

2020 Annual Report
National Pollutant Discharge Elimination System

For The
City of Cambridge, Massachusetts
Combined Sewer Overflow Permit
#MA0101974

Submitted to
U.S. Environmental Protection Agency
Water Technical Unit

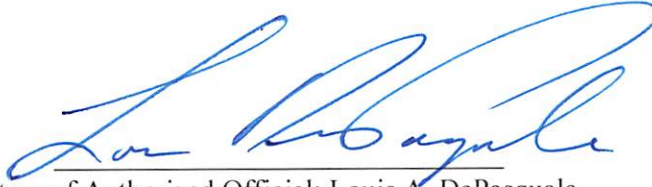
MA Department of Environmental Protection
Bureau of Resource Protection

Submitted by

City of Cambridge
Department of Public Works



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Signature of Authorized Official: Louis A. DePasquale
City Manager, City of Cambridge



Date

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1. Purpose of Report

This report has been prepared in accordance with Part I, Section D of Permit No. MA0101974, issued to the City of Cambridge Department of Public Works on September 30, 2009. The permit authorizes the City of Cambridge to discharge flow from twelve (12) Combined Sewer Overflows (CSO) located in eleven (11) regulator structures to the receiving water bodies named in the permit.

The City of Cambridge is additionally required to provide a comparison between the precipitation for the year and the precipitation of the typical year. Also required for each CSO is a comparison between the activation volume and frequency for the year and the volume and frequency during the MWRA typical year listed in Exhibit A to the Second CSO Stipulation. Where CSO discharges are determined to be greater than the activation frequency or volume, an assessment of the results was completed and documented.

2. Hydraulic Model Updates

During this calendar year 2020 analysis, the existing hydraulic model was updated with several system updates as part of the on-going system improvement work by the City of Cambridge CDPW (see Section 3.4).

3. Combined Sewer Overflow Monitoring Plan

As part of the 2020 Annual CSO reporting process, a review of the available meter data for 2020 was performed. This data review identified periods with good quality meter data that could be used to cross-check against model results. Potential meter malfunctions and data discontinuities were also identified and documented. CSO activations and volumes presented in this report are based on model-simulated data, however the model simulations have been cross-checked against MWRA or City of Cambridge (The City) meter data, when available. Where flow meter data was available, the modeled and metered CSO activations were well correlated during the 2020 CSO events. Section 3 provides an overview of the City's CSO monitoring program, the modelled CSO simulations, as well as correlation between the two at each CSO regulator.

3.1 Existing CSO monitoring methodology

3.1.1 Existing CSO Structures

In accordance with the City's current CSO permit, the city has a total of twelve CSOs located in 11 regulator structures (listed in Table 3.1), five regulator structures are located on the Charles River and six regulator structures are located on Alewife Brook.

Seven of the twelve existing CSOs are currently open, four located on the Alewife Brook and three

on the Charles River. On the Alewife Brook, the CAM004 and CAM400 regulators were permanently closed and CAM002B is temporarily closed. On the Charles River, both CAM009 and CAM011 have been temporarily closed. Figure 3.1 presents the locations of the seven active CSOs throughout the City.

Table 3.1 Summary of Combined Sewer Regulator Structures

Regulator Structure	Location	Status	Waterbody
CAM 001	Alewife Brook Parkway @ Foch St.	Open	Alewife Brook
CAM 002	2A-Massachusetts Ave. at Alewife Brook Parkway	Open	Alewife Brook
	2B-Massachusetts Ave. at Alewife Brook Parkway	Closed ¹	Alewife Brook
CAM 004	Fresh Pond Rotary	Closed ²	Alewife Brook
CAM 400	Alewife Brook Parkway and Harrison Avenue	Closed ³	Alewife Brook
CAM 401A	Sherman Street at railroad crossing	Open	Alewife Brook
CAM 401B	Massachusetts Ave. at Alewife Brook Parkway	Open	Alewife Brook
CAM 005	Mount Auburn Street @ Lowell Street	Open	Charles River
CAM 007	Memorial Drive at Hawthorne Street	Open	Charles River
CAM 009	Memorial Dr. at Old Murray Rd.	Closed ⁴	Charles River
CAM 011	Plympton St. @Memorial Dr.	Closed ⁴	Charles River
CAM 017	Binney Street at Land Blvd.	Open	Charles River

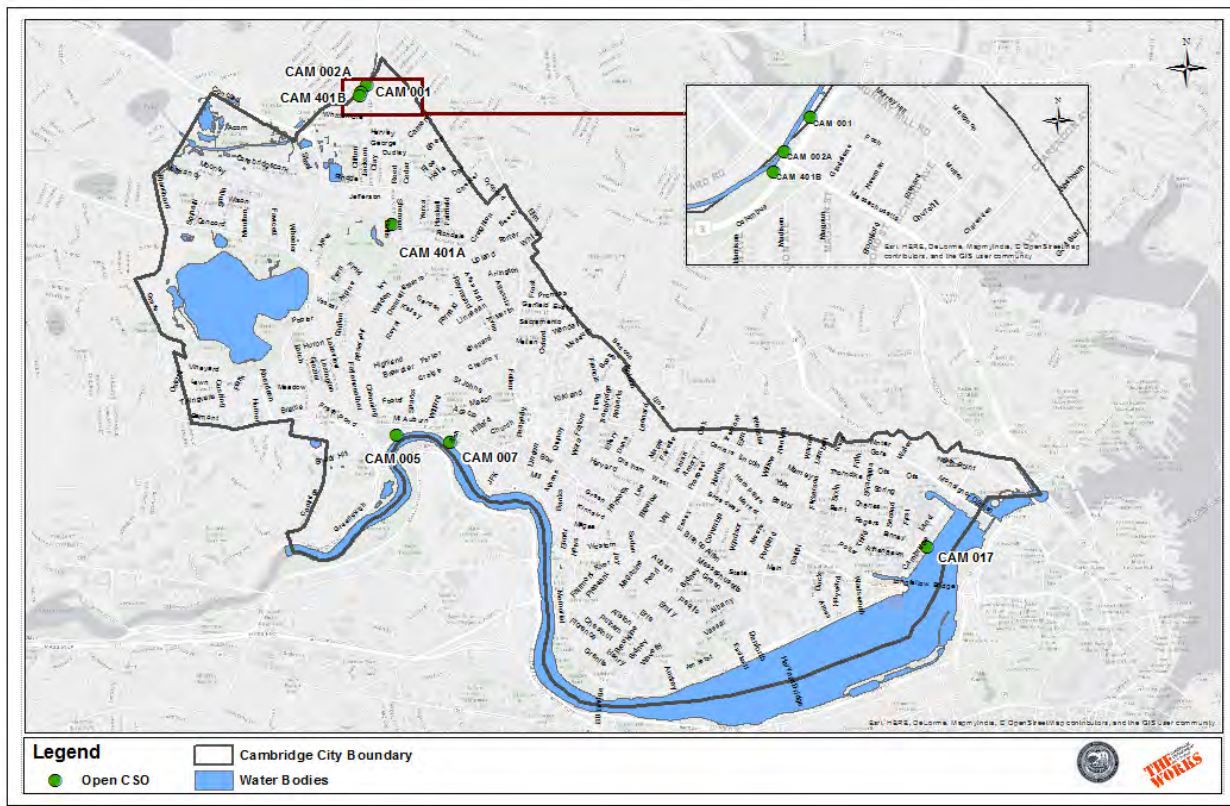
¹ Temporarily Closed

² Permanently closed on December 27, 2015

³ Permanently closed on March 31, 2011

⁴ City retains the right to re-open once a hydraulic study is completed

Figure 3.1 Active CSO Regulator Locations



3.1.2 CSO Monitoring

The following section outlines the 2020 network model simulation results for CSO spills and volumes, along with the methodology for CSO monitoring at each regulator location. The results for the Alewife Brook and Charles River CSOs are located in Tables 3.2 and 3.3, respectively.

CAM 001 Monitoring

The modelled data predicted 1 spill on June 28, 2020 with a total volume of approximately 0.11 MG. The CAM001 regulator is monitored by an outfall pipe flow meter, as well as a smart cover level sensor in the regulator manhole.

The flow meter located on the outfall pipe did not record any spill events. Several incidents of measured flow were observed in the outfall flow meter, however none of those events were rainfall related. The CAM001 outfall flow meter vault will be inspected to determine whether surface or groundwater may be flowing into the vault. The CAM001 smart cover data did not indicate any spill in the 2020 reporting period as the level did not exceed the threshold of 102 inches that would indicate a CSO spill.

CAM 002A Monitoring

At the CAM002 regulator, one low volume spill was simulated in the network model on June 28, 2020 with a volume of 0.01 MG. The City has a depth sensor located in the regulator as well as a flow meter located on the CAM002A outfall pipe. Both these meters indicated 0 spills during the 2020 period of record.

CAM 004 Monitoring

The CAM004 outfall was permanently closed on December 27, 2015, in accordance with the MWRA's LTCP for the Alewife Brook.

CAM 400 Monitoring

The CAM 400 CSO regulator was permanently closed in March 2011 in accordance with the MWRA's LTCP for the Alewife Brook.

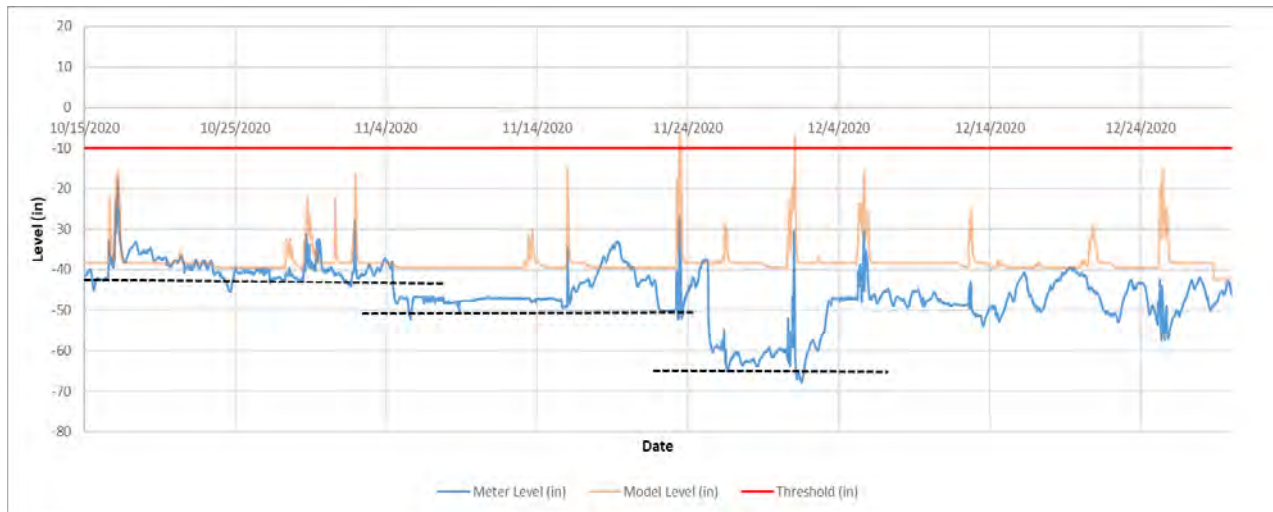
CAM 401A Monitoring

The CAM 401A regulator structure includes a floatables control brush screen mounted on a static weir structure, as well as flap gates located just downstream of the weir. The City's model was used to determine the activation volume at the CAM 401A regulator. The model simulated 8 spill events in 2020. The City maintains a level sensor in the 401A regulator structure and additionally installed a smart cover level sensor in the regulator manhole in October 2020.

Review of the City's level sensor data indicated one spill on August 23, 2020. The second spill being reported, on January 15, appears to have been a level sensor malfunction. The depth increases by 40 inches over one 15-minute interval and immediately recedes back to its original level.

On three other dates (corresponding to three model-simulated spills on June 28, July 23 and November 23, 2020) the level in the regulator was observed to be just a few inches below the -10" threshold for spill activation. Over the entire 2020 reporting period, the level sensor recorded the hydraulic grade line of the baseflow approximately 10" lower than the grade line observed in the 2019 reporting period. Additionally, the grade line was observed to have dropped 10" on average after November 4, 2020 and a further drop of 10" was observed between November 24 and December 3, 2020. Field reports suggest this reduction in the hydraulic grade line of the baseflow is likely due to cleaning of downstream pipes performed during the same time frame. Graph 3.1 shows the metered and modeled levels in the regulator for the time frame discussed. The over-simulation of the spill events in the network model, as compared to the level sensor data, can be attributed to this reduction in baseflow.

Adjustments to the model will be carried out during the 2021 analysis, when long-term data is available for the improved dry weather levels in the 401A regulator. In addition, as outlined in Section 3.5, the City has included an additional source of spill monitoring on the flap gate on the downstream side of the weir. This additional data will also be used to adjust the model's representation of flow and level in the 401A regulator.

Graph 3.1 CAM401A Hydraulic Grade Line of Baseflow Variation

CAM 401B Monitoring

The network model simulated one spill at CAM401B on June 28, 2020 with a total volume of 0.51 MG. The DPW depth sensor in the regulator appeared to have failed on that date (June 22-June 29, 2020), therefore no metered data for the June 28, 2020 storm was available for comparison to the model-simulated spill on that date. The DPW meter data recorded two spill events on August 23 and December 1, 2020. While the model simulated appreciable wet weather responses on those dates, the model-simulated levels did not come close to the weir crest. The model used rainfall data from the DPW rain gauge. A review of other available rainfall data for those same storms suggested the storms had higher peak intensity in other locations. It is assumed that the lack of spatially variable rainfall data to represent the intensity of these two storm events led to the lack of spills simulated in the model.

CAM 005 Monitoring

The network model simulated 5 spills at CAM005 with a total volume of 1.21 MG. The CAM005 outfall is monitored with a depth and velocity sensor mounted on the upstream side of the weir. In addition, a Smart cover level sensor is installed one manhole downstream of the CAM005 regulator. The Smart cover level sensor indicated a spill on 4 out of the 5 model-simulated spill dates and came within a few inches of the weir elevation on the one remaining activation on June 28, 2020. The DPW level data indicated 6 spill events, 4 of which were also simulated by the model. Two additional spills on August 2 and December 1, 2020 were recorded by the DPW level data.

CAM 007 Monitoring

The model simulated one spill at the CAM007 regulator on June 28, 2020 with a total volume of 0.23 MG. The DPW depth sensor in the regulator did not indicate a spill on June 28, 2020. The

sensor was observed to have reported erroneous level data after July 8, 2020. No spills were simulated by the model on or after July 8, 2020.

CAM017 Monitoring

The network model simulated one spill at CAM017 on June 28, 2020 with a total volume of 0.3 MG. At the CAM017 regulator, meters are located on the incoming 72" combined sewer on Binney Street, as well as on one of the static weir crests. Analysis of meter data showed that for the June 28, 2020 event, the depths had exceeded the bending weir crest and a corresponding velocity was measured. The inclinometer, however, did not register any movement. Two out of the three indications of a CSO spill event in the metered data matched the same spill date as the modelled results, therefore the June 28, 2020 spill is being reported herein. It should be noted that the calculation of CSO volume at this location is dependent upon the modelled CAM 017 bending weir operation parameters, as well as the operation of the Prison Point wet weather facility gates.

3.2 Summary of 2020 CSO Activations

In 2020 there were a total of seven activations at the four active Alewife Brook CSO regulators and seven activations occurred at the three Charles River CSO regulators. A summary of 2020 activations for the Alewife Brook and Charles River outfalls is provided in Table 3.2 and 3.3, respectively.

3.2.1 Alewife Brook CSO Results

The four active CSO outfalls along Alewife Brook spilled a total of seven times in 2020 resulting in approximately 0.97 MG of CSO volume. The following is an overview of each of the Alewife Brook CSO results:

- There was one simulated spill with a volume of 0.11 MG at CAM001 on June 28, 2020. The meter data did not indicate a spill in 2020. This over-simulation by the hydraulic model is likely due to the localized nature of the highest intensity rainfall on June 28, 2020. Upon analysis of the storm, the highest intensity precipitation was observed to stay south of the catchment areas feeding into the Alewife. Since the model assumes uniform rainfall over the entire catchment, this likely caused the model to simulate a spill that was not detected in the meter data. A detailed analysis of the June 28, 2020 storm is presented below in Section 3.3.
- Model simulation indicated one small volume spill at CAM002 with a volume of 0.01 MG (approximately 5,000 gallons) on June 28, 2020. This spill was not observed in the metered data, most likely due to the spatial variability in the storm intensity on that date (see Section 3.3).
- The network model indicated eight spills with a total volume of 2.50 MG at CAM401A. However, as discussed above and in Section 3.3, the June 28, 2020 modeled event is an over-simulation. Therefore, seven spills are being reported with a total volume of 0.97 MG. The city's level data indicated two spills. It is likely that

the over representation of spills by the network model is due to the variation in hydraulic grade line of baseflows, as discussed in Section 3.1.2 above.

- At the CAM 401B regulator, the model simulated one activation on June 28, 2020 with a volume of 0.51 MG. The City's level data in the 401B structure indicated two spills on August 23 and December 1, 2020, these two spills were not simulated in the model. The City's level data did not indicate a spill on June 28, 2020. As discussed above and in Section 3.3, the June 28, 2020 modeled event is an over simulation.

Table 3.2 Summary of 2020 Activations at Alewife Brook CSOs

Receiving Water	Outfall No.	Metered Results		Modelled Results	
		2020 CSO Spills	Meter Type (Threshold)	2020 CSO Spills	2020 CSO Volume (MG)
Alewife Brook	CAM 001	0	Outfall Meter (Depth, Vel>0)	0 ⁴	0
	CAM 002A	0	Level sensor (Depth> 9.78)	0 ⁴	0
	CAM 002B ¹	-	-	-	-
	CAM 004 ²	-	-	-	-
	CAM 400 ³	-	-	-	-
	CAM 401A	2	CDPW Level Sensor (Depth >-10")	7 ^{4&5}	0.97
	CAM 401B	2	CDPW Level Sensor (Depth >5.47 ft)	0 ^{4&6}	0
	TOTAL	4	-	7	0.97

1 CAM 002B is temporarily closed
 2 Permanently closed December 27, 2015
 3 Permanently closed on March 31, 2011
 4 Model simulated spill on 6/28/2020 likely due to spatial variability of the high intensity rainfall event, explained in the above section
 5 Over representation of spills in the model likely due to reduction in hydraulic grade line of baseflows following cleaning of the pipe (see section 3.1.2)
 6 Model simulation did not replicate the two spills (8/23/2020 and 12/1/2020) reported by the meters most likely due to spatial variability of the high intensity rainfall events, explained in the above section (see section 3.1.2)

3.2.2 Charles River CSO Results

The three active CSO outfalls on the Charles River spilled a total of seven times in 2020 resulting in approximately 1.74 MG of CSO volume. The following is an overview of each of the Charles River CSO results:

- At CAM005, the model simulated five CSO spills with a total volume of 1.21 MG (3/23, 6/28, 7/22, 7/23 and 8/23). The City's level sensor did not record any data between March 17 – June 1, 2020, therefore the March 23 spill simulated in the model cannot be compared to meter data. The Smart cover installed just downstream of CAM005, however, did also indicate a spill on March 23, matching the model.

The DPW level sensor indicated six spills on 6/28, 7/13, 7/23, 8/2, 8/23, 12/1, three of those spills were not replicated by the model (7/13, 8/2 and 12/1). In the case of the July 13 and August 2, 2020 storm events, the DPW level sensor recorded depths of only 1-2 inches above the weir crest. During the December 1, 2020 storm event, the model level came within 3 inches of the weir crest. The City's Smart cover level sensor indicated a spill on four out of the five model simulated spill dates and came within a few inches of the weir elevation on the one remaining activation.

- At the CAM007 regulator, one spill was simulated on June 28, 2020 in the model. This spill was not observed in the metered data. As discussed in the previous section, the June 28, 2020 storm, due to its spatially varied intensity is likely to have resulted in a spill at this location, but the volume may be over-simulated as discussed in Section 3.3.
- At CAM017, the model simulated one spill event on June 28, 2020. Analysis of meter data showed positive correlation with depth over the bending weir with corresponding velocity, however the inclinometer did not register any movement. As discussed in the previous section, the June 28, 2020 storm, due to its spatially varied intensity is likely to have resulted in a spill at this location, but the volume may be oversimulated.

Table 3.3 Summary of 2020 Activations at Charles River CSOs

Receiving Water	Outfall No.	Metered Results		Modelled Results	
		2020 CSO Spills	Meter Type (Threshold)	2020 CSO Spills	2020 CSO Volume (MG)
Charles River	CAM 005	6	Level Sensor (Depth >0)	5	1.21 ⁴
	CAM 007	0	Level Sensor (Depth >0)	1 ²	0.23 ⁴
	CAM 009 ¹	-	-	-	-
	CAM 011 ¹	-	-	-	-
	CAM 017	0 ³	Inclinometer triggered or depth and velocity across bending weir>0	1	0.30 ⁴
	TOTAL	6	-	7	1.74⁴

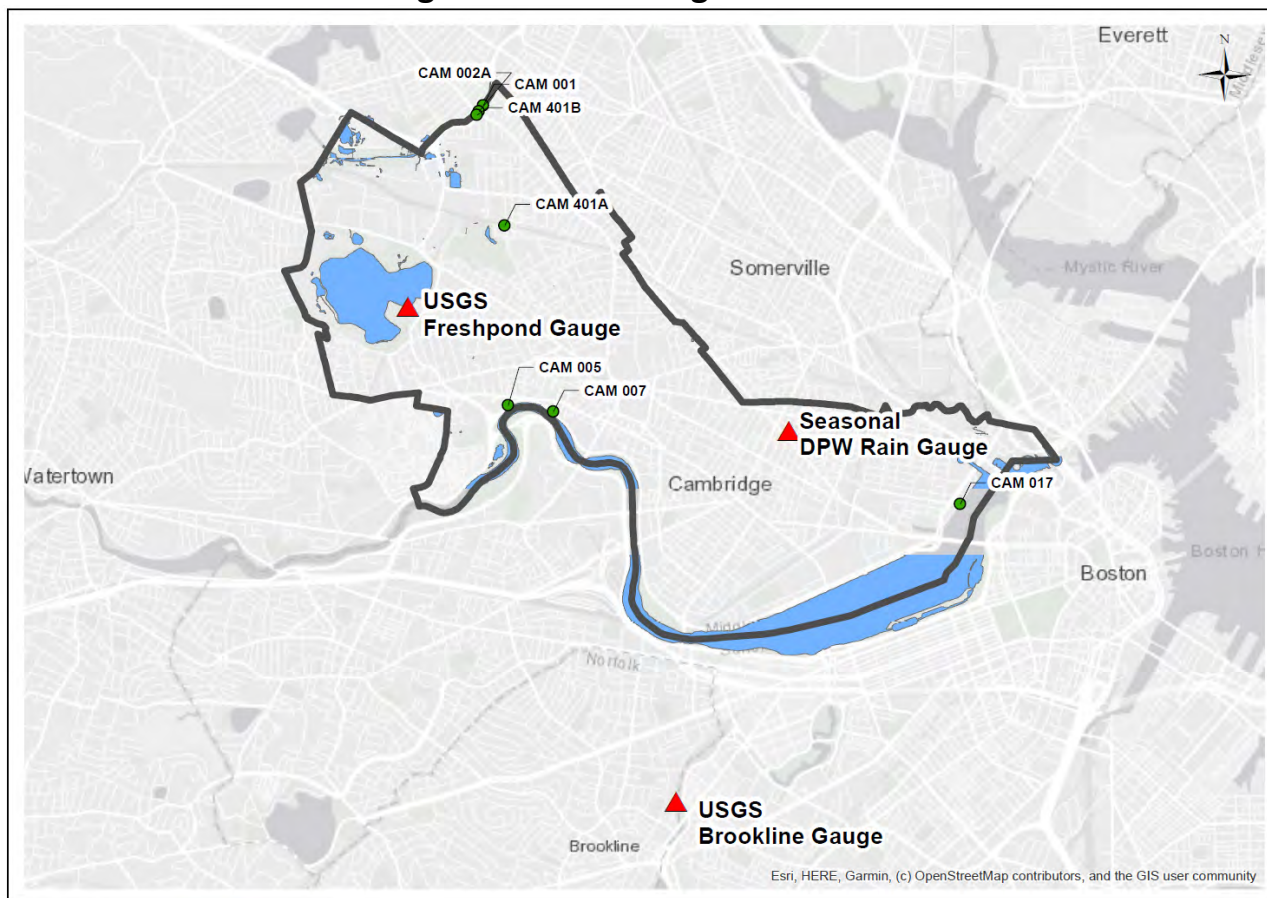
1 CAM 009 and CAM 011 are temporarily closed
 2 Model simulated spill on 6/28/2020 likely due to spatial variability of the high intensity rainfall event, explained in above section
 3 Meter showed positive correlation of velocity and depth over bending weir but no movement in inclinometer.
 4 Model simulated spill on 6/28/2020 likely due to spatial variability of the high intensity rainfall event, explained in the above section. Spill volumes may be oversimulated by the model on 6/28/2020.

3.3 Rainfall Characteristics

Under the City of Cambridge Combined Sewer Overflow Permit MA0101974, as part of the CSO NPDES Annual Report, precipitation data from the previous calendar year (2020) must be analyzed against the typical year (1992) rainfall record.

The City of Cambridge currently operates one seasonal rain gauge on the roof of the Cambridge DPW that in 2020 was operational from July 23, 2020 through December 16, 2020. The Cambridge DPW gauge data is presented in Appendix I. In addition to the seasonal DPW rainfall gauge, there are rain gauges operated by the USGS located in Fresh Pond in Cambridge and Muddy Brook in Brookline MA. Figure 3.2 shows the location of the rainfall gauges analyzed to obtain 2020 rainfall data.

Figure 3.2 Rain Gauge Locations

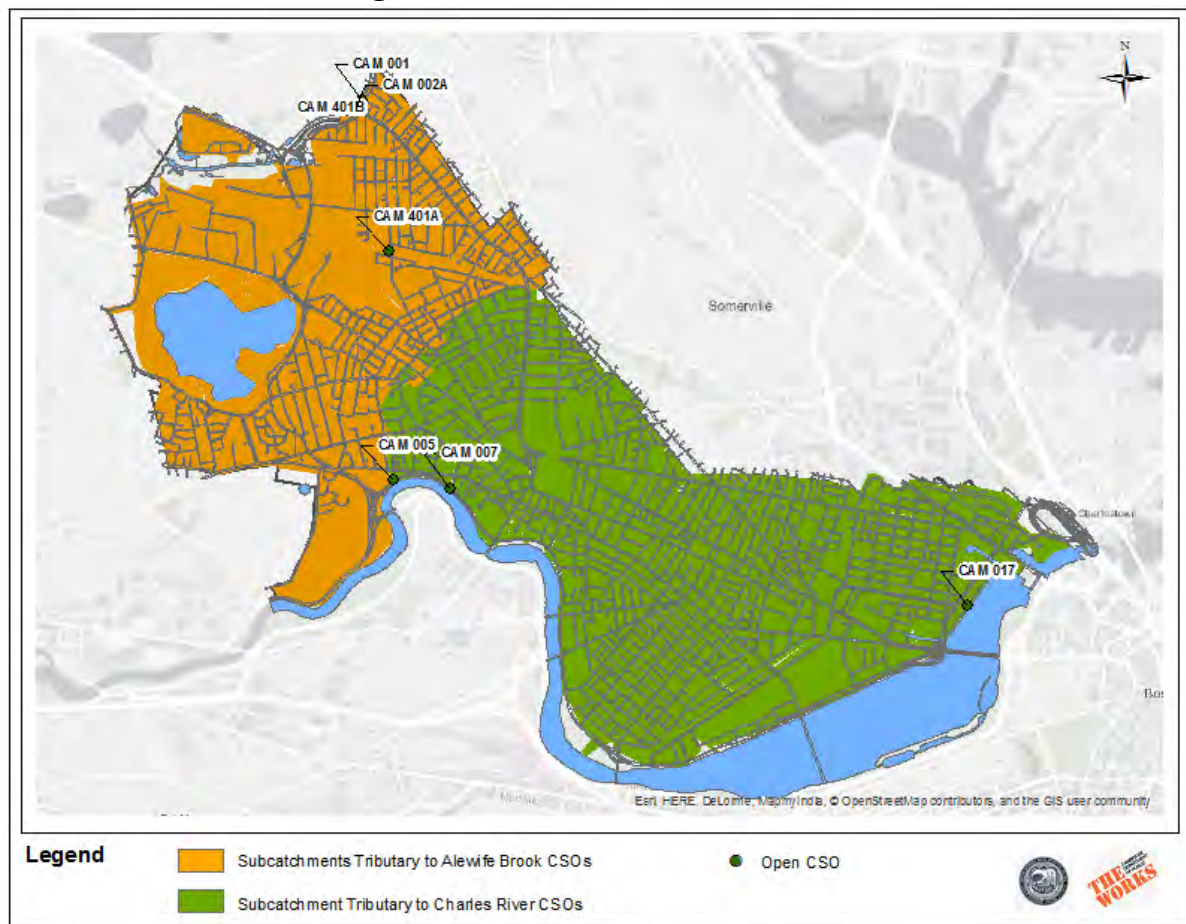


- Legend**
- ▲ Rain Gauge
 - Open CSO
 - Water Bodies
 - Cambridge City Boundary

Preliminary analysis of the USGS Fresh Pond gauge rainfall data indicated suspected erroneous readings on various occasions. The Fresh Pond gauge was not operational until after 5/20/20 and thereafter, the storms recorded at the Fresh Pond gauge reported consistently lower volumes and intensities than other gauges. This lack of confidence in the data led to the use of rainfall data recorded by the USGS gauge located in Brookline MA as an alternate data source. Data from the gauge was validated by comparing with the USGS Freshpond gauge and DPW gauge over several earlier time periods. Overall, the USGS Brookline gauge was determined to be the most comprehensive time series of rainfall available. Figure 3.3 presents the model subcatchments tributary to the Alewife Brook CSOs and those tributary to the Charles River CSOs.

The Cambridge DPW gauge is removed over the winter months. Therefore, to create a year-long rainfall series for the Charles River catchments, missing rainfall data was filled in with rainfall data from the USGS Brookline gauge from January 1st through July 22nd and December 17th through December 31st. This composite rainfall series, referred to as ‘Hybrid’ henceforth in the report was compared to the typical year rainfall to assess any similarities and differences in the rainfall distribution and patterns. The composite rainfall time series during 2020 did not reference any Fresh Pond rainfall data and relied solely on the USGS Brookline gauge and the Cambridge DPW gauge.

Figure 3.3 Model Subcatchments



As shown in Graph 3.2, the accumulated 2020 USGS Brookline and CDPW rainfall data are both less than the typical year (1992) rainfall. In addition, Figure 3.4 presents a map of the twenty-year average precipitation in the Northeast United States, indicating that the average total precipitation from 1981 to 2010 is between 45 and 50 inches, which is greater than the observed 2020 total rainfall of 40.00 inches in the CDPW/USGS Brookline (Hybrid) rainfall series.

A review of the distribution of storms in 2020 by total rainfall was performed. The City of Cambridge CSO report has historically assumed an inter-event time equal or greater than six hours for storm events (for instance, if no rain occurs between the end of one rainfall period and the beginning of the next then they are counted as two separate events). Tables 3.4 and 3.5 present a comparison of storm frequency and volumes within various ranges of total precipitation for the four 2020 series and for the typical year. The USGS Brookline series recorded thirteen fewer storms than the typical year (105 vs 118), while the hybrid series recorded 102 total for the year. The 2020 rainfall series all had lower total rainfall than the typical year (12.98% less for the USGS Brookline series and 14.58% less for the hybrid series). The USGS Brookline series had 61 storms in the <0.25 inch range, with a total volume of 4.52 inches. The hybrid series had 55 storms in the <0.25 inch range, with a total volume of 4.00 inches.

Graph 3.2 Typical Year Rainfall versus 2020 Rainfall

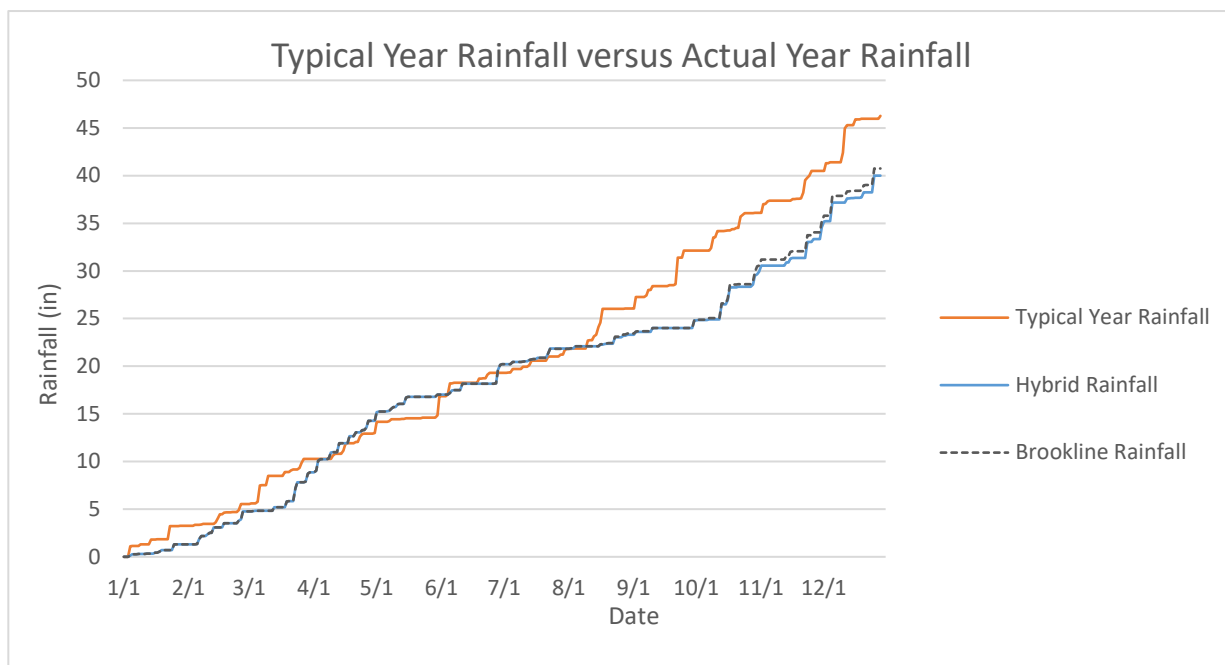
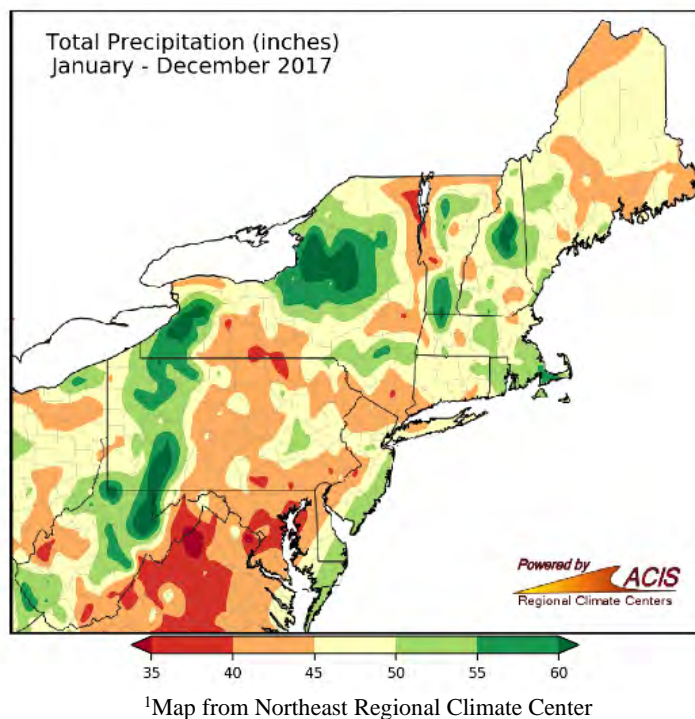


Figure 3.4 Twenty Year Average Rainfall in the Northeast US

The number of the typical year storms and volumes in the 0.25 to 0.50-inch range was slightly lower than those in 2020 hybrid, as shown in Tables 3.4 and 3.5. In the 0.50 to 1.0-inch volume range, the hybrid series recorded the same number of storm events as the typical year.

For storms with volumes greater than 1.0 inch and less than 2.0 inches, the hybrid series had one fewer storm than the typical year series, but 10.76% more rain in volume. The 2020 Brookline rainfall series has one rainfall above 2.0 inches while the CDPW gauge recorded slightly lower rainfall for the same event. Consequently, the 2020 hybrid series has no storms greater than 2.0 inches in magnitude. The typical year rainfall includes three storms of this magnitude.

Table 3.4 Frequency of Rainfall Events per Storm Depth Range

Rainfall Series	Total Rainfall (inches)	Total Number of Storms	Number of Storms by Depth				
			Depth <0.25 inches	Depth 0.25 to 0.50 inches	Depth 0.5 to 1.0 inches	Depth 1.0 to 2.0 inches	Depth >=2.0 inches
Typical Year	46.83	118	70	17	17	11	3
Brookline	40.75	105	61	16	18	9	1
DPW ¹	16.28	32	14	9	3	6	0
Hybrid	40.00	102	56	19	17	10	0
Fresh Pond ²	16.93	36	19	5	6	4	2

1 DPW gauge was operational between 7/23/2020 – 12/16/2020
 2 Fresh Pond gauge was operational between 5/20/2020 – 12/31/2020

Table 3.5. Annual Rainfall Depth Distribution per Storm Depth Range

Rainfall Series	Total Rainfall (inches)	Total Number of Storms	Total Rainfall Depth of Storms				
			Depth <0.25 inches	Depth 0.25 to 0.50 inches	Depth 0.5 to 1.0 inches	Depth 1.0 to 2.0 inches	Depth >=2.0 inches
Typical Year	46.83	118	4.52	6.33	12.01	15.06	8.91
Brookline	40.75	105	4.52	5.78	13.07	15.30	2.08
DPW ¹	16.28	32	0.89	3.19	2.17	9.94	0.00
Hybrid	40.00	102	4.00	6.78	12.54	16.68	0.00
Fresh Pond ²	16.93	36	1.12	1.75	3.92	6.03	4.11

1 DPW gauge was operational between 7/23/2020 – 12/16/2020
 2 Fresh Pond gauge was operational between 5/20/2020 – 12/31/2020

Table 3.6 and Graph 3.3 present the distribution of the total depth of storms by percentage. In 2020, the typical year series had rainfall mostly concentrated in the 0.5-1.0 inch range and the 1.0-to-2.0 inch range, the latter being the most dominant in overall depth. The 2020 hybrid series also followed this pattern, though the typical year had a larger amount of annual rainfall accumulated in events greater than 2 inches, while the hybrid series did not have any rainfall events greater than 2 inches.

This variability between the 2020 series and the typical year indicates that significant deviations with regards to CSO performance are to be expected. Overall performance measured against the typical year is a function not only of storm volumes but also of storm intensity, which is analyzed below.

Table 3.6 Percent of Annual Rainfall Depth per Storm Depth Range

Rainfall Series	Total Rainfall (inches)	Total Number of Storms	Depth of Storms by Percentage				
			Depth <0.25 inches	Depth 0.25 to 0.50 inches	Depth 0.5 to 1.0 inches	Depth 1.0 to 2.0 inches	Depth >=2.0 inches
Typical Year	46.83	118	9.65%	13.52%	25.65%	32.16%	19.03%
Brookline	40.75	105	11.09%	14.18%	32.07%	37.55%	5.10%
DPW ¹	16.28	32	5.47%	19.59%	13.33%	61.06%	0.00%
Hybrid	40.00	102	10.00%	16.95%	31.35%	41.70%	0.00%
Fresh Pond ²	16.93	36	6.62%	10.34%	23.15%	35.62%	24.28%

1 DPW gauge was operational between 7/23/2020 – 12/16/2020
 2 Fresh Pond gauge was operational between 5/20/2020 – 12/31/2020

Graph 3.3 Frequency Comparison of Total Rainfall Depth Distribution by Percentage

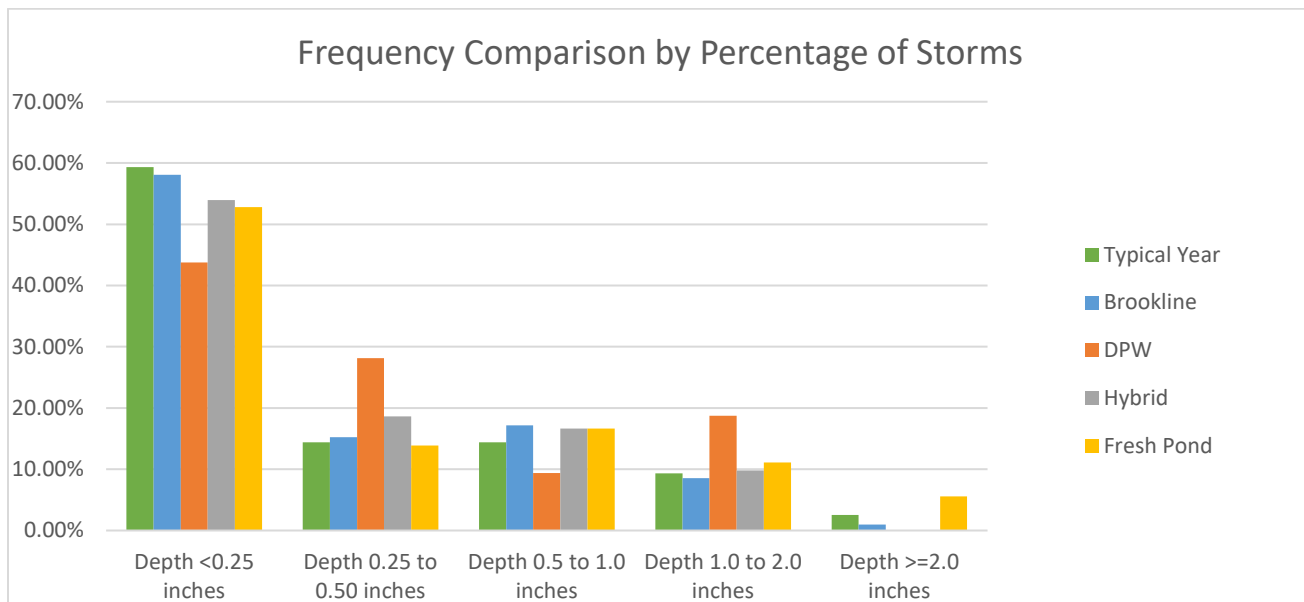


Table 3.7 presents the distribution of storms among of the rainfall series by 15-minute peak intensity. Table 3.8 presents the average and peak intensities for storms greater than 1 inch in depth and Table 3.9 presents the same metrics for storm events with a 15-minute peak intensity greater than 0.40in/hr.

Table 3.7 Number of Storm Events at Selected Ranges of 15-min Peak Intensity*

Rainfall Series	No. of Storms	Total Rainfall	Number of Peak Intensity				
			0.01 to 0.10 in/hr	0.10 to 0.25 in/hr	0.25 to 0.50 in/hr	0.50 to 1.0 in/hr	> 1.0 in/hr
Typical Year	118	46.83	60	27	16	10	5
Brookline	105	40.75	47	26	18	11	3
DPW ¹	32	16.28	12	6	8	4	2
Hybrid	102	40.00	45	24	20	9	3
Fresh Pond ²	36	16.93	13	11	7	3	2
1 DPW gauge was operational between 7/23/2020 – 12/16/2020 2 Fresh Pond gauge was operational between 5/20/2020 – 12/31/2020 *Brookline/DPW/Hybrid in 20-min							

As outlined in Table 3.8, the typical year includes fourteen storm events over one inch whereas both hybrid series recorded ten events greater than one inch in total rainfall, respectively. Recurrence intervals listed in Table 3.8 indicate that the typical year has two storms over one inch in rainfall (12/11/1992, and 9/22/1992) near or above the 1-year recurrence interval, whereas the 2020 hybrid series showed one storm event (3/23/2020) with a recurrence interval greater than 1 year.

Table 3.8 Comparison of Storms Greater 1 Inch of Total Rainfall, Typical Year Versus 2020

Rainfall Series	No. of Storms	Date	Duration (h)	Total Rainfall (in)	Average Int. (in/h)	15-min Peak Int (in/h)*	Recurrence Interval (yr)
Typical year	14	12/11/1992	39.5	3.88	0.10	0.24	2Y~5Y
		9/22/1992	22.0	2.79	0.13	0.65	1Y~2Y
		5/31/1992	29.3	2.24	0.08	0.48	<1Y
		3/6/1992	34.0	1.89	0.06	0.22	<1Y
		11/21/1992	34.8	1.88	0.05	0.36	<1Y
		8/17/1992	25.5	1.81	0.07	0.80	<1Y
		1/23/1992	16.0	1.36	0.09	0.40	<1Y
		6/5/1992	17.3	1.34	0.08	1.00	<1Y
		9/3/1992	12.3	1.19	0.10	0.68	<1Y
		10/23/1992	3.0	1.18	0.39	1.08	<1Y
		1/4/1992	20.8	1.15	0.06	0.48	<1Y
		5/2/1992	5.5	1.14	0.21	1.32	<1Y
		8/15/1992	38.5	1.10	0.03	0.28	<1Y
		4/16/1992	30.0	1.02	0.03	0.28	<1Y
Brookline	10	12/4/2020	24.3	2.08	0.09	0.33	1Y~2Y
		3/23/2020	14.7	1.98	0.13	0.66	<1Y
		10/16/2020	21.7	1.95	0.09	0.39	<1Y
		11/30/2020	15	1.76	0.12	0.63	<1Y
		12/25/2020	16.3	1.74	0.11	0.33	<1Y
		11/23/2020	11.3	1.67	0.19	0.6	<1Y
		6/28/2020	12	1.62	0.14	2.46	<1Y
		10/29/2020	39.7	1.61	0.04	0.21	<1Y
		10/13/2020	17	1.57	0.09	0.54	<1Y
4/2/2020	37	1.4	0.04	0.21	<1Y		
DPW ¹	6	12/5/2020	19	1.96	0.1	0.33	1Y~2Y
		11/30/2020	15	1.86	0.12	0.48	<1Y
		10/16/2020	19.7	1.75	0.09	0.36	<1Y
		11/23/2020	8.7	1.69	0.19	0.57	<1Y
		10/13/2020	17	1.61	0.09	0.69	<1Y
		10/29/2020	20.7	1.07	0.05	0.18	<1Y
Hybrid	10	3/23/2020	14.7	1.98	0.13	0.66	1Y~2Y
		12/5/2020	19	1.96	0.1	0.33	<1Y
		11/30/2020	15	1.86	0.12	0.48	<1Y
		10/16/2020	19.7	1.75	0.09	0.36	<1Y

Rainfall Series	No. of Storms	Date	Duration (h)	Total Rainfall (in)	Average Int. (in/h)	15-min Peak Int (in/h)*	Recurrence Interval (yr)
		12/25/2020	16.3	1.74	0.11	0.33	<1Y
		11/23/2020	8.7	1.69	0.19	0.57	<1Y
		6/28/2020	12	1.62	0.14	2.46	<1Y
		10/13/2020	17	1.61	0.09	0.69	<1Y
		4/2/2020	37	1.4	0.04	0.21	<1Y
		10/29/2020	20.7	1.07	0.05	0.18	<1Y
Fresh Pond ²	6	11/30/2020	14.3	2.08	0.15	0.76	<1Y
		12/5/2020	17.5	2.03	0.12	0.24	<1Y
		12/25/2020	15.8	1.86	0.12	0.44	<1Y
		11/23/2020	8.8	1.77	0.2	0.48	<1Y
		6/28/2020	29.3	1.32	0.05	2.44	<1Y
		10/13/2020	20.5	1.08	0.05	0.16	<1Y
1 DPW gauge was operational between 7/23/2020 – 12/16/2020 2 Fresh Pond gauge was operational between 5/20/2020 – 12/31/2020 *Brookline/DPW/Hybrid in 20-min							

Table 3.9 lists storms with peak intensities greater than 0.40in/hr and their average intensities for all three-rainfall series.

Table 3.9 Comparison of Storms with 15-min Peak Intensities Greater than 0.40 Inches/hour, Typical Year Versus 2020

Rainfall Series	No. of Storms	Date	Duration (hours)	15-min Peak Int (in/h)*	Average Intensity (in/h)	Recurrence Interval (yr)
Typical Year	20	9/9/1992	0.5	1.72	1.14	<1Y
		5/2/1992	5.5	1.32	0.21	<1Y
		8/11/1992	10.5	1.24	0.08	<1Y
		10/23/1992	3.0	1.08	0.39	~1Y
		6/5/1992	17.3	1.00	0.08	<1Y
		7/11/1992	0.5	0.84	0.44	<1Y
		8/17/1992	25.5	0.80	0.07	<1Y
		10/10/1992	5.3	0.72	0.09	<1Y
		10/10/1992	6.5	0.68	0.10	<1Y
		9/3/1992	12.3	0.68	0.10	<1Y
		7/31/1992	18.8	0.68	0.03	<1Y
		9/22/1992	22.0	0.65	0.13	<1Y
		7/29/1992	0.5	0.64	0.40	<1Y
Brookline	15	6/28/2020	12	2.46	0.14	1Y~2Y
		8/23/2020	4.3	1.11	0.18	<1Y
		7/23/2020	1	1.08	0.7	<1Y
		7/22/2020	4.7	0.99	0.09	<1Y
		6/11/2020	6	0.75	0.11	<1Y
		3/23/2020	14.7	0.66	0.13	<1Y
		11/30/2020	15	0.63	0.12	<1Y
		6/29/2020	1.7	0.6	0.15	<1Y
		11/23/2020	11.3	0.6	0.19	<1Y
		9/30/2020	8.3	0.57	0.1	<1Y
		5/15/2020	5.7	0.57	0.12	<1Y
		10/13/2020	17	0.54	0.09	<1Y
		11/15/2020	4.3	0.51	0.11	<1Y
		10/7/2020	0.3	0.51	0.2	<1Y
4/21/2020	4.7	0.45	0.09	<1Y		
DPW ¹	8	7/23/2020	0.7	1.41	0.7	1Y~2Y
		8/23/2020	4	1.35	0.17	<1Y
		9/30/2020	8.3	0.81	0.1	<1Y
		10/13/2020	17	0.69	0.09	<1Y
		11/23/2020	8.7	0.57	0.19	<1Y
		8/4/2020	1	0.54	0.21	<1Y

Rainfall Series	No. of Storms	Date	Duration (hours)	15-min Peak Int (in/h)*	Average Intensity (in/h)	Recurrence Interval (yr)
		11/30/2020	15	0.48	0.12	<1Y
		11/15/2020	4.3	0.45	0.11	<1Y
Hybrid	15	6/28/2020	12	2.46	0.14	1Y~2Y
		7/23/2020	0.7	1.41	0.7	<1Y
		8/23/2020	4	1.35	0.17	<1Y
		7/22/2020	4.7	0.99	0.09	<1Y
		9/30/2020	8.3	0.81	0.1	<1Y
		6/11/2020	6	0.75	0.11	<1Y
		10/13/2020	17	0.69	0.09	<1Y
		3/23/2020	14.7	0.66	0.13	<1Y
		6/29/2020	1.7	0.6	0.15	<1Y
		5/15/2020	5.7	0.57	0.12	<1Y
		11/23/2020	8.7	0.57	0.19	<1Y
		8/4/2020	1	0.54	0.21	<1Y
		11/30/2020	15	0.48	0.12	<1Y
		4/21/2020	4.7	0.45	0.09	<1Y
		11/15/2020	4.3	0.45	0.11	<1Y
Fresh Pond	9	6/28/2020	29.3	2.44	0.05	<1Y
		7/23/2020	0.8	1.64	0.76	<1Y
		6/11/2020	10.8	0.88	0.06	<1Y
		11/30/2020	14.3	0.76	0.15	<1Y
		7/22/2020	3.3	0.6	0.1	<1Y
		11/23/2020	8.8	0.48	0.2	<1Y
		9/10/2020	5.3	0.44	0.07	<1Y
		12/25/2020	15.8	0.44	0.12	<1Y
6/5/2020	0.8	0.44	0.21	<1Y		

1 DPW gauge was operational between 7/23/2020 – 12/16/2020
 2 Fresh Pond gauge was operational between 5/20/2020 – 12/31/2020
 *Brookline/DPW/Hybrid in 20-min

Comparison of peak intensity distributions of the 2020 rainfall series and the typical year shows that the 2020 hybrid rainfall series had fifteen storms with a peak intensity higher than 0.40 in/hr. The typical year has a total of four storms with an average intensity greater than 0.30in/h. Three out of these four have a duration of 30 minutes or less and only the 10/23/1992 is more significant in terms of duration (3 hours) and rainfall accumulation (1.18 inches). On the other hand, the 2020 hybrid series and USGS Fresh Pond series both had one event with an average rainfall intensity greater than

0.3in/h, both on 7/23/2020. They both had a duration of more than 30 minutes and a rainfall accumulation of 0.49 inches and 0.61 inches, respectively.

The highest intensity rainfall event in 2020 was observed on June 28, 2020. The Brookline rainfall data indicated a peak 20-minute intensity of 2.46 in/hr and a total volume of 1.62 inches recorded over the 12-hour duration of the storm on June 28, 2020. The event hyetograph shown in Graph 3.4 is indicative of a fast moving, high intensity thunderstorm. Further analysis was performed to better understand the spatial variability of this event. Radar images from the National Oceanic and Atmospheric Administration (NOAA)’s National Reflectivity Mosaic dataset were obtained for this purpose. Figure 3.5 below shows the progression of the storm in the Greater Boston Region between 12 pm and 3:30 pm Eastern Time. At 1:50 pm, the highest intensity rainfall (seen in red) is observed to be isolated just south of Cambridge, and directly over Brookline where the USGS Brookline gauge is located, corroborating the peak intensity observed in the rainfall hyetograph. The radar imagery suggests that the highest intensity rainfall likely stayed just south of Cambridge, before moving further east. Due to the highly localized nature of the storm, it is likely to have had a varied response at the various CSO locations and it is probable that the use of the Brookline rainfall data for the City of Cambridge is responsible for that over-simulation of CSO response in Cambridge, as compared to the metered data for the same event. It should be noted that the model simulation applies the same rainfall hyetograph for the entire model area, therefore it is probable that the spatial variability in rainfall intensity distribution is not being fully represented.

Graph 3.4 June 28, 2020 Rainfall Hyetograph

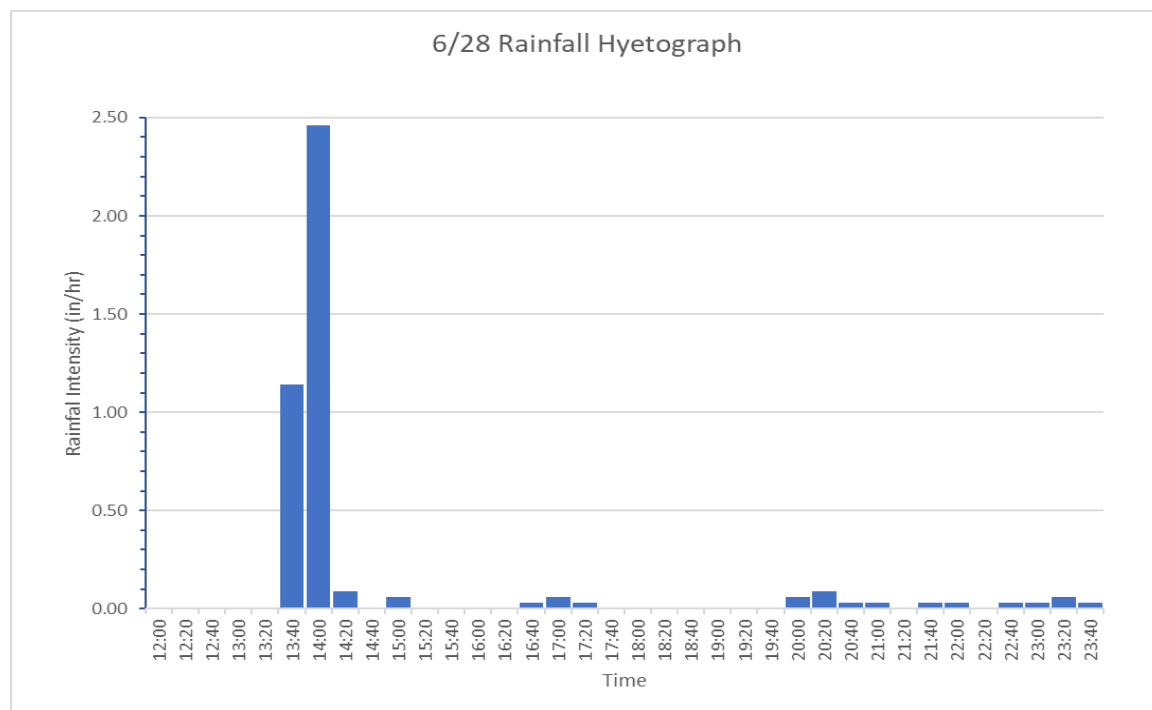
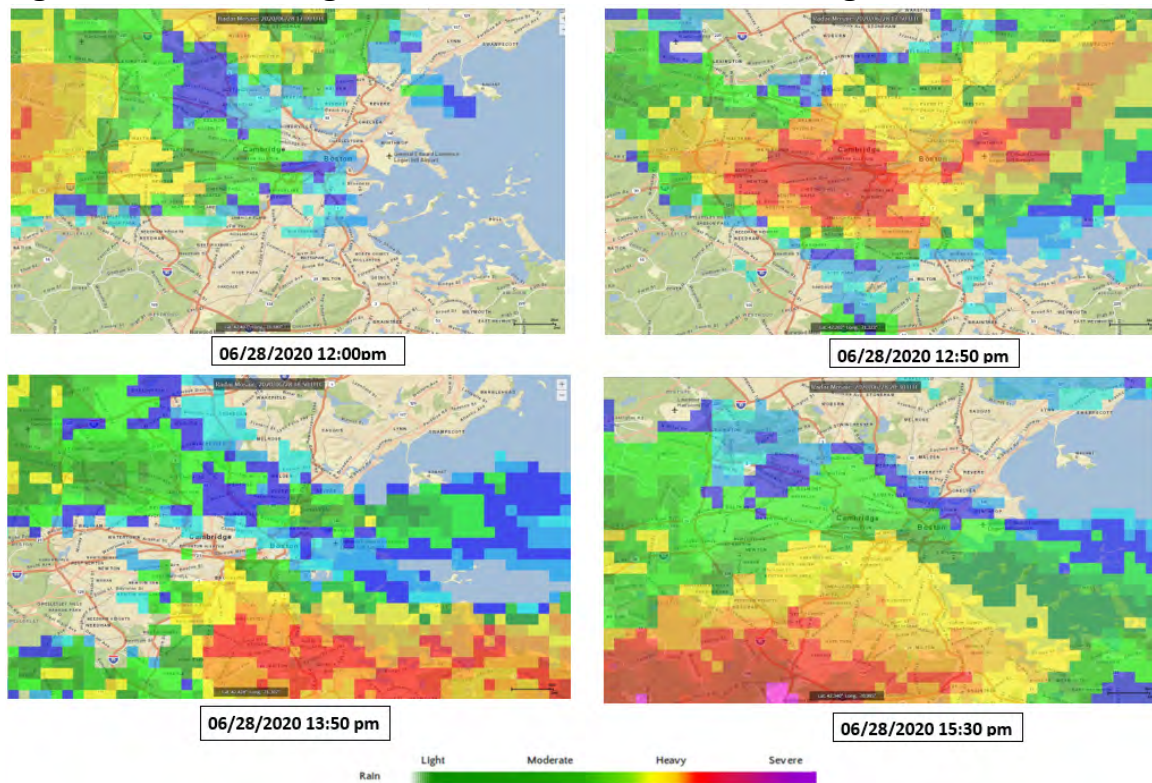
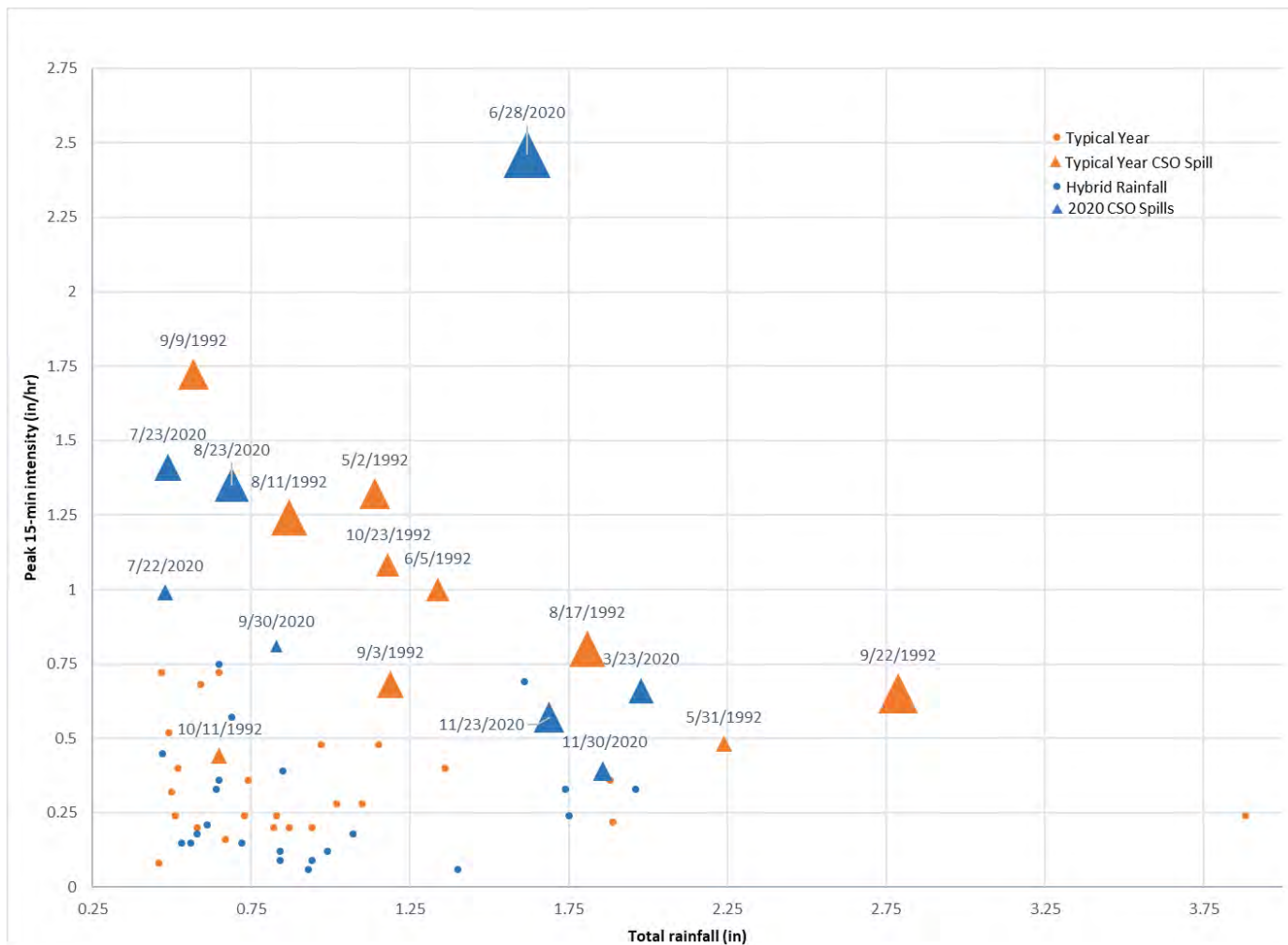


Figure 3.5 Storm Progression in the Greater Boston Region on 6/28/2020



The typical year and 2020 storm events are presented in Graph 3.5. This figure includes all storms over 0.45” of total rainfall and clearly indicates several 2020 storm events that were outliers with respect to their 15-minute peak intensity and total volume ratios (shown with a blue fill) while the typical year were marked in orange. All storms that caused a CSO spills during either time series are indicated as a triangle. The storms that were causing a spill in the typical year are within the similar rainfall characteristic as those during 2020 storms. For 2020 rainfall, the CSO spill events include March 23, June 28, July 23, August 23, November 23, and November 30, 2020. These storm events with high peak intensity and total volume, as would be expected, were responsible for a majority of the CSO spills recorded in 2020, as previously outlined in this report.

Graph 3.5 Typical Year and 2020 Rainfall Events, Peak 15-Minute Intensity for Storms Greater than 0.45” Total Rainfall



3.4 Combined Sewer Overflow Comparison

With the analysis of the 2020 rainfall complete and the CSO spill count and activations for 2020 calculated, the 2020 CSO results were then compared to those anticipated during the typical rainfall year. Table 3.10 presents the 2020 and typical year model simulation results for the existing conditions Cambridge network model. In contrast to previous years, there were no LTCP updates remaining to be performed to the system (or model) during the 2020 calendar year. As a result, this year there are no differences between the LTCP model and the existing conditions model. As noted previously, there are a number of inactive CSOs on both the Alewife Brook and the Charles River systems that are included in the table for consistency. The following significant elements were updated in the model between the network used for the 2019 CSO report and this document:

- The CAM005 weir crest elevation in the model was reduced by approximately 6 inches based on field measurements carried out by AECOM/MWRA at the end of December, 2019. The depth from the invert in the regulator structure to the weir crest was measured to be approximately 3.38 ft (approximately 6” less than the was originally established during previous field inspections). The model weir crest was adjusted accordingly, leading to an increase in CSO spills being simulated at the CAM005 regulator during the typical year. The weir crest elevation at this location will be revisited during the 2021 analysis to determine if the weir crest elevation can be raised to reduce CSO volumes, while maintaining appropriate LOS to the community.
- The Cambridgeport area of the system was updated in the model and calibrated as part of the sewer separation work done in that neighborhood. No appreciable changes to the City of Cambridge CSOs in this area were noted in the pre- and post-calibration model simulations, however there was a significant reduction in the CSO volumes simulated for the MWRA’s Cottage Farm associated with the Cambridgeport work and Talbot Street outfall.
- The MWRA ICM network model was calibrated in 2019 and adjusted over the past year. Updates made to the MWRA model will be reviewed and their incorporation will be considered during the 2021 Cambridge model update analysis.

Table 3.10 Comparison of 2020 and Typical Year CSO Results

	2020 RAINFALL UNDER 2020 SYSTEM CONDITIONS		TYPICAL YEAR RAINFALL UNDER 2020 SYSTEM CONDITIONS*		LONG TERM CONTROL PLAN REQUIREMENTS**	
OUTFALL	ACTIVATION FREQUENCY	VOLUME (MG)	ACTIVATION FREQUENCY	VOLUME (MG)	ACTIVATION FREQUENCY	VOLUME (MG)
ALEWIFE BROOK						
CAM 001	0 ⁶ (0)	0.00	1	0.10	5	0.19
CAM 002	0 ⁶ (0)	0.00	0	0	4	0.69
CAM 004 ¹	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	N/A
CAM 400 ²	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	N/A
CAM 401A	7 ⁶ (2)	0.97	5 ³	3.06 ³	5	1.61
CAM 401B	0 ⁶ (2)	0.00	4	0.90	7	2.15
TOTAL	7 (4)	0.97	10	4.06	21	4.63
CHARLES RIVER						
CAM 005	5 (6)	1.22	8 ⁴	1.50 ⁴	3	0.84
CAM 007	1 ⁶ (0)	0.23	0	0	1	0.03
CAM 009 ⁵	0	0	0	0	2	0.01
CAM 011 ⁵	0	0	0	0	0	0
CAM 017	1 ⁶ (0)	0.30	1	0.02	1	0.45
TOTAL	7 (6)	1.75	9	1.52	7	1.33

NUMBERS IN PARENTHESES REPRESENT METERED SPILLS

* ICM SIMULATION CONDITON WITH 15MIN TIMESTEP (15s) WITH 60 RESULTS MULTIPLIERS.

**VALUES REFLECT TARGET CSO VOLUMES AT LTCP COMPLETION AS PER CSO PERMIT. THESE ARE NOT MODEL RESULTS.

1. CAM 004 CLOSED ON DECEMBER 27, 2015

2. CAM 400 CLOSED ON MARCH 31, 2011

3. OVER REPRESENTATION OF SPILLS IN THE MODEL LIKELY DUE TO REDUCTION IN HYDRAULIC GRADE LINE OF BASEFLOWS FOLLOWING CLEANING OF THE PIPE⁴. SEE DESCRIPTION ABOVE IN SECTION 3.4

5. TEMPORARILY PLUGGED

6. MODEL SIMULATED SPILL ON 6/28/2020 LIKELY DUE TO SPATIAL VARIABILITY OF THE HIGH INTENSITY RAINFALL EVENT, EXPLAINED IN THE ABOVE SECTION. SPILLS SIMULATED BY THE MODEL ON 6/28/2020 IN THE ALEWIFE WERE REMOVED, WHERE METERED DATA DID NOT PROVIDE EVIDENCE OF A SPILL.

Alewife Brook Comparisons

The Alewife Brook in existing conditions showed a total of eleven activations with 3.13 MG volume under the 2020 rainfall series while in a typical year it simulated a total of ten spills and 4.06 MG in total. The ten spills are lower than the twenty-one target spills in the LTCP model. The total volume of 4.06 MG is lower than the targeted 4.63 MG in a typical year in LTCP conditions. The 401A results are the only location where the typical year results are slightly above the LTCP requirements. However, the improvements to the combined sewer system tributary to the Alewife have been implemented in such a way as to meet the overall LTCP requirements of activations and volumes of the receiving body, not the individual CSO activations and volumes. The City considers the Cambridge outfalls in the Alewife system, with 10 spills and 4.06MG, to be in compliance with the Alewife LTCP requirements. It should be further noted that, given the trend in hydraulic grade line of baseflow reductions, when the City has a full year of reduced data available, the model will be updated accordingly and the individual LTCP spill count and volume may also both be met at CAM401A. The City has also installed a new sensor on the downstream side of the 401A weir in order to confirm it's understanding of these improvements.

CAM 001

The 2020 rainfall resulted in one activation with an overflow volume of 0.11 MG. The typical year rainfall generated one spill with a volume of 0.10 MG, which is less than the targeted 5 spills and total volume of 0.19 MG.

CAM 002

The 2020 rainfall resulted in one activation with an overflow volume of 0.05MG. The typical year generated no activations, which is less than the targeted 0.69MG.

CAM 004

This structure was closed as of December 27, 2015 and the LTCP has CAM 004 closed since that date.

CAM 401A

The 2020 rainfall resulted in eight overflows with 2.50 MG of volume in current model conditions. In a typical year rainfall, there were five activations and a total of 3.06 MG of CSO volume at CAM 401A is more than the targeted 1.61MG. If the hydraulic grade line of baseflow was adjusted to reflect the reduction observed in the metered results, the targeted LTCP volume may be met.

CAM 401B

The 2020 rainfall resulted in one spill and a total volume of 0.51 MG. In the typical year rainfall, four spills are activated with a total of 0.90 MG, which is less than the targeted 7 spill events and a total of 2.15 MG.

Charles River Comparisons

The Charles River system showed a total of seven activations with 1.75 MG volume under the 2020 rainfall series while in the typical year it resulted in a total of nine spills and 1.52 MG in total. The overall spill count for the typical year is two spills higher than the targeted spills. The overall spill volume is 14% higher than the targeted LTCP volume of 1.33 MG in the Charles River system. Similar to the Alewife system, the improvements to the combined sewer system tributary to the Charles River have been implemented in such a way as to meet the overall LTCP requirements of total activations and total volumes, not the individual CSO activations and volumes. A summary of the CSO activations under different rainfall and system conditions is provided below.

CAM 005

The 2020 rainfall resulted in five activations with an overflow volume of 1.21 MG. Approximately 79% (0.95MG) of the spill volume being reported at CAM005 was simulated during the June 28, 2020 storm event. The typical year rainfall generates eight spills and a total of 1.50 MG, higher than the target of three spills and a total volume of 0.84MG in a year. As previously noted in Section 3.4, the CAM005 weir crest was lowered by 6” in the model due to field inspections carried out in December, 2019. This resulted in a decrease in the estimated depth required to generate a spill at CAM005. There is field work planned at this regulator to remove a pipe protrusion that is presumed to be causing some headloss issues. During that field work, the weir crest elevation will be confirmed.

CAM 007

The 2020 rainfall under the existing conditions resulted in one spill with a volume of 0.23 MG. The typical year rainfall generates no spill, lower than the target total volume of 0.03 MG at CAM007.

CAM 009 and CAM 011

CAM 009 and CAM 011 are temporarily plugged. The LTCP has both outfalls open. The City of Cambridge plans to keep these outfalls closed until a more comprehensive study can be completed in this area on the effects of climate change and upstream conditions.

CAM 017

The 2020 rainfall resulted in one spill with a volume of 0.30 MG at CAM017. The typical year rainfall generates one spill with a volume of 0.02 MG, lower than the targeted 0.45MG.

3.5 Monitoring Recommendations

The 2020 CSO data analysis carried out on both the metered CSO data and the modeled CSO simulations identified a number of recommendations for the CSO monitoring and analysis moving into 2021, as outlined below.

CAM001

During the 2020 reporting period, the outfall meter data was observed to have been possibly measuring extraneous flows from surface or ground water in the meter vault. The vault housing this sensor will be inspected to determine whether surface water may be entering the vault and causing some noise in the meter data.. The smartcover data in the CAM001 regulator provides sufficient context for confirmation of spill events and review of model-simulated depths in the regulator.

CAM002

The existing monitoring will be maintained as it is providing sufficient understanding of flow through this regulator.

CAM401A

The City installed a new inclinometer on the downstream side of the CAM401A overflow weir that will track when the flap gate into the outfall pipe has been activated. This will provide a third source for validating the spills at this regulator.

CAM 401B

The existing monitoring will be maintained as it is providing sufficient understanding of flow through this regulator.

CAM005

A combination of the DPW meter and the Smart Cover data provides a comprehensive understanding of the level inside the CAM005 regulator. The existing monitoring will be maintained and additional field work will be done to confirm the weir crest elevation, as well as the invert elevation of the smart cover meter location for continued use of the smart cover data in confirming CSO spills at this location.

CAM007

Upon analysis of the 2020 meter data, it was observed that the meter began to report erroneous readings after July 8, 2020. This was presumably in response to the high intensity rainfall event that occurred on that date. Additionally, the meter stopped recording data between July 16 and September 24, 2020. The sensor shall be reviewed and calibrated for error correction.

CAM017

It is recommended that the flow meter on the incoming Binney Street combined sewer be moved upstream in the Binney Street combined sewer in order to provide confirmation of the incoming flows upstream of the underflow to Prison Point.

3.6 Coordination with MWRA

System-wide, periodic coordination with the MWRA is advised to continue in order to routinely incorporate changes in the regional system and capture existing conditions. MWRA depth data has been used to cross check with the City meter depth where available. Where variability between the City and MWRA meters remain, the two entities will continue to coordinate to validate the results. Pump operations and system optimization at different key MWRA facilities is critical and may have a significant impact on Cambridge CSOs during individual storm events as the combined system ties to MWRA's interceptors. In particular, in instances where MWRA facilities are manually operated, there may be repercussions on the City's CSO volumes.

Recent updates to the inflows from the South Charles Relief Sewer (SCRS) into the Cottage Farm CSO facility in the MWRA model have been observed to change modelled flow patterns into and out of the facility during the typical year. The City of Cambridge model has not included this change to the inflows in order to assess possible impacts of the MWRA's SCRS on the City of Cambridge CSO activations and volumes.

4. Status of CSO Abatement Projects

4.1 Project Updates

The City of Cambridge has completed all required projects but continues to implement abatement projects to remove stormwater from its combined sewer system, however continued sewer separation is dependent upon cost effective strategies to manage water quality from stormwater discharges, in particular, for Phosphorous. This may include designing systems in which some portion of the stormwater continues to discharge to the sewer system, when there would be no impact on CSOs. Such abatement projects, which have been completed or are in planning/construction, include:

- Cardinal Medeiros and Binney St sewer separation
- Cambridgeport sewer separation and Talbot Street Outfall
- Monsignor O'Brien Highway sewer separation and new Lechmere Canal outfall
- The Port I/I removal and flood alleviation project
- Willard St sewer separation and Outfall

The information provided in this Annual Report conforms to information and data submitted to the MWRA for inclusion in their court-ordered annual report on CSO abatement project progress.

5. Modifications to Nine Minimum Controls Plan

The Nine Minimum Controls Plan (NMCP) was substantially updated in its entirety and submitted together with the first annual report (April 2009). The plan provides a summary of the evaluations undertaken to address each control measure since the original plan was developed in 1997.

Enhancements were made to the NMCP to meet the minimum implementation levels stipulated in the permit. These Public Notification requirements were further updated to reflect changes in current permit requirements. These enhancements were summarized in Table 5.1.

Table 5.1 –Enhancements to the Nine Minimum Controls Plan

Control Measure	Proposed Enhancement
1. Proper Operation and Regular Maintenance Programs	<ul style="list-style-type: none"> • Adherence to detailed "Good Housekeeping Manual" to provide specific guidance and protocols for major DPW tasks • Development and utilization of routine inspection forms and work order system • Update of infrastructure assets and nomenclature • Update of DPW organizational structure and budget figures
2. Maximization of Storage in the Collection System	<ul style="list-style-type: none"> • Update database of existing key regulator components • Establish procedure for documentation of purpose and benefits to any future modifications to existing structures
3. Review and Modification of Pretreatment Requirements	<ul style="list-style-type: none"> • Adherence to recently developed Wastewater and Stormwater Use Regulations, inspection frequencies and enforcement activities
4. Maximization of Flow to POTW	<ul style="list-style-type: none"> • Maintain updated inventory of CSO capital projects; • Continue funding for annual cleaning and remedial repair and reconstruction contracts
5. Prohibition Elimination of Dry Weather Discharges	<ul style="list-style-type: none"> • The City is unaware of any dry weather discharges from CSO outfalls
6. Control of Solid and Floatable Materials in CSOs	<ul style="list-style-type: none"> • Continue to implement floatable controls projects in conformance with revised Schedule Seven milestone deadlines. • Continue to require compliance with new City Wastewater and Stormwater Use Regulations

Control Measure	Proposed Enhancement
7. Pollution Prevention Programs to Reduce Contaminants in CSOs	<ul style="list-style-type: none"> • Adherence to "Good Housekeeping Manual" guidance and protocols to reduce the City's contribution of contaminants to stormwater; • Adherence to City of Cambridge Integrated Pest Management plan to reduce contributions of pesticides, fungicides, herbicides and fertilizer to run-off; • Continue aggressive recycling, street sweeping and household hazardous waste collections and management • Continue with public education and outreach activities • Continue to require compliance with new City Wastewater and Stormwater Use Regulations
8. Public Notification	<ul style="list-style-type: none"> • Public Notification procedure updated per variance requirements beginning in 2021.
9. Monitoring to Characterize CSO Impacts and Efficacy of CSO Controls	<ul style="list-style-type: none"> • On a regulator site-specific basis, use revised weir equations and parameters and/or hydraulic models and analysis to estimate effluent volumes released during CSO events

APPENDIX I
2020 DAILY RAINFALL
DATA

CITY OF CAMBRIDGE DEPARTMENT OF PUBLIC WORKS
 2020 DAILY RAINFALL DATA
 USGS METER AT MUDDY BROOK, BROOKLINE, MA

Date	Daily Rainfall (in)	Average Intensity (in/hr)	Maximum Intensity (in/hr)
1/1/2020	0.00	0.00	0.00
1/2/2020	0.00	0.00	0.00
1/3/2020	0.00	0.00	0.00
1/4/2020	0.13	0.01	0.06
1/5/2020	0.14	0.01	0.06
1/6/2020	0.00	0.00	0.00
1/7/2020	0.00	0.00	0.00
1/8/2020	0.02	0.00	0.03
1/9/2020	0.00	0.00	0.00
1/10/2020	0.00	0.00	0.00
1/11/2020	0.00	0.00	0.00
1/12/2020	0.05	0.00	0.06
1/13/2020	0.01	0.00	0.03
1/14/2020	0.00	0.00	0.00
1/15/2020	0.00	0.00	0.00
1/16/2020	0.09	0.00	0.06
1/17/2020	0.00	0.00	0.00
1/18/2020	0.09	0.00	0.09
1/19/2020	0.19	0.01	0.18
1/20/2020	0.00	0.00	0.00
1/21/2020	0.00	0.00	0.00
1/22/2020	0.00	0.00	0.00
1/23/2020	0.00	0.00	0.00
1/24/2020	0.00	0.00	0.00
1/25/2020	0.58	0.02	0.27
1/26/2020	0.00	0.00	0.00
1/27/2020	0.00	0.00	0.00
1/28/2020	0.00	0.00	0.00
1/29/2020	0.00	0.00	0.00
1/30/2020	0.00	0.00	0.00
1/31/2020	0.00	0.00	0.00
Total	1.30		

CITY OF CAMBRIDGE DEPARTMENT OF PUBLIC WORKS
 2020 DAILY RAINFALL DATA
 USGS METER AT MUDDY BROOK, BROOKLINE, MA

Date	Daily Rainfall (in)	Average Intensity (in/hr)	Maximum Intensity (in/hr)
2/1/2020	0.00	0.00	0.00
2/2/2020	0.00	0.00	0.00
2/3/2020	0.00	0.00	0.00
2/4/2020	0.00	0.00	0.00
2/5/2020	0.05	0.00	0.03
2/6/2020	0.48	0.02	0.09
2/7/2020	0.36	0.02	0.30
2/8/2020	0.00	0.00	0.00
2/9/2020	0.00	0.00	0.00
2/10/2020	0.17	0.01	0.12
2/11/2020	0.17	0.01	0.09
2/12/2020	0.00	0.00	0.00
2/13/2020	0.56	0.02	0.15
2/14/2020	0.00	0.00	0.00
2/15/2020	0.00	0.00	0.00
2/16/2020	0.00	0.00	0.00
2/17/2020	0.00	0.00	0.00
2/18/2020	0.44	0.02	0.15
2/19/2020	0.00	0.00	0.00
2/20/2020	0.00	0.00	0.00
2/21/2020	0.00	0.00	0.00
2/22/2020	0.00	0.00	0.00
2/23/2020	0.00	0.00	0.00
2/24/2020	0.00	0.00	0.00
2/25/2020	0.26	0.01	0.15
2/26/2020	0.15	0.01	0.12
2/27/2020	0.83	0.03	0.27
2/28/2020	0.00	0.00	0.00
2/29/2020	0.00	0.00	0.00
Total	3.47		

CITY OF CAMBRIDGE DEPARTMENT OF PUBLIC WORKS
 2020 DAILY RAINFALL DATA
 USGS METER AT MUDDY BROOK, BROOKLINE, MA

Date	Daily Rainfall (in)	Average Intensity (in/hr)	Maximum Intensity (in/hr)
3/1/2020	0.00	0.00	0.00
3/2/2020	0.00	0.00	0.00
3/3/2020	0.02	0.00	0.03
3/4/2020	0.03	0.00	0.03
3/5/2020	0.00	0.00	0.00
3/6/2020	0.00	0.00	0.00
3/7/2020	0.00	0.00	0.00
3/8/2020	0.00	0.00	0.00
3/9/2020	0.00	0.00	0.00
3/10/2020	0.00	0.00	0.00
3/11/2020	0.00	0.00	0.00
3/12/2020	0.00	0.00	0.00
3/13/2020	0.37	0.02	0.12
3/14/2020	0.00	0.00	0.00
3/15/2020	0.00	0.00	0.00
3/16/2020	0.00	0.00	0.00
3/17/2020	0.01	0.00	0.03
3/18/2020	0.00	0.00	0.00
3/19/2020	0.61	0.03	0.21
3/20/2020	0.03	0.00	0.03
3/21/2020	0.00	0.00	0.00
3/22/2020	0.00	0.00	0.00
3/23/2020	1.35	0.06	0.66
3/24/2020	0.63	0.03	0.42
3/25/2020	0.00	0.00	0.00
3/26/2020	0.00	0.00	0.00
3/27/2020	0.00	0.00	0.00
3/28/2020	0.08	0.00	0.06
3/29/2020	0.84	0.04	0.33
3/30/2020	0.11	0.00	0.06
3/31/2020	0.00	0.00	0.00
Total	4.08		

CITY OF CAMBRIDGE DEPARTMENT OF PUBLIC WORKS
 2020 DAILY RAINFALL DATA
 USGS METER AT MUDDY BROOK, BROOKLINE, MA

Date	Daily Rainfall (in)	Average Intensity (in/hr)	Maximum Intensity (in/hr)
4/1/2020	0.00	0.00	0.00
4/2/2020	0.17	0.01	0.06
4/3/2020	1.04	0.04	0.21
4/4/2020	0.19	0.01	0.12
4/5/2020	0.00	0.00	0.00
4/6/2020	0.00	0.00	0.00
4/7/2020	0.00	0.00	0.00
4/8/2020	0.06	0.00	0.03
4/9/2020	0.64	0.03	0.33
4/10/2020	0.04	0.00	0.09
4/11/2020	0.00	0.00	0.00
4/12/2020	0.00	0.00	0.00
4/13/2020	0.94	0.04	0.36
4/14/2020	0.00	0.00	0.00
4/15/2020	0.00	0.00	0.00
4/16/2020	0.00	0.00	0.00
4/17/2020	0.00	0.00	0.00
4/18/2020	0.72	0.03	0.15
4/19/2020	0.00	0.00	0.00
4/20/2020	0.00	0.00	0.00
4/21/2020	0.41	0.02	0.45
4/22/2020	0.00	0.00	0.00
4/23/2020	0.00	0.00	0.00
4/24/2020	0.22	0.01	0.06
4/25/2020	0.00	0.00	0.00
4/26/2020	0.30	0.01	0.12
4/27/2020	0.69	0.03	0.15
4/28/2020	0.01	0.00	0.03
4/29/2020	0.00	0.00	0.00
4/30/2020	0.00	0.00	0.00
Total	5.43		

CITY OF CAMBRIDGE DEPARTMENT OF PUBLIC WORKS
 2020 DAILY RAINFALL DATA
 USGS METER AT MUDDY BROOK, BROOKLINE, MA

Date	Daily Rainfall (in)	Average Intensity (in/hr)	Maximum Intensity (in/hr)
5/1/2020	0.91	0.04	0.39
5/2/2020	0.04	0.00	0.03
5/3/2020	0.00	0.00	0.00
5/4/2020	0.00	0.00	0.00
5/5/2020	0.00	0.00	0.00
5/6/2020	0.06	0.00	0.12
5/7/2020	0.01	0.00	0.03
5/8/2020	0.25	0.01	0.09
5/9/2020	0.16	0.01	0.06
5/10/2020	0.00	0.00	0.00
5/11/2020	0.32	0.01	0.33
5/12/2020	0.01	0.00	0.03
5/13/2020	0.00	0.00	0.00
5/14/2020	0.00	0.00	0.00
5/15/2020	0.68	0.03	0.57
5/16/2020	0.06	0.00	0.06
5/17/2020	0.00	0.00	0.00
5/18/2020	0.00	0.00	0.00
5/19/2020	0.00	0.00	0.00
5/20/2020	0.00	0.00	0.00
5/21/2020	0.00	0.00	0.00
5/22/2020	0.00	0.00	0.00
5/23/2020	0.00	0.00	0.00
5/24/2020	0.00	0.00	0.00
5/25/2020	0.00	0.00	0.00
5/26/2020	0.00	0.00	0.00
5/27/2020	0.00	0.00	0.00
5/28/2020	0.00	0.00	0.00
5/29/2020	0.00	0.00	0.00
5/30/2020	0.24	0.01	0.15
5/31/2020	0.00	0.00	0.00
Total	2.74		

CITY OF CAMBRIDGE DEPARTMENT OF PUBLIC WORKS
 2020 DAILY RAINFALL DATA
 USGS METER AT MUDDY BROOK, BROOKLINE, MA

Date	Daily Rainfall (in)	Average Intensity (in/hr)	Maximum Intensity (in/hr)
6/1/2020	0.00	0.00	0.00
6/2/2020	0.02	0.00	0.06
6/3/2020	0.00	0.00	0.00
6/4/2020	0.00	0.00	0.00
6/5/2020	0.15	0.01	0.12
6/6/2020	0.27	0.01	0.12
6/7/2020	0.04	0.00	0.03
6/8/2020	0.01	0.00	0.03
6/9/2020	0.00	0.00	0.00
6/10/2020	0.00	0.00	0.00
6/11/2020	0.65	0.03	0.75
6/12/2020	0.00	0.00	0.00
6/13/2020	0.00	0.00	0.00
6/14/2020	0.00	0.00	0.00
6/15/2020	0.00	0.00	0.00
6/16/2020	0.00	0.00	0.00
6/17/2020	0.00	0.00	0.00
6/18/2020	0.00	0.00	0.00
6/19/2020	0.00	0.00	0.00
6/20/2020	0.00	0.00	0.00
6/21/2020	0.00	0.00	0.00
6/22/2020	0.00	0.00	0.00
6/23/2020	0.00	0.00	0.00
6/24/2020	0.00	0.00	0.00
6/25/2020	0.00	0.00	0.00
6/26/2020	0.00	0.00	0.00
6/27/2020	0.03	0.00	0.06
6/28/2020	1.43	0.06	2.46
6/29/2020	0.53	0.02	0.60
6/30/2020	0.08	0.00	0.09
Total	3.21		

CITY OF CAMBRIDGE DEPARTMENT OF PUBLIC WORKS
 2020 DAILY RAINFALL DATA
 USGS METER AT MUDDY BROOK, BROOKLINE, MA

Date	Daily Rainfall (in)	Average Intensity (in/hr)	Maximum Intensity (in/hr)
7/1/2020	0.00	0.00	0.00
7/2/2020	0.00	0.00	0.00
7/3/2020	0.00	0.00	0.00
7/4/2020	0.00	0.00	0.00
7/5/2020	0.21	0.01	0.30
7/6/2020	0.01	0.00	0.03
7/7/2020	0.00	0.00	0.00
7/8/2020	0.00	0.00	0.00
7/9/2020	0.00	0.00	0.00
7/10/2020	0.03	0.00	0.06
7/11/2020	0.05	0.00	0.12
7/12/2020	0.00	0.00	0.00
7/13/2020	0.13	0.01	0.39
7/14/2020	0.06	0.00	0.18
7/15/2020	0.02	0.00	0.03
7/16/2020	0.00	0.00	0.00
7/17/2020	0.14	0.01	0.09
7/18/2020	0.00	0.00	0.00
7/19/2020	0.00	0.00	0.00
7/20/2020	0.00	0.00	0.00
7/21/2020	0.00	0.00	0.00
7/22/2020	0.48	0.02	0.99
7/23/2020	0.47	0.02	1.08
7/24/2020	0.00	0.00	0.00
7/25/2020	0.00	0.00	0.00
7/26/2020	0.00	0.00	0.00
7/27/2020	0.00	0.00	0.00
7/28/2020	0.00	0.00	0.00
7/29/2020	0.00	0.00	0.00
7/30/2020	0.00	0.00	0.00
7/31/2020	0.00	0.00	0.00
Total	1.60		

CITY OF CAMBRIDGE DEPARTMENT OF PUBLIC WORKS
 2020 DAILY RAINFALL DATA
 USGS METER AT MUDDY BROOK, BROOKLINE, MA

Date	Daily Rainfall (in)	Average Intensity (in/hr)	Maximum Intensity (in/hr)
8/1/2020	0.00	0.00	0.00
8/2/2020	0.05	0.00	0.12
8/3/2020	0.00	0.00	0.00
8/4/2020	0.20	0.01	0.27
8/5/2020	0.00	0.00	0.00
8/6/2020	0.00	0.00	0.00
8/7/2020	0.00	0.00	0.00
8/8/2020	0.00	0.00	0.00
8/9/2020	0.00	0.00	0.00
8/10/2020	0.00	0.00	0.00
8/11/2020	0.00	0.00	0.00
8/12/2020	0.00	0.00	0.00
8/13/2020	0.00	0.00	0.00
8/14/2020	0.00	0.00	0.00
8/15/2020	0.00	0.00	0.00
8/16/2020	0.22	0.01	0.21
8/17/2020	0.02	0.00	0.03
8/18/2020	0.06	0.00	0.09
8/19/2020	0.03	0.00	0.09
8/20/2020	0.01	0.00	0.03
8/21/2020	0.00	0.00	0.00
8/22/2020	0.01	0.00	0.03
8/23/2020	0.68	0.03	1.11
8/24/2020	0.00	0.00	0.00
8/25/2020	0.00	0.00	0.00
8/26/2020	0.00	0.00	0.00
8/27/2020	0.23	0.01	0.21
8/28/2020	0.00	0.00	0.00
8/29/2020	0.09	0.00	0.06
8/30/2020	0.00	0.00	0.00
8/31/2020	0.00	0.00	0.00
Total	1.60		

CITY OF CAMBRIDGE DEPARTMENT OF PUBLIC WORKS
 2020 DAILY RAINFALL DATA
 USGS METER AT MUDDY BROOK, BROOKLINE, MA

Date	Daily Rainfall (in)	Average Intensity (in/hr)	Maximum Intensity (in/hr)
9/1/2020	0.00	0.00	0.00
9/2/2020	0.22	0.01	0.27
9/3/2020	0.03	0.00	0.03
9/4/2020	0.00	0.00	0.00
9/5/2020	0.00	0.00	0.00
9/6/2020	0.00	0.00	0.00
9/7/2020	0.00	0.00	0.00
9/8/2020	0.00	0.00	0.00
9/9/2020	0.00	0.00	0.00
9/10/2020	0.32	0.01	0.24
9/11/2020	0.00	0.00	0.00
9/12/2020	0.00	0.00	0.00
9/13/2020	0.00	0.00	0.00
9/14/2020	0.00	0.00	0.00
9/15/2020	0.00	0.00	0.00
9/16/2020	0.00	0.00	0.00
9/17/2020	0.00	0.00	0.00
9/18/2020	0.00	0.00	0.00
9/19/2020	0.00	0.00	0.00
9/20/2020	0.00	0.00	0.00
9/21/2020	0.00	0.00	0.00
9/22/2020	0.00	0.00	0.00
9/23/2020	0.00	0.00	0.00
9/24/2020	0.00	0.00	0.00
9/25/2020	0.00	0.00	0.00
9/26/2020	0.00	0.00	0.00
9/27/2020	0.00	0.00	0.00
9/28/2020	0.00	0.00	0.00
9/29/2020	0.00	0.00	0.00
9/30/2020	0.87	0.04	0.57
Total	1.44		

CITY OF CAMBRIDGE DEPARTMENT OF PUBLIC WORKS
 2020 DAILY RAINFALL DATA
 USGS METER AT MUDDY BROOK, BROOKLINE, MA

Date	Daily Rainfall (in)	Average Intensity (in/hr)	Maximum Intensity (in/hr)
10/1/2020	0.00	0.00	0.00
10/2/2020	0.00	0.00	0.00
10/3/2020	0.00	0.00	0.00
10/4/2020	0.00	0.00	0.00
10/5/2020	0.00	0.00	0.00
10/6/2020	0.00	0.00	0.00
10/7/2020	0.17	0.01	0.51
10/8/2020	0.00	0.00	0.00
10/9/2020	0.00	0.00	0.00
10/10/2020	0.00	0.00	0.00
10/11/2020	0.00	0.00	0.00
10/12/2020	0.00	0.00	0.00
10/13/2020	1.57	0.07	0.54
10/14/2020	0.00	0.00	0.00
10/15/2020	0.00	0.00	0.00
10/16/2020	0.49	0.02	0.39
10/17/2020	1.46	0.06	0.39
10/18/2020	0.00	0.00	0.00
10/19/2020	0.00	0.00	0.00
10/20/2020	0.00	0.00	0.00
10/21/2020	0.04	0.00	0.03
10/22/2020	0.00	0.00	0.00
10/23/2020	0.00	0.00	0.00
10/24/2020	0.00	0.00	0.00
10/25/2020	0.00	0.00	0.00
10/26/2020	0.00	0.00	0.00
10/27/2020	0.00	0.00	0.00
10/28/2020	0.31	0.01	0.12
10/29/2020	0.98	0.04	0.21
10/30/2020	0.61	0.03	0.12
10/31/2020	0.05	0.00	0.09
Total	5.68		

CITY OF CAMBRIDGE DEPARTMENT OF PUBLIC WORKS
 2020 DAILY RAINFALL DATA
 USGS METER AT MUDDY BROOK, BROOKLINE, MA

Date	Daily Rainfall (in)	Average Intensity (in/hr)	Maximum Intensity (in/hr)
11/1/2020	0.64	0.03	0.36
11/2/2020	0.00	0.00	0.00
11/3/2020	0.00	0.00	0.00
11/4/2020	0.00	0.00	0.00
11/5/2020	0.00	0.00	0.00
11/6/2020	0.00	0.00	0.00
11/7/2020	0.00	0.00	0.00
11/8/2020	0.00	0.00	0.00
11/9/2020	0.00	0.00	0.00
11/10/2020	0.00	0.00	0.00
11/11/2020	0.01	0.00	0.03
11/12/2020	0.01	0.00	0.03
11/13/2020	0.34	0.01	0.12
11/14/2020	0.01	0.00	0.03
11/15/2020	0.45	0.02	0.51
11/16/2020	0.06	0.00	0.09
11/17/2020	0.00	0.00	0.00
11/18/2020	0.00	0.00	0.00
11/19/2020	0.00	0.00	0.00
11/20/2020	0.00	0.00	0.00
11/21/2020	0.00	0.00	0.00
11/22/2020	0.00	0.00	0.00
11/23/2020	1.67	0.07	0.60
11/24/2020	0.00	0.00	0.00
11/25/2020	0.01	0.00	0.03
11/26/2020	0.29	0.01	0.15
11/27/2020	0.00	0.00	0.00
11/28/2020	0.00	0.00	0.00
11/29/2020	0.00	0.00	0.00
11/30/2020	1.18	0.05	0.27
Total	4.67		

CITY OF CAMBRIDGE DEPARTMENT OF PUBLIC WORKS
 2020 DAILY RAINFALL DATA
 USGS METER AT MUDDY BROOK, BROOKLINE, MA

Date	Daily Rainfall (in)	Average Intensity (in/hr)	Maximum Intensity (in/hr)
12/1/2020	0.58	0.02	0.63
12/2/2020	0.00	0.00	0.00
12/3/2020	0.00	0.00	0.00
12/4/2020	0.01	0.00	0.03
12/5/2020	2.07	0.09	0.33
12/6/2020	0.00	0.00	0.00
12/7/2020	0.00	0.00	0.00
12/8/2020	0.00	0.00	0.00
12/9/2020	0.00	0.00	0.00
12/10/2020	0.00	0.00	0.00
12/11/2020	0.00	0.00	0.00
12/12/2020	0.47	0.02	0.33
12/13/2020	0.00	0.00	0.00
12/14/2020	0.05	0.00	0.03
12/15/2020	0.00	0.00	0.00
12/16/2020	0.01	0.00	0.03
12/17/2020	0.02	0.00	0.03
12/18/2020	0.00	0.00	0.00
12/19/2020	0.02	0.00	0.03
12/20/2020	0.54	0.02	0.12
12/21/2020	0.02	0.00	0.03
12/22/2020	0.00	0.00	0.00
12/23/2020	0.00	0.00	0.00
12/24/2020	0.00	0.00	0.00
12/25/2020	1.74	0.07	0.33
12/26/2020	0.00	0.00	0.00
12/27/2020	0.00	0.00	0.00
12/28/2020	0.00	0.00	0.00
Total	5.53		

CITY OF CAMBRIDGE DEPARTMENT OF PUBLIC WORKS
 2020 DAILY RAINFALL DATA
 DPW RAINFALL GAUGE (7/23/2020 – 12/16/2020), CAMBRIDGE, MA

Date	Daily Rainfall (in)	Average Intensity (in/hr)	Maximum Intensity (in/hr)
7/1/2020	N/A	N/A	N/A
7/2/2020	N/A	N/A	N/A
7/3/2020	N/A	N/A	N/A
7/4/2020	N/A	N/A	N/A
7/5/2020	N/A	N/A	N/A
7/6/2020	N/A	N/A	N/A
7/7/2020	N/A	N/A	N/A
7/8/2020	N/A	N/A	N/A
7/9/2020	N/A	N/A	N/A
7/10/2020	N/A	N/A	N/A
7/11/2020	N/A	N/A	N/A
7/12/2020	N/A	N/A	N/A
7/13/2020	N/A	N/A	N/A
7/14/2020	N/A	N/A	N/A
7/15/2020	N/A	N/A	N/A
7/16/2020	N/A	N/A	N/A
7/17/2020	N/A	N/A	N/A
7/18/2020	N/A	N/A	N/A
7/19/2020	N/A	N/A	N/A
7/20/2020	N/A	N/A	N/A
7/21/2020	N/A	N/A	N/A
7/22/2020	N/A	N/A	N/A
7/23/2020	0.49	0.07	1.41
7/24/2020	0.00	0.00	0.00
7/25/2020	0.00	0.00	0.00
7/26/2020	0.00	0.00	0.00
7/27/2020	0.00	0.00	0.00
7/28/2020	0.00	0.00	0.00
7/29/2020	0.00	0.00	0.00
7/30/2020	0.00	0.00	0.00
7/31/2020	0.00	0.00	0.00
Total	0.49		

CITY OF CAMBRIDGE DEPARTMENT OF PUBLIC WORKS
 2020 DAILY RAINFALL DATA
 DPW RAINFALL GAUGE (7/23/2020 – 12/16/2020), CAMBRIDGE, MA

Date	Daily Rainfall (in)	Average Intensity (in/hr)	Maximum Intensity (in/hr)
8/1/2020	0.00	0.00	0.00
8/2/2020	0.01	0.00	0.03
8/3/2020	0.00	0.00	0.00
8/4/2020	0.21	0.01	0.54
8/5/2020	0.00	0.00	0.00
8/6/2020	0.00	0.00	0.00
8/7/2020	0.00	0.00	0.00
8/8/2020	0.00	0.00	0.00
8/9/2020	0.00	0.00	0.00
8/10/2020	0.00	0.00	0.00
8/11/2020	0.00	0.00	0.00
8/12/2020	0.00	0.00	0.00
8/13/2020	0.00	0.00	0.00
8/14/2020	0.00	0.00	0.00
8/15/2020	0.00	0.00	0.00
8/16/2020	0.17	0.01	0.15
8/17/2020	0.01	0.00	0.03
8/18/2020	0.06	0.00	0.09
8/19/2020	0.03	0.00	0.06
8/20/2020	0.00	0.00	0.00
8/21/2020	0.00	0.00	0.00
8/22/2020	0.00	0.00	0.00
8/23/2020	0.69	0.03	1.35
8/24/2020	0.00	0.00	0.00
8/25/2020	0.00	0.00	0.00
8/26/2020	0.00	0.00	0.00
8/27/2020	0.17	0.01	0.15
8/28/2020	0.00	0.00	0.00
8/29/2020	0.10	0.00	0.06
8/30/2020	0.00	0.00	0.00
8/31/2020	0.00	0.00	0.00
Total	1.45		

CITY OF CAMBRIDGE DEPARTMENT OF PUBLIC WORKS
 2020 DAILY RAINFALL DATA
 DPW RAINFALL GAUGE (7/23/2020 – 12/16/2020), CAMBRIDGE, MA

Date	Daily Rainfall (in)	Average Intensity (in/hr)	Maximum Intensity (in/hr)
9/1/2020	0.00	0.00	0.00
9/2/2020	0.28	0.01	0.33
9/3/2020	0.01	0.00	0.03
9/4/2020	0.00	0.00	0.00
9/5/2020	0.00	0.00	0.00
9/6/2020	0.00	0.00	0.00
9/7/2020	0.00	0.00	0.00
9/8/2020	0.00	0.00	0.00
9/9/2020	0.00	0.00	0.00
9/10/2020	0.40	0.02	0.36
9/11/2020	0.00	0.00	0.00
9/12/2020	0.00	0.00	0.00
9/13/2020	0.00	0.00	0.00
9/14/2020	0.00	0.00	0.00
9/15/2020	0.00	0.00	0.00
9/16/2020	0.00	0.00	0.00
9/17/2020	0.00	0.00	0.00
9/18/2020	0.00	0.00	0.00
9/19/2020	0.00	0.00	0.00
9/20/2020	0.00	0.00	0.00
9/21/2020	0.00	0.00	0.00
9/22/2020	0.00	0.00	0.00
9/23/2020	0.00	0.00	0.00
9/24/2020	0.00	0.00	0.00
9/25/2020	0.00	0.00	0.00
9/26/2020	0.00	0.00	0.00
9/27/2020	0.00	0.00	0.00
9/28/2020	0.00	0.00	0.00
9/29/2020	0.00	0.00	0.00
9/30/2020	0.83	0.03	0.81
Total	1.52		

CITY OF CAMBRIDGE DEPARTMENT OF PUBLIC WORKS
 2020 DAILY RAINFALL DATA
 DPW RAINFALL GAUGE (7/23/2020 – 12/16/2020), CAMBRIDGE, MA

Date	Daily Rainfall (in)	Average Intensity (in/hr)	Maximum Intensity (in/hr)
10/1/2020	0.00	0.00	0.00
10/2/2020	0.01	0.00	0.03
10/3/2020	0.00	0.00	0.00
10/4/2020	0.00	0.00	0.00
10/5/2020	0.00	0.00	0.00
10/6/2020	0.00	0.00	0.00
10/7/2020	0.06	0.00	0.18
10/8/2020	0.00	0.00	0.00
10/9/2020	0.00	0.00	0.00
10/10/2020	0.00	0.00	0.00
10/11/2020	0.00	0.00	0.00
10/12/2020	0.00	0.00	0.00
10/13/2020	1.61	0.07	0.69
10/14/2020	0.00	0.00	0.00
10/15/2020	0.00	0.00	0.00
10/16/2020	0.42	0.02	0.24
10/17/2020	1.33	0.06	0.36
10/18/2020	0.00	0.00	0.00
10/19/2020	0.00	0.00	0.00
10/20/2020	0.00	0.00	0.00
10/21/2020	0.07	0.00	0.03
10/22/2020	0.00	0.00	0.00
10/23/2020	0.00	0.00	0.00
10/24/2020	0.00	0.00	0.00
10/25/2020	0.00	0.00	0.00
10/26/2020	0.00	0.00	0.00
10/27/2020	0.00	0.00	0.00
10/28/2020	0.25	0.01	0.09
10/29/2020	0.93	0.04	0.18
10/30/2020	0.14	0.01	0.06
10/31/2020	0.27	0.01	0.30
Total	5.09		

CITY OF CAMBRIDGE DEPARTMENT OF PUBLIC WORKS
 2020 DAILY RAINFALL DATA
 DPW RAINFALL GAUGE (7/23/2020 – 12/16/2020), CAMBRIDGE, MA

Date	Daily Rainfall (in)	Average Intensity (in/hr)	Maximum Intensity (in/hr)
11/1/2020	0.65	0.03	0.36
11/2/2020	0.00	0.00	0.00
11/3/2020	0.00	0.00	0.00
11/4/2020	0.00	0.00	0.00
11/5/2020	0.00	0.00	0.00
11/6/2020	0.00	0.00	0.00
11/7/2020	0.00	0.00	0.00
11/8/2020	0.00	0.00	0.00
11/9/2020	0.00	0.00	0.00
11/10/2020	0.00	0.00	0.00
11/11/2020	0.00	0.00	0.00
11/12/2020	0.00	0.00	0.00
11/13/2020	0.31	0.01	0.09
11/14/2020	0.00	0.00	0.00
11/15/2020	0.43	0.02	0.45
11/16/2020	0.04	0.00	0.06
11/17/2020	0.00	0.00	0.00
11/18/2020	0.00	0.00	0.00
11/19/2020	0.00	0.00	0.00
11/20/2020	0.00	0.00	0.00
11/21/2020	0.00	0.00	0.00
11/22/2020	0.00	0.00	0.00
11/23/2020	1.69	0.07	0.57
11/24/2020	0.00	0.00	0.00
11/25/2020	0.01	0.00	0.03
11/26/2020	0.28	0.01	0.12
11/27/2020	0.00	0.00	0.00
11/28/2020	0.00	0.00	0.00
11/29/2020	0.00	0.00	0.00
11/30/2020	1.27	0.05	0.39
Total	4.68		

CITY OF CAMBRIDGE DEPARTMENT OF PUBLIC WORKS
 2020 DAILY RAINFALL DATA
 DPW RAINFALL GAUGE (7/23/2020 – 12/16/2020), CAMBRIDGE, MA

Date	Daily Rainfall (in)	Average Intensity (in/hr)	Maximum Intensity (in/hr)
12/1/2020	0.59	0.02	0.48
12/2/2020	0.02	0.00	0.06
12/3/2020	0.00	0.00	0.00
12/4/2020	0.00	0.00	0.00
12/5/2020	1.96	0.08	0.33
12/6/2020	0.00	0.00	0.00
12/7/2020	0.00	0.00	0.00
12/8/2020	0.00	0.00	0.00
12/9/2020	0.00	0.00	0.00
12/10/2020	0.00	0.00	0.00
12/11/2020	0.00	0.00	0.00
12/12/2020	0.44	0.02	0.18
12/13/2020	0.00	0.00	0.00
12/14/2020	0.04	0.00	0.03
12/15/2020	0.00	0.00	0.00
12/16/2020	0.00	0.00	0.00
12/17/2020	N/A	N/A	N/A
12/18/2020	N/A	N/A	N/A
12/19/2020	N/A	N/A	N/A
12/20/2020	N/A	N/A	N/A
12/21/2020	N/A	N/A	N/A
12/22/2020	N/A	N/A	N/A
12/23/2020	N/A	N/A	N/A
12/24/2020	N/A	N/A	N/A
12/25/2020	N/A	N/A	N/A
12/26/2020	N/A	N/A	N/A
12/27/2020	N/A	N/A	N/A
12/28/2020	N/A	N/A	N/A
Total	3.05		

APPENDIX II

MONTHLY CSO VOLUMES*

*Note that June 28, 2020 model results are included in the following tables, but are not being reported for the Alewife CSOs.

Summary 2020 Monthly Rainfall and Combined Sewer Overflows

		Alewife Brook				Charles River			
Month	Rain Gauges		CAM001	CAM002	CAM401A	CAM401B	CAM005	CAM007	CAM017
	Cambridge DPW	USGS Brookline	Foch St. @Alewife Brook Pkwy.	Mass Ave. @ Alewife Brook Pkwy.	Sherman St. @ B&M Railroad	Mass Ave./Columbus Ave. @ Alewife Brook Pkwy	Lowell St. @ Mt. Auburn St.	Memorial Dr. @ Hawthorne St.	Edwin Land Blvd. @ Binney St.
	(in)	(in)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)
Jan	N/A	1.30	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Feb	N/A	3.47	0.000	0.000	0.000	0.000	0.000	0.000	0.000
March	N/A	4.08	0.000	0.000	0.178/1.75	0.000	0.001	0.000	0.000
April	N/A	5.43	0.000	0.000	0.000	0.000	0.000	0.000	0.000
May	N/A	2.74	0.000	0.000	0.000	0.000	0.000	0.000	0.000
June	N/A	3.21	0.114/1.00	0.005/0.74	1.531/1.71	0.512/1.25	0.954/1.25	0.232/0.75	0.3/0.75
July	0.49	1.60	0.000	0.000	0.116/1.53	0.000	0.117/1.25	0.000	0.000
Aug	1.45	1.60	0.000	0.000	0.278/1.13	0.000	0.143/1.00	0.000	0.000
Sept	1.52	1.44	0.000	0.000	0.002/0.75	0.000	0.000	0.000	0.000
Oct	5.09	5.68	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Nov	4.68	4.67	0.000	0.000	0.303/2.73	0.000	0.000	0.000	0.000
Dec	3.05	5.53	0.000	0.000	0.093/1.25	0.000	0.000	0.000	0.000
Total	16.28	40.75	0.114/1.00	.005/0.74	2.501/10.85	0.512/1.25	1.215/3.5	0.232/0.75	0.3/0.75

March 2020 Daily Rainfall and Combined Sewer Overflows

			Alewife Brook				Charles River		
March	Rain Gauges		CAM001	CAM002	CAM401A	CAM401B	CAM005	CAM007	CAM017
	Cambridge DPW	USGS Brookline	Foch St. @Alewife Brook Pkwy.	Mass Ave. @ Alewife Brook Pkwy.	Sherman St. @ B&M Railroad	Mass Ave./ Columbus Ave. @ Alewife Brook Pkwy	Lowell St. @ Mt. Auburn St.	Memorial Dr. @ Hawthorne St.	Edwin Land Blvd. @ Binney St.
	(in)	(in)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)
3/1	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3/2	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3/3	N/A	0.02	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3/4	N/A	0.03	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3/5	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3/6	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3/7	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3/8	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3/9	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3/10	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3/11	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3/12	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3/13	N/A	0.37	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3/14	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3/15	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3/16	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3/17	N/A	0.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3/18	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3/19	N/A	0.61	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3/20	N/A	0.03	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3/21	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3/22	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3/23	N/A	1.35	0.000	0.000	0.178/1.75	0.000	0.001	0.000	0.000
3/24	N/A	0.63	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3/25	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3/26	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3/27	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3/28	N/A	0.08	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3/29	N/A	0.84	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3/30	N/A	0.11	0.000	0.000	0.000	0.000	0.000	0.000	0.000
3/31	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	N/A	4.08	0.000	0.000	0.178/1.75	0.000	0.001	0.000	0.000

June 2020 Daily Rainfall and Combined Sewer Overflows

			Alewife Brook				Charles River		
June	Rain Gauges		CAM001	CAM002	CAM401A	CAM401B	CAM005	CAM007	CAM017
	Cambridge DPW	USGS Brookline	Foch St. @Alewife Brook Pkwy.	Mass Ave. @ Alewife Brook Pkwy.	Sherman St. @ B&M Railroad	Mass Ave./Columbus Ave. @ Alewife Brook Pkwy	Lowell St. @ Mt. Auburn St.	Memorial Dr. @ Hawthorne St.	Edwin Land Blvd. @ Binney St.
	(in)	(in)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)
6/1	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/2	N/A	0.02	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/3	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/4	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/5	N/A	0.15	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/6	N/A	0.27	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/7	N/A	0.04	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/8	N/A	0.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/9	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/10	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/11	N/A	0.65	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/12	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/13	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/14	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/15	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/16	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/17	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/18	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/19	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/20	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/21	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/22	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/23	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/24	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/25	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/26	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/27	N/A	0.03	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/28	N/A	1.43	0.114/1.00	0.005/0.74	1.531/1.71	0.512/1.25	0.954/1.25	0.232/0.75	0.3/0.75
6/29	N/A	0.53	0.000	0.000	0.000	0.000	0.000	0.000	0.000
6/30	N/A	0.08	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	N/A	3.21	0.114/1.00	0.005/0.74	1.531/1.71	0.512/1.25	0.954/1.25	0.232/0.75	0.3/0.75

July 2020 Daily Rainfall and Combined Sewer Overflows

		Alewife Brook					Charles River		
July	Rain Gauges		CAM001	CAM002	CAM401A	CAM401B	CAM005	CAM007	CAM017
	Cambridge DPW	USGS Brookline	Foch St. @Alewife Brook Pkwy.	Mass Ave. @ Alewife Brook Pkwy.	Sherman St. @ B&M Railroad	Mass Ave./Columbus Ave. @ Alewife Brook Pkwy	Lowell St. @ Mt. Auburn St.	Memorial Dr. @ Hawthorne St.	Edwin Land Blvd. @ Binney St.
	(in)	(in)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)
7/1	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/2	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/3	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/4	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/5	N/A	0.21	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/6	N/A	0.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/7	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/8	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/9	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/10	N/A	0.03	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/11	N/A	0.05	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/12	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/13	N/A	0.13	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/14	N/A	0.06	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/15	N/A	0.02	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/16	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/17	N/A	0.14	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/18	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/19	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/20	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/21	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/22	N/A	0.48	0.000	0.000	0.008/0.58	0.000	0.013/0.50	0.000	0.000
7/23	0.49	0.47	0.000	0.000	0.108/0.95	0.000	0.104/0.75	0.000	0.000
7/24	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/25	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/26	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/27	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/28	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/29	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/30	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
7/31	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	0.49	1.60	0.000	0.000	0.116/1.53	0.000	0.117/1.25	0.000	0.000

August 2020 Daily Rainfall and Combined Sewer Overflows

			Alewife Brook				Charles River		
August	Rain Gauges		CAM001	CAM002	CAM401A	CAM401B	CAM005	CAM007	CAM017
	Cambridge DPW	USGS Brookline	Foch St. @Alewife Brook Pkwy.	Mass Ave. @ Alewife Brook Pkwy.	Sherman St. @ B&M Railroad	Mass Ave./Columbus Ave. @ Alewife Brook Pkwy	Lowell St. @ Mt. Auburn St.	Memorial Dr. @ Hawthorne St.	Edwin Land Blvd. @ Binney St.
	(in)	(in)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)
8/1	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/2	0.01	0.05	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/3	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/4	0.21	0.20	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/5	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/6	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/7	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/8	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/9	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/10	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/11	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/12	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/13	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/14	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/15	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/16	0.17	0.22	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/17	0.01	0.02	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/18	0.06	0.06	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/19	0.03	0.03	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/20	0.00	0.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/21	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/22	0.00	0.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/23	0.69	0.68	0.000	0.000	0.278/1.13	0.000	0.143/1.00	0.000	0.000
8/24	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/25	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/26	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/27	0.17	0.23	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/28	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/29	0.10	0.09	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/30	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
8/31	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	1.45	1.60	0.000	0.000	0.278/1.13	0.000	0.143/1.00	0.000	0.000

September 2020 Daily Rainfall and Combined Sewer Overflows

			Alewife Brook				Charles River		
September	Rain Gauges		CAM001	CAM002	CAM401A	CAM401B	CAM005	CAM007	CAM017
	Cambridge DPW	USGS Brookline	Foch St. @Alewife Brook Pkwy.	Mass Ave. @ Alewife Brook Pkwy.	Sherman St. @ B&M Railroad	Mass Ave./Columbus Ave. @ Alewife Brook Pkwy	Lowell St. @ Mt. Auburn St.	Memorial Dr. @ Hawthorne St.	Edwin Land Blvd. @ Binney St.
	(in)	(in)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)
9/1	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/2	0.28	0.22	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/3	0.01	0.03	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/4	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/5	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/6	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/7	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/8	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/9	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/10	0.40	0.32	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/11	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/12	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/13	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/14	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/15	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/16	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/17	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/18	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/19	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/20	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/21	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/22	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/23	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/24	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/25	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/26	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/27	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/28	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/29	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
9/30	0.83	0.87	0.000	0.000	0.002/0.75	0.000	0.000	0.000	0.000
Total	1.52	1.44	0.000	0.000	0.002/0.75	0.000	0.000	0.000	0.000

November 2020 Daily Rainfall and Combined Sewer Overflows

			Alewife Brook				Charles River		
November	Rain Gauges		CAM001	CAM002	CAM401A	CAM401B	CAM005	CAM007	CAM017
	Cambridge DPW	USGS Brookline	Foch St. @Alewife Brook Pkwy.	Mass Ave. @ Alewife Brook Pkwy.	Sherman St. @ B&M Railroad	Mass Ave./Columbus Ave. @ Alewife Brook Pkwy	Lowell St. @ Mt. Auburn St.	Memorial Dr. @ Hawthorne St.	Edwin Land Blvd. @ Binney St.
	(in)	(in)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)
11/1	0.65	0.64	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11/2	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11/3	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11/4	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11/5	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11/6	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11/7	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11/8	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11/9	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11/10	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11/11	0.00	0.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11/12	0.00	0.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11/13	0.31	0.34	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11/14	0.00	0.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11/15	0.43	0.45	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11/16	0.04	0.06	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11/17	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11/18	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11/19	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11/20	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11/21	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11/22	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11/23	1.69	1.67	0.000	0.000	0.303/2.73	0.000	0.000	0.000	0.000
11/24	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11/25	0.01	0.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11/26	0.28	0.29	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11/27	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11/28	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11/29	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
11/30	1.27	1.18	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	4.68	4.67	0.000	0.000	0.303/2.73	0.000	0.000	0.000	0.000

December 2020 Daily Rainfall and Combined Sewer Overflows

			Alewife Brook				Charles River		
December	Rain Gauges		CAM001	CAM002	CAM401A	CAM401B	CAM005	CAM007	CAM017
	Cambridge DPW	USGS Brookline	Foch St. @Alewife Brook Pkwy.	Mass Ave. @ Alewife Brook Pkwy.	Sherman St. @ B&M Railroad	Mass Ave./Columbus Ave. @ Alewife Brook Pkwy	Lowell St. @ Mt. Auburn St.	Memorial Dr. @ Hawthorne St.	Edwin Land Blvd. @ Binney St.
	(in)	(in)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)	(MG)/(Hours)
12/1	0.59	0.58	0.000	0.000	0.093/1.25	0.000	0.000	0.000	0.000
12/2	0.02	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12/3	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12/4	0.00	0.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12/5	1.96	2.07	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12/6	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12/7	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12/8	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12/9	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12/10	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12/11	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12/12	0.44	0.47	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12/13	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12/14	0.04	0.05	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12/15	0.00	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12/16	0.00	0.01	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12/17	N/A	0.02	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12/18	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12/19	N/A	0.02	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12/20	N/A	0.54	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12/21	N/A	0.02	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12/22	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12/23	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12/24	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12/25	N/A	1.74	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12/26	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12/27	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12/28	N/A	0.00	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12/29	N/A	N/A	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12/30	N/A	N/A	0.000	0.000	0.000	0.000	0.000	0.000	0.000
12/31	N/A	N/A	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	3.05	5.53	0.000	0.000	0.093/1.25	0.000	0.000	0.000	0.000

APPENDIX III
CSO NOTIFICATIONS

Notice Alert: CSO Activation in Alewife Brook

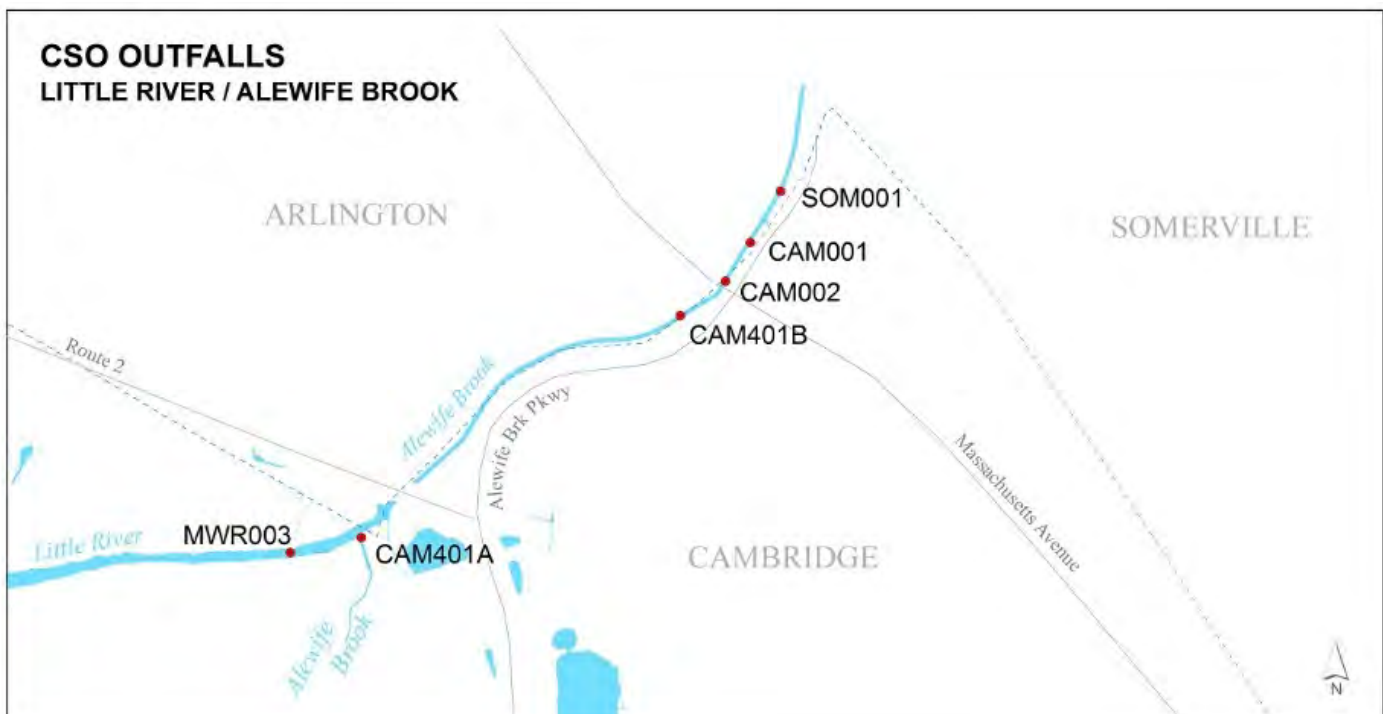
DATE: August 23, 2020

In accordance with the conditions of the Department of Environmental Protection's (DEP) Alewife Brook/Upper Mystic River Variance, we are hereby notifying you that a Combined Sewer Overflow (CSO) occurred at CAM401B on AUGUST 23, 2020 and discharged into the Alewife Brook. The Variance approved workplan requires the Cambridge Department of Public Works (DPW) to notify local health agents, DEP, EPA and MRWA within 24 hours of when a CSO event occurs. This notification does not reflect the absence of any activation at other sites. Rather, the notice is intended to be confirmation to users of the resource that untreated sewage discharges to the Brook/River have occurred.

The water quality in Alewife Brook is often impaired due to bacterial and other pollutants from a number of sources, including stormwater runoff, CSOs and cross connections between sanitary sewers and stormwater drains. Water quality in the brook during both wet and dry weather generally fails to meet state bacteria standards for fishing and swimming. Contaminant sources originate in the watershed communities of Belmont, Arlington, Cambridge and Somerville, all of which are undertaking programs to identify and control the sources of pollution to the brook.

Portions of Cambridge and Somerville are served by combined stormwater and sanitary sewer systems, common in older cities. There are six CSO outfalls on Alewife Brook (see the attached map for locations) which discharge untreated CSO (a mixture of wastewater and stormwater) during moderate and heavy rainfall to relieve the system and prevent sewer backups into homes, businesses, and streets. In addition, bordering communities also have separate drainage pipes that collect stormwater runoff and carry it to the brook. Discharges from CSOs and from separate stormwater pipes include bacteria and other pathogens, oxygen-demanding pollutants, solids and other contaminants. Public health officials recommend avoiding contact with the brook during and for 48 hours following rain storms, as there may be increased health risks during these periods. Contact with floodwaters should also be avoided as they may contain similar contaminants and pose associated health risks. Clean up information following a flood is available on the MA Department of Environmental Protection web site at: <http://www.mass.gov/dep/floodcleanup.htm> For real-time water data at Fresh Pond Reservoir, you can view the United States Geological Survey National Water System website at: <http://waterdata.usgs.gov/ma/nwis> Please contact Catherine Daly Woodbury at 617-349-4818 or James Wilcox at 617-349-6426 if you have any questions.

CSO Outfalls along the Little River/Alewife Brook



Notice Alert: CSO Activation in Alewife Brook

DATE: December 1, 2020

In accordance with the conditions of the Department of Environmental Protection's (DEP) Alewife Brook/Upper Mystic River Variance, we are hereby notifying you that a Combined Sewer Overflow (CSO) occurred at CAM401B on DECEMBER 1, 2020 AT 12:35 AM and discharged into the Alewife Brook. The Variance approved workplan requires the Cambridge Department of Public Works (DPW) to notify local health agents, DEP, EPA and MRWA within 24 hours of when a CSO event occurs. This notification does not reflect the absence of any activation at other sites. Rather, the notice is intended to be confirmation to users of the resource that untreated sewage discharges to the Brook/River have occurred.

The water quality in Alewife Brook is often impaired due to bacterial and other pollutants from a number of sources, including stormwater runoff, CSOs and cross connections between sanitary sewers and stormwater drains. Water quality in the brook during both wet and dry weather generally fails to meet state bacteria standards for fishing and swimming. Contaminant sources originate in the watershed communities of Belmont, Arlington, Cambridge and Somerville, all of which are undertaking programs to identify and control the sources of pollution to the brook.

Portions of Cambridge and Somerville are served by combined stormwater and sanitary sewer systems, common in older cities. There are six CSO outfalls on Alewife Brook (see the attached map for locations) which discharge untreated CSO (a mixture of wastewater and stormwater) during moderate and heavy rainfall to relieve the system and prevent sewer backups into homes, businesses, and streets. In addition, bordering communities also have separate drainage pipes that collect stormwater runoff and carry it to the brook. Discharges from CSOs and from separate stormwater pipes include bacteria and other pathogens, oxygen-demanding pollutants, solids and other contaminants. Public health officials recommend avoiding contact with the brook during and for 48 hours following rain storms, as there may be increased health risks during these periods. Contact with floodwaters should also be avoided as they may contain similar contaminants and pose associated health risks. Clean up information following a flood is available on the MA Department of Environmental Protection web site at: <http://www.mass.gov/dep/floodcleanup.htm> For real-time water data at Fresh Pond Reservoir, you can view the United States Geological Survey National Water System website at: <http://waterdata.usgs.gov/ma/nwis> Please contact Catherine Daly Woodbury at 617-349-4818 or James Wilcox at 617-349-6426 if you have any questions.

CSO Outfalls along the Little River/Alewife Brook

