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**NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM
COMBINED SEWER OVERFLOW PERMIT NO. MA0101982
2018 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 SOM-001A, and one on the Mystic River designated as SOM-007A.

Activation Frequency and Discharge Volumes

In accordance with Part I, Section C, Paragraph 4, the City of Somerville maintains a meter at SOM-001A to supply direct measurement of discharges from SOM-001A, and utilizes estimates provided by the Massachusetts Water Resources Authority (MWRA) to determine discharges from SOM-007A.

SOM-001A

SOM-001A 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 2018, the CSO at this location activated a total of twenty-two (22) times, in comparison to the fifteen (15) activations recorded in calendar year 2017. The table below summarizes the duration and volume of each discharge as measured by the meter, and the cumulative precipitation depth, according to recordings at the BWSC precipitation gauge in Charlestown.





Activation Dates	Duration (hours)	Volume (gal)	Cumulative Precip. (in)
13-Jan-2018	0.42	212,895	1.75
23-Jan-2018	0.75	455,428	1.13
16-Apr-2018	1.58	783,911	1.99
25-Apr-2018	0.33	26,427	0.76
15-May-2018	0.83	1,488,497	1.08
5-Jun-2018	0.42	127,044	1.03
25-Jun-2018	1.33	2,302,073	0.80
28-Jun-2018	0.75	932,250	1.27
6-Jul-2018	0.42	415,246	0.43
17-Jul-2018	1.58	1,604,637	2.25
26-Jul-2018	0.58	886,165	0.65
9-Aug-2018	0.42	172,409	0.37
11-Aug-2018	1.25	1,725,184	0.46
12-Aug-2018	0.92	1,480,231	1.72
14-Aug-2018	1.00	980,003	0.44
22-Aug-2018	0.50	421,071	0.37
18-Sep-2018	1.33	3,843,379	1.41
25-Sep-2018	0.58	417,868	1.59
29-Oct-2018	0.83	869,265	0.61
3-Nov-2018	1.00	278,823	1.82
10-Nov-2018	1.33	147,662	1.37
25-Nov-2018	0.25	13,466	0.65

Table 1: SOM001A 2018 CSO Activations

SOM-007A

SOM-007A, along with MWR-205A, discharge treated effluent from the MWRA Somerville Marginal CSO screening and disinfection facility to a location upstream of the Amelia Earhart Dam on the Mystic River during mid- to high-tide conditions. Under low tide conditions, discharge from the facility is through MWR-205. While SOM-007A is permitted to Somerville under the above referenced permit, MWR-205 and MWR-205A are permitted to MWRA under Permit No. MA0103284. MWRA provides data for the Somerville Marginal Facility.

The data as reported by the MWRA is based on model data for January 1st-April 14th, 2018 and on results from the temporary metering program for the rest of the year. Based on the model there was no activation





in Somerville from January 1st-April 14th. For the remainder of the year, the temporary metering data indicates a total of fifteen (15) activations in calendar 2018. Where volume is provided, please note the data provide total facility activation volumes and does not provide individual volumes at each of the three outfall locations.

Activation Dates	Duration (hours)	Volume (Mgal)	Cumulative Precip. (in)
15-Apr-2018	2.20		2.43
15-May-2018	0.47		0.98
24-Jun-2018	0.04		0.48
27-Jun-2018	3.27		0.68
17-Jul-2018	2.05		2.39
25-Jul-2018	0.33		0.68
11-Aug-2018	3.25		2.65
17-Aug-2018	1.25		0.35
18-Sep-2018		1.70	1.18
25-Sep-2018		0.41	1.82
27-Oct-2018		0.54	1.65
2-Nov-2018		4.10	1.91
9-Nov-2018		3.50	1.60
16-Nov-2018		0.62	1.43
26-Nov-2018		1.04	1.58

Table 2: SOM007A/MWR205A/MWR205 2018 CSO Activations

Additional information regarding operation of SOM-007A/MWR-205A/MWR-205 can be found in the MWRA's annual CSO discharge report.

MWRA Model Comparison

CSO Volume & Frequency for Typical Year Precipitation

MWRA modeled the 2018 system conditions for both the 2018 rainfall and the typical year precipitation as summarized in the table below:





		2018 RAINFALL UNDER 2018 SYSTEM CONDITIONS			TYPICAL-YEAR RAINFALL UNDER 2018 SYSTEM CONDITIONS		TYPICAL-YEAR RAINFALL W/ LONG TERM CSO CONTROL PLAN	
Outfall ¹	Regulator	Activation Frequency	Duration (hrs)	Volume (MG)	Activation Frequency	Volume (MG)	Activation Frequency	Volume (MG)
UPPER MYSTIC RIVER								
SOM007A/MWR205A ⁽¹⁾		21	48.87	NA	2	1.82	3	3.48
SOM007	Closed	N/A	N/A	N/A	Closed	N/A	Closed	N/A

1. The MWRA did not model SOM001A for 2018 rainfall conditions.

Table 3: SOM007A/MWR205A CSO Volume & Frequency for Typical Year Precipitation

Evaluation

The Somerville Marginal CSO Facility outfalls experienced more frequent and higher volume activations than the model predicted. For SOM-001A, it appears that the 24-inch orifice plate installed in 2013 by the MWRA at the connection of the City’s Tannery Brook conduit to the MWRA’s Alewife Brook Conduit, which was intended to improve system performance prior to the sewer separation in Cambridge and the closure of CAM-004, may now be causing a hydraulic restriction that increases discharges under such cloudburst conditions. This orifice plate was removed by the MWRA on March 27th, 2019. Of the 22 activations at SOM-001A, only 6 had a duration of over an hour, and 6 of the activations were 30 minutes or less. During those times, the Alewife Brook Conduit had capacity to accept flows, but the instantaneous rainfall created peak flows in the Tannery Brook Conduit that exceeded the hydraulic capacity of the orifice plate.

CSO Abatement Work Report

In 2013, the MWRA completed an upgrade to 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. Additional modifications have been contemplated to follow the CAM-004 separation in Cambridge, which was completed in 2017; however, those modifications have not taken place.

In 2013, the City of Somerville completed an investigation of the regulator manholes 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.

No modifications to the city's system that connects to the Alewife Brook or the Mystic River CSO discharges have taken place in 2018. Annual reports submitted by the City of Cambridge under Permit No. 0101974 and by the MWRA under Permit No. 0103284 can provide information on modifications to the shared systems that might influence discharges from the CSOs permitted to the City of Somerville.

The City of Somerville is currently in the third year of a multiyear program to conduct a Sewer System Evaluation Study. Last year, the City conducted pipeline inspections, including cleaning, CCTV inspection and flow isolation in the Tannery Brook and Alewife conduit tributary areas. These activities are informing the City's further pipe rehabilitation efforts to further reduce Infiltration and Inflow (I/I). The City's consultant for this work is currently designing the program which is expected to start in Fall 2019 or Spring 2020.

Conclusion

The City of Somerville is currently working with the MWRA and the City of Cambridge to evaluate the capacity of the Alewife Brook Conduit and to design alterations to the connection of the Tannery Brook Conduit to reduce the frequency of SOM-001A activations whilst not adversely impacting other CSO locations.

