EXTENSION TO VARIANCE FOR
COMBINED SEWER OVERFLOW DISCHARGES
LOWER CHARLES RIVER BASIN
FACT SHEET

This document is intended to provide a summary of the activities that have taken place since the Massachusetts Department of Environmental Protection's ("DEP") issuance of the Combined Sewer Overflow ("CSO") Variance for the Lower Charles River Basin on October 1, 1998, and to provide a frame of reference for DEP's decision to extend the Variance for a period not to exceed three years, to October 1, 2016.

I. Background on CSO Control and Variance

Boston Harbor Case

As part of the Boston Harbor Case (D. Mass. C.A. No. 85-0489-RGS), the Massachusetts Water Resources Authority ("MWRA") is required to undertake corrective actions in its approved Long Term CSO Control Plan ("LTCP") to reduce or eliminate CSO discharges to the Charles River. The LTCP includes 35 wastewater system improvement projects that will reduce or eliminate CSO discharges at 84 outfalls in the metropolitan Boston area at an updated MWRA cost of $888.1 million. The eight projects in the LTCP that address CSO discharges to the Charles River have a total estimated cost of $91 million.

In July 1997, MWRA produced its Final CSO Facilities Plan and Environmental Impact Report (the "1997 Facilities Plan/EIR"). The 1997 Facilities Plan/EIR was the result of several years of CSO planning and underwent extensive public, regulatory, and Massachusetts Environmental Policy Act ("MEPA") review as part of the process. Early in the planning process, MWRA characterized the baseline conditions throughout the regional planning area, including the Charles River Basin, through an extensive flow metering, water quality sampling and collection system modeling and water quality modeling program. In accordance with national and Massachusetts CSO control policies, the 1997 Facilities Plan/EIR evaluated the costs and benefits of a range of CSO alternatives in the Charles River Basin to address these discharges.

DEP and the United States Environmental Protection Agency ("EPA") reviewed the information in the 1997 Facilities Plan/EIR and in early 1998 concurred that the recommended plan for the Charles River Basin should move forward without delay. At that time, DEP and EPA decided to defer a final determination on the water quality standard and associated long-term level of CSO control in the Charles River Basin until additional information on CSO and non-CSO pollutant loads could be developed. Accordingly, DEP, with the support of EPA, issued the Variance for CSO discharges to the Charles River on October 1, 1998.

DEP extended the variance several times, in part to accommodate the collection and analysis of additional water quality data by the Charles River Watershed Association ("CRWA"), MWRA and others, the evaluation of the effectiveness of storm water pollution

controls by the United States Geological Survey ("USGS"), the implementation of storm water pollution control measures by municipalities along the Charles River, and the further evaluation of additional CSO controls. These analyses led MWRA to recommend additional controls and to expand its LTCP for the Lower Charles River Basin in 2005.

In March 2006, MWRA reached agreement with EPA, DEP and the United States Department of Justice ("DOJ") on the revised plan and a new schedule. The agreement was filed with the Federal District Court as part of a joint motion to amend the court schedule in the Boston Harbor Case (D. Mass. C.A. No. 85-0489). At that time, DEP and EPA determined that MWRA's LTCP satisfied the requirements for a variance from water quality standards for CSO discharges to the Lower Charles River Basin through 2020. As part of this determination, DEP and EPA agreed that DEP would issue and EPA would approve five consecutive extensions of no more than three-year duration each through 2020, when the LTCP would be fully implemented and verification of attainment of the long-term levels of CSO control would be made. The variance extensions would be consistent with and limited to the requirements in MWRA's LTCP.

In April 2006, the Court allowed the joint motion and issued an Order with a new schedule. Under the Order, MWRA has until the year 2020 to complete the remaining CSO work and subsequent monitoring to verify that the long-term CSO control goals are achieved. In addition, the United States and MWRA agreed to withdraw the February 27, 1987 Stipulation of the United States and the Massachusetts Water Resources Authority on Responsibility and Legal Liability for Combined Sewer Overflows and replace it with a Second Stipulation that requires MWRA to implement the CSO requirements set forth in the court schedule and to meet the levels of control described in MWRA's LTCP. In July 2006, the Court accepted revisions to Schedule Six incorporating a new Schedule Seven. The revisions include modified or additional milestones for projects in the Alewife Brook, Charles River and East Boston CSO plans.

More information about MWRA's LTCP, including the status of implementation of each of the 35 projects, is presented in MWRA's CSO Annual Progress Report 2012 (March 2013), available at: http://www.mwra.com/01news/2013/031513-csocontrolreport.html. To date, MWRA has completed 31 of the 35 projects in the LTCP, including all eight of the LTCP projects that address CSO discharges to the Charles River (see project updates below, under *Revised CSO Control Plan*). Two of the four LTCP projects not yet complete are currently in construction, including CAM004 sewer separation – one of the five projects in the Alewife Brook CSO control plan – and Reserved Channel Sewer Separation in South Boston. The remaining two projects, both components of the Alewife Brook CSO control plan, are in design and are scheduled to move into construction in 2013 and 2014.

Separately, the City of Cambridge continues to implement its own long-term plans for the separation of combined sewers tributary to MWRA's North Charles Metropolitan Sewer, North Charles Relief Sewer and Cambridge Branch Sewer, which MWRA predicts will contribute to attainment of the LTCP levels of CSO control.

CSO Variance

In October 1998, DEP issued, and EPA approved, a three-year variance to water quality standards for CSO discharges to the Lower Charles River Basin. DEP issued the variance in lieu of making a long-term revision to water quality standards for this receiving water, in accordance with MWRA's LTCP.

With the variance, DEP approved MWRA's LTCP for the Lower Charles River Basin and required MWRA to implement the LTCP, evaluate the potential for infiltration/inflow (I/I) removal to increase CSO control and benefits, and conduct additional water quality investigations to assess pollutant loadings to these waters. With the new information collected during the variance period, MWRA was required to report on whether certain CSO control measures beyond the LTCP recommendations might be cost effective, most notably alternatives for providing additional storage at MWRA's Cottage Farm CSO treatment facility.

An early condition of the Charles River CSO Variance issued to MWRA required preparation and submission of the Cottage Farm CSO Facility Assessment Report (the "Cottage Farm report" or "report"). The report was submitted in January 2004 and underwent a lengthy public review and comment period, extending to May 2004. The Cottage Farm report verified that the CSO facility provides significant treatment in compliance with the NPDES permit, and that additional storage at the facility would have great cost and adverse impact to the recreational facilities at Magazine Park, with negligible water quality benefit. In the Cottage Farm report, MWRA instead recommended specific system optimization measures to maximize the conveyance of wet weather flows to the Deer Island Wastewater Treatment Plant, minimize overflows into the Cottage Farm facility, and maximize the benefit of the facility's existing storage basins. The report also demonstrated the value of sewer separation work (i.e. removal of storm water inflow from the combined sewer system) by the City of Cambridge and the Town of Brookline in reducing CSO discharges to the Charles River.

On October 1, 2004, after reviewing the Cottage Farm report and related public comments, DEP issued an additional three-year extension to the Charles River variance, to October 1, 2007. DEP issued two additional three-year extensions, in 2007 and in 2010, in accordance with the 2006 its agreement and determinations approving MWRA's revised LTCP and, for each extension, after reviewing new information from MWRA, CRWA and the public regarding the status of MWRA's LTCP implementation efforts and updated water quality conditions.

Conditions in the current variance that expires on September 30, 2013 require MWRA, the City of Cambridge and the Boston Water and Sewer Commission ("BWSC") to implement all elements of the recommended CSO control plan for the Charles River as modified by the recommendations for additional work in the Cottage Farm report. The variance also requires MWRA, Cambridge and BWSC to continue to implement the Nine Minimum Controls, monitor CSO discharges, report annually on the frequency and volume of CSO discharges to the Charles River, and respond to any DEP comments or questions related to system conditions and CSO control. The current variance also requires MWRA to conduct Charles River water quality monitoring, to work with DEP and MWRA member communities to minimize the impacts of I/I

flows and identify opportunities for I/I removal that may further reduce CSO discharges, and to assist member communities in evaluating the CSO benefits associated with I/I removal or other sewer system improvements.

Water quality data collection and water quality characterization by the CRWA, MWRA, and others has continued, and the implementation of MWRA's LTCP projects is scheduled to be completed by December 2015, with verification of control by December 2020. The current variance extension expires September 30, 2013.

II. Level of CSO Control

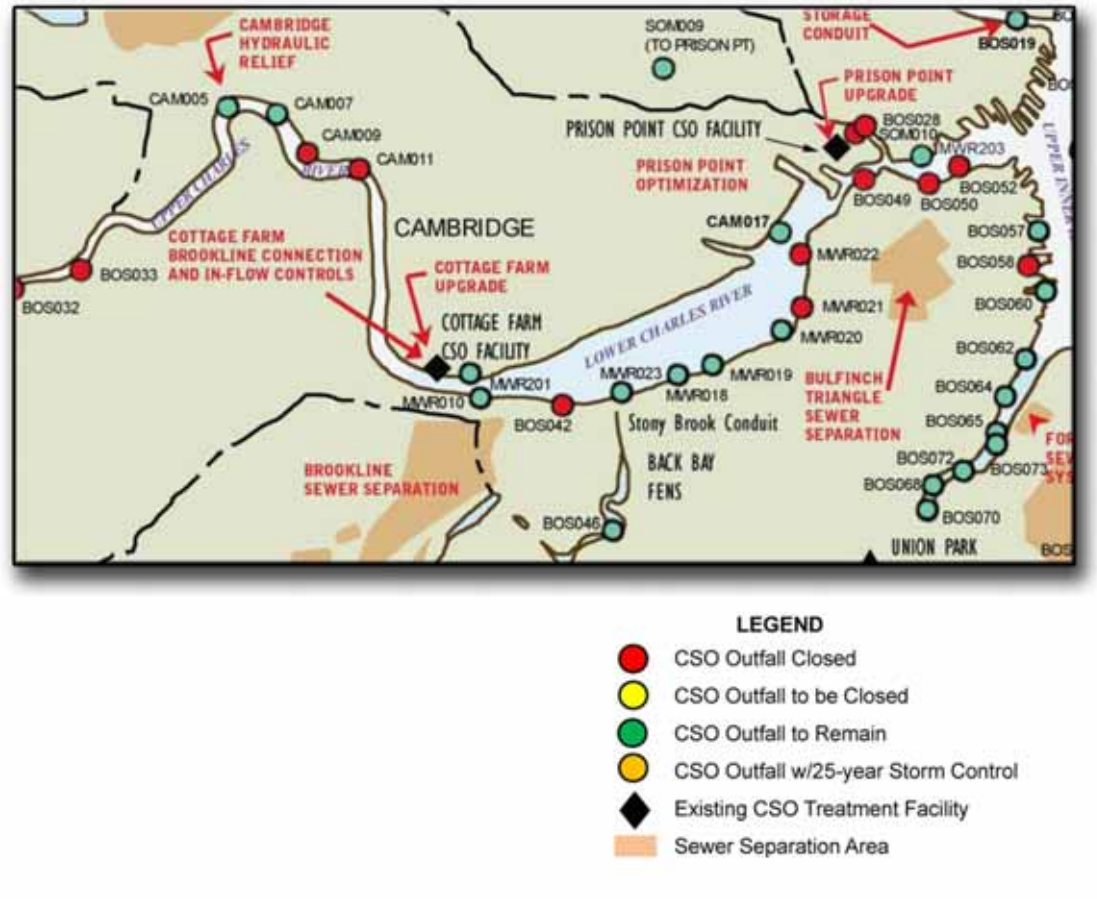
Revised CSO Control Plan and Implementation Status

In August 2005, MWRA recommended a revised region-wide LTCP that included a schedule for implementing the revised plan for the Charles River. At that time, MWRA recommended adding a set of optimization measures and targeted sewer separation projects to its plan to increase the level of CSO control at Cottage Farm and at other Charles River outfalls by improving hydraulic conditions and reducing storm water inflow. These additional projects account for approximately $40 million of the $91 million MWRA cost for the Charles River CSO plan. The projects were incorporated into the revised LTCP approved by EPA and DEP in March 2006 and incorporated into Schedule Seven by the Federal District Court in the Boston Harbor Case (D. Mass. C.A. No. 85-0489) in April 2006. See Table 1 and Figure 1 for project descriptions, locations and implementation status.

Table 1: MWRA Long-Term CSO Control Plan for Charles River Basin

Project	Purpose	Implementation Status	Cost (million $)
Upgrade Cottage Farm CSO Facility	Improve disinfection; add dechlorination	Completed 2000	5.7
CAM005 Hydraulic Relief	Increase flow into the MWRA system; reduce CSO	Completed 2000	1.2
CSO Outfall Closings	Eliminate CSO discharges at Outfalls BOS028, BOS032, BOS033, BOS042, SOM010, MWR020 and MWR021	Completed 2000	<1
Stony Brook Sewer Separation	Remove storm water from BWSC sewer system; reduce CSO to Stony Brook Conduit	Completed 2006	44.3
Floatables Controls	Control floatable materials at active outfalls	Completed 2007	0.4
Cottage Farm Brookline Connection and Inflow Control	Reduce CSO overflows into the Cottage Farm Facility	Completed 2009	3.6
Bulfinch Triangle Sewer Separation	Remove storm water from BWSC system; close outfall BOS049	Completed 2010	9.9
Brookline Sewer Separation (with cleaning of Outfall MWR010)	Remove storm water from Brookline system; reduce CSO at Cottage Farm Facility	Completed 2013	26.0

Figure 1: Charles River Basin CSO Locations and Projects



Together with projects in the original plan and MWRA's Deer Island treatment plant conveyance and treatment upgrades completed nearly two decades ago (which had a pronounced effect in reducing CSO discharges to the Charles River), the additional Charles River projects are predicted to reduce treated CSO discharges at the Cottage Farm facility to 2 activations and 6.3 million gallons in a typical year, compared to the 1997 goals of 7 activations and 23 million gallons. Most of the additional benefit comes from optimization improvements that increase in-system storage and direct more wet weather flow to MWRA's Ward Street Headworks for transport to the Deer Island Treatment Plant, thereby reducing overflows into the Cottage Farm facility. The targeted sewer separation work in Brookline and in the Bulfinch Triangle area of Boston are predicted to lower wet weather flows to the conveyance system, thereby offsetting the hydraulic impacts of projects that increase in-system storage and/or direct more flow to the Headworks.

The Town of Brookline completed the $24.9 million Brookline sewer separation project on April 26, 2013, ahead of the July 2013 milestone in Schedule Seven. All CSO related elements of the project are complete and are functioning as intended for full environmental benefit. With this project, Brookline has removed large volumes of storm water from its and MWRA's sewer systems, and the separated storm water now drains directly to the Charles River

Basin through MWRA's CSO outfall MWR010. The achieved separation removes the burden of the storm water flows on the sewage transport systems, reduces flows to the MWRA's Ward Street Headworks, and is predicted to lower CSO discharges to the Charles River at Outfall MWR010, at MWRA's Cottage Farm CSO treatment facility, and potentially at other Charles River CSO outfalls. Because the Ward Street Headworks system can also overflow to the MWRA's Boston Marginal Conduit ("BMC") and Prison Point CSO treatment facility, the project may also relieve overflows from the BMC to the Charles River Basin (outfalls MWR018, 019 and 020) and overflows to the Inner Harbor at Prison Point. MWRA plans to update its collection system model and system performance assessment using the as-built construction and inflow removal information it is now obtaining from Brookline.

The project involved separating the combined sewer systems serving a 71-acre area of the town. With the project, Brookline installed 10,370 linear feet of storm drain and 2,483 linear feet of sanitary sewer by open trench method and 4,218 linear feet of sanitary sewer by micro-tunneling at significant depths along the heavily used Beacon and Monmouth streets. The project converted Brookline's 84-inch by 89-inch St. Mary's Street combined sewer into a storm drain and modified Outfall MWR010 by removing old tide gates and an overflow plate to allow storm water flows to drain to the river. Since completion of the project, Brookline has conducted water quality sampling of the storm water flows in part to locate (and remove) remaining sanitary sources.

Related to this project, the Authority completed a $1.1 million contract in August 2012 to clean Outfall MWR010. The cleaning contract involved the removal of heavy sediments and was necessary to ensure conveyance of Brookline's separated storm water to the Charles River. Outfall MWR010 also serves as the continuing discharge point for CSO discharges from the Authority's Charles River Valley Sewer ("CRVS") and from a local BWSC combined sewer that ties into the CRVS, which activate only in very large storms.

Separately, and at significant additional cost, the City of Cambridge continues to implement its long-term plans for the separation of combined sewers tributary to MWRA's North Charles Metropolitan Sewer, North Charles Relief Sewer and Cambridge Branch Sewer. Ongoing and planned work to separate sewers in the Harvard Square, Western Avenue, Cambridgeport and Binney Street areas is expected to reduce CSO discharges at MWRA's Cottage Farm CSO treatment facility and at untreated CSO outfalls CAM005, CAM007 and CAM017. Cambridge closed outfalls CAM009 and CAM011 in 2007 and continues to monitor system performance to determine whether these outfalls can remain closed in the long term.

Achieved and Anticipated CSO Reductions in the Charles River Basin

The LTCP projects completed to date by MWRA and CSO communities within and outside the Charles River watershed, together with major improvements to the regional wastewater transport and treatment facilities MWRA completed in the late 1980's and 1990's, have reduced total average annual CSO discharge volume to the Charles River (including Stony Brook and the Back Bay Fens) from 1.7 billion gallons in 1988 to 31 million gallons today, a greater than 98% reduction. Approximately 85% of this remaining overflow to the Charles River is treated at the Cottage Farm facility. With completion of the LTCP projects and near

term progress by the City of Cambridge with its sewer separation program through 2020, MWRA predicts that average annual CSO discharge volume to the Charles River, Stony Brook and Back Bay Fens will be further reduced to less than 13 million gallons, with approximately half of this remaining overflow treated at Cottage Farm. Average annual CSO activations in the Charles River watershed have been reduced from up to 40 events in the early 1990's to only 5 events today, with the LTCP goal of only two events in the typical rainfall year. MWRA's hydraulic model and water quality model simulations predict that the recommended control levels will bring CSO discharges into compliance with Class B water quality criteria more than 98 percent of the time.

MWRA has already reduced the typical year CSO discharge volume to the Charles River (Upper and Lower Basins) from 1.7 billion gallons in 1988 to 31.4 million gallons today (see Figure 2 and Table 2), including CSO discharge to the Back Bay Fens at Outfall BOS046, but not including the benefits of the recently completed Brookline sewer separation project. Of this current average annual discharge volume, 86 percent is treated at the Cottage Farm CSO facility. MWRA has spent $91 million to implement the CSO control projects for the Charles River alone since the 1997 LTCP was issued. With planned completion of the system-wise LTCP and completion of sewer separation projects by the City of Cambridge tributary to the Charles River, MWRA predicts that CSO discharge volume to the Charles River will be reduced to approximately 13 million gallons in a typical year, with approximately 50 percent of the remaining annual discharge treated at the Cottage Farm CSO facility.

Figure 2

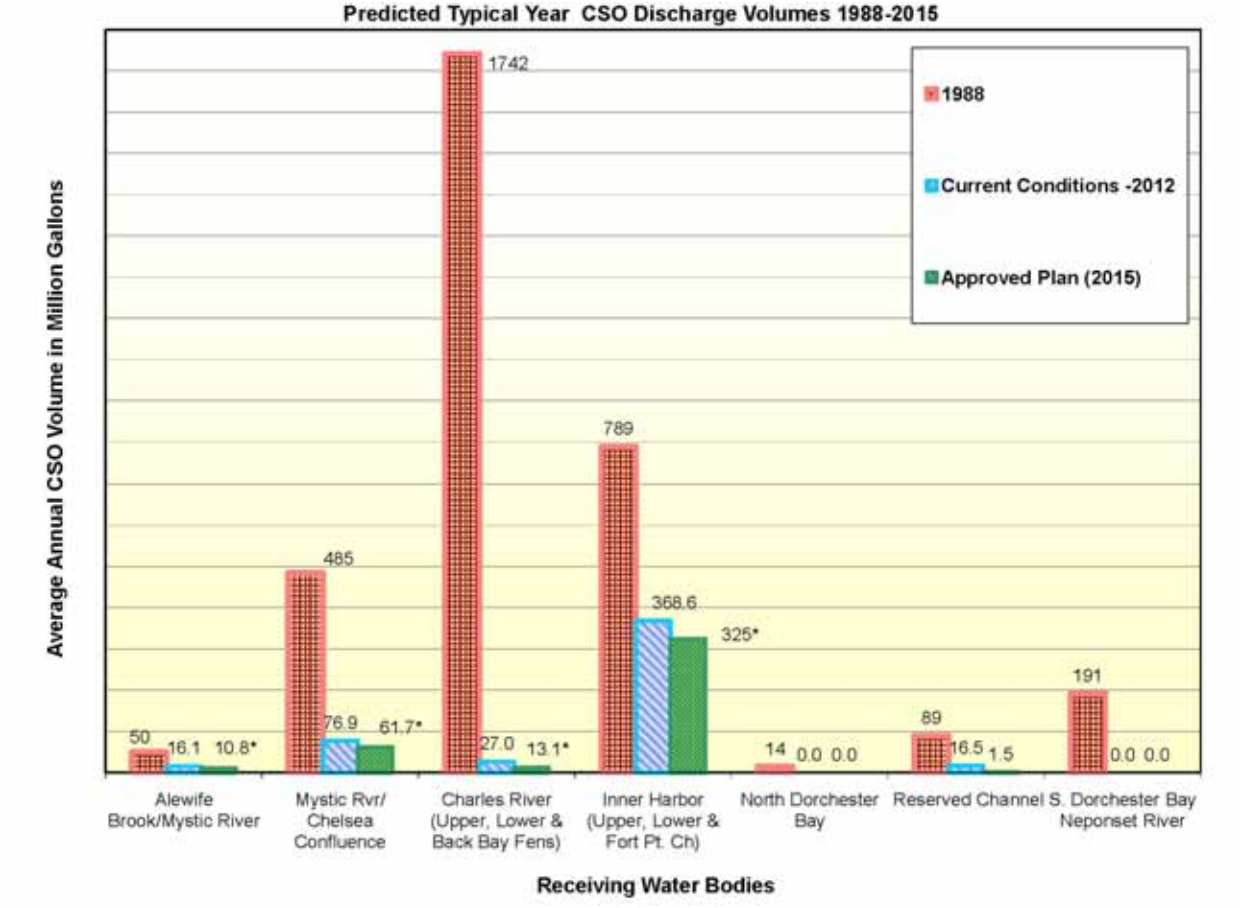

Predicted Typical Year CSO Discharge Volumes 1988-2015
Average Annual CSO Volume in Million Gallons
1988
Current Conditions -2012
Approved Plan (2015)
50
16.1
10.8*
485
76.9
61.7*
1742
27.0
13.1*
789
368.6
325*
14
0.0
0.0
89
16.5
1.5
191
0.0
0.0
Alewife Brook/Mystic River
Mystic Rvr/ Chelsea Confluence
Charles River (Upper, Lower & Back Bay Fens)
Inner Harbor (Upper, Lower & Fort Pt. Ch)
North Dorchester Bay
Reserved Channel
S. Dorchester Bay Neponset River
Receiving Water Bodies

Table 2
Typical Year CSO Discharge Frequency and Volume to the Charles River 1988-2015

Outfall	Baseline Conditions (1988)		Current Conditions[(1)]		Plan Implementation[(2)]	
	Activations	Volume (MG)	Activations	Volume (MG)	Activations	Volume (MG)
BOS032	4	3.17	Eliminated	N/A	Eliminated	N/A
BOS033	7	0.26	Eliminated	N/A	Eliminated	N/A
CAM005	6	9.17	3	1.40	3	0.84
CAM007	1	0.81	2	0.29	1	0.03
CAM009	19	0.19	Closed	N/A	2	0.01
CAM011	1	0.07	Closed	N/A	0	0.0
BOS028	4	0.02	Eliminated	N/A	Eliminated	N/A
BOS042	0	0.00	Eliminated	N/A	Eliminated	N/A
BOS049	1	0.01	Eliminated	N/A	Eliminated	N/A
CAM017	6	4.72	1	1.01	1	0.45
MWR010	16	0.08	0	0.00	0	0.0
MWR018	2	3.18	0	0.00	0	0.0
MWR019	2	1.32	0	0.00	0	0.0
MWR020	2	0.64	0	0.00	0	0.0
MWR021	2	0.5	Eliminated	N/A	Eliminated	N/A
MWR022	2	0.43	Eliminated	N/A	Eliminated	N/A
MWR201[(3)]	18+	1,547	7	27.15	2	6.3
MWR023	39	115	1	0.02	2	0.13
SOM010	18	3.38	Eliminated	N/A	Eliminated	N/A
Subtotal Charles River		1,690		29.87		7.76
BOS046 (Back Bay Fens)		52	1	1.57	2	5.38
TOTAL		1,742		31.44		13.14

(1) From MWRA modeling of 2012 system conditions. Includes the benefits of major improvements to Deer Island transport and treatment system and implementation of system optimization measures (SOPs) recommended by MWRA in 1993 and 1994, as well as the completed LTCP projects.

(2) These are required levels of control; not necessarily expected long-term conditions, i.e. higher levels of control may be achieved. Construction of the long-term CSO control plan for Boston Harbor and its tributaries is scheduled to be complete by December 2015, which will be followed by a period of post construction monitoring in accordance with Schedule Seven of the Boston Harbor Case.

(3) MWR201 is the effluent discharge for the Cottage Farm CSO Facility. Flows are screened, disinfected and dechlorinated prior to discharge.

Results of MWRA's Water Quality Monitoring in the Charles River

MWRA has been monitoring water quality continuously in the Charles River since 1989. Studies include measurements of sewage indicator bacteria, nutrients, and physical measures like dissolved oxygen, salinity and pH. MWRA has submitted reports annually during the timeframe of the variance. The reports (e.g. Coughlin K. 2012. Summary of CSO Receiving Water Quality Monitoring in Upper Mystic River/Alewife Brook and Charles River, 2011.

Boston: Massachusetts Water Resources Authority. Report 2012-07) are available at: http://www.mwra.state.ma.us/harbor/enquad/trlist.html.

Water quality in the Lower Charles River Basin has improved tremendously over the last twenty years, in part due to significant reductions in CSO discharges at the Cottage Farm facility and several other outfalls. Greatly improved pumping capacity at the Deer Island Wastewater Treatment Plant, improved sewer system operation and maintenance, and the implementation of projects under the long-term CSO control plan have contributed to the CSO reductions.

There has been noticeable improvement in the level of *Enteroccocus* bacteria in the Charles River since MWRA began implementation of the long-term CSO control plan. Average bacteria counts during heavy rain, when the river is affected by contaminated storm water and CSO, have decreased substantially. There has also been noticeable improvement during dry weather, when illicit connections have relatively large effects, because the CSOs typically only discharge in heavy rain (Figure 3).

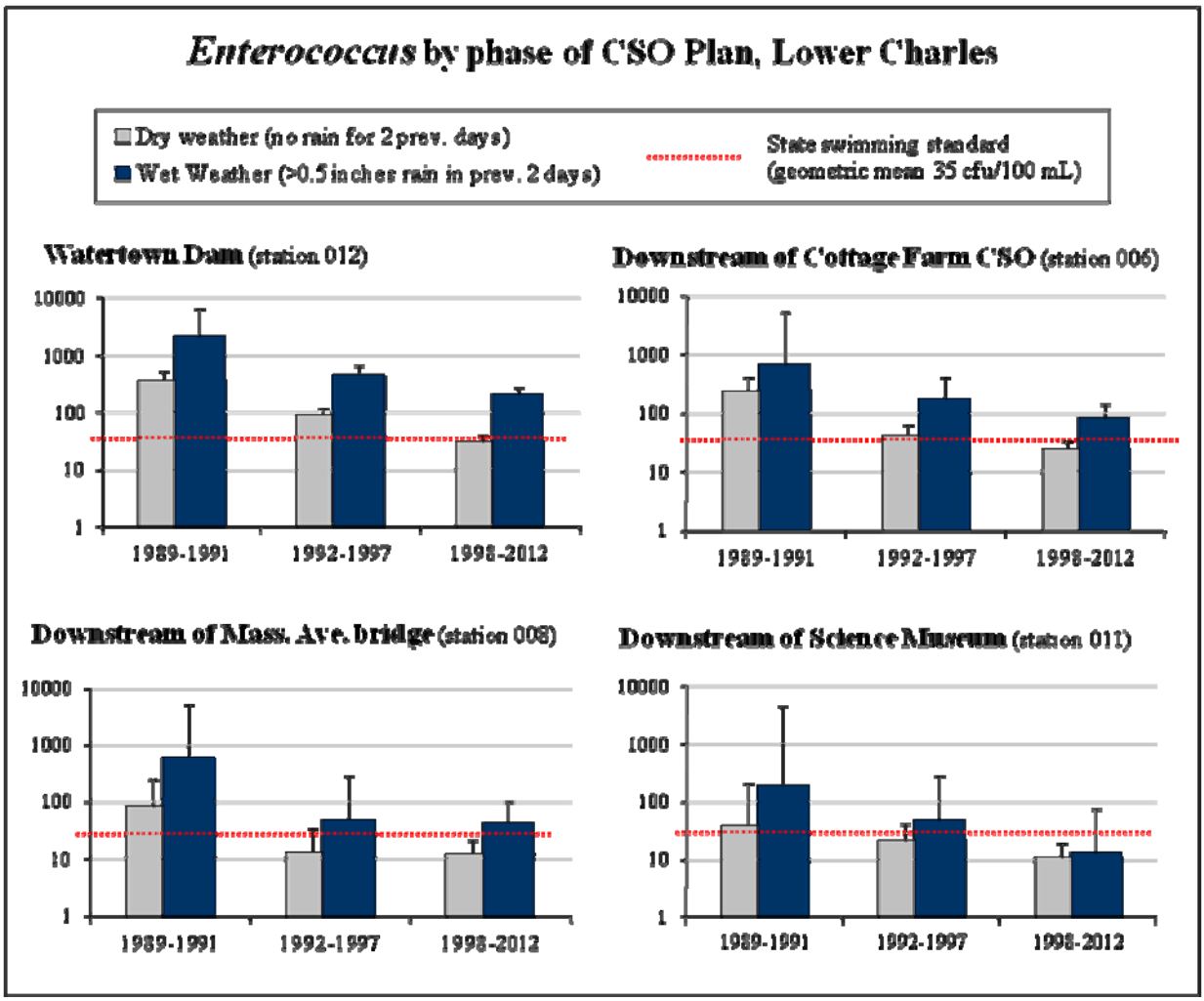


Figure 3: Geometric mean *Enterococcus* counts in wet and dry weather during phases of MWRA's CSO control plan at four locations in the lower Charles River.

Dotted line indicates the swimming standard. Error bars are upper 95% confidence intervals. (Note log scale.)

IV. Proposed Variance Extension and Next Steps

DEP noted in its comments on MWRA's Cottage Farm Facility Assessment Report (2004) that construction of CSO storage facilities at Cottage Farm was not a cost-effective measure for CSO control, and that MWRA should rather "*commit resources toward cost-effective projects which will further eliminate storm water from the combined sewer system, and which will be consistent with community efforts in managing broader wet weather impacts. This approach will be important to optimizing use of the Cottage Farm CSO Treatment Facility and improving water quality in the lower Charles River Basin*." DEP has concluded that the revised plan for the Charles River and specifically the system optimization and sewer separation projects added to the plan in 2006 are consistent with this approach and maximize CSO benefits.

Further water quality improvements in the Charles River watershed will rely largely on endeavors to address illegal discharges to storm drains, storm water Best Management Practices and other storm water impacts as they contribute to wet weather issues affecting the Charles River and its tributaries. DEP recognizes that progress is continuing to be made in these areas. Through the Charles River Basin CSO variance, the public, regulatory agencies and permittees have gained the benefit of information provided by the efforts of USGS, CRWA, MWRA, BWSC, the City of Cambridge, and others to make sound decisions for continued, significant improvement in the water quality of the Charles River Basin.

DEP also acknowledges the importance of proper operation, maintenance, and rehabilitation of both the MWRA and community sewer and storm water systems to assure optimized conditions for conveying wastewater flows through the system for treatment and discharge at Deer Island and improving storm water quality. Sewer system repairs and cleaning, as well as wet weather flow monitoring and optimized wet weather operation of MWRA's facilities, have resulted in and maintained improved conveyance capacities in a number of locations and have also contributed to mitigating CSO discharges by addressing localized system flow constraints and realizing the potential for in-system storage of wet weather flow.

With the significant CSO control and related water quality improvement already achieved, and with the expectation of further community work to lower storm water inflows and further reduce CSO discharges, MWRA has requested an extension to its variance for CSO discharges to the Lower Charles River/Charles Basin to September 30, 2016.

As part of the agreement on the LTCP reached in March 2006 among EPA, DEP, DOJ, and MWRA, MWRA requested that the Variance for the Lower Charles River Basin be reissued through 2020 when MWRA must complete the region-wide LTCP and subsequent monitoring to verify that the long-term CSO control goals are achieved. MWRA bases this request on the significance of the CSO control and related water quality improvement it has achieved to date, the expectation for additional CSO control and water quality improvement with the projects it added to the Charles River plan as part of the 2006 decision, and the desire to provide a level of financial certainty and stability for its ratepayers.

At that time, DEP and EPA determined that MWRA's LTCP satisfied the requirements for a variance from water quality standards for CSO discharges to the Lower Charles River Basin

through 2020. As part of this determination, DEP and EPA agreed that DEP would issue and EPA would approve five consecutive extensions on no more than a three-year duration each through 2020, which would be consistent with and limited to the requirements in MWRA's LTCP.

Substantial and Widespread Social and Economic Impact

DEP has emphasized cost-effectiveness for CSO long-term control plans, to ensure that financial resources for pollution abatement actually provide improvements in water quality. The principles of cost-effectiveness and water quality benefits have been a major factor used by MWRA in the development of its present $888 million CSO abatement plan. MWRA sewer rates are among the highest in the nation and are projected to increase significantly over the next five years.

Implementation of the recommended plan will reduce typical year CSO discharge volume to the Charles River to 13.1 million gallons in a typical year (from 1.7 billion gallons in 1988), with half of the remaining annual discharge volume treated at Cottage Farm. The untreated discharges to the Charles River will be reduced to three or fewer in a typical year and treated CSOs discharged at Cottage Farm will be reduced to two activations in a typical year. In accordance with DEP's CSO Guidance, cost-effectiveness, protection of sensitive uses, and the financial capability of CSO permittees are all important factors in making determinations on the appropriate level of CSO control.

MWRA submitted data related to DEP's finding of "substantial and widespread economic and social impact," the basis for its issuance of a Variance in 1997 (See 314 CMR 4.03(4)(f)). DEP documented for the current Variance ending September 30, 2013, its review of a report by Robert N. Stavins, Assessment of the Economic Impact of Additional Combined Sewer Overflow Controls on Households and Communities in the Massachusetts Water Resources Service Area, dated March 17, 2004. DEP also reviewed the Affordability Analysis Worksheets included in Appendix H of the Cottage Farm Report dated January 2004, which are based on EPA's Interim Economic Guidance for Water Quality Standards. During the current variance period, MWRA also updated its affordability analyses, specifically comparing updated household water and sewer rates to updated median household incomes by member community during, and EPA determined that the updated affordability analyses supported DEP's issuance of the variance extension to October 1, 2013.

DEP's conclusions from its review of the documents submitted by MWRA and determination in support of the Variance Extension request have not changed. DEP, upon issuance of the 2007 Variance Extension, indicated that it would evaluate the information required by the Variance to determine whether there are additional cost-effective CSO controls. DEP has reviewed the new information regarding revisions to the Charles River CSO control plan, as well as other revisions and cost changes in MWRA's LTCP, and has determined that additional controls beyond those recommended in the MWRA CSO Plan would not be cost-effective or affordable.

Based on these important considerations, DEP has determined that proceeding at this time with controls beyond those included in the MWRA Long-Term CSO Control Plan would result in substantial and widespread social and economic impact as specified in 314 CMR 4.03(4), and that an extension to the CSO Variance is appropriate at this time. Issuing of the CSO Variance Extension in the Lower Charles River Basin watershed is consistent with EPA Guidance: *Coordinating CSO Long-Term Planning with Water Quality Standard Reviews (July 31, 2001)*, which asserts that longer term variances and renewal of variances are warranted given the extended duration necessary for implementation of LTCPs.

Determination to Extend Variance

DEP makes the following determinations:

- The revisions MWRA made to its long-term CSO control plan for the Charles River, by adding projects to optimize sewer system performance and remove storm water inflow through sewer separation, are responsive to the conditions and intent of the Variance and will maximize CSO control benefits.

- It is not feasible to eliminate all of the CSO discharges in the Lower Charles River Basin. MWRA has completed numerous analyses since the late 1980s evaluating alternatives for eliminating CSOs from the collection system tributary to the Deer Island Wastewater Treatment Plant. Among these are the 1997 Facilities Plan/EIR, the 2004 Cottage Farm Facility Assessment Report, and the additional alternatives analyses and recommendations MWRA submitted to EPA and DEP in late 2005 and early 2006 that lead to the 2006 agreement. MWRA's revised LTCP incorporates all cost-effective and feasible CSO abatement projects for this watershed. At this point in time, it does not appear technically feasible to eliminate all CSO outfalls to this watershed given the engineering and infrastructure constraints in the MWRA interceptor system, headworks, conveyance tunnels, the Deer Island wastewater treatment plant, and the ocean outfall.

- It remains unclear whether the Class B water quality standards for the Basin can ultimately be achieved or the extent (percent of time) the standards can be met. Analyses completed by the MWRA and others indicate that substantial storm water pollutant loadings remain in the Charles River watershed. Actions are underway in this watershed to remediate storm water discharges, including aggressive measures to identify and remove illegal sewer connections. However, it remains unclear at this time whether storm water discharges to the Basin can meet the Class B water quality standard through the implementation of these controls. Therefore, additional time is needed before DEP can make a definitive determination as to the efficacy of the CSO and storm water controls now planned or underway in bringing these discharges into compliance with the Class B standards.

- Proceeding at this time with controls beyond those presently included in the revised LTCP would result in substantial and widespread social and economic impact as specified in 314 CMR 4.03(4). The cost of MWRA's CSO control program is substantial, at present estimated by MWRA to be $888 million, not including community

cost shares. MWRA's detailed financial impact assessment considered the effect of expected sewer rate increases, and, appropriately, median household income as adjusted by the relatively high cost of housing in the Boston area. The MWRA adequately demonstrated that proceeding at this time with CSO controls necessary for full attainment of Class B water quality standards in the Lower Charles River Basin would result in substantial and widespread economic and social impact.

DEP concludes that extension to the CSO Variance for the Lower Charles River Basin is appropriate at this time. DEP has also determined that it will reissue the variance in the future for three-year periods through 2020, when the CSO control plan and benefits will be completed and verified. Issuing of the CSO Variance Extension in the Charles watershed is consistent with EPA Guidance: *Coordinating CSO Long-Term Planning with Water Quality Standard Reviews (July 31, 2001)*, which asserts that longer term variances and renewal of variances are warranted given the extended duration necessary for implementation of LTCPs.

A determination on the highest feasible level of CSO control and associated water quality standard should be deferred until the LTCP is implemented and the associated benefits are verified in 2020, in compliance with Schedule Seven. During this same period, community programs to control illicit discharges, remove infiltration and inflow from sewer systems, and separate combined sewer systems are expected to continue and will result in additional water quality improvement for the Lower Charles River Basin.

Future Actions

(1) The Variance for CSO discharges to the Lower Charles River Basin will be extended by a period not to exceed three years (to October 1, 2016).

(2) MWRA, the City of Cambridge, and the Boston Water and Sewer Commission shall implement all elements of the LTCP as defined in the Second CSO Stipulation and in accordance with Schedule Seven.

(3) MWRA, the City of Cambridge, and the Boston Water and Sewer Commission shall continue to implement the Nine Minimum Controls and report on CSO activations and volumes.

(4) MWRA shall continue to implement its receiving water monitoring in the Lower Charles River watershed.