City of
Fitchburg

Department of
Public Works

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**STREETS & PARKS**
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115 Mount Elam Road
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February 28, 2019

U.S. Environmental Protection Agency
Water Enforcement
OES4-SMR
5 Post Office Square, Suite 100
Boston, MA 02109-3912

Re: CSOs Monitoring & Overflow Report
February 1, 2018 to January 31, 2019 Reporting Period
Consent Decree, VII. REMEDIAL MEASURES, Paragraphs 32 & 33

Dear Sir or Madam:

In accordance with Section VII, Paragraphs 32 and 33 of the Consent Decree (Decree) signed by Fitchburg's Mayor on June 1, 2012, this submission provides an Annual Summary of CSOs Monitoring, Overflows Reporting, and Inspection Certification of CSO Outfalls Report on the City's compliance with requirements of the Decree (as described by Paragraphs 32 and 33). In addition, weir wall adjustments at CSO locations and dry-weather CSO's will be discussed. The report covers the period from February 1, 2018 to January 31, 2019.

**Monitoring Sites**

The City of Fitchburg has maintained a total of 11 CSO Regulator Sites, all of which are metered.

The Collections Team of the City's Wastewater Division continued to monitor meters throughout the city during the reporting period, and also monitored the City's 180 remaining combination manholes with tell-tale blocks for USEPA and Massachusetts Department of Environmental Protection (MADEP) reporting purposes. During the reporting period, the City monitored regulators with ADS Environmental, Inc. Triton+ (Triton) flow meters, the latest meter offered by ADS. The City has an on-call agreement with ADS to assist the City in troubleshooting problematic meters, installing meters in difficult sites, or for training purposes. The City maintains two ADS "Rain Alert III" rain gauges, one at the Summer Street Fire Station, and one at the DPW Building. In December 2018, the City also installed an ADS "Echo" level sensor in CSO Regulator 045. The "Echo" sensor is ultrasonic, with no equipment in the flow. The sensor allows the City to monitor the water level in the regulator chamber, to help determine when an overflow over the weir wall is occurring. The City plans to use the "Echo" sensor in the next reporting period to assist in providing increased accuracy for overflow volumes from the regulator.

During the reporting period, the City had flow meters located at all of its remaining open overflow regulators. This report discusses the overflows recorded at each site, issues that occurred during the reporting period, and proposed future metering changes. The City

experienced some data quality and meter downtime issues during the period, which prompted the City to have ADS visit all the sites in the City to conduct maintenance and repairs near the end of the reporting period.

As stated above, the City maintains two ADS RainAlert III rain gauges, one at DPW and one on the Summer Street Fire Station. The rain gauges logged a total of 57.99-inches of rainfall during the reporting period, which is considerably above average for the one year period.

In order to most accurately calculate CSO volumes, a variety of methods were used. The City has worked closely with ADS to determine the most accurate way to calculate overflow volume, as CSO volume is notoriously difficult to obtain due to vastly different hydraulics at each CSO, and differing rain events. The City is frequently reviewing data and methods to calculate overflow volume, and revising calculation methods as appropriate. Some of the City's CSO sites were calculated using a "silt-method". With this method, if the incoming pipe is large, and the crown of the pipe is above the weir wall elevation, a "silt-level" is set on the flow meter to match the weir wall elevation. Any flow that that is recorded over this elevation is a CSO. Other sites were calculated using a velocity vs. depth relationship. Plotting the data on a scattergraph, and using ADS' "Iso-Q" lines, the maximum amount of flow that passes through the regulator prior to an overflow can be interpolated. This flow rate is then subtracted from the total flow rate, resulting in the CSO volume.

At other sites, a more traditional method of using a weir wall equation or Manning's Equation in Excel were used. Manning's Equation for open channel flow was used when a depth of water was known at an overflow pipe. The broad-crested rectangular weir equation was utilized when known depths overtopped weir walls. When the capacity of the downstream pipe was exceeded, the overflow calculation methodology was changed to Manning's Equation for pressurized pipe.

**Summary of Results**

Table 1 includes the summary of overflows. The flow meters logged 182 overflow events totaling 31,253,170 gallons. Additional data shown in Table 1 includes notes regarding the operational status of the meter.

Table 2 contains annual rainfall data. Daily total, average intensity, peak hour intensity and duration of storm are provided.

Table 3 contains the meters' overflow detail. Overflow event dates, calculated gallons of overflow and duration of overflow are all provided. Daily rainfall is also provided for the reviewer's convenience.

## Discussion of CSO Sites

### CSO 004 - Cleghorn Street at Oak Hill Road

Ten (10) overflow events were logged at CSO-004, totaling 109,282 gallons. The regulator manhole includes a 55″ x 36″ combined brick influent pipe, a 12″ sanitary effluent pipe, and a 55″ x 36″ brick overflow pipe. A brick weir wall directs all flow to the 12″ sanitary pipe. When this regulator does overflow, the 12″ sanitary becomes inundated and a weir wall overtops. Overflows discharge to the Nashua River. Further sewer separation upstream is required to close this regulator. The downstream pipe may also need to be upsized as it flows half full during dry weather.

**CSO 004 Highlights**
10 Overflow Events
109,282 gal. Overflow
2.66 hr. Duration
100% Meter Coverage
System type: Combined

### CSO 007 – Cushing Street at Riverfront Park

Two (2) overflow events were logged by the flow meter at Regulator CSO-007. This regulator manhole includes two influent pipes (a 16″ from Laurel Street and a 12″ from South Street), two 8″ effluent pipes to a 45″ interceptor, and an 18″ overflow core in the side of the chamber.

This regulator is scheduled for closure in 2020, as part of the CSOs 7, 11, 39, and 48 Combined Sewer Separation Project.

**CSO 007 Highlights**
2 Overflow Events
1,075 gal. Overflow
0.25 Hour Duration
95% Meter Coverage
System Type: Separate

### CSO 010 – Main Street at River Street

Twenty (20) overflow events were logged by the flow meter at Regulator CSO-010 totaling 3,830,642 gallons. The regulator manhole consists of a 15″ influent pipe, 12″ effluent pipe and a 15″ overflow. A significant amount of combined sewer upstream overwhelms the 12″ effluent pipe during intense rainfall causing weir wall overtopping.

**CSO 010 Highlights**
20 Overflow Events
3,830,642 gal. Overflow
18.17 hr. Duration
100% Meter Coverage
System type: Combined

### CSO 032 – 543 Main Street at Post Office

During the reporting period, CSO-032 experienced thirty-five (35) overflows at this site for a total of 1,738,111 gallons. The CSO regulator contains an 18″ combined influent pipe, an 8″ sanitary throttle discharge pipe, and an 18″ overflow to the drainage system. Due to a number of combined pipes upstream of this regulator, the 8″ throttle pipe becomes overwhelmed during heavy rainfall events and overflows to the drainage system.

**CSO 032 Highlights**
35 Overflow Events
1,738,111 gal Overflow
97.25 hr. Duration
88% Meter Coverage
System Type: Combined

### CSO 039 – Water Street at Walnut Street

Twenty-eight (28) overflow events were observed at CSO-039, with an estimated overflow of 5,195,111 gallons. The meter was active for the majority of the reporting year, however the meter had data fallout during one of the largest rain events of the year. The regulator manhole consists of a 20″ influent, an 8″ effluent and an 18″ overflow.

**CSO 039 Highlights**
28 Overflow Events
5,195,111 gal. Overflow
62.5 hr. Duration
96% Meter Coverage
System Type: Combined

MassDOT is planning to replace the bridge where this regulator is located in calendar year 2021, which will affect this regulator. Therefore, the City is targeting CSO-039 as the next combined sewer area to be separated. Construction is scheduled to start in Spring 2020 to close this regulator.

**CSO 041 – Benson Road at Falulah Street**

**CSO 041 Highlights**
9 Overflow Events
492,000 gal. Overflow
9 Hr. Duration
90% Meter Coverage
System Type: Separated

Nine (9) overflow events were logged at CSO-041. This regulator manhole consists of a 12" influent, a 10" effluent, and an 18" overflow. In past reporting periods, the City has experienced periodic overflows at this location. The contributing area to the regulator is fully separated, which correlates to high inflow in the contributing collection system. During the metering period, the data analysis by the City's engineering consultant revealed that high inflow is an issue in this portion of the City's sewer system. The contributing collection area is in the final stages of a formal Sewer System Evaluation Survey to determine the contributing sources of inflow. During the SSES study, it was determined that the base flow pipe is undersized, and will need to upsized in order close the overflow. In the past, the City experienced data gaps due to the flow sensor being in the downstream pipe due to the difficult flow conditions at the site. An ultrasonic down-looking level sensor was added during the period to better gather overflow data. The new sensor measures flow depth, and allows for calculation of overflows using a weir method.

**CSO 045 – Main Street at Oliver/Putnam Street**

**CSO 045 Highlights**
31 Overflow Events
3,777,000 gal. Overflow
80.75 Hr. Duration
95% Meter Coverage
System Type: Combined

During the reporting period, CSO-045 experienced 31 overflows at this site for a total of 3,777,000 gallons. This regulator consists of a chamber, with numerous inlets and outlets, and adjacent catch basins tied into the chamber. The basic construction of the chamber consists of a 30" diameter drain on one edge of the chamber, a sewer line on the adjacent edge (12" dia. inlet, 15" dia. outlet), with a weir wall between the drain and sewer. In addition, there is a 26" x 39" inlet sewer that bridges the drain and discharges to the sewer side of the chamber. Overflows consist of flow topping the weir wall, and also a 26" x 39" overflow outlet line. Both weir walls in the chamber are within an each of each other in overflow elevation. With a large number of combined sewer areas upstream that contribute to this regulator, the City is relying on the Wastewater Management Plan, which will be completed this year, to determine a timeline for closure. During the reporting period, the City added an ADS "Echo" ultrasonic sensor to the chamber to assist in overflow monitoring.

**CSO 048 – 85 Water Street at Market Basket**

**CSO 048 Highlights**
3 Overflow Events
4,712 gal. Overflow
0.5 Hr. Duration
72.3% Meter Coverage
System Type: Separated

Three (3) overflow event was logged at CSO-048. The manhole consists of an 18" influent pipe, an 8" throttle and an 18" overflow. The meter had battery issues and grease issues during the period which led to intermittent data logging. The meter sensor was moved out of the flow line to reduce grease accumulation.

Construction for closure of this regulator will start in spring 2020. There are no known areas of combined sewer that lead to this regulator. Few overflow events have occurred at this location during the five years the regulator has been monitored. The events that have occurred are of a

relatively low volume, and a low height over the weir wall, therefore closing of the regulator would should add minimal additional flow to the main interceptor sewer.

**CSO 064 – Water Street Easement Grit Chamber**

**CSO 064 Highlights**
24 Overflow Events
15,316,580 gal. Overflow
56.42 Hr. Duration
100% Meter Coverage
System Type: Combined/Separated

During the reporting period, CSO-064 experienced 24 overflows at this site for a total of 15,316,580 gallons. This regulator is located within a former grit/siphon chamber on the trunk sewer. Upstream of the regulator, the sewer is 48" diameter and downstream it is 30" diameter, creating a bottleneck. The opening of the overflow is currently a partially plugged outlet pipe, which essentially creates a weir wall, with approximately a 15" diameter opening. In order to fully close this regulator, additional sewer separation work and inflow removal will be required upstream. Approximately 60% of the collection system is located upstream of this location.

During the reporting period, the City's Capacity Assessment Report was submitted to the EPA and the MassDEP for review. During the capacity assessment, hydraulic model runs confirmed that upsizing the trunk sewer downstream of the regulator will allow for closure of the regulator.

**CSO 076 – Birch Street at Heywood Street**

**CSO 076 Highlights**
5 Overflow Events
39,460 gal. Overflow
2.75 Hr. Duration
90.1% Meter Coverage
System Type: Separated

Five (5) overflow events were logged at CSO-076 totaling 39,460 gallons. The regulator manhole consists of a 10" influent, 10" effluent, and a 12" overflow.

The contributing collection system area to CSO-076 contains areas of high infiltration, and sewers of poor construction, which leads to large quantity of suspected infiltration. In addition, the base flow pipe is undersized. It is anticipated that inflow and infiltration removal upstream will reduce the amount of overflows at this location. There is no known combined sewer upstream of this regulator.

**CSO 083 – Main Street at Prichard Street**

**CSO 083 Highlights**
15 Overflow Events
749,197 gal. Overflow
6.67 Hr. Duration
100% Meter Coverage
System Type: Combined

Fifteen (15) overflow events were logged at CSO-083 totaling 749,197 gallons. The regulator manhole consists of a 12" x 18" brick combined sewer for an inlet, a 15" VC effluent pipe, and a 12" overflow.

About half of the upstream contribution area is combined sewer, constructed in the late 1800s to early 1900s. Separation work would need to occur upstream of this location in order to close this regulator, however it is in a very densely developed area of the City.

**Weir Wall Elevation Adjustments and Regulator Closures**

No weir wall adjustments were made during the reporting year, as we believe that we have maximized the existing capacity in the collection system based on surcharge heights within regulator manholes without causing customer back-ups.

**Dry Weather Overflows**

Dry weather overflows are associated with blockages that occur in the sanitary system and cause an overflow either over a weir wall or through a relief pipe in a combination manhole or a regulator manhole. The City experienced no dry-weather overflows during the reporting period, due to an increased frequency of inspecting and servicing of problem regulators.

If you have any questions regarding this report, please contact the Fitchburg Sewer System Manager, Anthony W. Maressa, P.E., at 978-829-1916, or the undersigned.

Very Truly Yours,

Jeffrey A. Murawski

Jeffrey A. Murawski, P.E.
Fitchburg DPW Deputy Commissioner of Wastewater

| | |
|---|---|
| Electronic & Hard Copy: | Neil Handler, USEPA, Region 1 Office<br>David Boyer, P.E., MassDEP, Central Region Office |
| Electronic copy:<br>(Transmittal letter only) | Chief, Environmental Enforcement Section, DOJ<br>Susan M. Poswistilo, Assistant U.S. Attorney<br>Michael Wagner, USEPA<br>Louis Dundin, Assistant Attorney General, Massachusetts AG<br>Vincent Pusateri, II, Fitchburg City Solicitor |
| Electronic copy: | Lenny R. Laakso, P.E., Fitchburg Commissioner of Public Works<br>Anthony Maressa, P.E., Sewer System Manager |

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Jeffrey A. Murawski

Jeffrey A. Murawski, P.E.
Fitchburg DPW Deputy Commissioner of Wastewater

# Table 1: Summary of Overflows

**CSO SUMMARY FEBRUARY 1, 2018 TO JANUARY 31, 2019**

| Meter | Location | Events | Volume (Gallons) | Notes |
|---|---|---|---|---|
| CSO-004 | Cleghorn St at Oak Hill Road | 10 | 109,282 | 100% coverage. 1 event that meter missed on 1/24/19 |
| CSO-007 | Cushing St at Riverfront Park | 2 | 1,075 | 95% coverage. Scheduled for closure in 2020 |
| CSO-010 | Main St. at River St. | 20 | 3,830,642 | 100% coverage |
| CSO-032 | 543 Main St at Post Office | 34 | 1,738,111 | 88% coverage. Meter issues at end of period. |
| CSO-039 | Water St at Walnut St. | 28 | 5,195,111 | 96% coverage |
| CSO-041 | Benson Rd. near Falulah St. | 9 | 492,000 | 90% coverage. New downlooking sensor added for increased accuracy. |
| CSO-045 | Main St. at Oliver/Putnam St. | 31 | 3,777,000 | 95% coverage |
| CSO-048 | 85 Water St at Market Basket | 3 | 4,712 | 72.3% coverage. Battery and grease issues, moved sensor to help with grease. |
| CSO-064 | Water St. Easement at Chamber | 25 | 15,316,580 | 100% coverage, data logging issues during large 10/24 and 10/29 events |
| CSO-076 | Birch St. at Heywood Street | 5 | 39,460 | 90.1% coverage |
| CSO-083 | Main St. at Prichard St. | 15 | 749,197 | 100% coverage |
| | **Totals** | **182** | **31,253,170** | |

## Table 2 - Rainfall: 2/1/2018 to 1/31/2019

| Date | Daily Total (inches) | Duration (HR:MM) | Average Intensity (in/hr) | Peak Hour (in/hr) |
|---|---|---|---|---|
| 2/3/2018 | 0.17 | 4:45 | 0.04 | 0.05 |
| 2/4/18 & 2/5/18 | 0.51 | 6:00 | 0.09 | 0.14 |
| 2/8/2018 | 0.15 | 2:00 | 0.08 | 0.10 |
| 2/10/2018 | 0.56 | 11:30 | 0.05 | 0.15 |
| 2/11/2018 | 1.08 | 12:15 | 0.09 | 0.17 |
| 2/18/2018 | 0.44 | 2:30 | 0.18 | 0.25 |
| 2/23/2018 | 0.24 | 11:45 | 0.02 | 0.06 |
| 2/25/2018 | 0.64 | 7:45 | 0.08 | 0.17 |
| 3/2/2018 | 1.71 | 15:15 | 0.11 | 0.24 |
| 3/8/2018 | 0.57 | 4:15 | 0.13 | 0.29 |
| 3/14/2018 | 0.48 | 2:15 | 0.21 | 0.13 |
| 3/22/2018 | 0.12 | 1:00 | 0.12 | 0.11 |
| 4/2/2018 | 0.10 | 0:45 | 0.13 | 0.10 |
| 4/3/2018 | 0.42 | 8:00 | 0.05 | 0.10 |
| 4/4/2018 | 0.43 | 12:00 | 0.04 | 0.16 |
| 4/6/2018 | 0.39 | 10:45 | 0.04 | 0.08 |
| 4/7/2018 | 0.14 | 9:00 | 0.02 | 0.04 |
| 4/12/2018 | 0.12 | 1:30 | 0.08 | 0.11 |
| 4/16/2018 | 2.55 | 12:15 | 0.21 | 0.43 |
| 4/19/2018 | 0.06 | 1:30 | 0.04 | 0.05 |
| 4/25/2018 | 0.99 | 17:00 | 0.06 | 0.09 |
| 4/27/2018 | 0.24 | 3:45 | 0.06 | 0.12 |
| 4/29/2018 | 0.10 | 10:30 | 0.01 | 0.05 |
| 4/30/2018 | 0.09 | 0:30 | 0.18 | 0.09 |
| 5/6/2018 | 0.39 | 7:30 | 0.05 | 0.13 |
| 5/12/2018 | 0.11 | 5:00 | 0.02 | 0.04 |
| 5/15/2018 | 0.41 | 2:45 | 0.15 | 0.16 |
| 5/19/2018 | 0.28 | 8:45 | 0.03 | 0.05 |
| 5/23/2018 | 0.16 | 0:15 | 0.64 | 0.16 |
| 5/27/2018 | 0.28 | 22:45 | 0.01 | 0.10 |
| 6/4/2018 | 0.33 | 6:30 | 0.05 | 0.14 |
| 6/18/2018 | 1.46 | 2:45 | 0.53 | 1.10 |
| 6/19/2018 | 0.07 | 0:15 | 0.28 | 0.07 |
| 6/24/2018 | 0.29 | 7:15 | 0.04 | 0.16 |
| 6/25/2018 | 0.48 | 2:45 | 0.17 | 0.41 |
| 6/27/2018 | 0.17 | 2:45 | 0.06 | 0.11 |
| 6/28/2018 | 1.34 | 18:45 | 0.07 | 0.32 |
| 7/6/2018 | 0.21 | 3:00 | 0.07 | 0.11 |
| 7/17/2018 | 1.32 | 7:30 | 0.18 | 0.60 |
| 7/22/2018 | 0.77 | 16:45 | 0.05 | 0.29 |
| 7/25/2018 | 0.38 | 16:30 | 0.02 | 0.09 |
| 7/26/2018 | 0.69 | 14:15 | 0.05 | 0.30 |
| 7/27/2018 | 0.74 | 4:30 | 0.16 | 0.41 |
| 8/3/2018 | 0.20 | 0:45 | 0.27 | 0.20 |
| 8/4/2018 | 0.78 | 9:15 | 0.08 | 0.40 |
| 8/7/2018 | 0.51 | 2:00 | 0.26 | 0.42 |
| 8/8/2018 | 0.18 | 0:30 | 0.36 | 0.10 |
| 8/9/2018 | 0.11 | 2:00 | 0.06 | 0.06 |
| 8/11/18 & 8/12/18 | 2.13 | 12:30 | 0.17 | 0.60 |
| 8/13/2018 | 0.75 | 9:00 | 0.08 | 0.43 |
| 8/14/2018 | 0.71 | 3:45 | 0.19 | 0.54 |
| 8/17/18 & 8/18/18 | 0.40 | 10:00 | 0.04 | 0.13 |

## Table 2 - Rainfall: 2/1/2018 to 1/31/2019

| Date | Daily Total (inches) | Duration (HR:MM) | Average Intensity (in/hr) | Peak Hour (in/hr) |
|---|---|---|---|---|
| 8/22/2018 | 0.93 | 3:30 | 0.27 | 0.68 |
| 9/6/2018 | 0.08 | 0:45 | 0.11 | 0.08 |
| 9/10/18 & 9/11/18 | 1.68 | 14:15 | 0.12 | 0.39 |
| 9/18/2018 | 3.47 | 12:00 | 0.29 | 1.15 |
| 9/25/2018 | 1.42 | 12:45 | 0.11 | 0.31 |
| 9/26/2018 | 1.11 | 2:30 | 0.44 | 0.75 |
| 9/28/2018 | 0.13 | 3:30 | 0.04 | 0.05 |
| 10/1/2018 | 0.12 | 5:45 | 0.02 | 0.05 |
| 10/2/2018 | 0.60 | 21:00 | 0.03 | 0.23 |
| 10/3/2018 | 0.09 | 2:00 | 0.05 | 0.05 |
| 10/7/2018 | 0.11 | 2:00 | 0.06 | 0.09 |
| 10/11/2018 | 1.20 | 9:30 | 0.13 | 0.81 |
| 10/13/2018 | 0.16 | 7:30 | 0.02 | 0.08 |
| 10/15/2018 | 0.12 | 0:30 | 0.24 | 0.12 |
| 10/23/2018 | 0.31 | 1:00 | 0.31 | 0.30 |
| 10/27/2018 | 1.26 | 14:15 | 0.09 | 0.13 |
| 10/29/2018 | 0.32 | 6:45 | 0.05 | 0.19 |
| 11/1/2018 | 0.22 | 4:15 | 0.05 | 0.10 |
| 11/2/18 & 11/3/18 | 2.67 | 35:15 | 0.07 | 0.35 |
| 11/5/18 & 11/6/18 | 0.94 | 26:00 | 0.04 | 0.16 |
| 11/9/18 & 11/10/18 | 1.07 | 13:15 | 0.08 | 0.20 |
| 11/13/2018 | 1.42 | 11:00 | 0.13 | 0.25 |
| 11/16/2018 | 0.46 | 8:00 | 0.06 | 0.08 |
| 11/19/18 & 11/20/18 | 0.71 | 34:15 | 0.02 | 0.10 |
| 11/21/2018 | 0.18 | 4:30 | 0.04 | 0.07 |
| 11/26/18 & 11/27/18 | 1.98 | 17:00 | 0.12 | 0.20 |
| 12/2/2018 | 0.95 | 13:15 | 0.07 | 0.12 |
| 12/16/2018 | 0.67 | 5:15 | 0.13 | 0.30 |
| 12/21/2018 | 1.52 | 23:45 | 0.06 | 0.25 |
| 12/28/2018 | 0.47 | 9:45 | 0.05 | 0.13 |
| 12/31/18 & 1/1/19 | 0.72 | 8:45 | 0.08 | 0.19 |
| 1/5/2019 | 0.13 | 11:45 | 0.01 | 0.03 |
| 1/8/19 & 1/9/19 | 0.45 | 13:00 | 0.03 | 0.14 |
| 1/23/2019 | 0.26 | 2:30 | 0.10 | 0.14 |
| 1/24/2019 | 2.11 | 18:45 | 0.11 | 0.30 |
| Total | 57.99 | | | |

## TABLE 3: METER OVERFLOW DATA SUMMARY

**CSO SUMMARY**

**CSO-004 - Cleghorn St. at Oak Hill Rd.**

| Rainfall (in.) | Events (No.) | Volume (Gallons) | Duration (Hours) | Date |
|---|---|---|---|---|
| 2.55 | 1 | 20,000 | 0.5 | 4/16/18 |
| 1.46 | 1 | 52,000 | 0.5 | 6/18/18 |
| 0.29 | 1 | 6,500 | 0.25 | 6/24/18 |
| 1.32 | 1 | 1,500 | 0.08 | 7/17/18 |
| 0.78 | 1 | 1,985 | 0.17 | 8/4/18 |
| 0.93 | 1 | 12,340 | 0.25 | 8/22/18 |
| 3.47 | 1 | 8,969 | 0.58 | 9/18/18 |
| 1.11 | 1 | 5,974 | 0.25 | 9/26/18 |
| 1.2 | 1 | 14 | 0.08 | 10/11/18 |
| 2.11 | 1 | Unknown | - | 01/24/19 |
| Totals | 10 | 109,282 | 2.66 | |

**CSO-007 - Cushing Street at Riverfront Park**

| Rainfall (in.) | Events (No.) | Volume (Gallons) | Duration (Hours) | Date |
|---|---|---|---|---|
| 1.46 | 1 | 610 | 0.17 | 06/18/18 |
| 3.47 | 1 | 465 | 0.08 | 09/18/18 |
| Totals | 2 | 1,075 | 0.25 | |

**CSO-010 - Main Street at River Street**

| Rainfall (in.) | Events (No.) | Volume (Gallons) | Duration (Hours) | Date |
|---|---|---|---|---|
| 2.55 | 1 | 26,434 | 0.58 | 4/16/18 |
| 1.46 | 1 | 51,251 | 0.25 | 06/18/18 |
| 0.48 | 1 | 86,527 | 0.42 | 6/25/18 |
| 1.32 | 1 | 94,372 | 0.33 | 07/17/18 |
| 0.77 | 1 | 9,235 | 0.08 | 07/22/18 |
| 0.69 | 1 | 64,055 | 0.42 | 07/26/18 |
| 0.74 | 1 | 76,768 | 0.33 | 07/27/18 |
| 0.2 | 1 | 36,000 | 0.25 | 08/03/18 |
| 0.78 | 1 | 117,000 | 0.5 | 08/04/18 |
| 0.51 | 1 | 152,000 | 0.75 | 08/07/18 |
| 2.13 | 1 | 283,000 | 1.75 | 8/11/18 & 8/12/18 |
| 1.46 | 1 | 241,000 | 1.5 | 8/13 & 8/14/18 |
| 0.93 | 1 | 270,000 | 0.5 | 08/22/18 |
| 1.68 | 1 | 106,000 | 0.75 | 09/11/18 |
| 3.47 | 1 | 930,000 | 2.75 | 09/18/18 |
| 1.11 | 1 | 300,000 | 1 | 09/26/18 |
| 0.6 | 1 | 41,000 | 0.5 | 10/02/18 |
| 1.2 | 1 | 345,000 | 1.25 | 10/11/18 |
| 2.67 | 1 | 82,000 | 1.00 | 11/2/18 & 11/3/18 |
| 2.11 | 1 | 519,000 | 3.25 | 1/24/19 |
| Totals | 20 | 3,830,642 | 18.17 | |

**CSO-032 - Main St. at Post Office (542 Main St.)**

| Rainfall (in.) | Events (No.) | Volume (Gallons) | Duration (Hours) | Date |
|---|---|---|---|---|
| 0.51 | 1 | 5,000 | 0.75 | 02/04/18 |
| 0.56 | 1 | 2,000 | 0.50 | 02/10/18 |
| 1.08 | 1 | 19,000 | 1.75 | 02/11/18 |
| 1.71 | 1 | 176,000 | 9.75 | 03/02/18 |
| 2.55 | 1 | 122,000 | 6.50 | 04/16/18 |
| 0.41 | 1 | 20,000 | 2.00 | 05/15/18 |
| 0.16 | 1 | 6,000 | 0.50 | 05/23/18 |
| 1.46 | 1 | 94,000 | 1.25 | 06/18/18 |
| 0.48 | 1 | 25,000 | 1.50 | 06/25/18 |
| 1.34 | 1 | 13,000 | 2.00 | 06/28/18 |
| 0.21 | 1 | 4,000 | 0.25 | 07/06/18 |
| 1.32 | 1 | 61,000 | 1.00 | 07/17/18 |
| 0.77 | 1 | 19,000 | 0.50 | 07/22/18 |
| 0.69 | 1 | 54,000 | 3.25 | 07/26/18 |
| 0.74 | 1 | 52,000 | 3.50 | 07/27/18 |
| 0.2 | 1 | 6,000 | 0.50 | 08/03/18 |
| 0.78 | 1 | 38,000 | 2.00 | 08/04/18 |
| 0.51 | 1 | 25,000 | 0.75 | 08/07/18 |
| 2.13 | 1 | 111,000 | 5.75 | 8/11/18 & 8/12/18 |
| 1.46 | 1 | 74,000 | 2.75 | 8/13/18 & 8/14/18 |
| 0.93 | 1 | 66,000 | 2.00 | 08/22/18 |
| 1.68 | 1 | 68,000 | 3.75 | 9/10/18 & 9/11/18 |
| 3.47 | 1 | 311,111 | 9.00 | 09/18/18 |
| 1.42 | 1 | 35,000 | 4.75 | 09/25/18 |
| 1.11 | 1 | 84,000 | 3.00 | 09/26/18 |
| 0.6 | 1 | 18,000 | 2.00 | 10/02/18 |
| 1.2 | 1 | 45,000 | 1.25 | 10/11/18 |
| 0.31 | 1 | 8,000 | 0.75 | 10/23/18 |
| 0.32 | 1 | 3,000 | 1.00 | 10/29/18 |
| 2.67 | 1 | 44,000 | 6.00 | 11/03/18 |
| 1.07 | 1 | 20,000 | 3.00 | 11/09/18 |
| 1.98 | 1 | 83,000 | 9.00 | 11/26/18 |
| 0.67 | 1 | 3,000 | 0.25 | 12/16/18 |
| 1.52 | 1 | 24,000 | 4.75 | 12/21/18 |
| 2.11 | 1 | unknown | unknown | 01/24/19 |
| Totals | 35 | 1,738,111 | 97.25 | |

## TABLE 3: METER OVERFLOW DATA SUMMARY

**CSO-039 - Water St at Walnut St**

| Rainfall (in.) | Events (No.) | Volume (Gallons) | Duration (Hours) | Date |
|---|---|---|---|---|
| 0.51 | 1 | 92,000 | 2.25 | 02/05/18 |
| 0.56 | 1 | 67,000 | 1.25 | 02/10/18 |
| 1.08 | 1 | 669,000 | 10.50 | 02/11/18 |
| 2.55 | 1 | 174,000 | 3.25 | 04/16/18 |
| 0.16 | 1 | 12,000 | 0.25 | 05/23/18 |
| 1.46 | 1 | 147,000 | 0.25 | 06/18/18 |
| 0.48 | 1 | 139,000 | 1.50 | 06/25/18 |
| 1.34 | 1 | 142,000 | 1.50 | 06/28/18 |
| 1.32 | 1 | 84,000 | 1.00 | 07/17/18 |
| 0.77 | 1 | 44,000 | 0.75 | 07/22/18 |
| 0.69 | 1 | 34,000 | 0.25 | 07/26/18 |
| 0.74 | 1 | 63,000 | 1.25 | 07/27/18 |
| 0.2 | 1 | 34,000 | 0.25 | 08/03/18 |
| 0.78 | 1 | 74,000 | 1.25 | 08/04/18 |
| 0.51 | 1 | 28,000 | 0.50 | 08/07/18 |
| 2.13 | 1 | 400,111 | 4.25 | 8/11/18 & 8/12/18 |
| 1.46 | 1 | 263,000 | 1.75 | 8/13/18 & 8/14/18 |
| 0.4 | 1 | 29,000 | 1.00 | 8/17/18 & 8/18/18 |
| 0.93 | 1 | 121,000 | 1.50 | 08/22/18 |
| 1.68 | 1 | 297,000 | 3.25 | 9/10/18 & 9/11/18 |
| 3.47 | 1 | 678,000 | 4.75 | 09/18/18 |
| 1.42 | 1 | 267,000 | 4.50 | 09/25/18 |
| 1.11 | 1 | 303,000 | 3.00 | 09/26/18 |
| 0.69 | 1 | 179,000 | 3.25 | 10/2/18 & 10/3/18 |
| 1.2 | 1 | 272,000 | 2.00 | 10/11/18 |
| 0.31 | 1 | 78,000 | 0.75 | 10/23/18 |
| 2.67 | 1 | 5,000 | 0.50 | 11/02/18 |
| 2.11 | 1 | 500,000 | 6.00 | 01/24/18 |
| Totals | 28 | 5,195,111 | 62.5 | |

**CSO-041 - Benson Road near Falullah St**

| Rainfall (in.) | Events (No.) | Volume (Gallons) | Duration (Hours) | Date |
|---|---|---|---|---|
| 1.46 | 1 | 153,000 | 1.00 | 06/18/18 |
| 0.48 | 1 | 41,000 | 0.50 | 06/25/18 |
| 0.78 | 1 | 4,000 | 0.50 | 08/04/18 |
| 2.13 | 1 | 9,000 | 0.75 | 08/11/18 |
| 1.46 | 1 | 185,000 | 1.00 | 08/14/18 |
| 0.4 | 1 | 47,000 | 0.50 | 08/17/18 |
| 0.93 | 1 | 2,000 | 0.25 | 08/22/18 |
| 3.47 | 1 | 22,000 | 0.25 | 09/18/18 |
| 2.11 | 1 | 29,000 | 4.25 | 1/24/2019 |
| Totals | 9 | 492,000 | 9.00 | |

## TABLE 3: METER OVERFLOW DATA SUMMARY

**CSO-045 - Main St. at Oliver/Putnam St.**

| Rainfall (in.) | Events (No.) | Volume (Gallons) | Duration (Hours) | Date |
|---|---|---|---|---|
| 0.51 | 1 | 57,000 | 1.75 | 02/05/18 |
| 1.08 | 1 | 57,000 | 9.5 | 02/11/18 |
| 1.71 | 1 | 253,000 | 8.75 | 03/02/18 |
| 0.43 | 1 | 23,000 | 0.75 | 04/04/18 |
| 2.55 | 1 | 648,000 | 11 | 04/16/18 |
| 0.09 | 1 | 6,000 | 0.5 | 04/30/18 |
| 0.16 | 1 | 5,000 | 0.25 | 05/23/18 |
| 1.46 | 1 | 141,000 | 1.25 | 06/18/18 |
| 1.34 | 1 | 29,000 | 1.25 | 06/28/18 |
| 1.32 | 1 | 15,000 | 0.5 | 07/17/18 |
| 0.77 | 1 | 2,000 | 0.25 | 07/22/18 |
| 0.69 | 1 | 12,000 | 0.25 | 07/26/18 |
| 0.74 | 1 | 12,000 | 0.25 | 07/27/18 |
| 0.2 | 1 | 2,000 | 0.25 | 08/03/18 |
| 2.13 | 1 | 21,000 | 0.75 | 08/11/18 |
| 1.46 | 1 | 11,000 | 0.25 | 08/14/18 |
| 0.93 | 1 | 13,000 | 0.25 | 08/22/18 |
| 1.42 | 1 | 27,000 | 1 | 09/25/18 |
| 1.11 | 1 | 5,000 | 0.25 | 09/26/18 |
| 0.6 | 1 | 6,000 | 1 | 10/02/18 |
| 1.2 | 1 | 65,000 | 0.5 | 10/11/18 |
| 0.31 | 1 | 8,000 | 1 | 10/23/18 |
| 0.32 | 1 | 9,000 | 0.5 | 10/29/18 |
| 2.67 | 1 | 235,000 | 5.5 | 11/2/18 & 11/3/18 |
| 1.07 | 1 | 57,000 | 1.75 | 11/9/18 & 11/9/18 |
| 1.42 | 1 | 130,000 | 2.25 | 11/13/18 |
| 1.98 | 1 | 178,000 | 6 | 11/26/18 & 11/27/18 |
| 0.67 | 1 | 91,000 | 1.25 | 12/16/18 |
| 1.52 | 1 | 314,000 | 2 | 12/21/18 |
| 0.72 | 1 | 94,000 | 3 | 01/01/19 |
| 2.11 | 1 | 1,251,000 | 17 | 01/24/19 |
| Totals | 31 | 3,777,000 | 80.75 | |

**CSO-048 - 85 Water St at Market Basket**

| Rainfall (in.) | Events (No.) | Volume (Gallons) | Duration (Hours) | Date |
|---|---|---|---|---|
| 1.46 | 1 | 3,534 | 0.25 | 6/18/18 |
| 0.51 | 1 | 1,178 | 0.25 | 8/7/18 |
| 2.11 | 1 | unknown | unknown | 1/24/2019 |
| Totals | 3 | 4,712 | 0.50 | |

**CSO-064 - Water Street Easement at Chamber**

| Rainfall (in.) | Events (No.) | Volume (Gallons) | Duration (Hours) | Date |
|---|---|---|---|---|
| 0.51 | 1 | 9,145 | 0.17 | 02/05/18 |
| 1.08 | 1 | 422,906 | 2.83 | 02/11/18 |
| 2.55 | 1 | 1,073,969 | 5.00 | 04/16/18 |
| 1.46 | 1 | 940,888 | 0.67 | 06/18/18 |
| 0.48 | 1 | 6,708,844 | 10.75 | 06/25/18 |
| 1.32 | 1 | 79,186 | 0.50 | 07/17/18 |
| 0.74 | 1 | 19,399 | 0.33 | 07/27/18 |
| 0.78 | 1 | 82,725 | 0.50 | 08/04/18 |
| 0.51 | 1 | 41,650 | 0.33 | 08/07/18 |
| 2.13 | 1 | 213,256 | 1.08 | 08/11/18 |
| 2.13 | 1 | 251,429 | 1.42 | 08/12/18 |
| 1.46 | 1 | 267,516 | 1.42 | 08/14/18 |
| 0.93 | 1 | 154,810 | 0.75 | 08/22/18 |
| 1.68 | 1 | 78,689 | 0.67 | 09/11/18 |
| 3.47 | 1 | 915,283 | 3.83 | 09/18/18 |
| 1.42 | 1 | 139,530 | 1.75 | 09/25/18 |
| 1.11 | 1 | 307,448 | 1.67 | 09/26/18 |
| 0.6 | 1 | 20,427 | 0.25 | 10/02/18 |
| 1.2 | 1 | 311,627 | 1.25 | 10/11/18 |
| 2.67 | 1 | 966,893 | 6.58 | 11/03/18 |
| 1.07 | 1 | 110,193 | 1.17 | 11/10/18 |
| 1.42 | 1 | 233,381 | 1.50 | 11/13/18 |
| 1.98 | 1 | 282,113 | 3.17 | 11/27/18 |
| 1.52 | 1 | 130,296 | 1.00 | 12/21/18 |
| 2.11 | 1 | 1,554,978 | 7.83 | 01/24/19 |
| Totals | 25 | 15,316,580 | 56.42 | |

**CSO-076 - Birch St at Heywood St**

| Rainfall (in.) | Events (No.) | Volume (Gallons) | Duration (Hours) | Date |
|---|---|---|---|---|
| 1.46 | 1 | 4,000 | 0.25 | 6/18/18 |
| 0.29 | 1 | 1,000 | 0.25 | 6/24/18 |
| 1.46 | 1 | 4,000 | 0.25 | 8/14/18 |
| 3.47 | 1 | 23,000 | 1.50 | 9/18/18 |
| 2.11 | 1 | 7,460 | 0.50 | 1/24/19 |
| Totals | 5 | 39,460 | 2.75 | |

**CSO-083 - Main St. at Prichard St.**

| Rainfall (in.) | Events (No.) | Volume (Gallons) | Duration (Hours) | Date |
|---|---|---|---|---|
| 2.55 | 1 | 85,327 | 1.25 | 4/16/18 |
| 1.46 | 1 | 90,610 | 0.67 | 6/18/18 |
| 0.29 | 1 | 32,125 | 0.33 | 6/24/18 |
| 1.32 | 1 | 23,000 | 0.17 | 7/17/18 |
| 0.74 | 1 | 14,555 | 0.17 | 7/27/18 |
| 0.78 | 1 | 26,255 | 0.17 | 8/4/18 |
| 0.51 | 1 | 13,450 | 0.17 | 8/7/18 |
| 2.13 | 1 | 102,985 | 0.83 | 8/11/18 & 8/12/18 |
| 1.46 | 1 | 56,895 | 0.42 | 8/13/18 & 8/14/18 |
| 0.93 | 1 | 43,610 | 0.25 | 8/22/18 |
| 1.68 | 1 | 13,275 | 0.17 | 9/11/18 |
| 3.47 | 1 | 177,760 | 1.25 | 9/18/18 |
| 1.11 | 1 | 44,770 | 0.33 | 9/26/18 |
| 1.2 | 1 | 17,635 | 0.25 | 10/11/18 |
| 2.11 | 1 | 6,945 | 0.25 | 1/24/19 |
| Totals | 15 | 749,197 | 6.67 | |