



MASSACHUSETTS WATER RESOURCES AUTHORITY

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January 29, 2021

Kevin Brander, P.E.
Section Chief, Municipal Services Section
DEP Northeast Region Office
205B Lowell Street
Wilmington, MA 01887

Todd J. Borci
Office of Environmental Stewardship
US EPA New England
5 Post Office Square Suite 100 (OES 04-4)
Boston, MA 02109-3912

Re: Charles River and Alewife Brook/Upper Mystic River CSO Variances
Annual Report on Progress of Additional CSO System Optimization Measures

Dear Mr. Brander and Mr. Borci:

MWRA is pleased to submit the attached annual report on the progress of additional CSO system optimization measures. MWRA is required to evaluate these optimization measures in accordance with conditions established in the CSO variances for the Lower Charles River/Charles Basin and the Alewife Brook/Upper Mystic River Basin, which were issued by MassDEP on August 30, 2019. MWRA continues to perform activities as set forth in the other conditions in the variances, including collection system maintenance, water quality sampling and reporting requirements, receiving water quality modeling, public notification of CSO discharges, and performance assessment progress reporting.

The variances require MWRA to implement, by December 31, 2020, a subscriber and web-based system to alert the public of CSO discharges from its permitted outfalls. MWRA launched the public notification system in July 2020 and has since been issuing and posting notices of CSO activations for its outfalls. The subscriber notices include links to the website (http://www.mwra.com/harbor/html/cso_reporting.htm), which MWRA has updated to include detailed information on discharge locations, affected water body segments, and recent CSO activation history. More recently, MWRA completed the development of procedures for estimating and reporting discharge volume, as required within 5 days of an activation, and implemented volume reporting at the end of December. MWRA has coordinated these efforts with BWSC and the cities of Cambridge and Somerville.

Please do not hesitate to contact me, at dave.coppes@mwra.com, should you have questions or need additional information regarding MWRA's progress to date in meeting CSO variance requirements.

Very truly yours,

A handwritten signature in blue ink, appearing to read 'D. Coppes', with a horizontal line underneath.

David W. Coppes, P.E.
Chief Operating Officer

cc: Fred Laskey, Executive Director
Beth Card, Director, Environmental and Regulatory Affairs
John Colbert, P.E., Chief Engineer

MWRA CSO Variances
Additional System Optimization Measures
Progress Report as of January 29, 2021

MWR205 & SOM007/MWR205A Somerville Marginal CSO Reduction Project, Study and Preliminary Design

Variance Milestones: Notice to Proceed December 2020 | Report December 2021

Summary Description:

Evaluate alternatives and feasibility of reducing CSO activation frequency and volume at the Somerville Marginal CSO Treatment Facility and associated CSO outfalls SOM007A/MWR205A, and MWR205, including:

- Construction of dry weather connection relief/control from the City of Somerville's CSO regulator RE071A to MWRA's Somerville-Medford Branch Sewer
- Relocation of MassDOT I-93 drainage from upstream to downstream of the Somerville-Marginal facility to reduce the frequency and volume of facility activations

Progress to Date:

MWRA commenced the investigations into both of these potential mitigation measures in June 2020, ahead of the variance's December 2020 milestone. Preliminary model results show that increasing the size of the combined sewer connection can significantly lower activations and treated discharge volumes at both outfalls downstream of the Somerville-Marginal CSO facility. Model predictions indicate that increasing the connection size from the current 18-inch diameter to 24-inch diameter would bring treated discharges at both outfalls close to their LTCP goals. Additional investigations and model runs are underway to consider other connection diameters and connection options and to identify, and potentially mitigate, any adverse hydraulic impacts to other parts of MWRA's interceptor system, including the Cambridge Branch Sewer and its hydraulically related CSO outfalls. MWRA also plans to evaluate engineering, construction and permitting requirements and potential cost as part of this feasibility study.

Through coordinated investigations with the City of Somerville, MWRA has determined that portions of the piping system upstream of the 72-inch MassDOT connection collect sanitary flow and stormwater from certain combined sewer areas of the city, including Winter Hill. Redirecting all flow entering the 72-inch MassDOT connection to the City's sewer system is thus not an appropriate solution as it would require extensive sewer separation and storm drain construction in addition to redirecting the 72-inch storm drain to the downstream side of the facility.

MWRA and the City are now conducting investigations into whether separate stormwater segments tributary to the 72-inch MassDOT connection can be redirected away from the sewer system and the Somerville-Marginal CSO facility. These evaluations are currently focusing on two separate storm drains, one that serves a portion of Somerville's Ten Hills neighborhood and a 30-inch MassDOT storm drain that serves portions of I-93 and Mystic Avenue. Both of these storm drains currently convey stormwater to the 72-inch MassDOT connection. Preliminary modeling by MWRA shows that removing the Ten Hills storm drain flows will provide a small reduction in Typical Year discharge volume at the Somerville-Marginal facility and no reduction in activation frequency. MWRA is working with the City to evaluate the feasibility and potential CSO benefits of removing the 30-inch MassDOT storm drain from the sewer system, separately and together with removal of the Ten Hills stormwater. If a substantial benefit is predicted, MWRA and the City will evaluate the engineering, construction and permitting requirements, and potential cost of redirecting these flow around the CSO facility or to existing or new stormwater outfalls as part of this feasibility study.

Alewife Brook Pump Station Optimization Evaluation Project

Variance Milestones: Notice to Proceed April 2020 | Report: April 2021

Summary Description:

Evaluate maximizing beneficial use of enhanced pumping capacity at the recently rehabilitated Alewife Brook Pump station to lower wastewater elevations in the upstream collection system and potentially reduce CSO activations and volumes at upstream CSO outfalls discharging to Alewife Brook.

Progress to Date:

In April 2020, MWRA commenced evaluations of the feasibility of further optimizing the operation of its Alewife Brook Pump Station and the potential for reducing upstream CSO discharges to Alewife Brook. By the fall of 2020, MWRA and its consultant completed pump inspections, pump performance evaluations, and dry weather and wet weather pump testing. With the results of these evaluations and tests, MWRA selected a set of modified pump control settings intended to keep the pump station wet well at a lower elevation during storms. MWRA then operated the station utilizing these modified settings during the storms of December 5, 2020 and January 16, 2021, and MWRA and its consultant are currently evaluating the data collected during those events.

MWRA incorporated the modified pump control settings into its hydraulic model and performed a Typical Year simulation to determine whether maintaining the lower wet well elevation has an effect on the upstream CSOs. The model results showed little upstream CSO reduction from maintaining a lower wet well elevation. As a sensitivity analysis, MWRA also performed model simulations of free discharge at the downstream ends of the MWRA interceptors (no Alewife Brook Pump Station capacity or elevation limitation). Again, the model results showed little upstream CSO reduction. This is because the lower wet well elevation has only a slight effect on lowering the hydraulic grade line upstream in the interceptor system at the CSOs. While the upstream regulators at CAM401B and MWR003 are affected by the interceptor hydraulic grade line in the largest storm in the Typical Year, modifications to the pumping at Alewife Brook Pump Station are predicted to reduce Typical Year CSO activations and volumes only very slightly. All of the Alewife Brook regulators are primarily affected by localized hydraulic conditions at the regulators and upstream community flows, and less so by interceptor hydraulic grade, at least in Typical Year storms.

MWRA plans to reevaluate the benefits of the pumping modifications when joined with potential upstream CSO optimization measures (discussed below). Such reevaluation may be performed beyond April 2021, when MWRA intends to issue a report on pumping station optimization and associated CSO control benefit in compliance with the Alewife Brook/Upper Mystic variance.

CSO System Optimization for Alewife Brook, Study and Preliminary Design

Variance Milestones: Notice to Proceed December 2020 | Report December 2022

Summary Description:

Using the calibrated hydraulic model and coordinating technical evaluations with the cities of Cambridge and Somerville, MWRA will conduct system optimization evaluations at the remaining active regulators tributary to CSO outfalls discharging to the Alewife Brook watershed.

Progress to Date:

MWRA commenced the CSO optimization investigations for Alewife Brook CSO outfalls in August 2020, ahead of the variance's December 2020 milestone. MWRA is coordinating these efforts with the departments of public works in Cambridge and Somerville. MWRA's consultant has reviewed the CSO regulator configurations and has modeled hydraulic performance. These efforts are intended to identify regulator modifications or upstream flow controls that may further reduce CSO activations and/or volume. MWRA has initially focused attention on Outfall CAM401A, where past inspections and hydraulic modeling had determined that backwater in the downstream sewer system was contributing to higher overflow activity, and at Outfall SOM001A, the sole Alewife Brook outfall MWRA has forecasted as likely not attaining the LTCP goals by December 2021.

For Outfall CAM401A, Cambridge recently completed extensive sediment cleaning and some repairs along the combined sewer that conveys flows from the 401A regulator to the City's Rindge Avenue sewer and MWRA's interceptor system. Following the cleaning and repairs, Cambridge collected water level readings along the combined sewer, and it is coordinating the review of these elevations with MWRA prior to Cambridge and MWRA updating their respective hydraulic models. Past, preliminary modeling by MWRA's consultant showed that removing the backwater effect presumed to be caused by the sediment would result in attainment of the LTCP activation and volume goals at Outfall CAM401A.

For SOM001A, MWRA's consultant has performed preliminary modeling of potential regulator modifications, including raising the weir and relieving the existing connection to MWRA's interceptor, with and without the modified pump settings at Alewife Brook Pump Station mentioned above. The preliminary modeling results showed that raising the weir either 3 inches or 6 inches would not reduce Typical Year overflow activations and would reduce overflow volume by a small amount relative to the overflow volume exceeding the LTCP goal. Adding an 18-inch connection to the MWRA interceptor, to supplement the existing 36-inch connection, would have only a moderate effect on overflow activations and volumes, while adding a 36-inch connection could lower activations and volume to close to the LTCP goals. However, several factors cause concern in further pursuing this alternative, including: the potential to shift a portion of SOM001A's CSO discharge in large storm events to CSOs in the potentially more sensitive upstream reaches of Alewife Brook; the addition of a significant amount of additional Tannery Brook flow to MWRA's interceptor system that can experience SSOs during large storm events; and significant construction impacts given the location of the SOM001A regulator and MWRA's interceptor adjacent to Alewife Brook Parkway. Adding in the modified pump settings would not affect CSO activations and would further reduce overflow volume by a very small amount at this outfall.

MWRA is continuing its evaluations and coordination with Cambridge and Somerville for these two outfalls. Future work will include optimization evaluations at the other outfalls that discharge CSO to the Alewife Brook.

CSO System Optimization for Lower Charles River, Study and Preliminary Design

Variance Milestones: Notice to Proceed December 2020 | Report December 2022

Summary Description:

Using the calibrated hydraulic model and coordinating technical evaluations with the City of Cambridge and the Boston Water and Sewer Commission, MWRA will conduct system optimization evaluations at the remaining active regulators tributary to CSO outfalls discharging to the Charles River watershed.

Progress to Date:

MWRA commenced the CSO optimization investigations for Charles River CSO outfalls in August 2020, ahead of the variance's December 2020 milestone. MWRA is coordinating these efforts with Cambridge and BWSC. MWRA's consultant has reviewed the configurations of regulators tributary to the Charles River CSO outfalls and the hydraulic performance of these regulators from MWRA model simulations. To support these efforts, MWRA recently conducted surveys to confirm manhole rim elevations and performed internal inspections and measurements of the MWR018, MWR019 and MWR020 regulators along the Boston Marginal Conduit ("BMC"). These MWRA and consultant efforts are intended to identify regulator modifications or upstream flow controls that may further reduce CSO activations and/or volume.

MWRA is initially focusing efforts on outfalls that it forecasts likely will not attain the LTCP activation and volume goals by December 2021. For outfalls MWR018, MWR019 and MWR020, MWRA is evaluating the feasibility and benefits of raising the weirs in these regulator structures. MWRA is also evaluating the potential to reduce head losses within the BMC from these outfalls to the Prison Point facility, and MWRA is considering whether BWSC regulators upstream of the BMC can be modified to reduce their overflows to the BMC. For Outfall CAM005, MWRA is coordinating with the City of

Cambridge to confirm regulator configuration and elevations, further evaluate the factors contributing to overflows, and evaluate the feasibility and benefit of raising the overflow weir and/or reducing potential downstream head losses. For Outfall MWR201 (Cottage Farm Facility), MWRA is verifying its hydraulic model hydrology in the Cambridgeport area utilizing MWRA sewer meter data and Cambridge storm drain meter data during significant storm events that resulted in Cottage Farm activation, following Cambridge's completion of the partial sewer separation improvements, including the installation of 6-inch orifices at stormwater connections to the sewer system, in August 2020. Future work will also include optimization evaluations at the other outfalls that discharge CSO to the Charles River.