FINAL DETERMINATION TO ADOPT A VARIANCE FOR COMBINED SEWER OVERFLOW DISCHARGES TO ALEWIFE BROOK/UPPER MYSTIC 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 ("MassDEP") original issuance of the Variance for Combined Sewer Overflow ("CSO") Discharges to the Alewife Brook/Upper Mystic River Basin (the "Variance") on March 5, 1999, and to provide a frame of reference and regulatory justification for MassDEP's final decision to adopt a new variance with an expiration date of August 31, 2024.

I. Background on CSO Control and the 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 Alewife Brook/Upper Mystic River Basin and other Boston area surface waters affected by CSO discharges. MWRA's approved LTCP comprises 35 wastewater system improvement projects that would 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 Alewife Brook/Upper Mystic River Basin have a total MWRA cost of $112.6 million (see Table 1).

MWRA originally presented a recommended region-wide LTCP in its *Final CSO Facilities Plan and Environmental Impact Report, July 31, 1997* (the "1997 Facilities Plan/EIR"). At that time, MWRA estimated the cost for the Alewife Brook and Upper Mystic River Basin portions of the plan at approximately $17.2 million. In August 2005, MWRA recommended revisions to its LTCP, including a revised and expanded CSO control plan for Alewife Brook. At that time, MWRA had already completed the LTCP projects intended to control CSO discharges to the Upper Mystic River/Mystic Basin. In March 2006, MWRA reached agreement with the U.S. Environmental Protection Agency ("EPA"), MassDEP, the Massachusetts Attorney General's Office ("AGO") and the United States Department of Justice ("DOJ") on the revised LTCP, along with a new implementation schedule for Alewife Brook. 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.

As part of the agreement, MassDEP and EPA determined that MWRA's revised LTCP satisfied the requirements for a variance from water quality standards for CSO discharges to the Alewife Brook/Upper Mystic River Basin through 2020, by which time the LTCP would be fully implemented. Accordingly, MassDEP and EPA agreed that MassDEP would issue, and EPA would approve, variance extensions through 2020, and that each variance extension would be consistent with and limited to the requirements in the LTCP. On March 14, 2006, EPA approved the variance MassDEP submitted to EPA on March 13, 2006, for the CSO discharges to the

Alewife Brook/Upper Mystic River and the Lower Charles River Basin. EPA's action approved triennial reissuance of the variances through the year 2020, subject to conditions specified in EPA's March 14, 2006 letter. To ensure that those conditions are satisfied, EPA also has reviewed and taken a separate approval action on each triennial reissuance of the variances through 2020. EPA's most recent approval of the variances for the CSO discharges occurred on April 17, 2019.

Table 1: MWRA Long-Term CSO Control Plan for Alewife Brook/Upper Mystic River Basin

Project	Purpose	Receiving Water	Completed	Cost[(1)] (million$)
Somerville Baffle Manhole Separation[(2)]	Remove stormwater from the sewer system; eliminate CSO at outfalls SOM001, SOM006 and SOM007.	Mystic Basin and Alewife Brook	1996	0.4
Somerville-Marginal CSO Facility Upgrade	Improve disinfection; add dechlorination	Mystic Basin	2000	4.0
CAM004 Stormwater Outfall and Wetland Basin[(3)]	Convey stormwater flows to wetland system for attenuation and treatment.	Alewife Brook	2013	103.7
CAM004 Sewer Separation[(3)]	Remove large quantities of stormwater from the sewer system; eliminate CSO at Outfall CAM004.		2015	
CAM400 Manhole Separation[(3)]	Remove stormwater from the sewer system; eliminate CSO at Outfall CAM400.		2011	
Interceptor Connection Relief and Floatables Control at CAM002 and CAM401B and Floatables Control at CAM001[(3)]	Upgrade connections between Cambridge and MWRA systems to provide relief; add floatables control.		2010	
Interconnection Relief and Floatables Control at Outfall SOM01A	Upgrade connection and provide floatables control.		2013	0.4
Control Gate/Floatables Control at Outfall MWR003 and MWRA Rindge Avenue Siphon Relief	Optimize hydraulic conveyance; minimize overflows while controlling system flooding in large storms; provide floatables control.		2015	4.1
Total				**112.6**

(1) MWRA cost, only; from Proposed FY17 Capital Improvement Program. Total MWRA and City of Cambridge cost for design and construction of the Alewife Brook/Upper Mystic River Basin CSO projects totals more than $200 million.
(2) Implemented by City of Somerville with MWRA funding.
(3) Implemented by City of Cambridge with MWRA funding.

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 a subsequent post-construction monitoring program and CSO Performance Assessment 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 the revised LTCP.

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. The projects completed in 2015 included two of the eight projects benefitting Alewife Brook: Automated Gate and Floatables Control at Outfall MWR003 and MWRA Rindge Avenue Siphon Relief, which MWRA completed in October 2015, and CAM004 Sewer Separation, which the City of Cambridge completed in December 2015. More information about MWRA's LTCP, including descriptions of the 35 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.

MWRA, on June 4, 2019, filed a request with the Court to extend the deadline for submittal of the CSO Assessment to December 31, 2021, and also informed the Court that MWRA has requested a new five year CSO Variance for the Alewife Brook/Upper Mystic watershed.

Level of CSO Control

The seven Alewife Brook CSO projects, together with the earlier CSO control actions mentioned above, have resulted in closure of several CSO outfalls (see Figure 1) and are predicted to reduce CSO discharges to the Alewife Brook from 63 activations and 50 million gallons volume in the Typical Year[1] in 1997 to 7 activations and 7.3 million gallons, an 85 percent reduction by volume. MWRA's hydraulic model and water quality model simulations predicted that the recommended control levels will bring CSO discharges into compliance with Class B (fishable/swimmable) water quality criteria 98.5 percent of the time. Levels of CSO control at outfalls on the Alewife Brook for baseline (1997), current conditions (2017) and revised recommended plan (LTCP - 2020) conditions are shown in Table 2.

[1] "Typical Year" rainfall has been the basis for development, recommendation and approval of MWRA's LTCP, the establishment of the federal court mandated levels of control, and the assessment of system performance toward attainment of the LTCP levels of control. The Typical Year was developed from 40 years of rainfall records (1949-1987, plus 1992), and it includes 93 storms with a total precipitation of 46.8 inches.

Figure 1: Alewife Brook and Mystic River CSO Outfalls and Projects

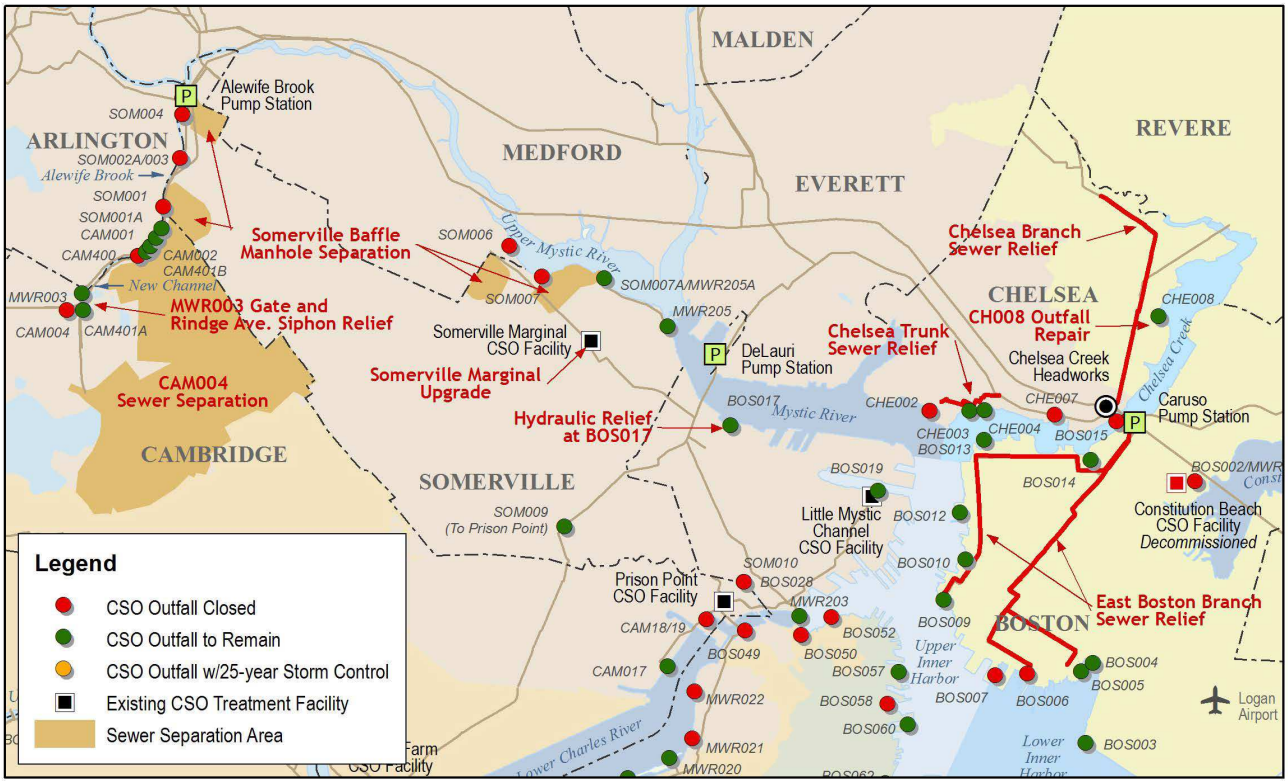


Table 2: CSO Discharges at Alewife Brook/Upper Mystic River Outfalls in the Typical Year

Outfall	Baseline Condition[1]		Current Conditions[2]		Long-term CSO Control Plan[3]	
	Activations	Volume (MG)	Activations	Volume (MG)	Activations	Volume (MG)
CAM001	1	0.01	1	0.02	5	0.19
CAM002	7	1.57	1	0.21	4	0.69
MWR003	1	0.06	2	0.38	5	0.98
CAM004	63	24.10	Eliminated		Eliminated	
CAM400	10	0.80	Eliminated		Eliminated	
CAM401A	7	2.74	2	0.44	5	1.61
CAM401B	25	10.50	2	0.18	7	2.15
SOM01A	10	9.89	5	3.90	3	1.67
SOM001	Eliminated		Eliminated		Eliminated	
SOM002A	Eliminated		Eliminated		Eliminated	
SOM003	Eliminated		Eliminated		Eliminated	
SOM004	Eliminated		Eliminated		Eliminated	
Total Alewife	**63**	**49.70**	**5**	**5.12**	**7**	**7.29**
SOM007A/ MWR205A[4]	11	6.72	2	1.82	3	3.48
SOM007	2	0.04	Eliminated		Eliminated	

Total Upper Mystic	**11**	**6.76**	**2**	**1.82**	**3**	**3.48**

(1) From the April 2001 Notice of Project Change (NPC).
(2) From recent MWRA modeling of 2017 end-of-year system conditions in the Typical Year. The Model is currently undergoing recalibration.
(3) These are the required levels of control. Higher level of control may be achieved at certain outfalls.
(4) Includes portion of flow treated at Somerville Marginal facility and separate stormwater entering the Somerville Marginal Conduit (outfall) downstream of the facility.

Cost of the Long-term CSO Control Plan

The cost of the Alewife Brook/Upper Mystic River CSO control plan was $112.6 million, which includes the design and construction costs incurred by MWRA to implement some of the CSO projects and the funds MWRA provided to the Cities of Cambridge and Somerville for the eligible costs of implementing certain projects, identified in Table 1, pursuant to the Memorandum of Understanding and Financial Assistance Agreement for the Implementation of CSO Control Projects between MWRA and Cambridge. In addition, the City of Cambridge spent a total of approximately $90 million more for CSO related work and for other work, such as non-CSO related infrastructure and street improvements, that Cambridge determined was necessary to include with construction of the major CSO related storm drain and sewer improvements in city streets.

Other Priorities to Ensure Continued Progress

Further water quality improvements in the Alewife Brook/Upper Mystic River watershed will also rely on municipal efforts to locate and remove illegal wastewater discharges to storm drains, implement stormwater Best Management Practices, and address other stormwater impacts as they contribute to wet weather issues affecting these watersheds. MassDEP recognizes that progress is continuing to be made by the communities in these areas.

MassDEP also acknowledges the importance of proper operation, maintenance and rehabilitation of MWRA and community sewer and stormwater systems to assure optimized conditions for conveying wastewater flows through the system for treatment at Deer Island and improving stormwater quality. Sewer system repairs and cleaning, as well as optimized operation of the sewer system and facilities during wet weather, have resulted in improved conveyance capacities in a number of locations, removal of localized system flow constraints, and maximum use of in-system storage, all contributing to CSO reduction. Lastly, effective infiltration/inflow removal programs being implemented by MWRA and all of the member communities will be important to achieve and sustain CSO control benefits.

II. Water Quality Monitoring in the Alewife Brook and Mystic River

MWRA has been monitoring water quality continuously in the Alewife Brook and the Mystic 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., Wu D, Goodwin C. 2018. *Summary of CSO Receiving Water Quality Monitoring in Upper Mystic River/Alewife Brook and Charles River, 2017. Boston: Massachusetts Water*

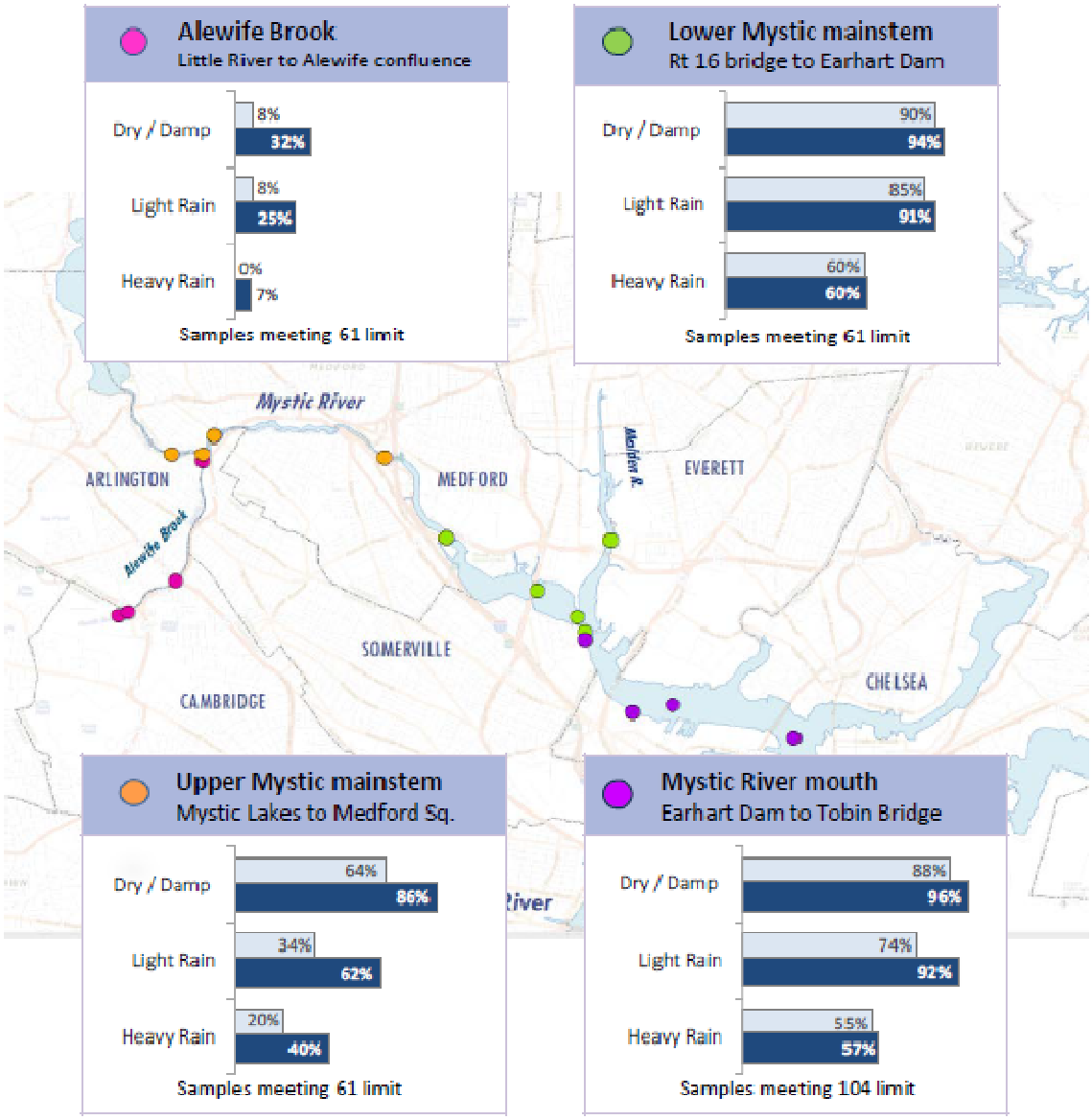
Resources Authority. Report 2018-03. 94 pp, plus appendices.) are available at: http://www.mwra.state.ma.us/harbor/enquad/trlist.html.

Figure 2 shows the bacterial water quality in the Alewife Brook and the Mystic River. The Lower Mystic and Mystic River mouth had the best water quality, meeting water quality limits most of the time, with the majority of bacteria samples meeting the *Enterococcus* swimming limit in all weather conditions for 2012 through 2016, and 94% or more of the samples meeting standards in dry weather. While conditions worsen in heavy rain events, these rainfall conditions are relatively infrequent.

Bacteria counts in Alewife Brook (prior to the completion of the major CSO work at the end of 2015) frequently fail to meet the *Enterococcus* swimming limits of 61 MPN/100mL in both dry and wet weather, and water quality is particularly poor after heavy rain. However, Alewife Brook's influence on downstream water quality conditions in the Mystic main stem is limited, with bacterial conditions downstream showing little influence downstream of the Alewife Brook confluence with the river.

Figure 2: Change in Alewife Brook and Mystic River Water Quality

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



Dots are MWRA sampling locations. State swimming standards for *Enterococcus* single sample limits are 104 cfu/100 mL for marine waters, and 61 cfu/100 mL in freshwater. 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. 2012 – 2016 period is considered current conditions, following substantial completion of infrastructure improvements. Data from intervening years (2000 – 2011) are excluded.

During the course of the proposed Variance, MWRA will be conducting enhanced CSO/receiving water monitoring, and in turn, developing an updated receiving water model, which will provide detailed information on the impacts of the remaining CSO discharges on water quality in the Alewife Brook/Upper Mystic River watershed. The information will also distinguish impacts from both CSO and non-CSO sources in this receiving water segment.

III. Variance History

A three-year Variance for CSO discharges to the Alewife Brook/Upper Mystic River Basin was initially issued by MassDEP on March 5, 1999. The Variance is a short-term modification of the Water Quality Standards issued by MassDEP subject to approval by EPA. The Variance allowed limited CSO discharges from the outfalls along the Alewife Brook/Upper Mystic River permitted to MWRA and the cities of Cambridge and Somerville, subject to specific conditions. During wet weather events where the limited CSO discharges are authorized, Class B requirements at 314 CMR 4.05(3)(b) for bacteria, solids, color and turbidity, and taste and odor may not be met. Other standards and criteria of the receiving waters' Class B designation are unaffected and have remained in force. The Variance was reissued in 2003 and was approved by EPA. As noted above, MassDEP issued the Variance currently in effect for CSO discharges to the Alewife Brook/Upper Mystic River Basin on March 13, 2006. EPA approved the Variance on March 14, 2006 as well as the triennial reissuance of the variance through the year 2020, subject to conditions specified in EPA's March 14, 2006 letter. MassDEP has reissued, and EPA has approved, the variance every three years, re-affirming during each re-evaluation that the conditions on which its 2006 approval were based remain in effect.

The current Variance expires August 31, 2019. Conditions in the current Variance require MWRA, Cambridge and the City of Somerville to continue to implement the CSO Nine Minimum Controls, monitor CSO discharges, report annually on the frequency and volume of CSO discharges to these receiving waters, provide public notice for CSO activations, 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 water quality monitoring in the Alewife Brook and Upper Mystic River.

Water quality data collection and water quality characterization by the Mystic River Watershed Association, 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. One schedule milestone remains: completion of the post-construction monitoring program and CSO Performance Assessment and submission of a related report verifying attainment of the long-term levels of control in MWRA's approved LTCP that was to have been completed by December 2020. MWRA is undertaking the CSO Performance Assessment at this time. As noted above, MWRA has recently requested additional time to complete the CSO Performance Assessment Report.

IV. Request for New Variance

As part of the agreement on the LTCP reached in March 2006 among EPA, MassDEP, the Massachusetts Attorney General's Office, the United States Department of Justice and MWRA, MWRA requested that the Variance for the Alewife Brook/Upper Mystic 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 based this request on the work that was then completed to achieve a high level of CSO control at certain outfalls, the expectation for significant CSO control and water quality improvement with the remaining CSO projects in the Alewife Brook CSO control plan, and the desire to provide a level of financial certainty and stability for its ratepayers.

During this time, MassDEP and EPA determined that MWRA's LTCP satisfied the requirements in effect at that time for a variance from water quality standards for CSO discharges to the Alewife Brook/Upper Mystic River Basin through 2020. As part of this determination, MassDEP and EPA agreed that MassDEP 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.

On May 14, 2019, MWRA submitted a written request to MassDEP for a CSO Variance in the Alewife Brook/Upper Mystic River for five years to August 31, 2024. MWRA has indicated that such time is needed to complete the CSO Assessment work, which includes both quantification of CSO activations and volumes, and associated water quality assessment of the receiving water impacts of the remaining CSO discharges. The additional time is also needed for MWRA and the cities of Cambridge and Somerville to complete updated CSO control plans and affordability analyses upon which MassDEP will be able to base the receiving water quality standards determinations. Finally, MassDEP will also use this time to determine what additional reductions in CSO events can be attained beyond 2024, if any, and evaluate whether a future water quality standard variance or change to the designated use may be warranted for these waters.

V. Regulatory Requirements

EPA regulations at 40 CFR 131.14, adopted in 2015, and MassDEP regulations at 314 CMR 4.03(4), establish the currently applicable regulatory requirements for issuing water quality standards variances. Use of variances for CSO discharges is also discussed in detail in MassDEP's *Guidance for Abatement of Pollution from CSO Discharges* (August 11, 1997), and EPA's *Guidance: Coordinating CSO Long-Term Planning with Water Quality Standards Reviews* (July 31, 2001).

Substantial and Widespread Social and Economic Impact

Water Quality Standard (WQS) Variances must be supported by at least one of six factors common to both EPA and MassDEP regulations. The following is included as one of these factors, in both 40 CFR 131.10(g)(6) and 314 CMR 4.03(4)(f):

"Controls more stringent than those required by sections 301(b) and 306 of the Act would result in substantial and widespread economic and social impact."

On May 24, 2019, MWRA submitted an economic analysis to MassDEP, documenting an estimated cost of $18.6 billion to completely eliminate CSO discharges. Based on the information provided by MWRA, MassDEP has determined that proceeding at this time with controls necessary to eliminate CSO discharges would result in substantial and widespread social and economic impact per 40 CFR 131.14(g)(6) and 131.10(g)(6) and MassDEP regulations at 314 CMR 4.03(4)(f). The determination to issue a CSO Variance is further supported by EPA's 1994 *Combined Sewer Overflow (CSO) Control Policy*:

"A water quality standard variance may be appropriate in limited circumstances on CSO-impacted waters where the State is uncertain as to whether a standard can be attained and time is needed for the State to conduct additional analyses on the attainability of the standard."

Accordingly, MassDEP has determined that a new CSO WQS Variance is appropriate at this time. Issuance of this proposed Variance in the Alewife Brook/Upper Mystic River watershed is consistent with both MassDEP's and EPA's WQS variance regulations noted above, which allow for subsequent variances provided that all conditions of EPA's variance regulations at 40 CFR 131.14 are met.

MassDEP also notes that the requirements in the proposed CSO Variance specifically include developing updated CSO control plans, which encompass an assessment of a full range of higher levels of CSO control, as well as a rigorous financial capability analysis, both of which will be central to regulatory determinations on a final water quality standard.

Highest Attainable Condition

Federal regulations at 40 CFR 131.14(b)(1)(ii) also establish that the requirements applicable over the term of a variance must represent the "highest attainable condition" of the waterbody segment. For discharger(s)-specific WQS variances, 40 CFR 131.14(b)(1)(ii)(A) provides that the "highest attainable condition" must be quantified as one of the following:

(1) The highest attainable interim criterion; or
(2) The interim effluent condition that reflects the greatest pollutant reduction achievable; or
(3) If no additional feasible pollutant control technology can be identified, the interim criterion or interim effluent condition that reflects the greatest pollutant reduction achievable with the pollutant control technologies installed at the time the State adopts the WQS variance, and the adoption and implementation of a Pollutant Minimization Program.

For this proposed Variance, MassDEP has incorporated conditions in the Variance which require not only implementation of the Nine Minimum Controls, but also additional system optimization measures which collectively will further minimize CSO discharges and their water quality impacts. MassDEP has conducted a review of the past CSO facilities planning documents

by the CSO Variance permittees, and concluded that there are no further CSO abatement projects which could be feasibly designed and implemented in the CSO Variance timeframe. Thus, the Variance requirements, including those projects identified in Exhibit A to the Variance Determination, represent the highest interim attainable condition which can be achieved during the course of the CSO Variance. The Variance requirement for development of updated CSO control plans will facilitate a determination on the affordability and feasibility of higher levels of CSO controls, at the end of the Variance term.

2019 Variance Conditions

In developing the 2019 draft Variance conditions MassDEP has carried forward many tasks from past Variances, and has added many additional requirements MassDEP considers vital steps to further minimize CSO discharges, to gather information needed to understand CSO water quality impacts and to render water quality standards determinations at the close of the Variance period. In addition, some of the tasks carried forward from past iterations of the Variance have been strengthened, so that the collection of Variance requirements achieves the highest attainable conditions to control CSO discharges and improve water quality in the Alewife Brook/Upper Mystic watershed. Draft Variance conditions include:

- A Pollution Minimization Program which includes continued implementation of the Nine Minimum Controls and implementation of a number of additional system optimization projects intended to further reduce CSO discharges;
- An expanded CSO/receiving water quality monitoring program;
- Progress Reports and public meetings for the ongoing MWRA CSO Performance Assessment;
- A requirement for MWRA to develop and calibrate a receiving water quality model, and use such model to present information on the water quality impacts of CSO and non-CSO discharges in the Alewife Brook/Mystic River watershed;
- A requirement for MWRA, and the Cities of Cambridge and Somerville to establish a subscriber-based CSO notification program, and to maintain CSO data on their respective websites; and
- A requirement for MWRA, and the Cities of Cambridge and Somerville to provide a scope of work and schedule for developing an updated CSO Control Plan, along with updated affordability analyses, which will be needed to determine if higher levels of control are feasible.