City of Worcester
Department of Public Works & Parks

Quinsigamond Ave Combined Sewer Overflow Treatment Facility
NPDES Permit Number: MA 0102997

Annual Report #18

For the period

January 1 through December 31, 2022

Blackstone River, Millbury, MA

Table 1- QCSOTF 2022 Activation and Discharge

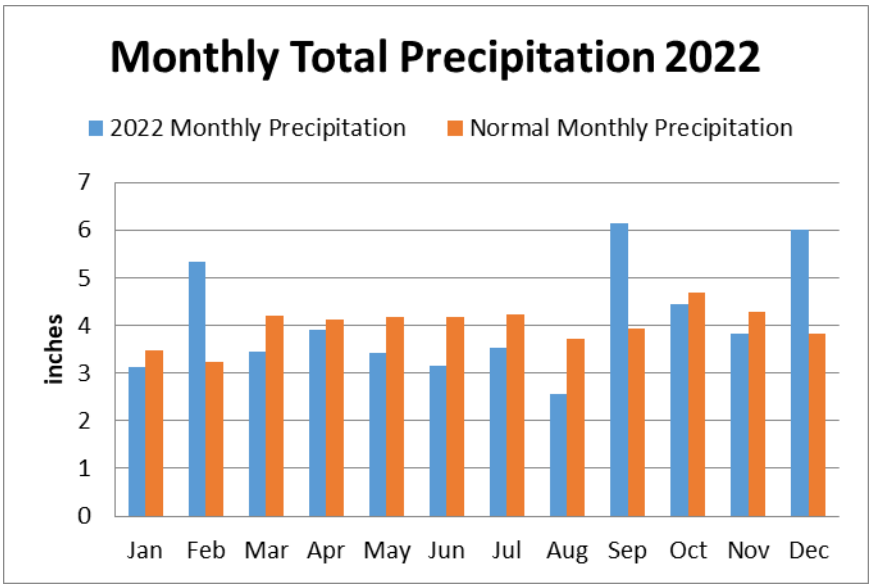
Event	Date	Duration-Hours	Discharge-Million Gallons	Rainfall-Inches
1	1/17/2022	6.6	8.953	1.18
2	2/4/2022	11.4	30.627	1.44
3	2/8/2022	5.5	1.514	0.70
4	4/8/2022	3.2	6.955	0.78
5	4/19/2022	3.1	8.38	1.13
6	6/9/2022	3.7	1.11	1.11
7	7/14/2022	0.7	0.879	0.40
8	8/26/2022	1.9	2.511	0.65
9	9/6/2022	13.5	4.848	2.56
10	9/22/2022	2.4	2.067	0.18
11	10/13/2022	1.4	0.912	0.52
12	11/11/2022	5.1	5.001	1.10
13	11/30/2022	0.5	1.398	0.50
14	12/16/2022	4.8	3.666	1.58
15	12/23/2022	20.7	30.072	2.27
	TOTALS	84.5	108.893	16.1
	AVERAGE	5.63	7.26	1.07

2022 Precipitation Summary

Total rainfall measured at Worcester Regional Airport in 2022 was 47.93 inches, making it a below average year (Average = 48.07). Total annual rainfall was about 0.9% below the long-term average and 0.14 inches below the average of the representative period (1967-1971) used in the Phase 1 CSO Long Term Control Plan (CDM 2002).

Monthly distribution of precipitation shows 9 months below average levels and 3 months above average. September was the wettest month of the year recording 6.14 inches of rain. There were 58 rainfall events of over 0.25 inches which is above the average of 46 such events annually over the long term and during the representative period.

The peak hourly precipitation of 0.89 inches occurred on August 23, 2022 and the maximum daily rainfall of 2.76 inches occurred on September 6, 2022.



Precipitation analysis and hourly precipitation is based on records from the Worcester Regional Airport. However, Worcester DPW&P installed a rain gauge at the QCSOTF and it was operational during 2022. The rainfall totals included in the activation and discharge table are from the QCSOTF rain gauge. Hourly data is not available from this gauge, thus precipitation analysis relied upon the airport data.

Phase II CSO LTCP Status

Status of the implementation of the Phase II CSO Long Term Control Plan's Recommended Plan as set forth in Part I.E.

1. The City of Worcester has completed all four of the required weir modifications to regulators at the locations identified.

2. The Green Hill Pond Diversion Project has been completed, diverting the pond overflow out of the combined sewer system.

3. The Kelly Square Control Station Rehabilitation project design is complete.

4. The Kelly Square Control Station construction was complete in April 2008. Technical problems were encountered with the communications between the CSO treatment facility and the control station. After extensive trial runs and equipment modifications the gate structure was made fully operational in September 2008.

5. The original deadline was June 1st, 2008; an extension was requested on March 25, 2008 and, given the lack of a reply, assumed to be approved.

6. The original deadline was June 1st, 2010; an extension was requested on March 25, 2008 and, given the lack of a reply, assumed to be approved.

For both items #5 and #6, Worcester DPW&P has previously indicated that discussion of the need for additional pumping capacity must take place between EPA, MassDEP, Upper Blackstone Clean Water and Worcester. There is concern that additional pumping to the Upper Blackstone WWTP during wet weather events may not be beneficial to the Blackstone River and the environment. Before we proceed with design and installation we need to analyze the pros and cons of this approach and weigh the benefits to water quality. This issue will be considered in a Long Term Control Plan update scheduled to begin in 2022. The Long Term Control Plan update is included in the Worcester Integrated Water Resources Management Plan which was submitted to EPA Region 1 in October 2019.

Precipitation and Operational Data Comparisons

Item four of the Annual Report requires a statistical review of treated discharges, precipitation, and the relationship to facility upgrades in the Long Term Control Plan. The intent of the analysis is to verify a reduction in facility discharges resulting from structural systemic upgrades.

Treated discharges occurred in 10 out of the 12 months of the year with more than one event occurring in 5 months (February, April, September, November, & December). Monthly rainfall was significantly above average in February, September and December; slightly below normal in the remaining months.

The total of seventeen (15) treated discharges in 2022 is higher than the average number of yearly events under the current NPDES permit which became effective in

August 2005. The low was in 2015 with six (6) treated discharges. Based on rainfall data, of the seventeen (15) occurrences of treated discharges in 2022, eight (8) (53%) were associated with rainfall events of over one (1) inch and two (2) of these were triggered by rainfall in excess of two (2) inches. The average rainfall event associated with a treated discharge was 1.07 inches. Storms that included the monthly maximum hour rainfall intensity produced 46% of the treated discharges. Those that included the monthly maximum daily rainfall produced 46% of the treated discharges. Storms that included both the monthly maximum hour rainfall intensity and the monthly maximum daily rainfall produced 46% of the treated discharges. There were 52 storms producing over 0.25 inches of rain and all treated discharges were associated with such events. There were 31 hours during the year that had rainfall intensities exceeding 0.25 inches per hour. Of these, 19 (61%) were associated with treated discharges. Antecedent conditions, rainfall duration, peak intensity, groundwater levels and other factors all contribute to discharge occurrence and make it difficult if not impossible to determine a causative link that could serve as a predictor of future discharges.

A review of 2022 flow data for the Blackstone River taken from the USGS Stream Gauge # 01109730 at West Main Street in Millbury revealed that QCSOTF treated discharges did not occur at river flows of less than approximately 120 cfs with the majority occurring at river flows of 200 CFS or greater. Five events in (January 17, 2022, February 4, 2022, February 8, 2022, April 8, 2022 and December 23, 2022) all occurred at river at 500 cfs or greater. There does not appear to be any correlation between discharge events and river flows. The 2022 data suggests that discharge events are driven primarily by individual rainfall events with antecedent conditions playing a more minor role.

Overall, 2022 was a close to average year for rainfall with nine months returning lower than normal rainfall and February, September, and December returning significantly higher than normal rainfall. The majority of rainfall events included periods of high intensity. These conditions resulted in a number of events with significant rainfall over a short duration.

Weather, and precipitation in particular, remains the driver behind QCSOTF activation. The unique properties of each rain event will continue to dictate the number of treated discharges that occur each year.

Nine Minimum Controls Update

Item #5-A summary of modifications to the approved NMC program which have been evaluated and a description of those which will be implemented during the coming year. In the first annual report submitted in accordance with this permit, the permittee shall submit a public notification plan to describe the measures actively being taken to meet NMC #9, and an evaluation of further measures to enhance the public notification program, including use of web postings with CSO information. (see NMC #9 in Part IA.1.a.viii)

For a summary of modifications to the NMC program please refer to Item # 3 of this report (Status of implementation of the Phase II CSO Long Term Control Plan's Recommended Plan)

With regards to a public notification plan relative to NMC #9, under the Massachusetts Notification Requirements to Promote Public Awareness of Sewage Pollution at 314CMR16.00, Worcester was required to prepare and submit to MassDEP a Preliminary CSO Notification Plan by May 1, 2022 and a Final CSO Notification Plan by January 12, 2023. The Plans are currently under review. The Preliminary Plan took effect July 6, 2022. The Notification Plan includes provisions for website-based information on the CSO and a subscription component for interested persons to register to directly receive CSO notifications via email within 2 hours of discovery of a discharge.

Worcester DPW&P Sewer Operations information can be found at http://www.worcesterma.gov/water-sewer/sewer-system.