FINAL DETERMINATION TO EXTEND VARIANCE FOR COMBINED SEWER OVERFLOW DISCHARGES TO LOWER CHARLES RIVER/CHARLES 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 ("MassDEP") original issuance of the Combined Sewer Overflow ("CSO") Variance for the Lower Charles River/Charles Basin (the "Variance") on October 1, 1998, and to provide a frame of reference for MassDEP's decision to extend the Variance for a period not to exceed three years, to August 31, 2019.

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 through its approved Long-Term CSO Control Plan (the "LTCP") to reduce or eliminate CSO discharges to the Charles River and other Boston area surface waters affected by CSO discharges. MWRA's approved LTCP comprises 35 wastewater system improvement projects that will reduce or eliminate CSO discharges at 84 outfalls in the metropolitan Boston area at a capital cost of $906.7 million. The eight projects in the LTCP that address CSO discharges to the Charles River have a total estimated cost of $88.8 million.

In July 1997, MWRA issued its *Final CSO Facilities Plan and Environmental Impact Report, July 31, 1997* (the "1997 Facilities Plan/EIR"). The 1997 Facilities Plan/EIR was the result of a several-year CSO planning process, 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 extensive sewer system inspections, flow metering, water quality sampling, sewer system modeling and receiving water quality modeling. In accordance with national and Massachusetts CSO policies, the 1997 Facilities Plan/EIR evaluated the costs and benefits of a range of CSO control alternatives for the Charles River Basin and recommended several Charles River projects within a preferred regional control plan that addressed cost effectiveness, maximum water quality improvement considering other pollution sources and their impacts, and affordability.

MassDEP 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, MassDEP and EPA also decided to defer a final determination on the water quality standard and associated long-term level of CSO control for the Charles River Basin until additional information on CSO and non-CSO pollutant loads and their impacts could be collected, understood and evaluated. Accordingly, MassDEP, with the support of EPA, issued the Variance for CSO discharges to the Charles River on October 1, 1998.

MassDEP has since 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 collection and evaluation of water quality data by the United States Geological Survey ("USGS") in 1999-2002 of the effectiveness of stormwater pollution controls, the implementation of stormwater pollution control measures by municipalities along the Charles River, and the further evaluation of additional CSO controls and water quality benefits. These analyses led MWRA to recommend additional controls and a revised and expanded LTCP for the Lower Charles River Basin in 2005.

In March 2006, MWRA reached agreement with EPA, MassDEP and the United States Department of Justice ("DOJ") on the revised plan, along with a revised and expanded implementation schedule. The revisions included modified or additional schedule milestones for projects in the Charles River, Alewife Brook, and East Boston portions of the LTCP. 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, MassDEP and EPA determined that MWRA's LTCP would continue to satisfy 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, MassDEP and EPA agreed that MassDEP 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 projects in MWRA's LTCP.

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 the revised LTCP. In April 2006, the Court allowed the joint motion of the United States and MWRA seeking to revise the compliance schedule to incorporate the proposed changes. MWRA has until the year 2020 to meet the last of the CSO requirements set forth in Schedule Seven – a three-year post-construction monitoring and system performance assessment to verify achievement of the court-mandated long-term levels of CSO control in the approved LTCP, which it must commence by January 2018 and complete with submission of a related report to EPA and MassDEP by December 2020.

More information about MWRA's LTCP, including descriptions of the 35 CSO control projects and the benefits for each receiving water segment, is presented in MWRA's *CSO Annual Progress Report 2015*, March 2016, at: http://www.mwra.com/annual/csoar/2015/2015csoar-r4.pdf.

In December 2015, MWRA, with support from its member communities with permitted CSO outfalls, completed construction of the last of the 35 projects in the LTCP, in compliance with the respective project completion milestones in the court schedule. All of the projects are functioning for environmental benefit. MWRA, Boston Water and Sewer Commission ("BWSC"), the City of Cambridge and the Town of Brookline had earlier completed the eight projects in the LTCP that address CSO discharges to the Charles River (see project updates below, under *Revised CSO Control Plan and Implementation Status*). 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 for the Charles River.

II. CSO Variance

In September 1998, MassDEP issued, and EPA subsequently approved, the Variance to water quality standards for CSO discharges to the Lower Charles River/Charles Basin for a variance term of 24 months. MassDEP 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. The Variance, along with several subsequent extensions of it, allows CSO discharges from outfalls along the Charles River permitted to MWRA, BWSC and the City of Cambridge, subject to conditions of the Variance, while providing time for MassDEP to collect information necessary to determine the appropriate long-term water quality standard and related level of CSO control.

With the Variance, MassDEP approved MWRA's 1997 LTCP for the Lower Charles River, Charles 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 capacity at MWRA's Cottage Farm CSO treatment facility.

MassDEP issued 1-year extensions of the Variance in 2000, 2001, 2002 and 2003. An early condition of the Variance required MWRA to prepare and submit the Cottage Farm CSO Facility Assessment Report (the "Cottage Farm report" or "report"). MWRA submitted the report in January 2004, and it 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 MWRA's NPDES permit, and that additional storage at the facility would carry great cost and have an adverse impact to the recreational facilities at Magazine Park, with negligible water quality benefit for the Charles River. In the 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 additional sewer separation work (i.e., removal of stormwater inflow from the combined sewer system) by the City of Cambridge and the Town of Brookline in reducing CSO discharges to the Charles River.

After reviewing the Cottage Farm report and related public comments, MassDEP issued a three-year extension of the Variance, to October 1, 2007. Later, MassDEP separately issued additional three-year extensions, in 2007, 2010 and 2013, in accordance with the 2006 agreement and EPA and MassDEP's approval of MWRA's revised and expanded LTCP described above. Each of these variance extension determinations was also made with information MassDEP

collected 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, 2016, require MWRA and the City of Cambridge to implement all elements of the recommended CSO control plan for the Charles River. The variance also requires MWRA and Cambridge to continue to implement the CSO Nine Minimum Controls, monitor CSO discharges, report annually on the frequency and volume of CSO discharges to the Charles River, and respond to any MassDEP comments or questions related to system conditions and CSO control. The current variance also requires MWRA to continue to conduct Charles River water quality monitoring, to work with MassDEP 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, including construction and operational start-up, of MWRA's 35 LTCP projects is now complete. Over the past three decades, MWRA has achieved more than 180 discrete federal court schedule milestones related to CSO control. Two schedule milestones remain: commencement of a three-year post-construction monitoring program and system performance assessment by January 2018, and completion of the assessment and submission of a related report verifying attainment of the long-term levels of control in MWRA's approved LTCP by December 2020.

In compliance with a condition in the Variance, MWRA submits an annual report to EPA and MassDEP by April 30th that includes MWRA's estimates of CSO discharges to the Charles River (and other receiving waters) during the previous calendar year. The report also includes MWRA sewer system model predictions of CSO discharge frequency and volume at every active outfall for Typical Year rainfall[1] and updated sewer system conditions, and compares the predictions to the level of control in the approved LTCP for each outfall.

III. 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 stormwater inflow. These additional projects account for approximately $40 million of the $88.8 million MWRA cost for the Charles River CSO plan. The projects were included in the revised LTCP approved by EPA and MassDEP in March 2006 and incorporated into Schedule Seven by the Federal District Court in the Boston

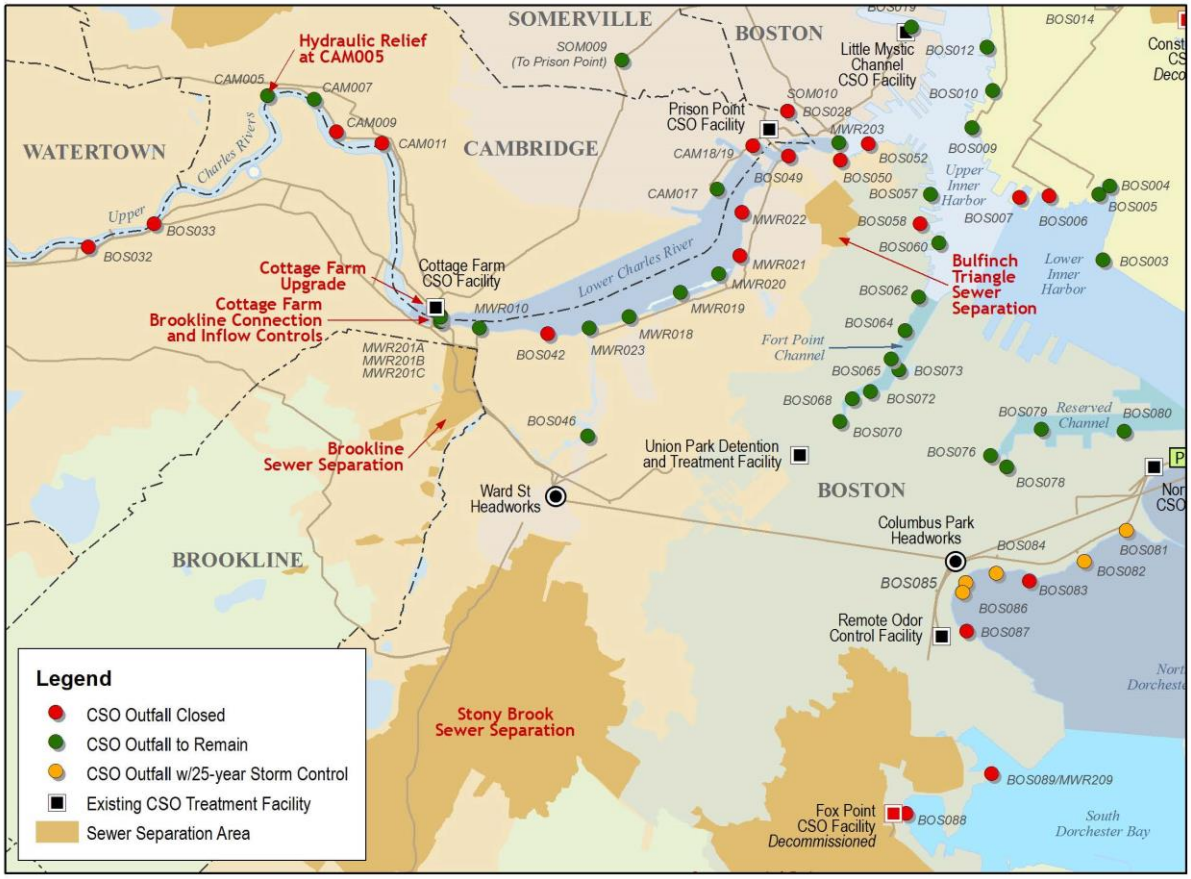
[1] Typical Year rainfall ("Typical Year") was developed by MWRA in 1992 using a 40-year rainfall record and was approved by EPA and MassDEP as a basis for measuring the performance of CSO control alternatives and the water quality impacts of remaining CSO discharges. Level of CSO control in the Typical Year is a key performance objective of the approved Long-Term Control Plan mandated by the Federal District Court Order.

Harbor Case (D. Mass. C.A. No. 85-0489) in April 2006. See Table 1 and Figure 1 for project descriptions, locations, costs and schedules.

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

Project	Purpose	Completed and Operational	Cost (million$)
Upgrade Cottage Farm CSO Facility	Improve disinfection; add dechlorination	2000	5.7
CAM005 Hydraulic Relief	Increase flow into the MWRA system; reduce CSO	2000	1.1
CSO Outfall Closings	Eliminate CSO discharges at Outfalls BOS028, BOS032, BOS033, BOS042, SOM010, MWR020 and MWR021	2000	<1
Stony Brook Sewer Separation	Remove stormwater from BWSC sewer system; reduce CSO to Stony Brook Conduit	2006	44.3
Floatables Controls	Control floatable materials at active outfalls	2007	0.4
Cottage Farm Brookline Connection and Inflow Controls	Reduce CSO overflows into the Cottage Farm Facility	2009	3.6
Bulfinch Triangle Sewer Separation	Remove stormwater from BWSC system; close outfall BOS049	2010	9.1
Brookline Sewer Separation	Remove stormwater from Town of Brookline system; reduce CSO at Cottage Farm Facility	2013	24.7

Figure 1: Charles River Basin CSO Outfalls and Projects



The Deer Island Wastewater Treatment Plant conveyance system and treatment upgrades, which MWRA completed in the early 2000s, had an especially pronounced effect in reducing CSO discharges to the Charles River. In the 1990s, MWRA and the CSO communities implemented more than 100 "system optimization plans," including raising dozens of overflow weirs, which further reduced system-wide CSO discharges, including those to the Charles River. These early improvements, along with the LTCP, 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 plan goals of 7 activations and 23 million gallons. Most of the additional benefit comes from optimization improvements recommended in the 2004 Cottage Farm report that have increased in-system storage and directed more wet weather flow to MWRA's Ward Street Headworks for transport to the Deer Island Wastewater 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. Upon completion of the Bulfinch Triangle sewer separation project, the BWSC closed its last CSO outfall (BOS049) to the Lower Charles and thus they are no longer included in the Variance extension process.

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. Though MWRA's LTCP does not require the closure of CAM009 and CAM011, Cambridge temporarily closed them in 2007 and continues to monitor system performance to determine whether these outfalls can remain closed in the long term.

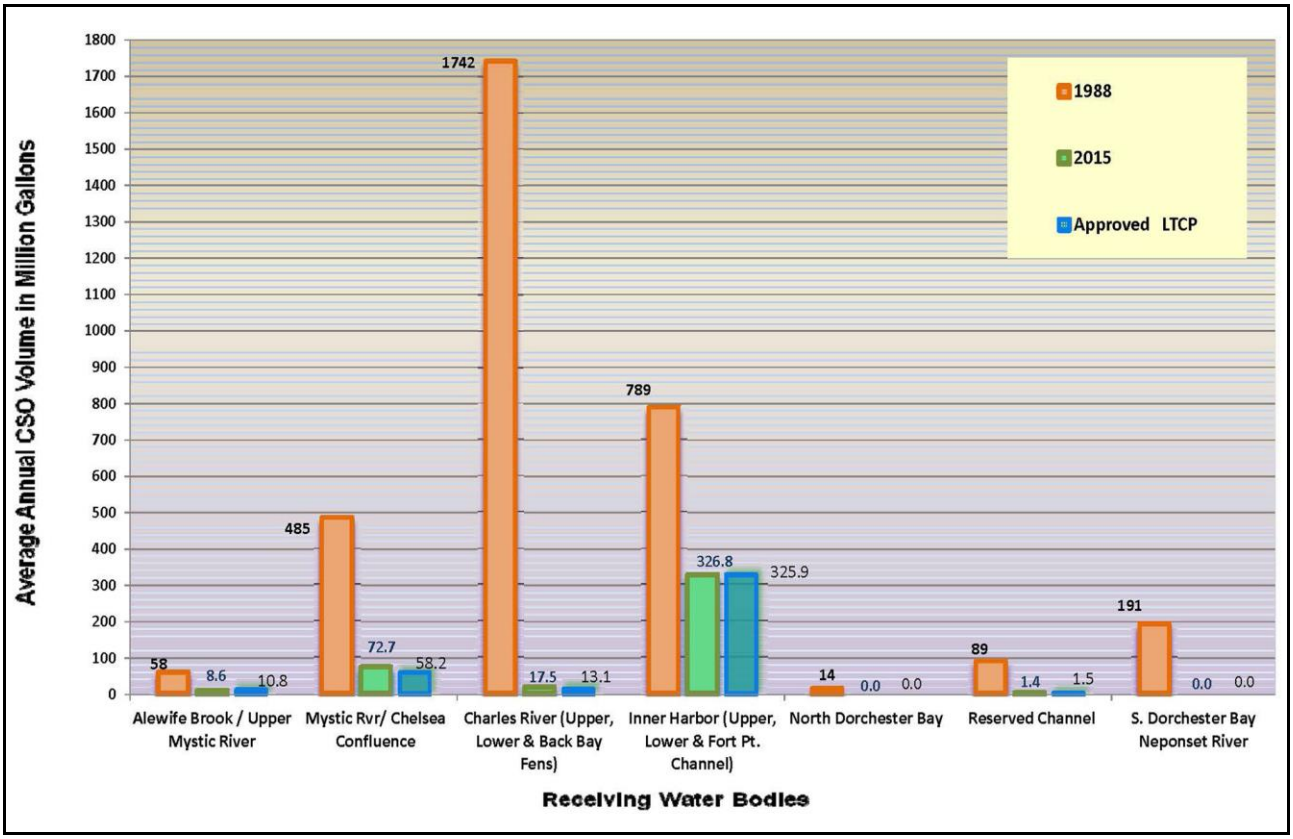
Achieved and Anticipated CSO Reductions in the Charles River Basin

With completion of the LTCP projects and the earlier major improvements to the Deer Island Wastewater Treatment Plant conveyance and treatment systems, MWRA has reduced Typical Year CSO discharge volume to the Charles River (including Back Bay Fens) by 99 percent, from 1.74 billion gallons in 1988 to 17.47 million gallons today (see Figure 2 and Table 2). Of the current Typical Year discharge volume, 12.75 million gallons is treated at the Cottage Farm CSO facility. With the completion of ongoing sewer separation projects by the City of Cambridge, MWRA predicts that Typical Year CSO discharge volume to the Charles River will be reduced to approximately 13 million gallons, and 50 percent of this remaining volume will be treated at the Cottage Farm CSO facility.

The predictions of MWRA's hydraulic model updated for end-of-year 2015 conditions show that Typical Year CSO activation frequency in the Charles River watershed has been reduced from up to 40 events in the early 1990s to only 5 events today at the Cottage Farm facility and up to 3 events at remaining untreated outfalls. In 2015, the actual measured CSO activations at the Cottage Farm facility was 2, with a measured volume of treated CSO of 32.67 million gallons, 31.40 million gallons of which was discharged during one large storm, on September 29-30, 2015. Completion of the City of Cambridge sewer separation is predicted to further reduce the treated CSO discharges at Cottage Farm. MWRA's LTCP hydraulic model

and water quality model simulations showed that the LTCP control levels bring CSO discharges into compliance with Class B "fishable/swimmable" water quality criteria more than 98 percent of the time.

Figure 2: CSO Discharge Reduction 1988-2015 by Receiving Water



IV. 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 and nutrients, along with physical measures like dissolved oxygen, Secchi depth and pH. MWRA has submitted reports on the results annually during the full timeframe of the variance. The reports (e.g., *Coughlin K, Wu D. 2015. Summary of CSO Receiving Water Quality Monitoring in Upper Mystic River/Alewife Brook and Charles River, 2014. Boston: Massachusetts Water Resources Authority. Report 2015-06. 47 p. plus appendices.*) 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 25 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, system optimization, improved sewer system operation and maintenance, and the implementation of projects under the LTCP have all contributed to the CSO discharge reductions. Urban stormwater pollution controls implemented by communities along the Charles River have also contributed to improved water quality. As shown in Figure 3, there has been

noticeable improvement in the level of *Enterococcus* bacteria in the Charles River since MWRA began implementation of the LTCP. Average bacteria counts during heavy rain, when the river is affected by contaminated stormwater and CSOs, have decreased substantially.

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

Outfall	Baseline Conditions (1988)		Current Conditions[(1)]		Long-Term Control Plan[(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	1.37	3	0.84
CAM007	1	0.81	2	0.26	1	0.03
CAM009	19	0.19	Closed[(3)]	N/A	2	0.01
CAM011	1	0.07	Closed[(3)]	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	1.51	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[(4)]	18+	1,547	5	12.75	2	6.3
MWR023	39	115	1	0.02	2	0.13
SOM010	18	3.38	Eliminated	N/A	Eliminated	N/A
Subtotal Charles Basin		1,690		15.91		7.76
BOS046 (Back Bay Fens)		52	1	1.56	2	5.38
TOTAL		1,742		17.47		13.14

(1) From MWRA modeling of 2015 year-end system conditions in a Typical Year. Includes the benefits of major improvements to Deer Island transport and treatment systems, implementation of system optimization measures (SOPs) recommended by MWRA in 1993 and 1994, and the CSO control projects in the approved LTCP.

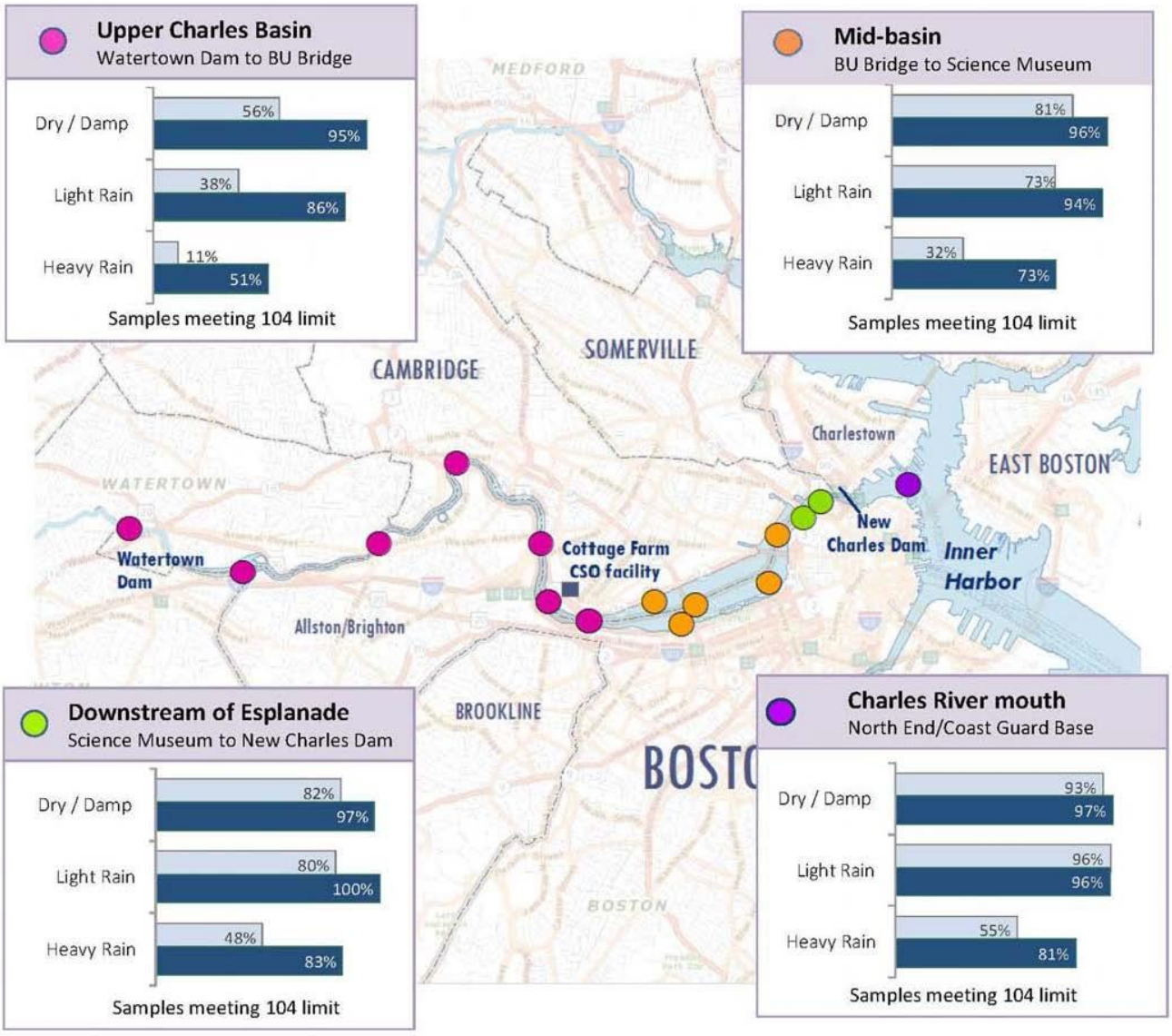
(2) These are the required levels of control. Higher levels of control may be achieved (see, for instance, Outfall BOS046 Back Bay Fens current and Long Term Control Plan discharge levels). The LTCP levels of control on the Charles River Basin anticipate completion of ongoing sewer separation work (independent of MWRA's LTCP) by the City of Cambridge. These projects are a part of the City's long term capital improvements program, are contingent on funding and other factors, and thus are not on the schedule of MWRA's LTCP.

(3) Pending ongoing hydraulic performance evaluation by the City of Cambridge.

(4) MWR201 is the effluent discharge for the Cottage Farm CSO Facility. Flows are screened, disinfected and dechlorinated prior to discharge. Actual, measured Cottage Farm activations in 2015 was 2, with total discharge volume of 32.67 MG, of which 31.40 million gallons was discharged during the large storm on September 29-30, 2015.

Figure 3: Change in Lower Charles River Water Quality

Graphs show the percent of samples meeting the *Enterococcus* bacteria limit for swimming, 104 counts/100mL, by river reach and weather condition.



Dots are MWRA sampling locations. State swimming standards for *Enterococcus* single sample limit is 104 cfu/100 mL. Rainfall: Heavy Rain is at least 0.5 inches of rain in previous 48 hours; Light Rain is between 0.1 and 0.5 inches of rainfall in previous 48 hours. 2008 – 2015 period is considered current conditions, following substantial completion of infrastructure improvements. Data from intervening years (2000 – 2007) are excluded.

V. Proposed Variance Extension and Next Steps

With the levels of CSO control attained, further significant water quality improvement in the Charles River watershed will rely largely on endeavors to address illegal discharges to storm drains, stormwater Best Management Practices and other stormwater impacts. MassDEP 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.

MassDEP also acknowledges the importance of proper operation, maintenance and rehabilitation of both the MWRA and community sewer and stormwater systems to assure optimized conditions for conveying wastewater flows through the system for treatment and discharge through the Deer Island Wastewater Treatment Plant and improving stormwater 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, the expectation of further community work to lower stormwater inflows and further reduce CSO discharges, the continuing collection of water quality data, and the need for MWRA to complete a three-year performance assessment of its LTCP from January 2018 to December 2020 in accordance with the court schedule, MWRA has requested an extension to its variance for CSO discharges to the Lower Charles River/Charles Basin to August 31, 2019.

As part of the agreement on the LTCP reached in March 2006 among EPA, MassDEP, DOJ, and MWRA, MWRA requested that the Variance for the Lower Charles River/Charles Basin be reissued through 2020 when MWRA must complete the region-wide LTCP and subsequent monitoring to verify that the LTCP levels of control are achieved. MWRA requested – and EPA and MassDEP approved – this timeframe based on 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 with MWRA's need to provide a level of financial certainty and stability for its ratepayers. At that time, MassDEP 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, MassDEP and EPA agreed that MassDEP would issue and EPA would approve five consecutive extensions of 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

MassDEP 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 $906.7 million CSO abatement plan.

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 MassDEP'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 MassDEP'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)). MassDEP documented for the current Variance ending September 30, 2016, 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. MassDEP 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, and EPA determined that the updated affordability analyses supported MassDEP's issuance of the variance extension to September 30, 2016.

MassDEP's conclusions from its review of the documents submitted by MWRA and determination in support of the Variance Extension request have not changed. MassDEP, upon issuance of the 2007 Variance Extension, indicated that it would evaluate the information required by the Variance to determine whether there were additional cost-effective CSO controls. MassDEP 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 determined that additional controls beyond those recommended in the MWRA CSO Plan would not be cost-effective or affordable.

Based on these important considerations, MassDEP has determined that proceeding at this time with controls beyond those included in the MWRA LTCP would result in substantial and widespread social and economic impact as specified in 314 CMR 4.03(4)(f), 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

MassDEP 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 stormwater inflow through sewer separation, are responsive to the conditions and intent of the Variance and 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 MassDEP in late 2005 and early 2006 that led 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 stormwater pollutant loadings remain in the Charles River watershed. Actions are underway in this watershed to remediate stormwater discharges, including aggressive measures to identify and remove illegal sewer connections. However, it remains unclear at this time whether stormwater discharges to the Basin can meet the Class B water quality standard through the implementation of these controls. Therefore, additional time is needed before MassDEP can make a definitive determination as to the efficacy of the CSO and stormwater controls now planned or underway in bringing these discharges into compliance with the Class B standards.

- Per MWRA's 2006 variance agreement with EPA and MassDEP, MWRA's implementation of its CSO control plan will be unchanged and remain consistent with and limited to the projects identified in MWRA's LTCP, and further made part of Court Schedule Seven. However, MWRA shall modify its current water quality monitoring and reporting to address EPA's comments during the last renewal in 2013, and to develop water quality data essential for MassDEP to render a determination on the water quality standard for the Lower Charles River:

  > MWRA shall modify its water quality sampling program to support long-term water quality decisions for the Charles River Basin, with a particular focus on wet weather impacts. The modifications will enhance upon MWRA's existing substantial water quality and wastewater operations historical data to support comparative evaluations of water quality conditions during wet weather events—with and without CSO discharges. Since several additional years of monitoring are needed to provide a robust analysis, this information will aid MassDEP and EPA in water quality evaluations following MWRA's submission of its three-year CSO performance assessment to the Court in December 2020.

MWRA will add an appendix of raw data to the annual water quality report that is already required by the Charles River Basin Variance. The added information will include sample location, date/time, precipitation and time since last CSO discharge, as modeled and/or measured.

A scope of work for this effort shall be submitted on or before December 1, 2016, and reviewed and approved by MassDEP.

- MWRA is required to commence a three-year post-construction monitoring program and system performance assessment in January 2018. MWRA will prepare a scope of work for submittal to MassDEP on or before May 1, 2017. MassDEP will make the scope of work available for public comment.

- MWRA will add a CSO public notification webpage to its website, which will report and provide information on recent Cottage Farm CSO treatment facility activations. Cottage Farm is the most active CSO in the Lower Charles River/Charles Basin.

- 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)(f).

MassDEP concludes that extension to the CSO Variance for the Lower Charles River Basin is appropriate at this time, and proposes to extend the CSO Variance for MWRA and the city of Cambridge to August 31, 2019. MassDEP has also determined that it will reissue the variance in the future through 2020, when the LTCP and its 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 December 2020, in compliance with Schedule Seven of the Federal District Court Order. 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 three years (to August 31, 2019).

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

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

(4) Following MassDEP review, MWRA shall modify and continue to implement its receiving water monitoring in the Lower Charles River watershed.

(5) MWRA will prepare a scope of work for a three-year post-construction monitoring program and system performance assessment that will commence in January 2018.