



NEW ENGLAND CIVIL ENGINEERING CORP.

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March 31, 2022

Mr. Michael B. Hale
DPW Director
28 Poplar Street
Gloucester, MA 01930

Re: City of Gloucester, Annual CSO Activity Report (2021)

Dear Mr. Hale:

As requested, we have provided the following summary of metered and predicted overflow activity in all CSOs between (2009 and 2021) based on rainfall data collected between 2009 and 2021.

Metered Rainfall:

A graph depicting metered rainfall events in the City of Gloucester in 2021 is attached for reference.

Total Rainfall:

2021 = 50.34 inches	
2020 = 38.82 inches	2014 = 46.07 inches
2019 = 48.15 inches	2013 = 37.79 inches
2018 = 49.90 inches	2012 = 40.17 inches
2017 = 44.35 inches	2011 = 51.01 inches
2016 = 35.44 inches	2010 = 57.29 inches
2015 = 32.08 inches	2009 = 44.61 inches

Metered Overflow Activity:

Metered overflow activity in the CSO-002 regulator has been previously reported on a quarterly basis in accordance with the CSO Control Plan. A table summarizing the dates and overflow volume of each overflow event metered in the CSO-002 regulator is attached for reference.

CSO-002 overflow activity:

2021 = 4 overflow events, 67,306 gallons	
2020 = 1 overflow event, 3,128 gallons	2014 = 1 overflow event, 4,700 gallons
2019 = 1 overflow event, 3,200 gallons	2013 = 2 overflow events, 4,599 gallons
2018 = 1 overflow event, 12,000 gallons	2012 = 2 overflow events, 4,131 gallons
2017 = 0 overflow events, 0 gallons	2011 = 1 overflow event, 32,000 gallons
2016 = 0 overflow events, 0 gallons	2010 = 8 overflow events, 3,219,277 gallons
2015 = 0 overflow events, 0 gallons	2009 = 30 overflow events, 3,541,528 gallons

Predicted Overflow Activity:

Predicted overflow activity at all CSOs for a “typical year” of rainfall was previously summarized in the Supplemental Combined Sewer Overflow Long-Term Control Plan report submitted under cover dated September 2011. The following table summarizes the overflow activity predicted by the Phase 7 hydraulic model representing “2013 existing conditions” and the Phase 8 hydraulic model representing “2015 existing conditions” for a “Typical Year” of rainfall as well as the overflow activity predicted for the past thirteen years (2009-2021) of actual metered rainfall which are summarized above and depicted on the attached table:

<p>NECE predicted overflows (Phase 8 model, 2015 conditions) following 90% achieved separation (CSO-005-1 area) and raising 004, 005-1, and 009 weirs in accordance with SLTCP, and removal of inflow sources from East Gloucester and areas tributary to the Hartz Street pump station. Phase 8 actual weir elevations: 002 = 11.52 feet, 004 = 8.95 feet, 005-1 = 9.90 feet, 009 = 11.26 feet</p>					
<p>Predicted overflows “2015 “existing conditions” (Phase 8 model) for a “Typical Year” from April 2016 Report</p>			<p>Predicted overflows “2015 “existing conditions” (Phase 8 model ##) based on metered 2021 rainfall (50.34 inches) ##</p>		
CSO	Overflow Events	Volume (MG)	CSO	Overflow Events	Volume (MG)
002	1	0.002	002	3	0.0686
004	0		004	0	0
004A	N/A, drain only		004A	N/A, drain only	
005-1	0		005-1	2	0.0590
005-2	closed		005-2	closed	
006	closed		006	closed	
006A	0		006A	2	0.0017
009	0		009	0	0
<p>Predicted overflows “2015 “existing conditions” (Phase 8 model ##) based on metered 2020 rainfall (38.82 inches) ##</p>			<p>Predicted overflows “2015 “existing conditions” (Phase 8 model) based on metered 2019 rainfall (48.15 inches)</p>		
CSO	Overflow Events	Volume (MG)	CSO	Overflow Events	Volume (MG)
002	2	0.2114	002	1	0.0279
004	0		004	0	0
004A	N/A, drain only		004A	N/A, drain only	
005-1	2	.1380	005-1	1	0.0107
005-2	closed		005-2	closed	
006	closed		006	closed	
006A	2	.0848	006A	1	0.0064
009	2	.0389	009	0	0
<p>Predicted overflows “2015 “existing conditions” (Phase 8 model) based on metered 2018 rainfall (49.90 inches)</p>			<p>Predicted overflows “2015 “existing conditions” (Phase 8 model) based on metered 2017 rainfall (44.35 inches)</p>		
CSO	Overflow Events	Volume (MG)	CSO	Overflow Events	Volume (MG)
002	1	0.0030	002	1	0.002
004	0	0	004	0	0
004A	N/A, drain only		004A	N/A, drain only	
005-1	0	0	005-1	1	0.030
005-2	closed		005-2	closed	
006	closed		006	closed	
006A	0	0	006A	1	0.011
009	0	0	009	0	0



Predicted overflows “2015 existing conditions” (Phase 8 model) based on metered 2016 rainfall (35.44 inches)			Predicted overflows “2015 existing conditions” (Phase 8 model) based on metered 2015 rainfall (32.08 inches)		
CSO	Overflow Events	Volume (MG)	CSO	Overflow Events	Volume (MG)
002	0		002	1	0.003
004	0		004	0	N/A
004A	N/A, drain only		004A	N/A, drain only	
005-1	0		005-1	1	0.020
005-2	closed		005-2	closed	
006	closed		006	closed	
006A	0		006A	1	0.013
009	0		009	0	N/A

NECE predicted overflows (**Phase 7 model, 2013 conditions**) following 90% achieved separation (CSO-005-1 area) and raising 004, 005-1, and 009 weirs in accordance with SLTCP, and removal of inflow sources from East Gloucester and areas tributary to the Hartz Street pump station.
Phase 7 actual weir elevations: 002 = 11.52 feet, 004 = 8.95 feet, 005-1 = 9.90 feet, 009 = 11.26 feet

Predicted overflows “2015 “existing conditions” (Phase 7 model) based on actual metered 2014 rainfall (46.07 inches)			Predicted overflows “2013 existing conditions” (Phase 7 model) based on actual metered 2013 rainfall (37.79 inches) *****		
CSO	Overflow Events	Volume (MG)	CSO	Overflow Events	Volume (MG)
002	2	0.0180	002	1	0.049
004	0	0	004	1	0.030
004A	N/A, drain only		004A	N/A, drain only	
005-1	3	0.3734	005-1	2	0.128
005-2	closed		005-2	closed	
006	closed		006	closed	
006A	3	0.2645	006A	3	0.127
009	2	0.116	009	8	0.208

Predicted overflows “2011 existing conditions” (Phase 4 model) based on actual metered 2012 rainfall (40.17 inches) ***			Predicted overflows “2011 existing conditions” (Phase 4 model) based on actual metered 2011 rainfall (51.01 inches)		
CSO	Overflow Events	Volume (MG)	CSO	Overflow Events	Volume (MG)
002	3	0.101	002	3	0.184
004	2	0.041	004	2	0.111
004A	1	0.004	004A	1	0.035
005-1	3	0.450	005-1	4	1.161
005-2	0	0.000	005-2	0	0.000
006	7	0.171	006	7	0.204
006A	1	0.001	006A	1	0.001
009*	13	0.494	009*	14	0.857

Predicted overflows “2011 existing conditions” (Phase 4 model) based on actual metered 2010 rainfall (57.29 inches)			Predicted overflows “2011 existing conditions” (Phase 4 model) based on actual metered 2009 rainfall (44.61 inches)		
CSO	Overflow Events	Volume (MG)	CSO	Overflow Events	Volume (MG)
002**	4	0.791	002**	2	0.007
004	3	0.382	004	1	0.052
004A	3	0.022	004A	0	0.000



005-1	6	3.383	005-1	2	0.717
005-2	0	0.000	005-2	0	0.000
006	9	0.470	006	4	0.083
006A	3	0.015	006A	1	0.002
009*	17	1.541	009*	10	0.479

*Adequate metering data was not collected to allow accurate predictions of CSO 009 activity, metering and hydraulic model update based on 2012 flow data submitted in Phase 6 model report November 12, 2012.

* A depth-only sensor was installed upstream of the CSO-009 weir on January 7, 2014 to record water surface elevations. Sensor records water depths sufficient to result in overflow but does not record velocity.

No overflows were recorded by meters and sensors in CSO-002 or CSO-009 in calendar year 2015 or 2016.

No overflows were recorded by meters and sensors in CSO-002 in calendar year 2017, CSO-009 depth sensor indicated saline inflow or combined sewer overflow occurred at 009 on 6 days (5 events) in 2017.

**CSO-002 regulator weir was raised 6-inches to 18.8-inches on 7/9/2009 and was raised again to 23.6-inches (11.22') on 12/13/2010 and to 27.2-inches (11.52') on July 31, 2013).

***During the calendar year 2012, sewer separation was achieved in the CSO-004, CSO-005-2, and lower CSO-006 areas in addition to raising the overflow weir at CSO-004 and closure of the CSO-005-2 and CSO-006 outfalls with milestones being achieved between June and November of 2012 as described in MCD quarterly reports. In addition, the hydraulic model was updated to reflect data collected in the CSO-009 area between June and August of 2012. Since these milestones were achieved throughout the latter half of the calendar year at different dates, the 2012 overflow predictions are conservatively based on conditions that existed at the beginning of the year (2012) based on the Phase 4 (2011 existing conditions) model.

****During the calendar year 2013, sewer separation was achieved in the CSO-005-1 area and other isolated areas in addition to raising the overflow weir at CSO-005-1 and CSO-009 overflows with milestones being completed in July, October, and November of 2013. In addition, the hydraulic model was updated to reflect data collected in the Hartz Street pumping station in December of 2013. Since these milestones were achieved throughout the calendar year, the modeled "back predictions" may conservatively (over predict) the overflow activity.

The Phase 8 hydraulic model was converted from InfoWorks CS (version 16.5) software to the InfoWorks ICM (version 10.0) software for analysis of the 2020 and 2021 rainfall data.

Future annual overflow predictions will be based on the Phase 8 hydraulic model (utilizing InfoWorks ICM version 16.5 software) which will account for data collected following separation achieved during 2015 calendar year.

If you have any questions or require additional information, please do not hesitate to contact me at any time on my cell phone at 978-767-5415 or at my Salem office at 978-741-7401.

Sincerely,

William M. Ross, P.E.
Project Manager/Principal Engineer
New England Civil Engineering Corp.

Cc: Kevin Brander, MassDEP
Doug Koopman, USEPA

w/attachment

