REGION 1
NEW ENGLAND REGIONAL LABORATORY
NORTH CHELMSFORD, MA 01863

Date: 9/20/2024

Subject: Reconnaissance and Sampling Inspection Report
Clean Water Act – National Pollutant Discharge Elimination System
Worcester, MA

From: Anna Hatke, Inspector
Laboratory Services and Applied Science Division (LSASD)
Field Services Branch (FSB)

ANNA HATKE Digitally signed by ANNA HATKE Date: 2024.09.23 09:30:34 -04'00'

Reviewed By: Jerome Keefe, Investigations Team Leader
LSASD-FSB

JEROME KEEFE Digitally signed by JEROME KEEFE Date: 2024.09.23 09:51:01 -04'00'

To: Todd Borci, Manager
Enforcement and Compliance Assurance Division (ECAD)
Water Compliance Section 1

CC: Douglas Koopman, Inspector
ECAD

I. Facility Information

A. Facility Name: City of Worcester, MA
B. Facility Location: Worcester, MA
C. Facility Contact: Jay J. Fink, Commissioner, Dept. of Public Works and Parks, dpw@worcesterma.gov, (508) 929-1300
D. NPDES Permit ID: MAS010002 (MS4)

II. Background Information

A. Date/Start time of Reconnaissance inspection: **07/23/2024 9:05**
B. Weather conditions: Overcast, spotted showers approx. 74°F
C. USEPA Representatives: Anna Hatke, Michelle Coombs, Ryan Leo
D. State/Local Representatives: N/A

A. Date/Start time of sampling inspection: **07/24/2024 9:00**

B. Weather conditions: Overcast, spotted showers, approx. 73°F
C. USEPA Representatives: Anna Hatke, Ryan Leo, Nafisah Ali
D. State/Local Representatives: N/A
E. Federally Enforceable Requirements Investigated: Stormwater discharges and certain non-stormwater discharges from the Worcester, MA Municipal Separate Storm Sewer Systems (MS4) are authorized by the National Pollutant Discharge Elimination System (NPDES) General Permit for the Discharge of Stormwater from Small MS4 (hereinafter, the Permit), issued by the Environmental Protection Agency (EPA) Region 1. The City obtained coverage under the Permit with NPDES Permit ID MAS010002.
F. Pollutants Sampled: Pharmaceuticals and Personal Care Products (PPCPs), E. coli/Enterococcus, Ammonia (nitrogen), Total Chlorine, and Surfactants

III. Disclaimer:

Unless otherwise noted, this report describes conditions at the facility/property as observed by EPA inspector(s), and/or through records provided to and/or information reported to EPA inspector(s) by facility representatives and as understood by the inspector(s). This report may not capture all operations or activities ongoing at the time of the inspection. This report does not make final determinations on potential areas of concern. Nothing in this report affects EPA's authorities under federal statutes and regulations to pursue further investigation or action.

IV. Type and Purpose of Inspection(s)

The purpose of the reconnaissance inspection was to locate stormwater outfalls which discharge into Coal Mine Brook, O'Hara Brook, Fitzgerald Brook, and Lake Quinsigamond, while noting appearance, presence of flow, and access requirements for one or more sampling inspections.

The purpose of the compliance sampling inspection was to identify potential illicit connections or illegal discharges within the Worcester, MA MS4 that may adversely impact the water quality in Coal Mine Brook, Fitzgerald Brook, Poor Farm Brook, and Lake Quinsigamond. Samples were collected from 7 locations in accordance with the FSB Investigations Team Stormwater Program Plan.

V. Permittee Details

The City of Worcester occupies approximately 38.5 square miles in Worcester County, MA approximately 39 miles east of Boston, MA. The city shares borders with the municipalities of Holden and West Boylston to the north, Shrewsbury and North Grafton to the east, Millbury and Auburn to the south, Paxton, and Leicester to the west. According to the 2020 U.S. Census, the population of Worcester, MA was 206,518.

VI. 07/23/2024 Reconnaissance Inspection Summary

On July 23, 2024, EPA Inspectors Anna Hatke, Michelle Coombs, and Ryan Leo conducted an unannounced reconnaissance inspection of the Worcester, MA MS4 at the locations described in Section VIII, including locations described under the map of the sample locations. They were not

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accompanied by any city or state representatives. The inspection started near Great Brook Valley Park, Worcester, MA at approximately 9:05. At the time of the inspection, the weather was overcast and approximately 74°F.

According to the National Weather Service (NWS) for the Worcester Regional Airport (KORH) the last precipitation event prior to the inspection occurred on 7/18, 2024, with 0.02 inches recorded. There was not precipitation recorded within the 72 hours before the inspection. According to the NWS, in the month (to date) of July, the area observed 1.3 inches of rain, which is approximately 52% of the 30-year normal value of 2.49 inches. According to the US Drought Monitor, as of July 23, 2024, Worcester County is experiencing no drought conditions.

VII. 07/24/2024 Sampling Inspection Summary

On July 24, 2024, Anna Hatke, Nafisah Ali, and Ryan Leo, ("the EPA Inspection Team") conducted an unannounced compliance sampling inspection of the Worcester, MA MS4 at the locations described in Section VIII. They were not accompanied by any city or state representatives. The inspection started near 180 Constitution Avenue, Worcester, MA at approximately 9:05. At the time of the inspection, the weather was overcast and approximately 73 °F.

According to the National Weather Service (NWS) for the Worcester Regional Airport (KORH) the last precipitation event prior to the inspection occurred on 7/23, 2024, with 0.12 inches recorded. There was not precipitation recorded within the 72 hours before the inspection. According to the NWS, in the month (to date) of July, the area observed 1.42 inches of rain, which is approximately 54% of the 30-year normal value of 2.62 inches. According to the US Drought Monitor, as of July 23, 2024, Worcester County is experiencing no drought conditions.

The sampling locations described in Section VIII were field screened using test kits for ammonia (nitrogen), surfactants, and total chlorine. In-situ measurements for specific conductivity, salinity, and temperature were also measured using a YSI water quality meter and recorded. Field data were recorded on field data sheets. Samples were delivered to and analyzed for E. coli, Enterococcus, and PPCPs at the EPA New England Regional Laboratory (NERL) in North Chelmsford, MA. Table 1 below summarizes the sampling and analytical data.

VIII. Description of Sampling Locations (in order of collection time)

Photographs depicting each sample location are included in Appendix A of this report.

- **LQ-08**: One circular concrete outfall approximately 3.5 feet in diameter, preceding a roughly 20-foot concrete flume, located at 180 Constitution Avenue. Discharge flow was approximately 10 gallons per minute ("gpm") into Poor Farm Brook. Sample was collected at the mouth of the outfall. No odor was detected. Color was clear and turbidity was low. Some organic particulates were observed. Dark green algae growth was observed on the concrete flume. Fish were observed in the stream directly downstream of the outfall.
- **LQ-09:** One half-circle concrete outfall, approximately 2.5 feet in diameter, located at the beginning of a wetland and at the base of a large shopping center, located at 541 Lincoln Street. Discharge flow was approximately <1 gpm into a wetland that channeled into an

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unnamed stream/brook. Sample was collected at the mouth of the outfall. A musty odor was detected. Color was clear and some particulate matter was observed. Green algae were observed growing on rocks directly downstream of the outfall. The outfall was roughly halfway submerged.

- **LQ-10:** One circular corrugated metal outfall, approximately 4 feet in diameter, preceding a roughly 10-foot concrete slanted pad, located at 481 Lincoln Street. Discharge flow was approximately 5 gpm into an un-named stream, which combines into Coal Mine Brook, which discharges into Lake Quinsigamond. Sample was collected at the mouth of the outfall. A slight musty odor was detected, and a slight breeze was noted. Color was clear-brown, and turbidity was low. Some organic particulates were observed. Trash was strewn around the outfall and directly downstream. Froth was seen at the base of the concrete pad, downstream of the outfall.
- **LQ-11UP**: One of two circular concrete outfalls on either side of a concrete wall, approximately 1.5 feet in diameter, emptying onto a concrete conveyance, located at 25 Laselle Avenue. This confluence of discharge from both outfalls is joined downstream by the discharge from LQ-10. Discharge flow was approximately 20 gpm. Discharge contributes into Coal Mine Brook, which discharges into Lake Quinsigamond. Sample was collected at the mouth of the left-side outfall, looking up-stream. A sewage odor was detected. Color was clear- brownish-yellow, turbidity was low, and some suspended organic particulates were observed. Light rainfall began during the sampling at this outfall. Outfall sampled was chosen based on the Worcester, MA stormwater sewer system map.
- **LQ-12**: In-stream sample from the inside of a concrete stormwater conveyance structure on the East side of a stone wall culvert at 240 Coburn Avenue. The flow from the concrete conveyance structure is joined immediately downstream by Fitzgerald brook, convening into one stream, which discharges into Lak Quinsigamond. Sample was collected approximately 3 feet prior to the confluence. An earthy sewage smell was detected. Color was clear and turbidity was low. No floatables were observed. Dark brown algae growth was observed on the bottom of the concrete conveyance structure. Trash and grass clippings were observed upstream of the outfall. Fitzgerald Brook, prior to the confluence was mostly non-flowing.
- **LQ-13**: One circular concrete outfall approximately 2.5 feet in diameter located at North High School- 150 Harrington Way that empties out onto a concrete flume approximately 3 feet long. The outfall was located at the base of an elevated parking lot. Discharge flow was approximately <1 gpm into wetland that feeds into Fitzgerald Brook which discharges into Lake Quinsigamond. Sample was collected at the mouth of the outfall. A notable sour and musty odor was detected. Color was clear-but slightly brown. Turbidity was low and no suspended particulates were observed. Sand was observed to be piled at the base of the concrete flume.
- **LQ-14**: One circular concrete outfall at the base of a stone wall, approximately 3.5 feet in diameter located approximately .08 miles Southeast of 376 Coburn Avenue on an unpaved road and parallel to the commuter rail. Discharge flow was approximately 2 gpm into an unnamed stream that discharges into Lake Quinsigamond. Sample was collected at the mouth of the outfall. No notable odor was detected. Color was clear- brown and some suspended particulates were observed. Garbage was observed to be instream directly downstream of the outfall.

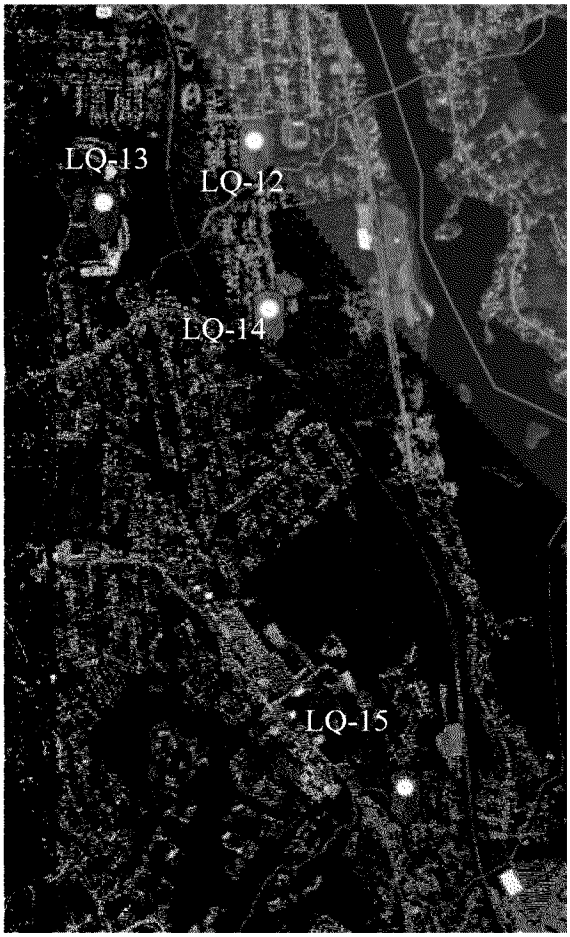
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Map of Sample Locations

Note: the locations on the map were estimated using Google Earth and are used for display purposes only.

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Note:
LQ-07: Outfall was inaccessible.
LQ-09A/LQ-09B: Only one outfall identified and labeled as "LQ-09".
LQ-11: No flow. "LQ-11UP" taken upstream of LQ-11.
LQ-15: Outfall was inaccessible.

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Table 1: Summary of Sampling and Analytical Data

	Site ID	LQ-8	LQ-09	LQ-10	LQ-11UP	LQ-12
Location	Sample Date	07/24/2024	07/24/2024	07/24/2024	07/24/2024	07/24/2024
	Sample Time	9:05	9:47	10:20	11:20	12:25
Coordinates[1] (decimal degrees)	North	42.308207	42.292486	42.293418	42.290417	42.263929
	West	-71.771581	-71.770181	-71.777243	-71.776333	-71.759341
YSI Meter	Salinity, ppt.	0.6	1.8	0.5	0.1	0.1
	Temperature, °C	17.7	17.3	18.9	25.6	18.8
	Conductivity,	1213	3374	1009	224.8	123.5
Field Test Kits (mg/L)	Ammonia	0.25	0.0	0.25	0.15	0.25
	Total Chlorine	0.03	0.03	0.03	0.07	0.02
	Surfactants	0.25	0.5	0.5	0.15	0.5
Bacteria (MPN/100mL)	E. coli	626	1302	3080	30	[redacted]
	Enterococcus	305	10	457	20	[redacted]
PPCPs (ng/L)	Cotinine	2.5	0.54	18	3.6	[redacted]
	Acetaminophen	26	ND	[redacted]	ND	[redacted]
	Paraxanthine	5.5	ND	120	ND	62
	Atenolol	ND	ND	21	ND	6.5
	Caffeine	13	6.0	[redacted]	5.3	[redacted]
	Metoprolol	ND	ND	5.9	ND	4.6
	Diphenhydramine	0.52	ND	17	ND	7.6
	Carbamazepine	0.61	ND	0.44	ND	2.0

Abbreviations and Notes:

1. The coordinates listed in Table 1 were derived from the map created in Google Earth, therefore the coordinates are estimates of the actual locations.

N/A: Not Analyzed

ND: Not Detected above Reporting Limit

E. Coli/Fecal Coliform: [redacted], Orange ≥ 1,260 col/100ml, Yellow ≥ 235 col/100ml, Black < 235 col/100ml

Entero: [redacted], Orange ≥ 350, Yellow ≥ 61 col/100ml, Black < 61 col/100ml

NH_3: [redacted], Orange ≥ 0.5 mg/L, Yellow ≥ 0.25 mg/L, Black < 0.25 mg/L

Cl_2: [redacted], Orange ≥ 0.3 mg/L, Yellow ≥ 0.02 mg/L, Black < 0.02 mg/L

Surfactants: [redacted], Orange ≥ 0.5 mg/L, Yellow ≥ 0.25 mg/L, Black < 0.25 mg/L (may give false positive at salinity greater than 1 ppt)

PPCPs: [redacted],Orange ≥ 10x the RL,Yellow ≥ 3x the RL; Black < 3x the RL*

*See Reporting Limit (RL) values for each compound in attached Laboratory Report for Source Tracking

EPA notes while there are currently no numerical standards to compare pharmaceutical results against, it is EPA's experience that acetaminophen is the single best bacterial source tracking compound of those listed above, and any detection of this compound may indicate a source of sanitary sewage. With respect to all of the above compounds, when a sanitary sewage source is present, depending on the type of source, distance from the sample location, and the strength of the source, concentrations of these compounds may range from the low ng/l range up to thousands of ng/L.

Table 1: Summary of Sampling and Analytical Data, cont.

Location	Site ID	LQ-13	LQ-14
	Sample Date	07/24/2024	07/24/2024
	Sample Time	12:54	13:47
Coordinates[1] (decimal degrees)	North	42.262834	42.257660
	West	-71.766319	-71.758855
YSI Meter	Salinity, ppt.	0.0	0.2
	Temperature, °C	21.7	16.0
	Conductivity,	77.8	507
Field Test Kits (mg/L)	Ammonia	0.25	0.25
	Total Chlorine	0.03	0.00
	Surfactants	0.75	1.0
Bacteria (MPN/100mL)	E. coli	512	1302
	Enterococcus	[redacted]	
PPCPs (ng/L)	Cotinine	3.8	18
	Acetaminophen	3.0	46
	Paraxanthine	6.1	23
	Atenolol	ND	4.5
	Caffeine	240	170
	Metoprolol	ND	2.6
	Diphenhydramine	ND	3.6
	Carbamazepine	ND	ND

Abbreviations and Notes:

1. The coordinates listed in Table 1 were derived from the map created in Google Earth, therefore the coordinates are estimates of the actual locations.

N/A: Not Analyzed

ND: Not Detected above Reporting Limit

E. Coli/Fecal Coliform: [redacted], Orange ≥ 1,260 col/100ml, Yellow ≥ 235 col/100ml, Black < 235 col/100ml

Entero: [redacted], Orange ≥ 350 col/100ml, Yellow ≥ 61 col/100ml, Black < 61 col/100ml

NH_3: [redacted] Orange ≥ 0.5 mg/L, Yellow ≥ 0.25 mg/L, Black < 0.25 mg/L

Cl_2: [redacted], Orange ≥ 0.5 mg/L, Yellow ≥ 0.02 mg/L, Black < 0.02 mg/L

Surfactants: [redacted], Orange ≥ 0.5 mg/L, Yellow ≥ 0.25 mg/L, Black < 0.25 mg/L (may give false positive at salinity greater than 1 ppt)

PPCPs: [redacted], Orange ≥ 10x the RL, Yellow ≥ 3x the RL; No Pink < 3x the RL*

*See Reporting Limit (RL) values for each compound in attached Laboratory Report for Source Tracking

EPA notes while there are currently no numerical standards to compare pharmaceutical results against, it is EPA's experience that acetaminophen is the single best bacterial source tracking compound of those listed above, and any detection of this compound may indicate a source of sanitary sewage. With respect to all of the above compounds, when a sanitary sewage source is present, depending on the type of source, distance from the sample location, and the strength of the source, concentrations of these compounds may range from the low ng/l range up to thousands of ng/L.

IX. Appendix

Appendix A: Photograph Log

X. Attachments

Attachment A: Laboratory Report for PPCPs (Source Tracking) Analysis
Attachment B: Laboratory Report for E. coli Analysis
Attachment C: Laboratory Report for Enterococcus Analysis

End of Report

Appendix A
Photograph Log

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Photo 1: LQ-08 (photo taken 07/24/2024 at approx. 9:05) Stream located near 180 Constitution Avenue, discharging into Poor Farm Brook, upstream of Lake Quinsigamond. Sample point is indicated by a red X.



Photo 2: LQ-09 (photo taken 07/24/2024 at approx. 9:47) Stream located near 541 Lincoln Street, discharging into a wetland with contributes into Coal Mine Brook, upstream of Lake Quinsigamond. Sample point is indicated by a red X.

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Photo 3: LQ-10 (photo taken 07/24/2024 at approx. 10:20) Stream located near 481 Lincoln Street. discharge contributes into Coal Mine Brook, which discharges into Lake Quinsigamond. Sample point is indicated by a red X.

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Photo 4: LQ-11UP (photo taken 07/24/2024 at approx. 11:20) Stream located near 25 Laselle Avenue Combined discharge contributes into Coal Mine Brook, which discharges into Lake Quinsigamond. Sample point is indicated by a red X.

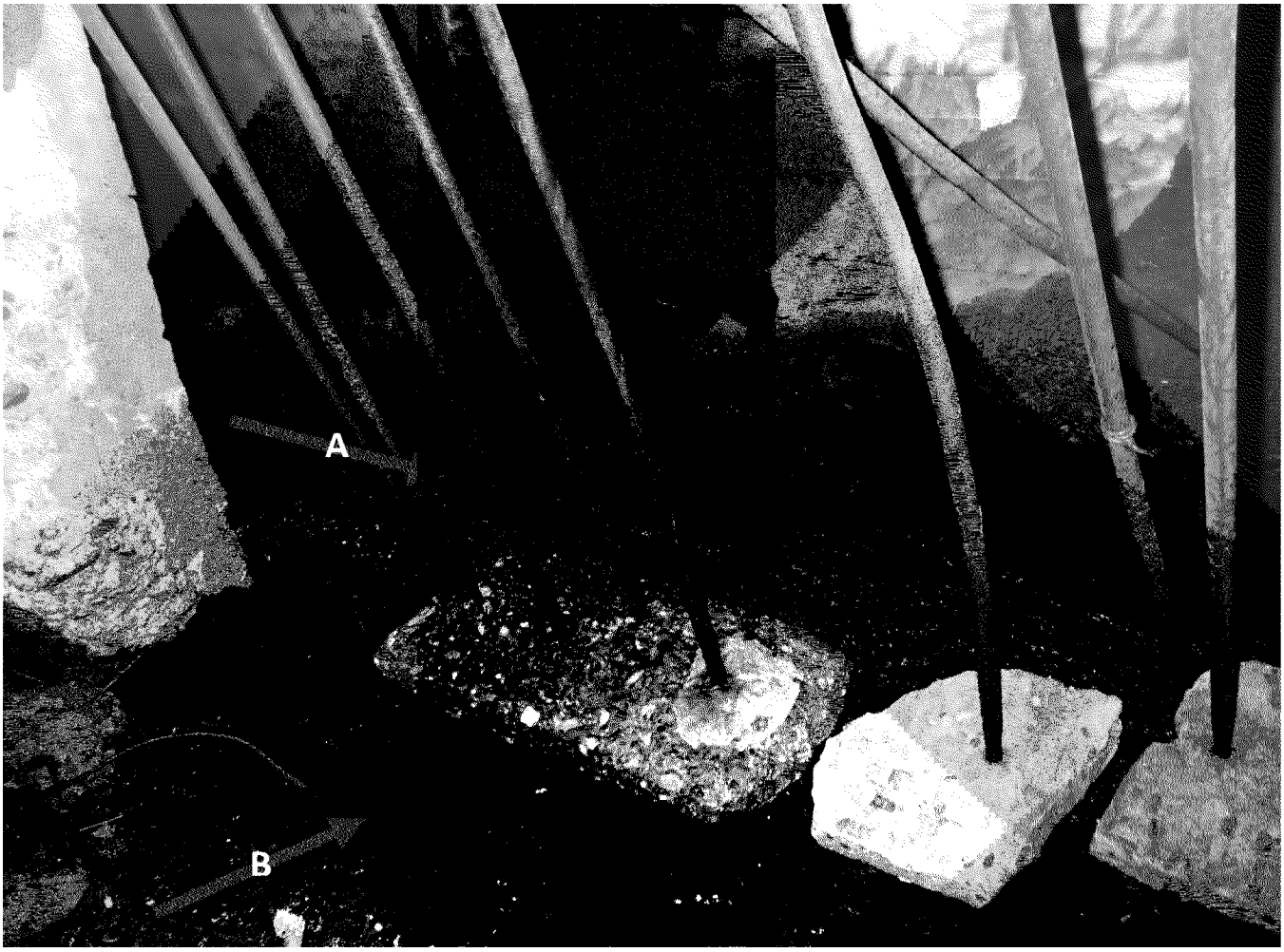


Photo 5: LQ-12 (photo taken 07/24/2024 at approx. 12:25) Stream located near 240 Coburn Avenue, discharging into Fitzgerald Brook, upstream of Lake Quinsigamond. Sample point is indicated by a red X. LQ-12 flow is indicated by blue arrow 'A'. Flow from Fitzgerald Brook is indicated by blue arrow 'B'.



Photo 6: LQ-13 (photo taken 07/24/2024 at approx. 12:54) Stream located near North High School- 150 Harrington Way, discharging into a wetland which contributes into Fitzgerald Brook. Fitzgerald Brook discharges into Lake Quinsigamond. Sample point is indicated by a red X.

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Photo 7: LQ-14 (photo taken 07/24/2024 at approx. 13:47) Stream located near 376 Coburn Avenue, discharging into an unidentified brook, upstream of Lake Quinsigamond. Sample point is indicated by a red X.

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Attachment A
Laboratory Report for
Source Tracking Analysis

Author: LSASD Laboratory Services Branch
Pages: 16

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Attachment B
Laboratory Report for
E. coli Analysis

Author: LSASD Laboratory Services Branch
Pages: 4

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Attachment C
Laboratory Report for
Enterococcus Analysis

Author: LSASD Laboratory Services Branch
Pages: 4

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End of Report

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