



MASSACHUSETTS WATER RESOURCES AUTHORITY

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January 31, 2022

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 for 2021, 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 remaining activities as set forth in the other conditions in the variances, including collection system maintenance, water quality sampling and reporting requirements, and public notification of CSO discharges.

In addition, the variances require MWRA to complete a water quality assessment through development and use of receiving water quality models of the Charles River and Alewife Brook/Mystic River. This water quality assessment, was completed by December 31, 2021 as required, and is documented in three reports covering the model development and calibration, assessment of water quality impacts of CSO and non-CSO sources, and an evaluation of alternatives. Also in 2021, MWRA completed the installation of informational signs at John Wald Park and four other public access locations as required by the Alewife Brook/Mystic River variance.

MWRA has now completed two of the four system optimization measures to be studied under the Variances, with the intent of evaluating whether implementation of these measures will improve CSO performance and water quality. A summary of these reports and further progress on the remaining studies are included in the attached progress report.

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,



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

cc: Frederick Laskey, Executive Director
Carolyn Fiore, Deputy Chief Operating Officer
Rebecca Weidman, Director, Environmental and Regulatory Affairs
John Colbert, P.E., Chief Engineer
Betsy Reilly, Director, Environmental Quality
Brian L. Kubaska, P.E., Assistant Director of Engineering

MWRA CSO Variances
Additional System Optimization Measures
Progress Report as of January 31, 2022

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:

To satisfy this requirement, MWRA submitted on December 29, 2021 the Somerville-Marginal CSO Facility Evaluation report and the Somerville Marginal CSO Facility New Pipe Connection Preliminary Design Assessment report <https://www.mwra.com/cso/variances/122721-somerville.pdf>. A brief summary of the report's findings is provided as follows:

MWRA evaluated relocating the Ten Hills and I-93 storm drain areas downstream of the facility which modeling predicted would reduce the volume at outfall MWR205 by approximately 7 MG, with no change to the activation frequency. This alternative also was predicted to reduce the volume at the Prison Point CSO Facility by approximately 6 MG, with no change to the activation frequency. However, these modest reductions in volume were not sufficient to bring the Somerville Marginal Facility into attainment with the LTCP goal for volume. Given flows through the Somerville Marginal CSO facility are disinfected, diverting stormwater flows around the facility, would also increase the stormwater bacterial load to the receiving waters. Since other alternatives were subsequently identified that provided better performance at the Somerville Marginal Facility by maximizing system capacity, the alternative to divert the upstream stormwater directly to the Mystic River was not recommended for further evaluation.

MWRA evaluated relieving the existing 18-inch dry weather flow connection using a larger diameter pipe from the Somerville Marginal Interceptor to the MWRA's Somerville-Medford Branch Sewer. Initial modeling predicted a substantial reduction in the discharge volume at the Somerville Marginal CSO Facility. Additional consideration of other alternatives that could result in similar benefits led to a more effective and constructible approach to take advantage of available capacity in the MWRA's sewer during some storm events, which included evaluation of a new or supplemental interceptor connection and control gate. Two alternative for this new interceptor connection were evaluated.

Option 1 consisted of adding a new connection with a control gate between the 85 x 90-inch influent line to the Somerville Marginal CSO Facility and the Somerville-Medford Branch Sewer. The control gate would limit flows to the interceptor during larger storm events, and would be controlled based on level set points monitored at three locations. Option 2 consisted of providing a connecting chamber between

an existing 42-inch storm drain tributary to the 85 x 90-inch influent combined sewer and the interceptor, with a similar control gate. Both options had similar CSO reduction benefits, including bringing the discharge volume from Somerville Marginal CSO Facility (MWR205) to within approximately 2 to 3 MG (3-5%) of the LTCP target and reducing the discharge from the high tide discharge into the Upper Mystic River (SOM007A/MRW205A) to within approximately 0.2 MG of the LTCP goal. Model predictions also indicated that the activation frequency would drop from 30 to 18 activations at MWR205, well below the LTCP target of 39 and would meet the activations goal of 3 per year at SOM007A/MWR205A. Although both options showed increases to the treated discharge volume at Prison Point, an overall reduction of CSO discharge (29 MG) was predicted from hydraulically connected CSO discharges.

MWRA retained Hazen and Sawyer to further evaluate the two options and prepare a preliminary design and cost estimate as documented in the December 29, 2021 submittal. The recommendation is to move forward with Option 2, connecting to the existing 42-inch storm drain. The preliminary design will be further refined to determine how best to make this connection to existing sewers. The construction cost associated with the recommended alternative was estimated to be approximately \$1.2M. The MWRA has given Hazen authorization to move into the final design stage. The current schedule includes completing the design in 2022 and awarding the construction contract for the new dry weather connection and control gate in early 2023.

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:

On April 27, 2021, MWRA issued the Final Alewife Brook Pump Station Optimization Evaluation report <https://www.mwra.com/cso/variances/042721-alewife.pdf>. A brief summary of the report's findings is provided as follows.

An alternative ABPS operating strategy was developed based on the collection, analyses, and synthesis of ABPS record drawings, operational history and SCADA station data, field-collected data from pump performance tests, hydraulic model runs, and refined field implementation of initial proposed alternative operations strategies.

Model results suggested that an alternative operating strategy of lowering the wetwell at the start of a storm event, would result in marginal improvements to the reduction of CSO activation frequency and discharge volume for the six outfalls tributary to the Alewife Brook. A comparison of the typical year model using the final wet weather ABPS operating strategy indicate a total reduction in CSO volume of 0.25 million gallons.

Although providing only nominal improvement in CSO discharge volumes, the report recommended the final wet weather ABPS operating strategy be implemented into the stations controls, given the noted wet weather pump operation was greatly improved with no observed pump cycling as the wet well level fluctuated, as determined through field trials. A reduction in cycling provided a more stable operation and should result in reduced fatigue wear on the pumps which can extend the service life, reducing station maintenance cost. An additional benefit noted is a reduction in the risk of the wet weather pumps being simultaneously triggered OFF, followed by a quick rise in the wet well prior to the pumps cycling ON that could potentially impact upstream CSOs.

The new operating strategy has since been incorporated in the station controls via the MWRA SCADA system. The station now has two operating strategies: the existing operating strategy for dry weather flow conditions and the final wet weather ABPS operating strategy for storm events.

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. MWRA has initially focused efforts on outfalls that it forecasted would not attain the LTCP activation and volume goals by December 2021. Various alternative have been evaluated and documented in Semi Annual Reports 6 and 7, as well as the Final CSO Post Construction Monitoring and Performance report submitted on December 29, 2021. CAM401A was brought in line with LTCP volume and activation goals after substantial sediment removal within the hydraulically connected system, leaving SOM001A as the only remaining CSO not meeting LTCP volume and activation goals discharging to Alewife Brook.

Future work anticipated in the spring of 2022 will include optimization evaluations at the other outfalls meeting LTCP goals that discharge CSO to the Alewife Brook, which will be compiled along with SOM001A evaluations into the required report on CSO Optimization Evaluation for 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 the department of public works in Cambridge and the Boston and Water Sewer Commission (BWSC). MWRA has initially focused efforts on outfalls that it forecasted would not attain the LTCP activation and volume goals by December 2021. Various alternatives have been evaluated and documented in Semi Annual Reports 6 and 7 as well as the Final CSO Post Construction Monitoring and Performance report submitted on December 29, 2021 for CSO discharges from MWR201 (Cottage Farm), MWR018, MWR019, and MWR020, and CAM005.

Future work anticipated in the spring of 2022 will include optimization evaluations at the other outfalls meeting LTCP goals that discharge CSO to the Charles River, which will be compiled along with evaluations performed at MWR201, MWR018, MWR019, and MWR020, and CAM005 in the required report on CSO Optimization Evaluation for the Charles River.