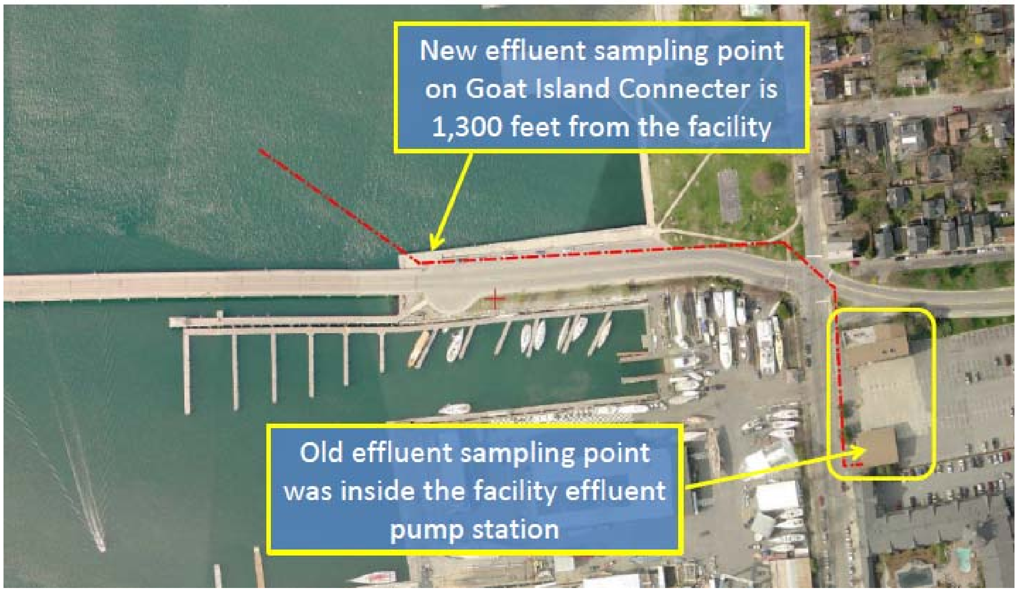
The Washington Street Facility has two above grade buildings: one influent screening, the other effluent pumping. Flows entering the facility pass through automatic mechanical screens to three below ground storage tanks. Each tank is constructed with sloped bottoms to a center trough for facilitating solids removal. Wastewater flows which exceed the facility's storage capacity are disinfected with sodium hypochlorite before being discharged to the harbor approximately 400 feet north of the Goat Island Causeway. Additional specifications are available in the Wright-Pierce report.

3.2.2 Treatment Performance Monitoring

To reiterate*, for monitoring purposes, an overflow is defined as any occurrence of a discharge from a CSO to the receiving water with a minimum duration of 15 minutes. Overflows shall be considered to be separate if they are separated by at least six hours. During months of no overflow, DMRs are marked as "no discharge." All flows* *created by the greater than 1-year 6-hour storm (depth = 1.95 inches) and all storms occurring less frequently are not subject to these limitations. Dry weather overflows are prohibited. Any discharge from a CSO to the receiving water, regardless of duration, must be reported as a CSO to the DEM's Operations and Maintenance Program* (RIDEM, 2007).

Again, the NPDES requires sampling the Washington Street outfall for every wet weather event during the CSO occurrence. Overflow discharge sampling is taken from the Goat Island Connector about 1300 feet from the facility, as indicated in Exhibit 9. The effluent sampling point changed on 11/15/10 in order to obtain more representative samples, as this change allows for increased mixing time so that the chlorine is able to disinfect the pathogens before recording a value. Readings prior to this date are likely overestimates.

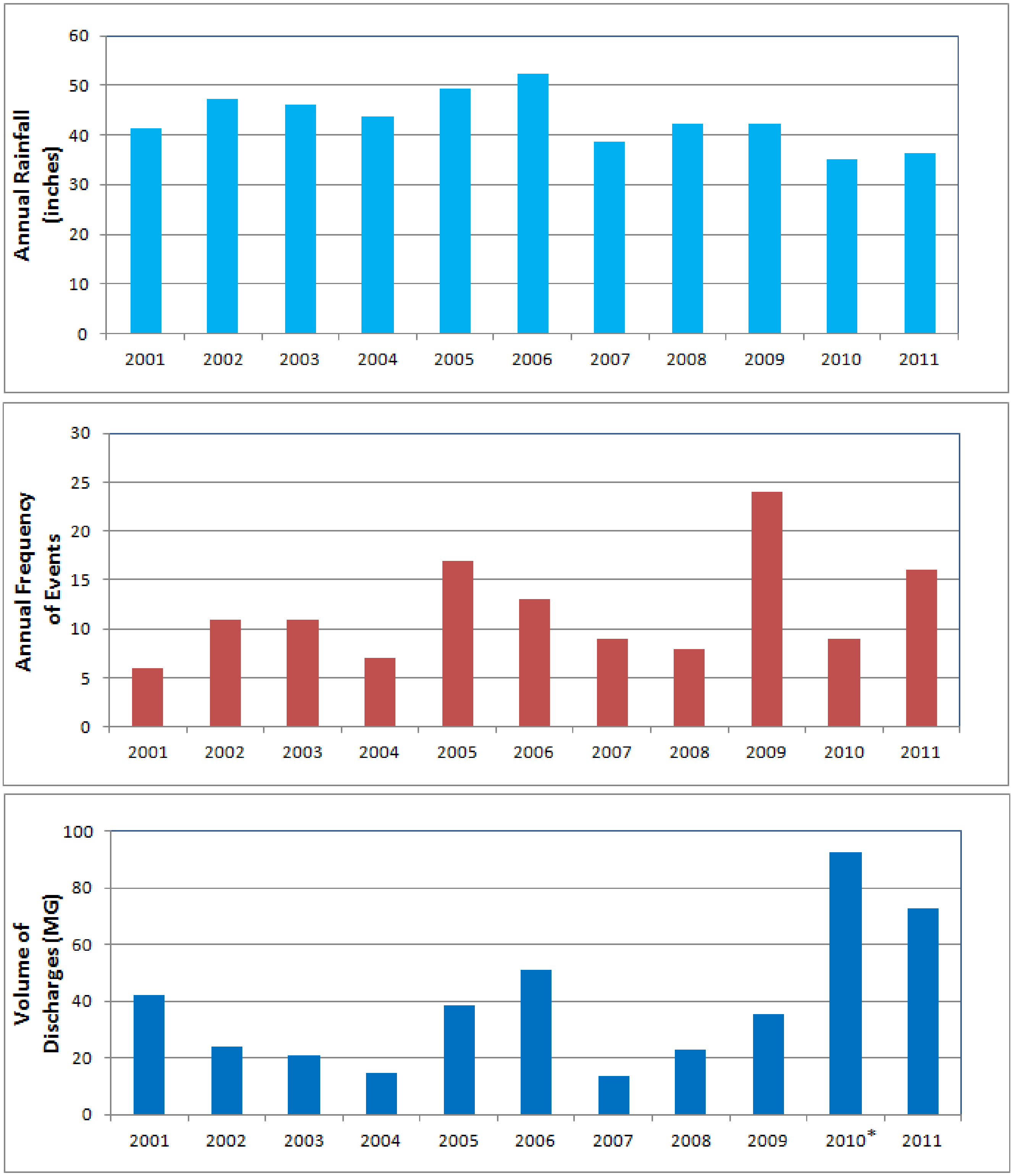
EXHIBIT 9
Washington Street CSO Facility and Discharge Location



3.2.3. CSO Frequency and Volume of Discharges

Similar to Wellington Avenue, a CSO discharge characterization was performed for Washington Street, including both CSO frequency and volume, along with the corresponding recorded rainfall on location (the last two years of which are included for reference in Attachment A). Again, discharge volumes are calculated by multiplying pump run times by the pump capacity. Exhibit 10 summarizes these frequency and volume statistics for 2001 to 2011. Many small CSO events were witnessed in 2009, whereas 2010 had fewer but more extreme events in terms of total volume discharged (as evidenced by the single 64.4 MG discharge that occurred on 03/29/10).

EXHIBIT 10
Washington Street CSO Frequency, Volume Statistics



* March 29, 2010 - 64.4 million gallons in one event

3.2.4 CSO Discharge Quality Characterization

Analogous to the Wellington Avenue facility, the following effluent water quality parameters are monitored daily at the Washington Street: biochemical oxygen demand (BOD_5), total suspended solids (TSS), fecal coliform, total residual chlorine, oil and grease, and settleable solids. As was seen for the Wellington Avenue facility, the fecal coliform at the Washington Street facility upon effluent discharge and mixing is similarly represented by Exhibit

11. The fecal coliform count is seen to drop over the sampling period, particularly after 11/15/10 when the sampling location moved outside the facility effluent pump station. When allowing for adequate mixing time, the average fecal coliform concentration drops from 632,000 (prior to 11/15/10) to 175,000 MPN/100 mL (after 11/15/10), as demonstrated in Exhibit 12. While these parameters must be monitored and reported, no maximum limits have been established for fecal coliform at present (RIDEM, 2007).

EXHIBIT 11
Washington Street Effluent Samples

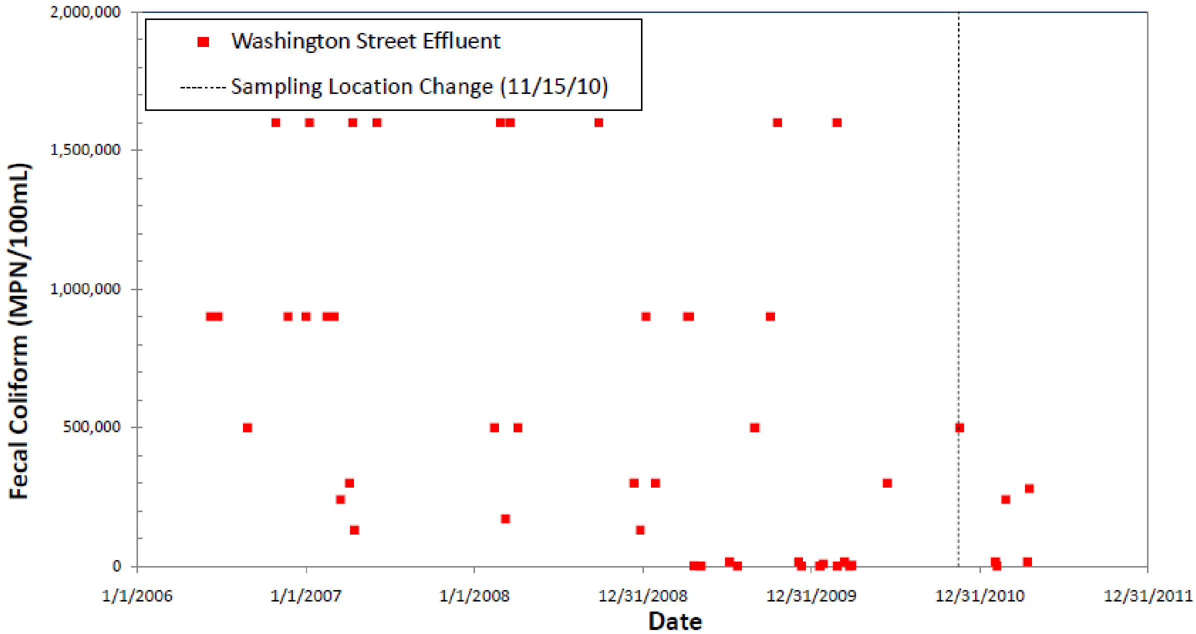


EXHIBIT 12
Washington Street Effluent Fecal Coliform Statistics

Parameter (MPN/100 mL)	Before Sampling Location Change	After Sampling Location Change
Max	1,600,000	500,000
Min	2	2
Average	632,490	175,334

4 Receiving Water Quality Characterization

The effects of CSOs are far-reaching. As water quality is important to the vitality of the harbor, it is necessarily monitored by multiple agencies.

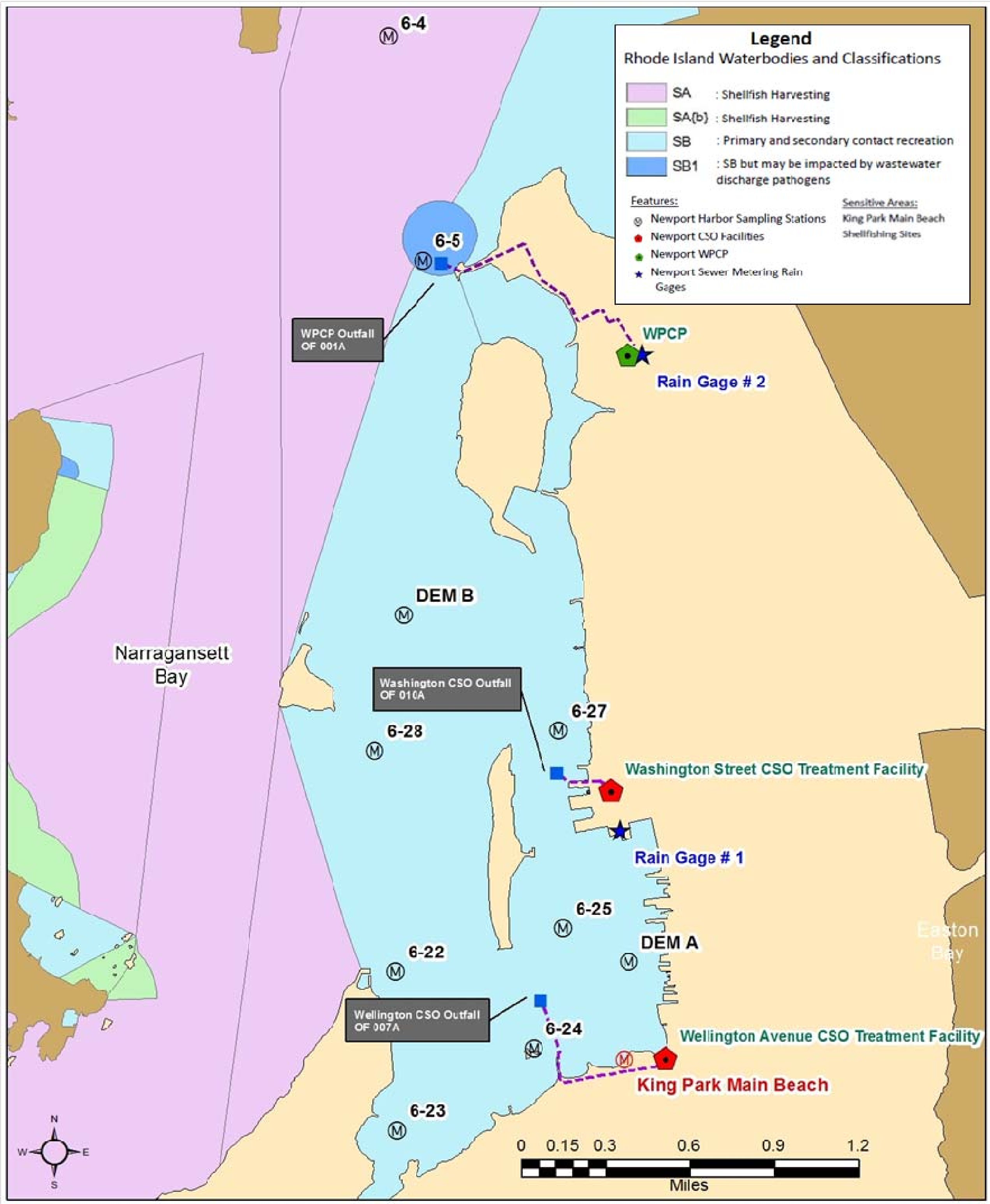
4.1 Water Quality Monitoring Programs

Water quality is monitored by two main entities: the City of Newport and the Rhode Island Department of Health (RIDOH). The City has been monitoring Newport Harbor since 2008 in conjunction with the Rhode Island Department of Environmental Management (RIDEM), while RIDOH collects water quality data in conjunction with Clean Ocean Access (COA).

4.1.1 City of Newport

The City of Newport collects water quality samples in Newport Harbor both weekly and during CSO discharges (as well as 6 hours later). The latter is performed approximately twice a year for each facility at stations nearest the outfalls. The following levels are recorded: Fecal Coliform, Enterococci, Biochemical Oxygen Demand, Total Suspended Solids, Total Kjeldahl Nitrogen (TKN), Organic nitrogen, and ammonia. Of these indicators, Enterococci is the primary factor used to characterize overall water quality health and dictate beach closures. Exhibit 13 maps the sampling sites.

EXHIBIT 13
City of Newport Water Quality Sampling Locations



4.1.2 State of Rhode Island

RIDOH samples Enterococci at designated beaches from Memorial Day to Labor Day, including 7-8 times per month at King Park Main Beach. COA, a volunteer group that monitors [strictly] beaches and known swimming areas (some not designated), also samples at King Park Beach, providing a fairly extensive array of water quality data at this critical location. King Park Beach is also mapped in Exhibit 13.

4.2 Harbor Surface Water Quality Data

Harbor water quality is determined by examining Enterococci bacteria counts as well as a handful of other indicators, as explored in subsequent sections.

4.2.1 Bacteria

Using Enterococci as the metric for measuring overall water quality, Exhibits 14 and 15 show two sample water quality standard exceedance graphs for October of 2008 through the end of 2011. Site 6-24 was selected for this example because of its close proximity to the Wellington Avenue outfall while site 6-27 was chosen for its proximity to the Washington Street outfall. The remaining harbor plots are attached for reference in Attachment B. Both geometric mean and single sample maximum limits are included in these figures as well as the CSO discharge volumes from each facility. These CSO volumes are recorded by the City along with their corresponding rainfall volumes. Attachment A shows a 2-year portion of this data, obtained from the City's website. Points above the orange dashed line represent exceedances of the single sample maximum Enterococci value. Points highlighted by blue squares represent wet weather exceedances without CSOs while purple circles represent dry weather exceedances. These graphs indicate that many water quality standard exceedances occur in the absence of CSOs and even rain. Nevertheless, Exhibit 16 tabulates the annual Enterococci exceedances for the period 10/02/08 – 12/31/11.

EXHIBIT 14
Enterococci Levels in relation to CSOs at site 6-24 (near the Wellington Ave. facility)

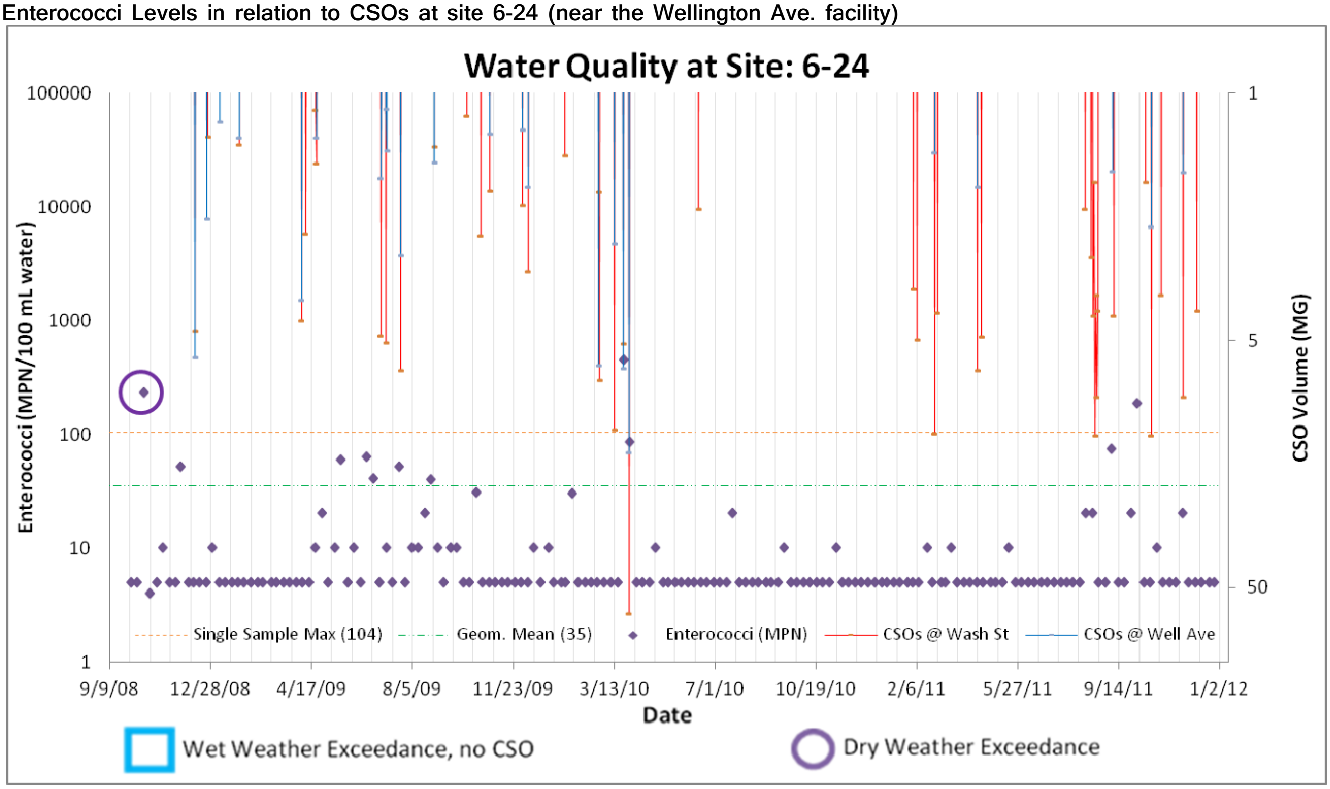


EXHIBIT 15
Enterococci Levels in relation to CSOs at site 6-27 (near the Washington St. facility)

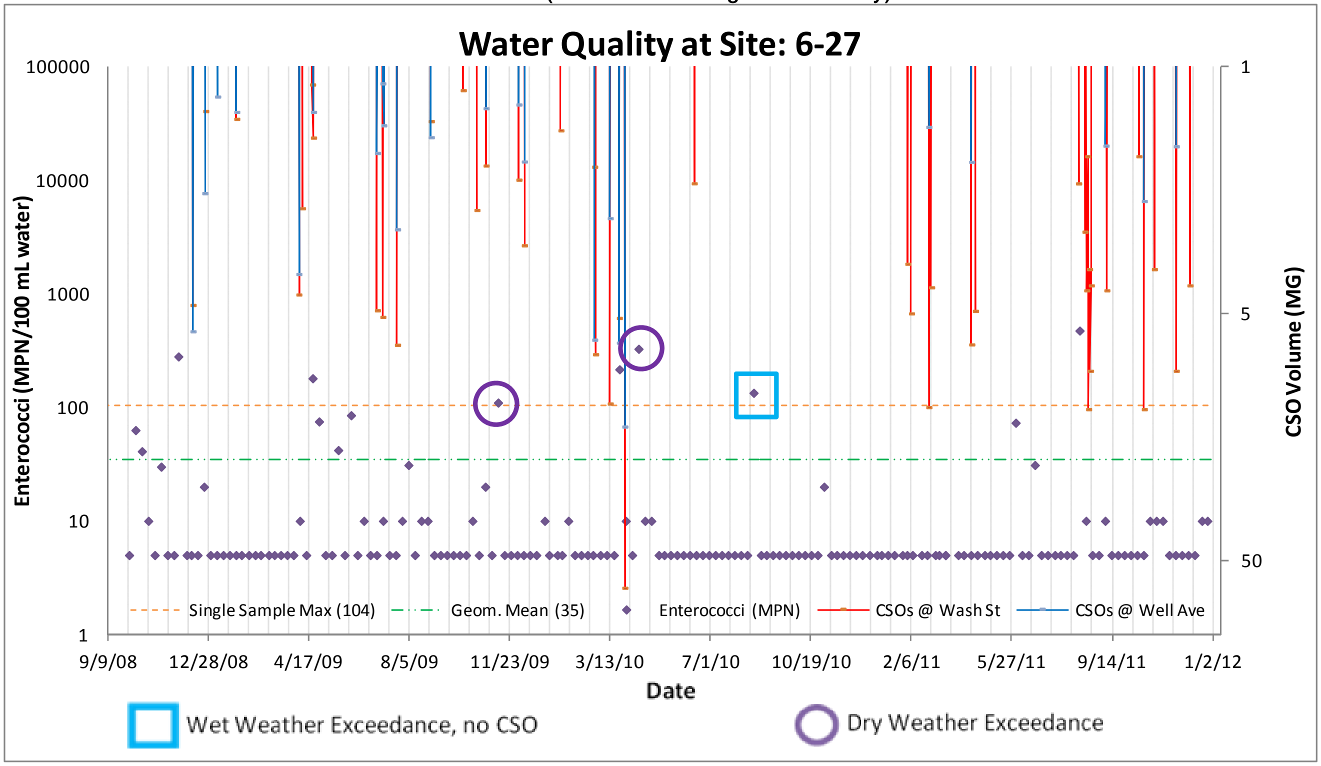


EXHIBIT 16
Annual Enterococci Exceedances for Harbor Waters, 2008 - 2011

Site / Year	2008*	2009	2010	2011
6-4	1	0	0	1
6-5	0	0	0	0
6-22	0	0	0	0
6-23	1	0	0	2
6-24	1	0	1	1
6-25	1	0	2	1
6-27	1	2	3	1
6-28	1	1	0	0
DEM-A	2	1	4	2
DEM-B	1	0	0	0
Total	9	4	10	8

*Partial Year beginning 10/02/2008

4.2.2 Other Indicators

As previously mentioned, a number of other water quality indicators are consistently measured throughout the harbor, including fecal coliform, biochemical oxygen demand, total suspended solids, and total kjeldahl nitrogen (TKN). Exhibit 17 tabulates the ranges and averages for these data based on 170 weekly samples from October of 2008 through the end of 2011. While an abundance of data is available for these parameters, this study focuses on Enterococci as the primary water quality metric.

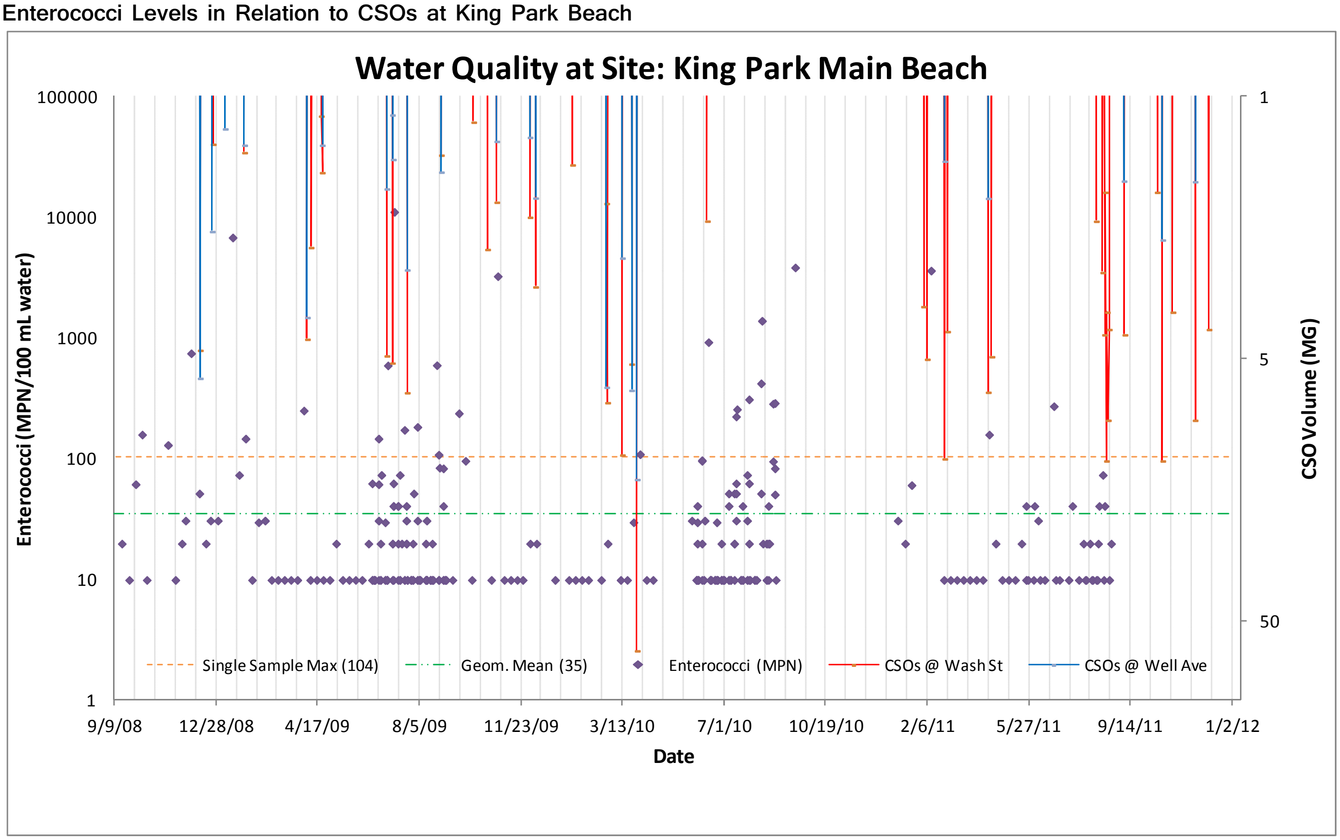
EXHIBIT 17
Ranges and Median Values for Various WQ Indicators across all Harbor Sites

Parameter	Fecal Coliform (MPN)	BOD5 (mg/L)	TSS (mg/L)	TKN (mgN/L)
Max	1600	47	60	2.5
Min	1	1	1	0
Median	2	2	10	0.1

4.3 Harbor Beach Data

Newport's beaches are sampled by opening and filling a sterile bottle underwater. Samples are collected in the middle of the water column; no closer to the surface or sediment level than 1 foot (RIDOH, 2011). Analogous to the harbor surface water data, Enterococci data was plotted for King Park Beach. Since multiple sampling locations exist at this beach (specifically, King Park Main Beach-Center, -East, and –West as well as King Park Boat Ramp-East and –West), only the maximum daily readings were utilized for analysis. Exhibit 18 illustrates the water quality standard exceedance graph for October of 2008 through the end of 2011, along with corresponding CSOs and water quality exceedance limits. As was the case for the Harbor waters, Newport's beaches also close upon Enterococci levels exceeding 104 CFU/100 mL (RIDOH, 2011). At King Park Beach there were 5, 12, 10, and 3 Enterococci exceedances in 2008, 2009, 2010, and 2011, respectively.

EXHIBIT 18
Enterococci Levels in Relation to CSOs at King Park Beach



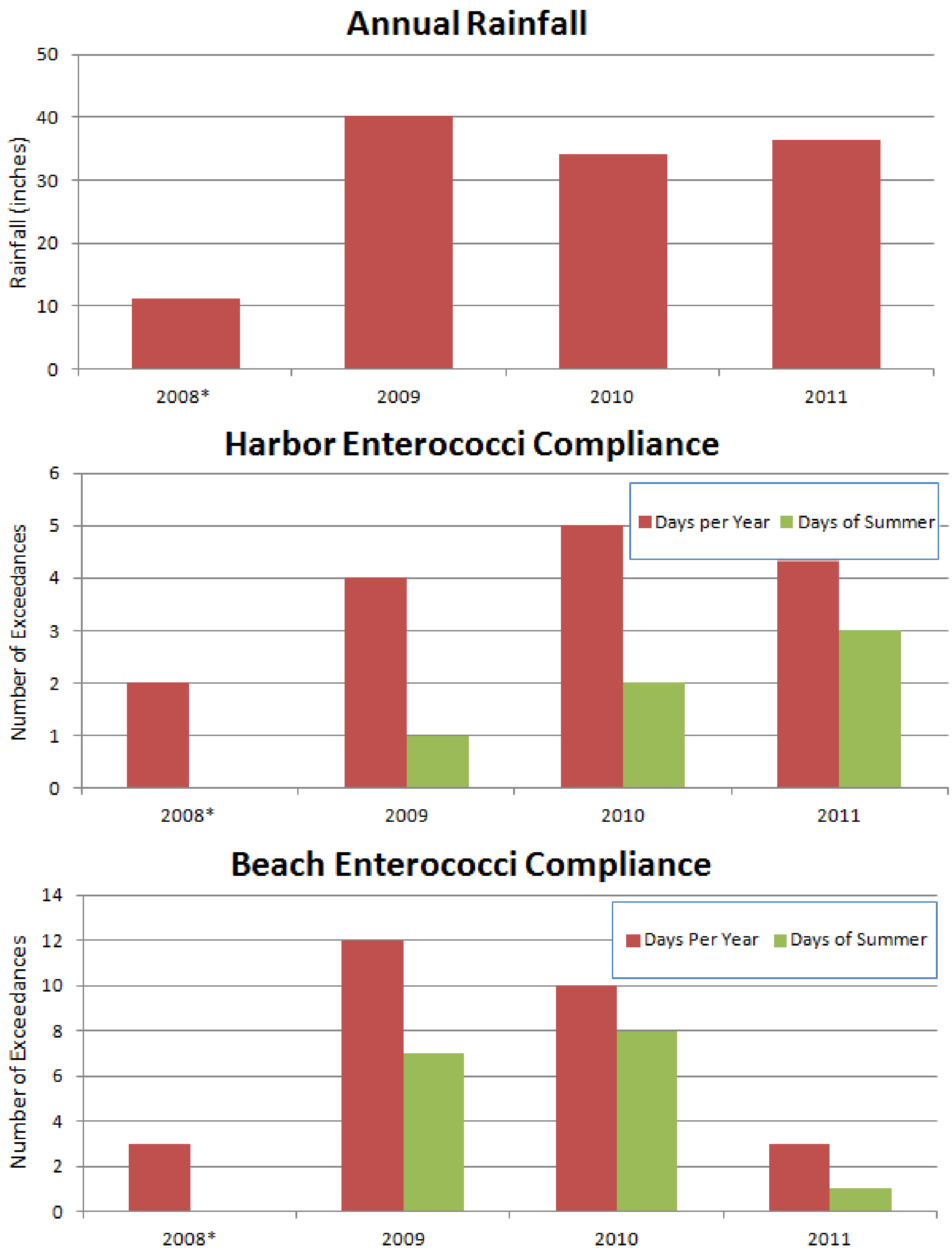
5 Harbor Water Quality Summary

The impact of CSOs on water quality is realized by comparing the total number of Enterococci exceedances over the years to both rainfall and CSOs during the same time frame.

5.1 Overall Water Quality Compliance Assessment

Exhibit 19 shows the number of Enterococci exceedances during 2008-2011 for both Harbor waters and King Park Beach. Since Enterococci monitoring began in late 2008, the corresponding rainfall displayed here for 2008 is not an annual total. Rainfall did not vary significantly over this multiyear period. While Enterococci exceedances may have slightly decreased at the Beach, Harbor water quality clearly did not improve.

EXHIBIT 19
Water Quality Compliance with Recreational and Shellfish Standards



* Partial Year beginning 10/02/2008

5.2 CSO Discharge Effects on Water Quality

Exhibit 20 summarizes wet weather surface monitoring Enterococci exceedances for 2009-2011 at both CSO facilities. For the period considered, 8 Enterococci exceedances were witnessed in 12 wet weather CSO events (33% compliant). The same measurements performed six hours later, however, resulted in only 3 Enterococci exceedances (75% compliant). This suggests that any water quality violations due to CSOs are diluted to acceptable levels in a matter of hours.

EXHIBIT 20
Wet Weather Enterococci Exceedances at Both CSO Facilities

Year	Samples During CSO Event	CSO Enterococci Exceedances	Samples 6 Hours after a CSO Event	Post-CSO Enterococci Exceedances	Months Sampled
2009	4	3	4	0	July & October
2010	4	1	4	0	March, April and November
2011	4	4	4	3	August and September
Total	**12**	**8**	**12**	**3**	**-**

Water quality exceedances are also observed during dry weather flows. Exhibit 21 shows Enterococci exceedances in relation to rainfall and CSOs. For each of these four years, there are at least two annual instances where exceedances occur in the absence of CSOs. In 2010, for example, only half of the 10 total exceedances resulted from a CSO that occurred within two days of sampling. Therefore, it is seen that CSOs are not the sole cause of poor water quality. Stormwater runoff carrying fecal matter from birds as well as local point source contamination occurring during completely dry weather, such as boats dumping their waste directly into the harbor, are major contributors to Enterococci exceedances in Newport Harbor.

EXHIBIT 21
Harbor Enterococci Exceedance Background Weather Conditions

Year	Total Samples Collected	Total Enterococci Exceedances+	Enterococci Exceedances Associated w/ Rainfall (but No CSO Event)	Enterococci Exceedances within 2 days of a CSO Event	Enterococci Exceedances Preceded by 24+ hrs of Dry Weather
2008*	130	9	0	6	3
2009	530	4	1	1	2
2010	520	10	4	5	1
2011	520	8	2	6	0
Total	**1700**	**31**	**7**	**18**	**6**

*Partial Year beginning 10/02/2008

+ Enterococci levels were not exceeded at all 10 locations. For 11 of the 16 days, Enterococci levels were exceeded at only 1 station.

It is worth noting the importance of the mixing zone, as water quality standards may be met at sampling points located near the surface but not at immediate points of discharge from an effluent diffuser. Thus, mixing zone policy becomes important.

5.3 Potential Benefits of Implementing Additional CSO Controls

Additional CSO controls and measures to reduce overflows into the harbor would certainly improve water quality. However, as the aforementioned exceedance table suggests, degraded water quality also results from other factors, such as stormwater runoff and dry weather point source pollution. Therefore, it may not be cost effective to focus efforts on further CSO improvements while other larger water quality degradation contributors will persist.

A Collection System Capacity Assessment will be performed in an effort to eliminate outfalls completely by identifying and modifying portions of the collection system subject to capacity related surcharges or overflows. Additional system improvements may be achieved through implementation of public and private infiltration/inflow removal programs. Structural measures required to prevent surcharges and overflows will be identified. The City's ability to eliminate the Wellington and Washington outfalls will be evaluated.

If the outfalls will not be eliminated, a System Master Plan (SMP) may be needed. Additional measures will be identified to eliminate outfalls. WPCP upgrades, including CEPT, will be considered. Off-line and in-line storage methods are likely solutions. A schedule for implementation will then be crafted based on affordability that is compliant with EPA CSO guidance documents.

5.4 Final Observations

There are no untreated discharges of raw sewage to Newport Harbor by the City of Newport; all aforementioned CSOs are treated. Treated wet weather discharges occur only at two RIDEM-permitted CSO treatment facilities (Wellington Avenue and Washington Street). The designated uses for the Harbor are SB and SB1 (fishable/swimmable). The State of Rhode Island reports that designated uses are "fully supported" with the exception of a non-related contaminated sediments issue.

6 Works Cited

Consolidated Assessment and Listing Methodology for Section 305(b) and 303(d) Integrated Water Quality Monitoring and Assessment Reporting. 2009. State of Rhode Island and Providence Plantations Department of Environmental Management, Office of Water Resources. January 2012.

EPA. 1994. *Combined Sewer Overflows - CSO Control Policy*. Washington, DC. U.S. Environmental Protection Agency, Office of Water. EPA 830-B-94-001. January 2012.

Newport Harbor Water Quality Monitoring. 2011. City of Newport Department of Utilities. Web. January 2012. <http://cityofnewport.com/departments/utilities/pollution_control/harbor.cfm>.

Rhode Island Department of Environmental Management. 2007. *Newport WPCP Final Permit RIPDES No. RI0100293.* January 2012. 2-10.

Rhode Island Department of Environmental Management. 2011. *State of Rhode Island 2010 303(d) List, List of Impaired Waters.* January 2012. 31.

RIDOH. 2011*. Water Quality Information*. Rhode Island Department of Health - Beach Monitoring. Web. January 2012. <http://www.ribeaches.org/search.cfm

Summary of CSO Events since 2001. City of Newport Department of Utilities. Web. January 2012. <http://cityofnewport.com/departments/utilities/pdf/CSO_Summary_2001-current.pdf>.

Water Quality Regulations. 2009. State of Rhode Island and Providence Plantations Department of Environmental Management, Office of Water Resources. Web. January 2012. <http://www.dem.ri.gov/pubs/regs/regs/water/h20q09a.pdf>.

Wright-Pierce, and United Water. 2010. *Engineering Evaluation - Wellington Avenue CSO Treatment Facility, Washington Street CSO Treatment Facility, and Narragansett Avenue Storage Conduit*. Rep. City of Newport, Rhode Island, CSO Long-Term Control Plan Implementation. Print. January 2012. 5-11.

Attachment A – Recent sample of Newport's posted CSO and Rainfall Volumes

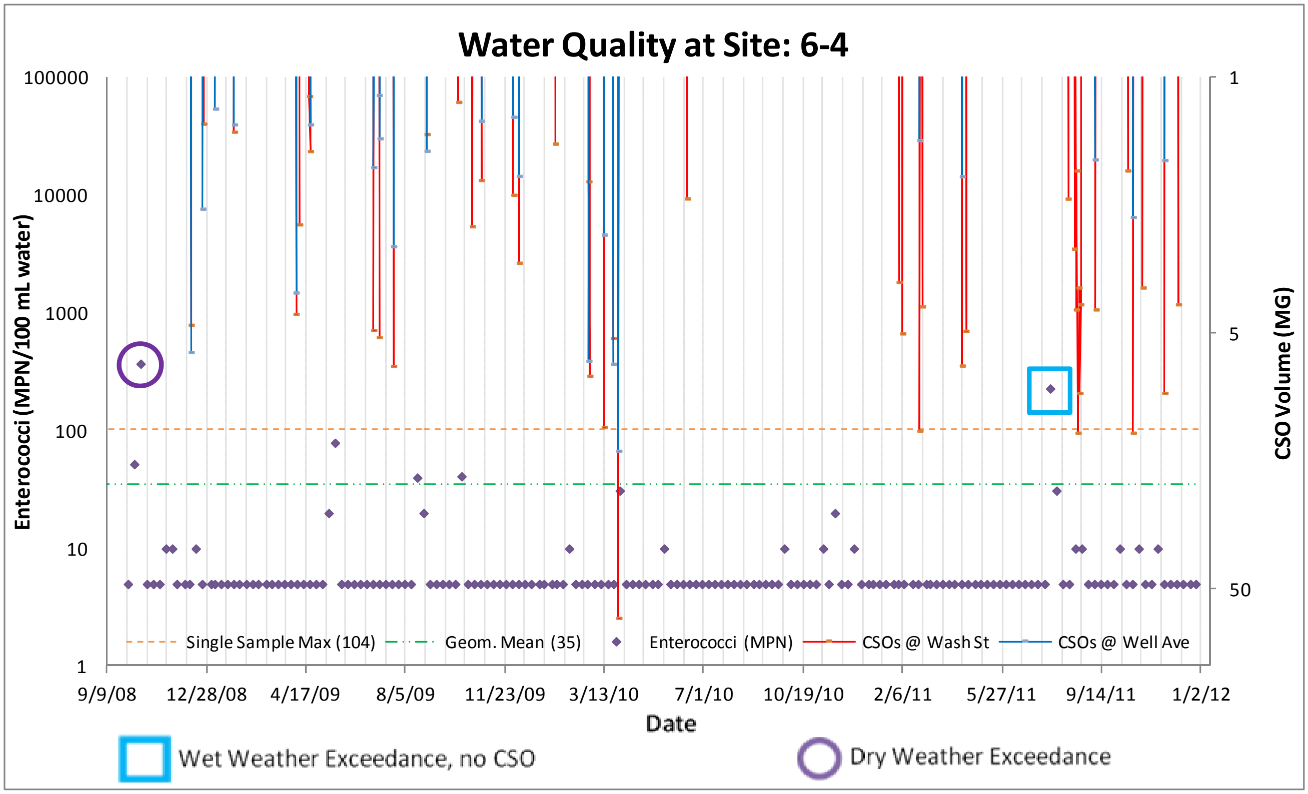
Wellington Avenue CSO Facility CSO Discharges 2001-Current

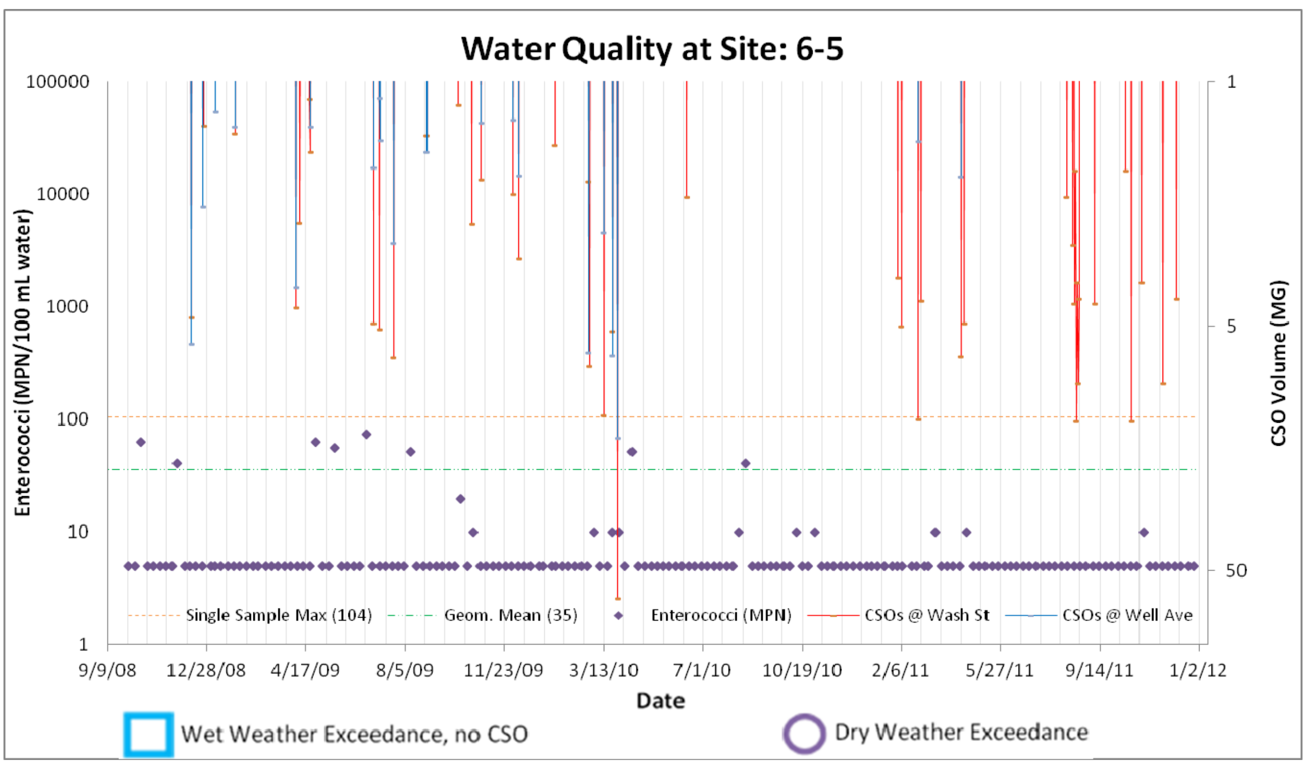
Year	Day & Month of Discharge	Wellington CSO Total Discharge (gal)	Rainfall Total (inches)
2008	October 26	152,388	1.35
cont.	November 25	34,000	1.68
	Dec 11-14	5,892,336	4.15
	Dec 21	152,388	0.8 + snow melt
	Dec 24-26	1,625,472	0.85 + snow melt
2009	Jan 7-8	660,348	1.55+ snow melt
	Jan 28-29	761,940	2.35"
	March 29	50,796	1.15"
	April 3	50,796	0.8"
	April 6-8	3,454,128	3.08"
	April 11- 12	126,990	0.76"
	April 21	76,194	1.36"
	April 21-23	761,940	2.03"
	May 5	25,398	0.85"
	May 6	101,592	0.68"
	May 7	76,194	0.5"
	June 19	56,286	1.2"
	July 1-2	1,117,512	2.64"
	July 2-3	177,786	0.73"
	July 7-8	584,154	1.08"
	July 8-9	863,532	0.84
	July 23-26	2,277,254	2.67"
	Aug 29-30	965,124	3.66"
	Oct 3	380,970	1.32"
	Oct 18	406,368	1.76"
	Oct 25	25,398	1.07"
	Oct 28-29	736,542	1.21"
	Dec 3	711,144	1.55"
	Dec 9-10	1,210,638	1.47"
	Dec 13	253,980	1.07"
	Dec 27	279,378	0.28" + snow melt
2010	Jan 18	380,970	1.5"
	Jan 25-26	177,786	1.08"
	Feb 24-28	6,374,898	4.4"
	Feb 28	76,194	n/a
	Mar 13-18	2,052,378	4.46"
	Mar 23-27	6,552,684	3.94"
	Mar 27	76,194	n/a
	Mar 29- Apr 4	14,324,472	7.23"
	Apr 4	33,864	n/a
	June 5	29,631	1.41"
	June 13	207,417	2.31"
	July 19	38,097	0.6"
	July 24	41,440	0.47"
	Oct 6	175,328	1.36"
	Oct 15	304,384	1.64'
	Nov 17	135,648	1.38"
	Dec 12	60,064	1.24"
2011	Feb 2	82,880	1.03" +snow
	Feb 6	62,280	0.44 + snow
	Feb 25	876,544	2.2"
	Feb 28	55,200	0.63"
	Apr 13-14	1,214,208	2.49"
	April 17	152,388	0.95"
	June 22	87,552	1.08"
	Aug 8	299,392	1.41"
	Aug 15	273,792	2.45"
	Aug 28	171,108	1.1"
	Sept 6	41,184	2.08"
	Sept 8	1,043,776	2.36"
	Sept 9	76,128	n/a
	Oct 4	86,208	1.09"
	Oct 13	75,293	1.37"
	Oct 19-20	1,750,000	2.77"
	Oct 30	266,679	1.81"
	Nov 10	27,467	1.25"
	Nov 23	1,049,921	2.66"
	Dec 8	404,801	2.36"

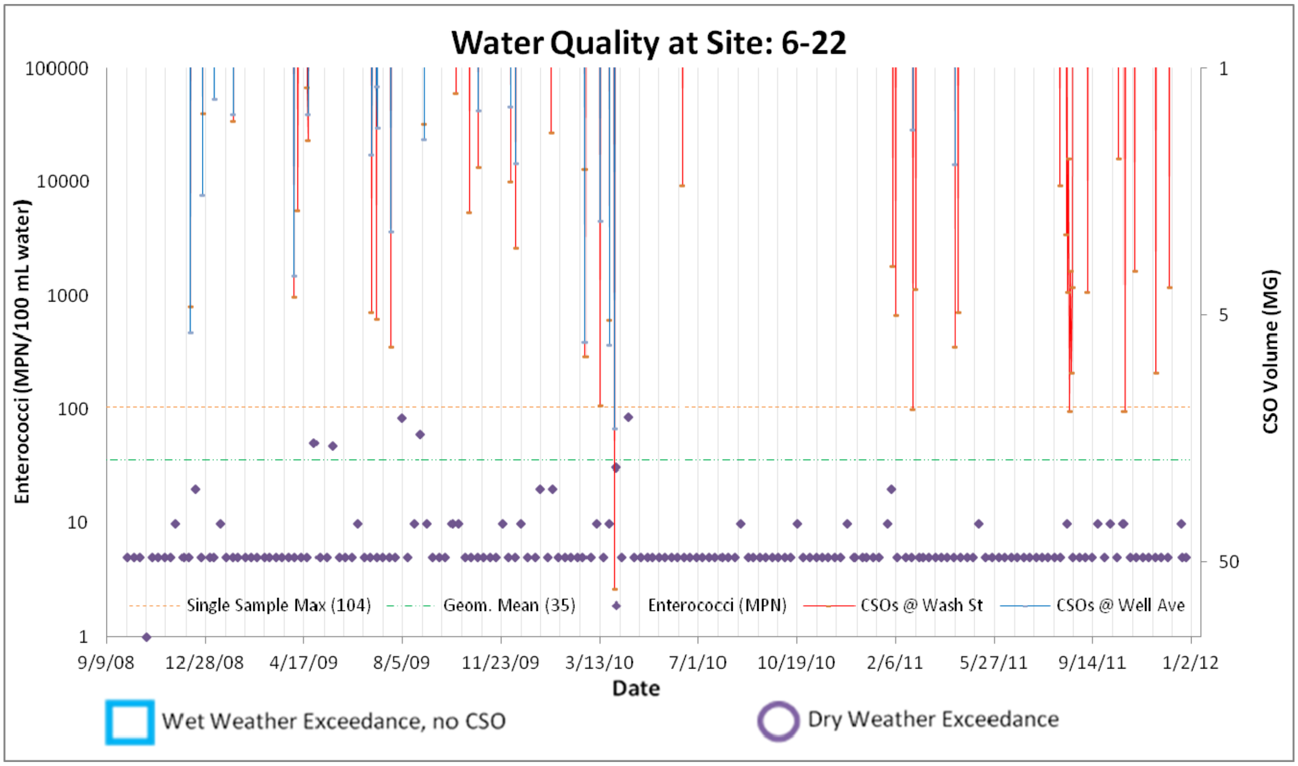
Washington Street CSO Facility CSO Discharges 2001-Current

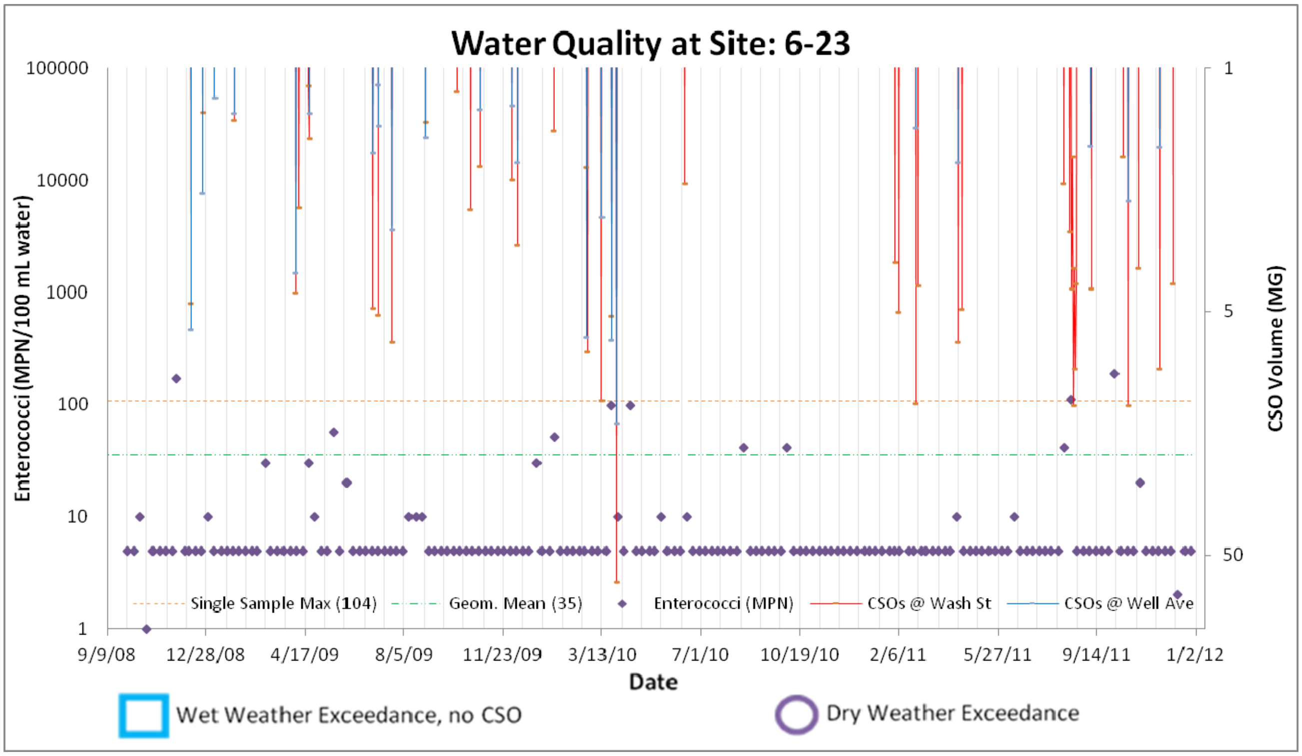
Year	Day & Month of Discharge	Washington CSO Total Discharge (gal)	Rainfall Total (inches)
2008			
cont.			
2009	Jan 7-8	463,693	1.55+ snow melt
	Jan 28-29	813,107	2.35"
	April 6-9	4,182,400	3.08"
	April 10-11	1,870,592	n/a
	April 11-12	79,104	0.76"
	April 21	590,082	1.36"
	April 21-23	968,691	2.03"
	April 23	5,504	n/a
	May 6	189,299	0.68"
	July 1-5	4,843,098	3.37"
	July 5	138,509	n/a
	July 7-11	5,154,406	1.84"
	July 11-12	61,287	n/a
	July 23-28	6,686,195	3.85"
	July 28	61,210	n/a
	Aug 29-30	830,612	3.66"
	Aug 31	169,408	n/a
	Oct 3	622,118	1.32
	Oct 18-21	1,902,502	1.76"
	Oct 28-29	1,256,307	1.21"
	Dec 3	1,433,396	1.55"
	Dec 9-10	2,642,893	1.47"
	Dec 13-14	438,195	1.07"
	Dec 15	6,195	n/a
2010	Jan 18	904,960	1.5"
	Jan 25-26	101,004	1.08"
	Feb 24	1,270,604	see below
	Feb 25- Mar 1	7,300,290	4.4"
	Mar 13-18	11,558,592	4.46"
	Mar 23-28	5,204,404	3.94"
	Mar 29- Apr 4	64,429,952	7.23"
	June 13	1,483,000	2.31"
	Nov 17	185,000	1.38"
2011	Feb 2	3,141,000	1.03" + snow
	Feb 6	4,985,000	0.44 + snow
	Feb 8	334,000	0.32" +snow
	Feb 25-26	11,955,000	2.2"
	Feb 28	3,911,000	0.63"
	Apr 13-14	6,663,000	2.49"
	April 17	4,874,000	0.95"
	Aug 8	1,484,000	1.41"
	Aug 15	2,328,000	2.45"
	Aug 28	31,000	1.1"
	Sept 8	4,022,000	2.36"
	Oct 13	1,152,000	1.37"
	Oct 19-22	12,180,000	2.77"
	Oct 30-31	3,300,000	1.81"
	Nov 23-24	8,520,000	2.66"
	Dec 8-9	3,840,000	2.36"

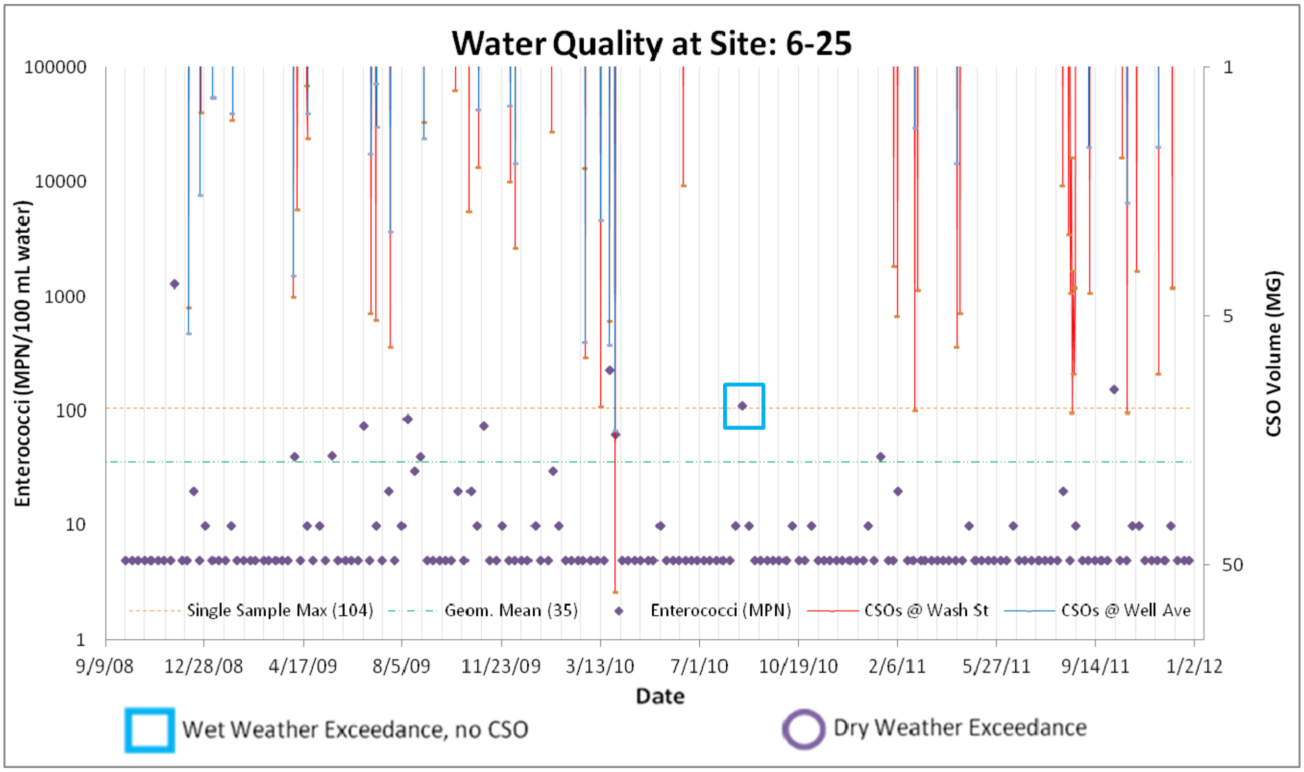
Attachment B - Enterococci WQ Plots at Remaining Harbor Sites

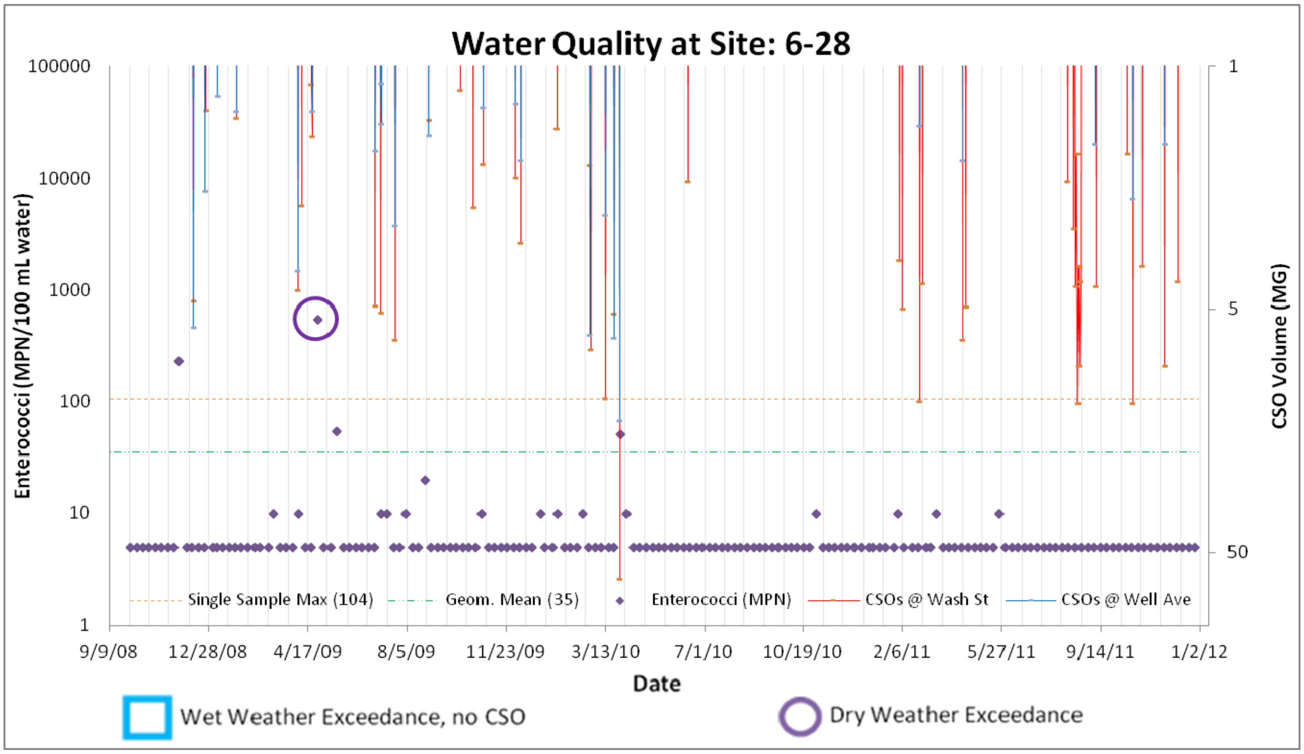


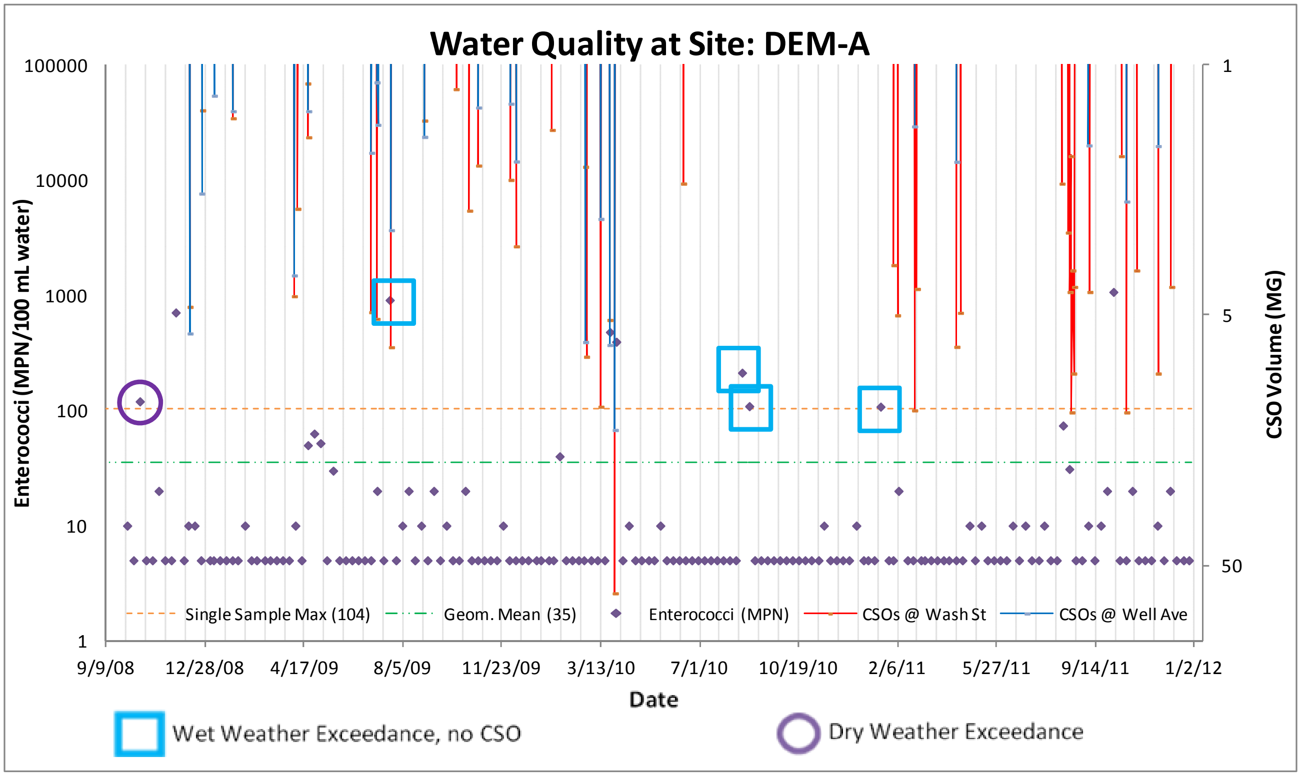


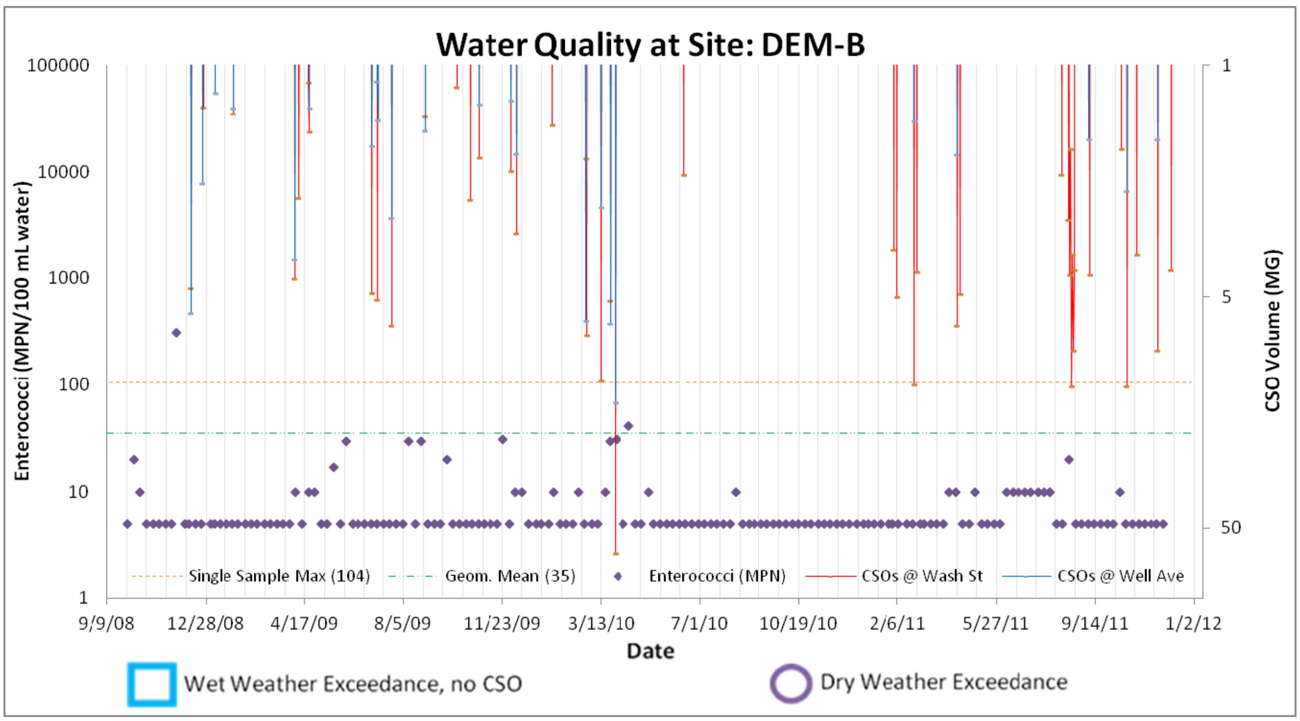

Water Quality at Site: 6-22
Enterococci (MPN/100 mL water)
CSO Volume (MG)
100000
10000
1000
100
10
1
1
5
50
Single Sample Max (104)
Geom. Mean (35)
Enterococci (MPN)
CSOs @ Wash St
CSOs @ Well Ave
9/9/08
12/28/08
4/17/09
8/5/09
11/23/09
3/13/10
7/1/10
10/19/10
2/6/11
5/27/11
9/14/11
1/2/12
Date
Wet Weather Exceedance, no CSO
Dry Weather Exceedance


Water Quality at Site: 6-23
Enterococci (MPN/100 mL water)
CSO Volume (MG)
100000
10000
1000
100
10
1
1
5
50
Single Sample Max (104)
Geom. Mean (35)
Enterococci (MPN)
CSOs @ Wash St
CSOs @ Well Ave
9/9/08
12/28/08
4/17/09
8/5/09
11/23/09
3/13/10
7/1/10
10/19/10
2/6/11
5/27/11
9/14/11
1/2/12
Date
Wet Weather Exceedance, no CSO
Dry Weather Exceedance


Water Quality at Site: 6-25
Enterococci (MPN/100 mL water)
100000
10000
1000
100
10
1
CSO Volume (MG)
1
5
50
Single Sample Max (104)
Geom. Mean (35)
Enterococci (MPN)
CSOs @ Wash St
CSOs @ Well Ave
9/9/08
12/28/08
4/17/09
8/5/09
11/23/09
3/13/10
7/1/10
10/19/10
2/6/11
5/27/11
9/14/11
1/2/12
Date
Wet Weather Exceedance, no CSO
Dry Weather Exceedance


Water Quality at Site: 6-28
Enterococci (MPN/100 mL water)
100000
10000
1000
100
10
1
CSO Volume (MG)
1
5
50
Single Sample Max (104)
Geom. Mean (35)
Enterococci (MPN)
CSOs @ Wash St
CSOs @ Well Ave
9/9/08
12/28/08
4/17/09
8/5/09
11/23/09
3/13/10
7/1/10
10/19/10
2/6/11
5/27/11
9/14/11
1/2/12
Date
Wet Weather Exceedance, no CSO
Dry Weather Exceedance


Water Quality at Site: DEM-A
100000
10000
1000
100
10
1
Enterococci (MPN/100 mL water)
1
5
50
CSO Volume (MG)
Single Sample Max (104)
Geom. Mean (35)
Enterococci (MPN)
CSOs @ Wash St
CSOs @ Well Ave
9/9/08
12/28/08
4/17/09
8/5/09
11/23/09
3/13/10
7/1/10
10/19/10
2/6/11
5/27/11
9/14/11
1/2/12
Date
Wet Weather Exceedance, no CSO
Dry Weather Exceedance


Water Quality at Site: DEM-B
100000
10000
1000
100
10
1
Enterococci (MPN/100 mL water)
1
5
50
CSO Volume (MG)
Single Sample Max (104)
Geom. Mean (35)
Enterococci (MPN)
CSOs @ Wash St
CSOs @ Well Ave
9/9/08
12/28/08
4/17/09
8/5/09
11/23/09
3/13/10
7/1/10
10/19/10
2/6/11
5/27/11
9/14/11
1/2/12
Date
Wet Weather Exceedance, no CSO
Dry Weather Exceedance