CITY OF SOMERVILLE, MASSACHUSETTS
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RICHARD E. RAICHE, PE, PMP
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Kevin Brander, PE
Section Chief Municipal Services Section
DEP Northeast Regional Office
205B Lowell Street
Wilmington, MA 01887

And

Todd J. Borci
Office of Environmental Stewardship
US EPA New England
5 Post Office Square, Suite 100
Boston, MA 021109-3912

Re: NPDES Permit No. MA0101982 - 2020 Annual Report

Dear Mr. Brander and Mr. Borci,

Enclosed please find copies of the City of Somerville's Annual Report for National Pollutant Discharge Elimination System (NPDES) permit (Permit No. MA0101982) for calendar year 2020.

If you have any questions, please contact me at 617-448-3716 or lhiller@somervillema.gov.

Regards,

LucicaHiller

Lucica S. Hiller, EIT
Stormwater Program Manager

Attachment: NPDES Permit No. MA0101982- 2020 Annual Report

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cc:
Massachusetts Department of Environmental Protection
1 Winter Street, 5th Floor
Boston, MA 02108
Attn. David Ferris

MassDEP Surface Water Discharge (NPDES) Permitting Program
627 Main Street, 2nd Floor
Worcester, MA 01608

U.S. Environmental Protection Agency
Water Technical Unit (OES04-SMR)
5 Post Office Square, Suite 100
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NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
COMBINED SEWER OVERFLOW PERMIT NO. MA0101982

2020 ANNUAL REPORT

This report has been prepared in accordance with Part I, Section D of the above referenced permit issued to the City of Somerville Department of Public Works on 11 June 2012. The permit authorizes the City of Somerville to discharge flows from two Combined Sewer Overflows (CSO), one on the Alewife Brook designated as SOM001A, and one on the Mystic River designated as SOM007A.

1. Activation Frequency and Discharge Volumes

In accordance with Part I, Section C, Paragraph 4, the City of Somerville (the City) maintains a meter at SOM001A to supply direct measurement of discharges from SOM001A, and utilizes estimates provided by the Massachusetts Water Resources Authority (MWRA) to determine discharges from SOM007A.

SOM001A

SOM001A is located on the Alewife Brook at a location within the City of Cambridge where flow from the western and central portions of Somerville discharges to the MWRA's Alewife Brook Conduit via Somerville's Tannery Brook Conduit. In calendar year 2020, the CSO at this location activated a total of three (3) times, in comparison to the nine (9) activations recorded in calendar year 2019 and twenty-two (22) activations recorded in calendar year 2018. Table 1 summarizes the duration and volume of each discharge as measured by the existing permanent meter, the cumulative precipitation depth, and the peak 15-minute interval depth.

Of the three (3) activations at SOM001A, two (2) had a duration of 30 minutes or less, and one (1) of the activations was 10 minutes. During those times, the instantaneous rainfall created peak flows in the Tannery Brook Conduit that exceeded the hydraulic capacity of the 36" connection to the Alewife Brook Conduit, and the peak hydraulic grade line exceeded the SOM001A overflow weir elevation.

MWRA employed a temporary meter at this location for the first half of 2020 (January 1 through June 30). The MWRA meter data, as well as the meter data collected by the City of Somerville indicates no discharge during this period.

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Table 1: SOM001A 2020 CSO Activations

Activation Dates	Duration (hours)	Volume (gallons)	Cumulative Precip. (inch) (1)	Peak 15-minute Interval (inch)
23-Jul-2020	0.17	51,622	0.61	0.34 (2)
23-Aug-2020	0.50	497,946	1.10	0.61 (3)
1-Dec-2020	0.50	297,324	1.72	0.18 (2)

Notes:
1. Cumulative precipitation data acquired from the USGS Fresh Pond Cambridge, MA rain gauge.
2. Peak interval data acquired from the USGS Fresh Pond Cambridge, MA rain gauge.
3. Peak interval data acquired from the USGS Hobbs Brook, Lincoln MA rain gauge.

SOM007A

SOM007A, jointly permitted to MWRA as MWR205A, discharges treated effluent from the MWRA Somerville Marginal CSO Screening and Disinfection Facility, together with separate stormwater that enters the facility's outfall, to a location upstream of the Amelia Earhart Dam in the Mystic River Basin during mid- to high-tide conditions. Under low tide conditions, discharge from the facility is through MWR205 downstream of the dam. While SOM007A is permitted to Somerville under the above referenced permit, MWR205 and MWR205A are permitted to MWRA under Permit No. MA0103284. MWRA provides discharge data for the Somerville Marginal Facility.

Discharges at SOM007A, summarized in Table 2 and detailed in Table 3, are from MWRA's model results and MWRA's metering. The metering data indicates a total of seven (7) activations and total discharge volume of 12.47 MG in calendar 2020., while the model predicted three (3) of the seven activations The CSO discharge volume also at SOM007A/MWR205A is total discharge, comprising both treated CSO and separate storm water entering the overflow conduit downstream of the CSO facility.

Additional information regarding discharges at SOM007A/MWR205A and MWR205 can be found in the MWRA's 2020 Annual CSO Discharge Report.

Table 2: SOM007A/MWR205A/MWR205 2020 CSO Activation Summary Table

Activation Frequency Period	Metered Activations	Metered Volume (1)	Modeled Activations (1)	Modeled Volume (MG)
2020	7	12.47	3	9.43

Note:
1. Storm events in which the model and meter did not match tended to have high rainfall spatial variation.

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Table 3: SOM007A/MWR205A 2020 CSO Activations by Storm

Activation Dates	Metered Volume (Mgal)	Metered Duration (hours)	Model Volume (MG)	Model Duration (hours)
23-Mar-20	1.36	4	3.82	3.37
3-Apr-20	0.018	0.25		
29-Jun-20	0.097	<0.25		
23-Aug-20	0.43	0.25	0.56	0.30
30-Nov-20	5.12	3.25		
5-Dec-20	3.03	3.16	5.04	3.27
25-Dec-20	2.41	2.17(1)		

Note:
1. The 12/25/2020 activation had multiple starts and stops.

2. MWRA Model Comparison

MWRA modeled the 2020 system conditions for the 2020 rainfall as summarized in the Table 4.

Table 4: SOM001A and SOM007A/MWR205A CSO Volume & Frequency for Metered and Modeled Events

Outfall	Regulator	January 1, 2020 – December 31, 2020					
		Meter			Model		
		Activation Frequency	Duration (hours)	Volume (MG)	Activation Frequency	Duration (hours)	Volume (MG)
SOM001A (1)	RE-01A	3	1.17	0.85	2	0.64	0.98
SOM007A/MWR205A (2)		7(3)	13.33	12.47	3(3)	6.94	9.43(4)

Notes:
1. The meter data reported for SOM001A is the data from the City of Somerville permanent meter installation.
2. Outfall SOM007A/MWR205A, jointly permitted to the City of Somerville and MWRA, provides high tide relief to MWRA's Somerville-Marginal Conduit. The Somerville-Marginal Conduit conveys treated CSO from MWRA's Somerville-Marginal Facility and separate stormwater to the tidal portion of the Mystic River below the Amelia Earhart Dam, at Outfall MWR205. The reported discharge at high tide Outfall SOM007A/MWR205A is total flow, both separate stormwater and CSO.
3. The metered activations occurred on 3/23/20, 4/3/20, 6/29/20, 08/23/2020, 11/30/2020, 12/5/2020 and 12/25/2020. The model results show activations on the larger of these storms, namely 3/23/20, 08/23/20 and 12/5/20.
4. The model predicted less discharge volume mostly tied to missing the activation for the 11/30/2020 storm due to the rainfall's high spatial variation.

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During 2019, system modifications were made to the regulator associated with outfall SOM001A. The modifications included the removal of a structure that had been built over the dry weather flow connection, and the removal of the temporary orifice plate used by MWRA to restrict the dry weather flow connection until completion of CSO Long-Term Control Plan (LTCP) projects and post-construction hydraulic evaluations. Metering data from 2019 and 2020 were used to recalibrate the MWRA model at SOM001A to account for the removal of the structure in the manhole and the orifice plate. MWRA also adjusted the model's hydrology tributary to Tannery Brook to improve the model's ability to predict influent flows to SOM001A, and adjusted the orifice coefficient at SOM001A based on comparison of the metered and modeled system responses.

3. CSO Abatement Work Report

In 2013, the MWRA completed construction to provide for eventual upgrade of the size of the local sewer connection between Somerville's Tannery Brook Conduit and MWRA's interceptor system and installed an underflow baffle to control the discharge of floatable materials.

In 2013, the City completed an investigation of the regulator manholes between the Tannery Brook and Union Square systems that divert high level flows from the City's connection to the MWRA Cambridge Branch interceptor to the Alewife Brook Conduit. The resulting report was submitted for review in 2014; however, no additional actions have been required.

The City is currently in the fifth year of a multiyear program to conduct a Sewer System Evaluation Study. The City has started pipeline inspections, including cleaning, CCTV inspection, and flow isolation continuing in Summer through Fall 2020 and Spring through Fall 2021. These activities are informing the City's pipe rehabilitation efforts to further reduce Infiltration and Inflow (I/I). The City's pipe rehabilitation program is currently in development and expected to start in Fall 2021.

The City is currently undertaking a City-Wide Drainage and Water Quality Improvements Plan including a Hydraulic Model Update and Master Planning effort. The Master Plan is evaluating options to reduce CSOs in the combined system areas, mitigate localized flooding, and evaluate potential water quality features. The Drainage and Water Quality Improvements Plan is evaluating system capacity and developing strategic opportunities for sewer and drainage improvement projects at a sewershed level. Seven sewersheds have been delineated, and the evaluations include field investigations, model updates and calibrations, root cause analysis, and concept development in each sewershed. The evaluations for the sewershed tributary to SOM007A started in Fall of 2020 and are expected to be completed by the end of 2021. The evaluations for the sewersheds tributary to SOM001A started in early 2021 and are expected to be completed by the end of 2021.

SOM001A

For SOM001A, the most recently updated and calibrated MWRA hydraulic model predicts that the typical year activations and discharge volumes will not meet the LTCP goals by December 31, 2021. The City and MWRA have been working together on field inspections, modeling, and the reevaluation of system conditions to explain and attempt to mitigate higher CSO activity. MWRA has modified the Alewife Brook Pumping Station wet weather operation strategy as recommended in the MWRA Alewife Brook Pumping Station Optimization Evaluation Report (April 27, 2021). The modified pumping strategy

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improves pumping operation, even it results in only minor CSO discharge reduction at upstream Alewife Brook outfalls, including at SOM001A.

MWRA is currently investigating a range of alternatives to potentially reduce the activation frequency and volume and work towards achieving the LTCP goals. These alternatives currently include raising the weir in the SOM001A regulator, increasing the conveyance of flow between the SOM001A regulator and the interceptor system, diverting upstream flows away from the Tannery Brook Drain, towards regulator SOM009 and the Prison Point system, and utilizing in-system storage within the Tannery Brook Drain to attenuate peak flows to the regulator.

The Alewife Brook/Upper Mystic River CSO Variance, issued by MassDEP to the City of Somerville, MWRA and the City of Cambridge on August 30, 2019, requires Somerville, MWRA, and Cambridge to implement, by December 31, 2020, a subscriber and web-based system to alert the public of CSO discharges from their permitted outfalls. The City of Somerville launched the public notification system in December 2020. The subscriber notices include links to the City's website, Alewife Brook Combined Sewer Overflow (CSO) Control , which the City updated to include detailed information on recent CSO activation history, estimated duration and discharge volumes for each activation, links to the MWRA and the City of Cambridge CSO websites, and CSO educational materials for the public.

SOM007A

For SOM007A, the most recently updated and calibrated MWRA hydraulic model predicts that the typical year activations and discharge volumes will meet the LTCP goals after December 31, 2021.

MWRA is currently investigating the feasibility and impact of installing a new dry weather flow connection between the influent conduit to Somerville Marginal CSO Facility and the Somerville-Medford Branch Sewer, as well as a control on the dry weather flow connection that would limit peak flows during larger storm events to avoid downstream impacts. Construction feasibility, impacts, and costs will also need to be assessed. In parallel with the interceptor connection relief, evaluations are being conducted jointly by MWRA and the City of Somerville into the removal of separate stormwater from the Ten Hills neighborhood and a portion of the elevated I-93 drainage system that is currently tributary to the Somerville-Marginal CSO Facility.

The City is working with MWRA 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 flows around the Somerville-Marginal CSO Facility or to existing or new stormwater outfalls as part of this feasibility study.

No modifications to the City's system that connects to the Somerville Marginal Mystic River CSO discharges have taken place in 2020. The City is currently in the design phase of rehabilitating the Marginal Sewer Interceptor, which is the most downstream sewer collecting flow from the City and conveying it to the Somerville-Medford Branch Sewer or for treatment at the Somerville Marginal CSO Facility in larger storms.

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