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# NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM COMBINED SEWER OVERFLOW PERMIT NO. MA0101982

# 2025 ANNUAL REPORT

## 1. Purpose of 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.

Per the 2019 Variance for Combined Sewer Overflow Discharges to the Alewife Brook / Upper Mystic River Basin and Charles River Basin issued by the Massachusetts Department of Environmental Protection, the City is required to complete an Updated CSO Control Plan for City-owned outfalls. The recommendations in this Report will be used to support creation of that Control Plan.

## 2. Hydraulic Model Updates

In 2025, no significant modifications were made to the existing conditions hydraulic model by the City of Somerville. In 2022, the City had integrated its model into a Unified Hydraulic Model (the Unified Model). This Unified Model is a collaborative effort between the City of Cambridge, City of Somerville, and the Massachusetts Water Resources Authority (MWRA), who are collaborating on developing Updated CSO Control Plans to build upon the current MWRA CSO Long-Term Control Plan (LTCP). The model results discussed in this report were derived from this Unified Model, except MWRA results presented for SOM007A/MWR205A.

SOM001A connects to the MWRA-owned Alewife Brook Conduit, which ultimately discharges into the Alewife Brook pump station. The capacity of the pump station along with the capacity of MWRA's trunk


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sewer conduits along the Alewife Brook can become limiting during certain storms hence the importance of merging Somerville's and the MWRA regional model to reflect these potential limitations. Similarly, activations at SOM007A depend highly on the operation of the Somerville Marginal Facility owned and operated by the MWRA.

## 3. 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 metered 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 2025, the CSO at this location activated a total of three (3) times, in comparison to six (6) activations recorded in 2024, and twelve (12) activations recorded in calendar year 2023. Table 1 summarizes the duration and estimated volume of the discharge as measured by the existing permanent meter installation, the cumulative precipitation depth, and the peak 15-minute interval depth.

Somerville utilizes a professional metering firm for the installation and maintenance of:

- Flow metering equipment and the assessment of CSO activations, volumes, and durations based on the meter data.
- Rain gauge equipment at the Somerville DPW building at 1 Franey Road.

*Table 1: SOM001A 2025 Metered CSO Discharges*[1]

| Activation Date | Duration (hours) | Volume (gallons) | Cumulative Precipitation (inch) (2) | Peak 15-minute Interval (inch) (2) |
|---|---|---|---|---|
| 8/29/2025 | 0.17 | 39,000 | 0.63 | 1.56 |
| 9/6/2025 | 0.25 | 338,000 | 1.81 | 1.28 |
| 10/8/2025 | 0.67 | 729,000 | 1.11 | 1.88 |

Notes:

1. Metered data are estimates of outfall discharge calculated using data from sensors and considering physical configurations and constraints.
2. Cumulative precipitation and peak interval data acquired from the Somerville DPW Building rain gauge.



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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.

Metered discharges at SOM007A, summarized in Table 2, have been provided by MWRA. The metering data indicates a total of five (5) activations and total discharge volume of 8.38 MG in calendar year 2025. The CSO discharge volume at SOM007A/MWR205A is total discharge, comprising of 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 2025 Annual CSO Discharge Report.

*Table 2: SOM007A/MWR205A/MWR205 2025 CSO Activation Summary Table*

| Activation Frequency Period | Metered Activations | Metered Volume (MG) |
|---|---|---|
| 2025 | 5 | 8.38 |

## 3. 2025 Rainfall Statistical Analysis

Rainfall data were obtained from the City's rain gauge installed at DPW as well as the USGS Fresh Pond rain gauge as these are practically equidistant to the SOM-001A CSO outfall. Data were reviewed for completeness, and no data gaps were identified. However, the lower total accumulated rainfall at the Fresh Pond gauge suggests that some missing data may be present.

Once the DPW and Fresh Pond datasets were complete, the 2025 rainfall data was analyzed, and all the storms were segregated, assuming a minimum rainfall accumulation threshold of 0.1 inches and a storm inter-event time of 12 hours. A summary of the 2025 rainfall statistics is provided in Table 3. As seen in Table 3, a significant difference between the two rain gauges was observed in total rainfall accumulation and longest and average storm duration. However, the rest of the statistics were very similar. After comparing total rainfall accumulation in other areas in the Boston area, it seems like 2025 rainfall accumulation was closer to 40 inches, and therefore, we suspect that the Fresh Pond gauge was either non-operational during a part of the year or had some missing data that was reported as zero in the USGS database.



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*Table 3: 2025 Rainfall Statistics*

| Parameter | Somerville DPW Rain Gauge | Fresh Pond Rain Gauge |
|---|---|---|
| Total annual rainfall accumulation | 40.63 inches | 32.85 inches |
| Number of storm events | 89 | 87 |
| Peak 15-minute intensity | 1.88 in/hour | 2.00 in/hour |
| Average storm 15-minute peak intensity | 0.28 in/hour | 0.29 in/hour |
| Largest storm rainfall accumulation | 2.37 inches | 2.44 inches |
| Average storm rainfall accumulation | 0.47 inches | 0.38 inches |
| Longest storm duration | 77.8 hours | 52.3 hours |
| Average storm duration | 10.9 hours | 6.3 hours |

According to data from the DPW rain gauge, a total of 40.63 inches of precipitation fell in Somerville in 2025. This is 12% less than the historic observed median value of 46.3 inches. A total of 89 storm events were recorded using a 12-hour inter-event time, which is 8% less than the historical median number of storms (97).

In the Fresh Pond rain gauge, a total of 32.85 inches of precipitation fell in Somerville in 2025. This is 29% below the historic observed median value of 46.3 inches. A total of 87 storm events were recorded using a 12-hour inter-event time, which is much lower than the historical median number of storms. As mentioned above, the total rainfall recorded by this gauge seems to be well below other records from gauges in the Boston area (e.g., Logan Airport), which were around 40 inches.

Additionally, for storms that caused CSO activations at SOM001A as identified by the meters or the model, a frequency analysis was performed using rainfall accumulations for different storm durations from NOAA Atlas 14. A summary of this storm frequency analysis is provided in Tables 4 and 5 for the DPW and Fresh Pond rain gauges, respectively.

Rainfall statistics from the DPW rain gauge (Table 4) indicate that two storm events exceeded the 1-year return period, suggesting that 2025 was representative of a typical or historically median rainfall year in terms of storm frequency.

Rainfall statistics from the Fresh Pond rain gauge (Table 5) indicate that three storm events in 2025 had a 1-year return period, again suggesting that 2025 was representative of a typical or historically median rainfall year in terms of storm frequency.



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*Table 4: 2025 Rainfall Frequency Analysis Using DPW Rain Gauge Data for Storms that Generated CSOs at SOM-001A*

| RETURN PERIODS FOR DIFFERENT RAINFALL DURATIONS | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **STORM DATE** | **15-min** | **30-min** | **1h** | **2h** | **6h** | **12h** | **24h** | **Duration (Hours)** | **Total Rainfall (in)** | **Peak 15-min Intensity (in/h)** |
| **3/17/2025** | 6M | 6M | 6M-1Y | 6M | 6M | 6M-1Y | 6M-1Y | 15.25 | 1.54 | 0.84 |
| **5/15/2025** | <3M | <3M | 3M | 3M | 3M | 3M | 3M | 2.75 | 0.38 | 0.28 |
| **7/31/2025** | 3M | 3M | 3M-6M | 6M | 6M | 6M-1Y | 6M | 20.50 | 1.64 | 0.6 |
| **8/14/2025** | 6M | 6M | 3M-6M | 3M | 3M | 3M | 3M | 0.50 | 0.33 | 0.88 |
| **8/29/2025** | 6M | >6M | 6M | 6M | 3M | 3M | 3M | 10.00 | 0.63 | 1.56 |
| **9/6/2025** | 6M | >6M | 1Y | 1Y | 6M | 6M-1Y | 6M-1Y | 11.25 | 1.81 | 1.28 |
| **10/8/2025** | 1Y | 1Y | 1Y | 1Y | 6M-1Y | 6M-1Y | 6M-1Y | 4.25 | 1.11 | 1.88 |

*Table 5: 2025 Rainfall Frequency Analysis Using Fresh Pond Rain Gauge Data for Storms that Generated CSOs at SOM-001A*

| | RETURN PERIODS FOR DIFFERENT RAINFALL DURATIONS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **STORM DATE** | **15-min** | **30-min** | **1h** | **2h** | **6h** | **12h** | **24h** | **Duration (Hours)** | **Total Rainfall (in)** | **Peak 15-min Intensity (in/h)** |
| **3/17/2025** | 6M | 6M | 6M | 6M | 6M-1Y | >6M | 6M-1Y | 15.25 | 1.28 | 0.84 |
| **5/16/2025** | 1Y | 6M-1Y | 6M | 6M | 3M | 3M | >3M | 0.25 | 0.50 | 2.00 |
| **7/31/2025** | 3M | 3M | 6M | 6M | 6M | 6M | 6M | 21.25 | 1.65 | 0.6 |
| **8/14/2025** | 3M-6M | 6M-1Y | 6M | 6M | 6M | 3M | 6M | 0.75 | 0.63 | 1.36 |
| **8/29/2025** | 6M | 6M | 6M | 3M-6M | 3M | 3M | 3M | 10.00 | 0.53 | 1.4 |
| **9/6/2025** | 6M | 1Y | 1Y | 1Y | 6M-1Y | 6M | 6M-1Y | 20.00 | 1.79 | 1.44 |
| **10/8/2025** | 6M | 1Y | 1Y | 1Y | >6M | 6M | 6M | 4.50 | 1.12 | 1.44 |

## 4. SOM001A Metered and Modeled CSO Activation Analysis

As shown in Tables 6 and 7, there is a general good agreement between the recorded CSO activations by the meters and those predicted by the hydraulic model, especially when using the DPW rainfall data. There are significant differences in CSO predictions when using the two rain gauges, which indicate the importance of rainfall geographic variability in CSO predictions. In general, the model seems to overpredict smaller CSOs, but it is difficult to determine if these differences are induced by the model or other factors like rainfall variability or operations at facilities like the Alewife Pump Station.



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*Table 6: 2025 CSO Activations and Volumes at SOM001A Recorded by Flow Meters vs Unified Model Estimates -*

| Activation Date | Flow Meter Volume (MG) | Unified Model Volume (MG) – Fresh Pond Gauge | Unified Model Volume (MG) – DPW Gauge |
|---|---|---|---|
| 3/17/2025 | - | 0.18 | 0.50 |
| 5/16/2025 | - | 0.03 | - |
| 7/31/2025 | - | 0.02 | - |
| 8/14/2025 | - | 0.30 | - |
| 8/29/2025 | 0.04 | - | - |
| 9/6/2025 | 0.34 | 1.31 | 0.93 |
| 10/8/2025 | 0.73 | 1.31 | 1.18 |

*Table 7: 2025 CSO Activations and Volumes at SOM001A Recorded by Flow Meters vs Unified Model Estimates - Summary*

| Outfall | Regulator | January 1, 2025 – December 31, 2025 | | | | | |
|---|---|---|---|---|---|---|---|
| | | Meter | | Unified Model – DPW Gauge | | Unified Model – Fresh Pond Gauge | |
| | | Activation Frequency | Volume (MG) | Activation Frequency | Volume (MG) | Activation Frequency | Volume (MG) |
| SOM001A | RE-01A | 3 | 1.11 | 6 | 3.15 | 3 | 2.61 |

Below are likely reasons explaining the differences between storms with differing results:

March 17, 2025: The meters did not capture a spill in this storm, while the model predicted an activation of 0.18MG using the Fresh Pond gauge and 0.50MG when using the DPW gauge. This difference in results between rain gauges indicates the effect of rainfall spatial rainfall variability as the DPW gauge recorded slightly higher rainfall during this storm. However, the absence of a recorded activation at SOM 001A, despite the model predicting one, suggests that the receiving trunk sewers were less surcharged than assumed in the model, potentially due to pumping operations that were not accurately captured by the model.

May 16, July 31, and August 14, 2025: The meters did not capture a spill in these storms, while the model predicted small activations using the Fresh Pond gauge and no spills when using the DPW gauge. This difference in results most likely indicates that the discrepancies in model results are due to spatial rainfall variability.



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August 29, 2025: The meters captured a very small activation during this event, while the model did not. These small differences in CSO activations in the model are likely caused by small differences in the boundary conditions in the receiving MWRA trunk sewer.

September 6 and October 8, 2025: Both meters and the model predicted an overflow for these storms. However, the model CSO volumes with both rain gauges were larger than the one computed with the meters. These storms were both a 1-year event (Table 2 and 3) with peak intensities ranging from 1.28-1.88in/h. The model overprediction in CSO volume seems to stem from the boundary conditions at the MWRA interceptor. Differences in volumes are likely caused by differences in boundary conditions at the MWRA trunk sewers or how volumes are computed within the hydraulic model or when using meters (weir equation based on water levels above the weir).

## 5. SOM007A/ MWRA205A Metered Activation Analysis

Somerville and MWRA have been collecting meter data at each of the outfalls listed in the LTCP as part of the CSO Notification Program. This meter data were used to tabulate the CSO activation frequency and volume for the January 1, 2025 to December 31, 2025 period as shown in Table 8.

*Table 8: SOM007A/MWRA205A 2025 Metered CSO Discharges*

| Date | MWRA Metered CSO Discharge Estimates | | Rainfall Statistics | | | |
|---|---|---|---|---|---|---|
| | Volume (gallons) | Duration (hr) | Depth (in) | Peak Intensity (in/hr) | Atlas 14 - 1hr Recurrence Interval | Atlas 14 - 24hr Recurrence Interval |
| 3/6/2025 | 0.37 | 0.25 | 1.02 | 0.33 | 3M | 3M |
| 3/17/2025 | 0.05 | 0.17 | 1.43 | 0.55 | 6M | 3M-6M |
| 5/22/2025 | 7.33 | 4.33 | 2.93 | 0.36 | 3M | 1-2Y |
| 10/8/2025 | 0.04 | 0.25 | 0.96 | 0.69 | 6M-1Y | 3M |
| 10/13/2025 | 0.59 | 2.25 | 1.99 | 0.17 | <3M | 6M |



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*Table 9: SOM001A and SOM007A/MWR205A CSO Volume & Frequency for 2025 Metered Events*

| Outfall | Regulator | Activation Frequency | Metered Discharge Volume (MG) |
|---|---|---|---|
| SOM001A (1) | RE-01A | 3 | 1.11 |
| SOM007A/MWR205A (2) | | 5 | 8.38 |

Notes:

1. The meter data reported for SOM001A is the data from the City of Somerville permanent meter installation.
2. Outfall SOM007A/MWR205A is a side-outlet relief off outfall MWR205, downstream of the Somerville Marginal Facility. This outfall can activate and discharge treated flow during storm events when high tides restrict the discharge from outfall MWR205. The SOM007A/MWR205A volume includes a fraction of the flow treated at Somerville Marginal facility plus separate stormwater that enters the Somerville Marginal Conduit (outfall) downstream of the facility.

## 6. CSO Abatement Work Report

### Sewer Inspection, Cleaning, and Rehabilitation

The City has continued pipeline inspections, including cleaning, CCTV inspection, and flow isolation work throughout 2025. Approximately 50,000 linear feet of sewer pipe were cleaned and inspected in 2025. The City continues to observe large volumes of debris in pipes. Heavy cleaning (greater than three passes of the jet head) has been utilized, as needed, to remove large debris, sand, and grease.

These activities are informing the City's pipe rehabilitation efforts to further reduce Infiltration and Inflow (I/I). The City utilized CCTV review to select candidate sites for an approximately $3.4 million sewer rehabilitations project throughout Somerville that began construction in June 2025. This rehabilitation work included approximately 18,000 linear feet of CIPP lining and approximately 1,700 linear feet of gravity sewer pipe excavation and replacement. Substantial completion is expected in June 2026.

### SOM001A

For SOM001A, the MWRA hydraulic model predicted that the typical year activations and discharge volumes are not meeting the LTCP goals as of 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 improves pumping operation, although it results in only minor CSO discharge reduction at upstream Alewife Brook outfalls, including at SOM001A.

MWRA has investigated a range of alternatives to potentially reduce the activation frequency and volume and work towards achieving the LTCP goals. Somerville and MWRA continue to work together to



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investigate additional alternatives that might provide CSO reduction benefits, including the conceptual projects identified in the Citywide Drainage and Water Quality Improvements Plan.

In 2025, the City continued the design of one of these large conceptual projects: Morrison Avenue – Flood Relief, Water Quality Improvements, and Streetscape Safety Improvements (https://voice.somervillema.gov/morrisonavenue). As part of this effort, the City will be installing new drainage infrastructure and rehabilitating the existing sewer system along Morrison Avenue (between Cedar Street and Grove St.) as well as throughout the surrounding neighborhood. This project will reduce flood risk in the surrounding area, mitigate combined sewer overflows at SOM001A, and help maintain the water quality of local rivers.

## 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 construction of a new connection from the facility influent conduit to the interceptor and replace tide gate began in October 2024. CIPP lining of impacted Somerville sewer was completed in 2025. Due to a change in MassDOT permit, the project is now expected to be complete in summer 2026. Additionally, MWRA is procuring a consultant to design facility rehabilitation to ensure reliable treatment of remaining CSO discharges. Notice to proceed is expected for the designer in summer 2026.

In 2025, Somerville continued the design of another of the large conceptual projects: Mystic River Outfall and Sewer Separation (https://voice.somervillema.gov/mystic-river-outfall). As part of this effort, the City will be installing new drainage infrastructure and rehabilitating the existing sewer system in the Winter Hill and Ten Hills neighborhood and constructing a new stormwater outfall to the Mystic River. This project will reduce flood risk in the surrounding area and mitigate combined sewer overflows at SOM007A and MWRA205.

## Additional Large Capital Infrastructure Projects

The City is continuing investment in updating and upgrading the sewer, stormwater, and drinking water infrastructure. The completed Spring Hill Sewer Separation Project includes the installation of new storm drains that separate stormwater from the existing combined sewer, the installation of green stormwater infrastructure systems, new tree plantings, bicycle facilities, and improvements to the streetscape. Construction of all underground utility work, GSI installation, and surface and streetscape improvements was completed in fall 2025 in its entirety.

The Poplar Street Pump Station will collect the stormwater from the newly separated Spring Hill project and future sewer separation projects in the Union Square area and store it in a 4 MG underground stormwater tank for pumping into the MBTA drain that eventually discharges into the Millers River. The pump station and accompanying underground storage tank will fundamentally change the way stormwater drainage is managed for approximately 60% of the city. It represents a major investment in modernizing the



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City’s stormwater management infrastructure and increasing preparedness for extreme weather events. The project broke ground in Winter of 2023 and is expected to be completed 2027. The 4 MG underground stormwater tank and 42" force main, construction of which began in 2024, were substantially completed in Spring 2025. Beginning in summer 2026, work to connect the Somerville Ave drainage culvert to the underground stormwater tank will commence prior to completion next year.

The benefits of these two projects include reducing flooding in the larger Union Square area, improving water quality, reducing wet weather flow to the MWRA Cambridge Branch Interceptor, and ultimately reducing CSO discharges at Prison Point.



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