

Via Electronic Mail

January 31, 2025



Mr. Todd Borci  
Manager, Water Compliance Section 2  
Enforcement and Compliance Assurance Division  
U.S. Environmental Protection Agency, Region 1  
5 Post Office Square – Suite 100  
Mail Code 04-3  
Boston, MA 02109-3912

Re: Semiannual Compliance Report No. 21  
Reporting Period: 07/01/2024 – 12/31/2024  
DJ # 90-5-1-1-11060 – City of Lawrence, MA

Dear Mr. Borci:

In advance of the February 1, 2025 due date, Woodard & Curran, Inc. (Woodard & Curran) on behalf of the City of Lawrence, Massachusetts (City) is hereby submitting this Compliance Report for activities completed during the Reporting Period of July 1, 2024 through December 31, 2024. Compliance activities reported herein were undertaken to achieve compliance with the Consent Decree, and include those activities implemented under the Capacity, Management, Operations, and Maintenance (CMOM) Corrective Action Plan in accordance with Paragraph 33 of the Consent Decree.

The City will continue its efforts during the next six months to prepare and deliver compliance submissions listed below in Table 1: Summary of Compliance Submittals.

**TABLE 1: SUMMARY OF COMPLIANCE SUBMITTALS**

| <b>Consent Decree Ref.</b> | <b>Description</b>                                    | <b>Consent Decree Deadline</b> |
|----------------------------|-------------------------------------------------------|--------------------------------|
| VI.G.33.                   | CMOM Program Implementation Semiannual Report         | 08/01/2025                     |
| VI.J.37.                   | Updated GIS Map of the Collection System and MS4      | 08/01/2025                     |
| VII.51.                    | Semiannual Compliance Report & IDDE Semiannual Report | 08/01/2025                     |

The following sections detail the City's Illicit Discharge and Detection Elimination (IDDE) efforts (Section 1), Sanitary Sewer Overflows (Section 2), construction site stormwater control efforts (Section 3), the City's CMOM Corrective Action Plan (Section 4), the City's Geographic Information System (GIS) (Section 5), a summary of the City's noncompliance (Section 6), and other collection system investigation and maintenance activities (Section 7). The following attachments are also included:



- Attachment A: IDDE Documentation
- Attachment B: SSO Summary
- Attachment C: CMOM Program Implementation Documentation
- Attachment D: City Maps

## 1. ILLICIT DISCHARGE DETECTION AND ELIMINATION

Throughout this Reporting Period, the City has continued to implement illicit discharge detection and elimination (IDDE) procedures to locate and remove sources of illicit discharge from the municipal separate storm sewer system (MS4). To date, there are approximately 232,518 linear feet (LF) of known storm drain pipe in the City. The City focused on performing detailed field investigations of areas with potential illicit connections. In accordance with the Catchment Investigation Procedure in Section 5 of the City's *IDDE Program Manual*, the City and its consultants (Woodard & Curran and SDE) performed building dye testing, outfall screening, and manhole bracket sampling. During this Reporting Period, the City:

- Completed dye tests at 35 buildings. These dye tests resulted in the verification of three illicit discharges throughout the City at the following locations and catchments, 34 Eaton Street (OF0003), 174 Marston Street (OF0006) and 5 Durso Avenue (OF0018). All three illicit discharges have been eliminated by either repairing the sewer main adjacent to the property (34 Eaton Street) or replacing the sewer lateral (174 Marston Street & 5 Durso Avenue). Additional information on the removal of the illicit discharges is in the respective catchments' Catchment Summary in **Attachment A-1**.
- Investigated 361 Canal Street after being notified that the EPA received a citizen complaint noting a strong chlorine smell and suds discharging at Outfall OF0098 adjacent to the address. Additional investigations determined that maintenance staff at 361 Canal Street were cleaning machines located on the roof, which discharged to the roof drain. The roof drain at 361 Canal Street is tied directly into catchment OF0098. Maintenance staff received good housekeeping communication to ensure wash water is collected and directed to a discharge point plumbed into the sanitary sewer.
- Followed up on an illicit discharge that had been identified in November 2023 at 106 Bradford Street. Bracket sampling conducted in catchment OF0097 on November 17, 2023 indicated elevated concentrations of ammonia (0.25 mg/l) and surfactants (3.0 mg/L); chlorine was non-readable through the test equipment because of excessive sediment. The water was a murky black and gray color with a detergent odor. While the field team was sampling from manhole MH5898, they observed a person who appeared to be working at a car wash located at 106 Bradford St, sweeping runoff from the car wash into catch basin CB9127. While these observed actions were assumed to be the source of the elevated levels of surfactants, dye testing was scheduled to confirm what, if any, contributions may be added from within the car wash facility. SDE returned to 106 Bradford Street on September 24, 2024 to attempt a dye test appointment. The car wash employees did not facilitate the dye test and informed SDE that they would





inform the owner of the request. While on site, SDE witnessed vehicles being washed in the street outside of 106 Bradford Street. The owner of 106 Bradford Street has worked with the City to remove the car wash illicit discharge by installing a catch basin around the perimeter of 106 Bradford Street which will connect to the sewer. This construction has not been completed as of the time of this report.

The five outfalls in which illicit discharges were verified during this reporting period (34 Eaton Street (OF0003), 174 Marston Street (OF0006), 5 Durso Avenue (OF0018), 106 Bradford Street (OF0097), and 361 Canal Street (OF0098) will be re-screened within a year of their removal dates, noted in **Attachment A-2: Verified Direct Illicit Connections (as of December 31, 2024)**. The amount of illicit discharge removed by catchment and watershed area are summarized in **Attachments A-3 and A-4**, respectively. A map of the verified illicit connections is provided in **Attachment A-8**.

At this point in the City's investigation, manhole sampling has been completed for all known catchment areas. The City continues to focus its efforts on identifying illicit sources via building inspections, CCTV inspection, and dye testing. Where the City has completed building inspections with legal results, the City continues to perform CCTV investigations of suspect stormwater pipes and adjacent sewer infrastructure. In areas where CCTV inspections were inconclusive, the City is moving forward with resampling key junction manholes via test kits and lab testing, as well as additional building inspections where pertinent.

Table 2: Summary of IDDE Activities shows the progress of outfall and interconnection monitoring, catchment investigations, and illicit discharge verification completed during this Reporting Period. **Attachment A-6: Outfall and Interconnection Monitoring Results** and **Attachment A-7: Bracket Sampling Results** provide additional detail.

**TABLE 2: SUMMARY OF IDDE ACTIVITIES**

| Illicit Discharge Detection and Elimination Activities |                                             |  | Amount During this Reporting Period | Amount to Date |
|--------------------------------------------------------|---------------------------------------------|--|-------------------------------------|----------------|
| <b>1. Outfall and Interconnection Monitoring</b>       | # Dry Weather Inspections Completed:        |  | 1                                   | 188            |
|                                                        | # Dry Weather Samples Collected:            |  | 1                                   | 63             |
|                                                        | # Wet Weather Inspections Completed:        |  | 0                                   | 158            |
|                                                        | # Wet Weather Samples Collected:            |  | 0                                   | 93             |
| <b>2. Catchment Investigations</b>                     | # Catchment Investigations Completed:       |  | 0                                   | 121            |
|                                                        | # LF Drain Pipe Investigated <sup>1</sup> : |  | 1,940                               | 255,958        |
|                                                        | # LF Drain Pipe "Cleared":                  |  | 92                                  | 177,212        |
| <b>3. Illicit Discharges</b>                           | # Illicit Discharges Verified:              |  | 5                                   | 45             |
|                                                        | # Verified Illicit Discharges Removed:      |  | 4                                   | 44             |
|                                                        | # Verified Illicit Discharges Outstanding:  |  | 1                                   | 1              |

Note: 1. "Linear Footage of Drain Pipe Investigated" is based on the number of inspections. Therefore, credit is taken here for pipes that are inspected multiple times.

There are 11 catchments identified in the Consent Decree as "Problem Catchments". However, only nine out of the 11 catchments are considered high priority as the City has identified and removed illicit connections in some of these catchments. Narrative summaries that provide the



status of catchment with active investigations are included in **Attachment A**, as well as records from monitoring performed during this Reporting Period and an updated priority ranking of all sub-catchment areas in accordance with Paragraph 51 of the Consent Decree. **Attachment A-5** contains the priority ranking table of all catchments. Updated maps of the MS4 are included as part of the geographic information system (GIS) update discussed in Section 5 of this report.

In addition to the City's IDDE investigations, the EPA completed an announced bracket sampling event in catchments OF0003, OF0004 and OF0015, on 10/2/2024 (see **Attachment A-9: 10/2/2024 Announced EPA MS4 Compliance Sampling Inspection Report**). This report notes that the EPA attempted to sample pipes in catchment OF0015 from MH5503 on Logan Street but inadvertently sampled from the sewer manhole MH0613. The City confirmed that the sample was taken from MH0613 and that MH5503 could not be located. The City plans to conduct additional investigation on Custer Street and Logan Street to confirm the location of MH5503 and to investigate the surrounding infrastructure in the next reporting period.

## 2. SANITARY SEWER OVERFLOWS

During this Reporting Period, there were no Sanitary Sewer Overflows (SSOs) and thus the City did not report any to the EPA and the Massachusetts Department of Environmental Protection (MassDEP) as required by Paragraph 27 of the Consent Decree. There were no citizen reports of non-reportable building/private property backups documented during this Reporting Period. **Attachment B** is provided in this report for consistency across past reports.

## 3. CONSTRUCTION SITE STORMWATER CONTROL

Throughout this Reporting Period, the City has continued to implement its construction site inspection and enforcement procedures in accordance with Paragraph 44 of the Consent Decree. Table 3: Construction Site Inspections and Enforcement Actions summarizes inspections and enforcement actions during this Reporting Period and to date. It should be noted that no complaint-driven inspections were required during this Reporting Period.

**TABLE 3: CONSTRUCTION SITE INSPECTIONS AND ENFORCEMENT ACTIONS**

| Description                                     | Amount During this Reporting Period | Amount to Date |
|-------------------------------------------------|-------------------------------------|----------------|
| # Routine Inspections Completed                 | 2                                   | 38             |
| # Complaint-Driven Inspections Completed        | 0                                   | 0              |
| # Total Construction Site Inspections Completed | 2                                   | 38             |
| # Enforcement Actions Taken                     | 0                                   | 0              |



#### 4. CMOM CORRECTIVE ACTION PLAN

Refer to **Attachment C-1** for documentation of CMOM Program implementation and actions taken by the City during this Reporting Period to resolve deficiencies identified in the CMOM Corrective Action Plan.

##### 4.1. Relevant Contracts

In the Fall of 2016, the City contracted with Woodard & Curran to provide engineering services for additional sewer system evaluation survey (SSES), CMOM Asset Management, IDDE and MS4 Field Investigation, Computerized Maintenance Management Software (CMMS) and GIS Support, Construction Administration, and Compliance Support. Under this agreement, Woodard & Curran will provide the City compliance support services through July of 2026. The City has integrated a third-party Work Order Management System (WOMS) that spans both the Department of Public Works and the Water & Sewer Department to better track and manage service requests and work orders.

##### 4.2. Budgets and Staffing

The total fiscal year (FY) 2025 recommended operation and maintenance (O&M) budget for the Water & Sewer Department is **\$8,742,232**. This budget represents a \$84,339 increase from the FY2023 budget of \$8,657,893. The Water & Sewer Department currently operates an Enterprise Fund that finances the O&M budget and does not operate a capital replacement (or "sinking") fund. The Enterprise Fund is predominately comprised of water and sewer fees, which are based on metered water consumption. The City has undertaken rate increases to address declining Enterprise Fund retained earnings. The first of several rate increases went into effect January 1, 2023. The City approved 7% increases in January and July of 2023 and 3% increases in January and July of 2024. These increases will provide a reserve for City operations. A summary of additional proposed rate increases and Collection System revenue and expenditure projections through FY2028 is included in **Attachment C-2**.

The City's FY2025 community assessment to the Greater Lawrence Sanitary District (GLSD) is \$7,741,325 of which \$4,789,193 is related to O&M and \$2,952,133 is for capital projects, including debt service. A summary of the City's annual contributions to the GLSD for FY2007 through FY2024 and projections of approximate annual contributions to the GLSD through FY2028 is included in **Attachment C-3**.

Table 4: Description of Water & Sewer Department Staff Positions summarizes the budgeted and vacant positions within the Water & Sewer Department, including a brief description of the responsibilities of each position relating to Collection System O&M. Other public works responsibilities of each position are not listed. It is important to note that during this compliance period the City has been seeking to fill vacant job positions within the Water & Sewer Department. Two HMEO positions were posted to the City's website on September 10, 2024 and one HI-SHMEO position was posted in March 2024 (<https://www.cityoflawrence.com/Jobs.aspx>); these job postings are included in **Attachment C-4**. They have been removed from the website as the City reviews applications received and interviews candidates.



**TABLE 4: DESCRIPTION OF WATER & SEWER DEPARTMENT STAFF POSITIONS**

| Position Title                                       | Staff Name         | Description of Responsibilities                                                                                                                   |
|------------------------------------------------------|--------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| Water & Sewer Commissioner                           | W. Hale            | Manages administrative duties for the Water & Sewer Department, including employee management, operations and maintenance, and budget management. |
| Water & Sewer Department Supervisor                  | J. Medina          | Assists with administrative duties for the Water & Sewer Department, including employee management, and operations and maintenance.               |
| Water & Sewer Construction Supervisor (Acting)       | M. Halloran        | Oversees field activities conducted by the Water & Sewer Department.                                                                              |
| Sewer Foreman (Acting)                               | F. Condo           | Manages field activities conducted by the Sewer Maintenance staff. Manages emergency response activities, oversees construction projects, etc.    |
| Backhoe Operator / Sewer Working Foreman             | J. Ouellet         | Performs routine maintenance on collection system and pump station assets and responds to service requests.                                       |
| Hi-Special Heavy Motor Equipment Operator (HI-SHMEO) | J. Sanchez         | Performs routine maintenance on collection system and pump station assets and responds to service requests.                                       |
| Hi-Special Heavy Motor Equipment Operator (HI-SHMEO) | Vacant             | Performs routine maintenance on collection system and pump station assets and responds to service requests.                                       |
| Special Heavy Motor Equipment Operator (SHMEO)       | J. Lantigua        | Performs routine maintenance on collection system and pump station assets and responds to service requests.                                       |
| Heavy Motor Equipment Operator (HMEO) Laborer        | Vacant             | Performs routine maintenance on collection system and pump station assets and responds to service requests.                                       |
| Heavy Motor Equipment Operator (HMEO) Laborer        | W. Lopez           | Performs routine maintenance on collection system and pump station assets and responds to service requests.                                       |
| Motor Equipment Operator (MEO) Laborer               | J. Nunez Hernandez | Performs routine maintenance on collection system and pump station assets and responds to service requests.                                       |



## 5. GEOGRAPHIC INFORMATION SYSTEM

Updated figures and an updated electronic GIS database reflecting newly developed and/or discovered information, corrections, and modifications to the City's GIS are included in **Attachment D**. In addition, the City has a WebGIS site in place. Please use the following information to view the site; note that this has been updated since the previously submitted reports:

URL: <https://experience.arcgis.com/experience/99ba59fb2ce9423d8cf1c3edb35d924d/>

Username: lawdpw\_regulator

Password: lawG!\$2023

## 6. SUMMARY OF NONCOMPLIANCE

The City had no identified instances of noncompliance during this Reporting Period regarding SSOs or any other noncompliance with the requirements of the Consent Decree during this Reporting Period.

## 7. COLLECTION SYSTEM INVESTIGATION AND MAINTENANCE ACTIVITIES

In addition to the requirements of the Consent Decree, the City has completed the following tasks pertaining to the proactive investigation and maintenance of their collection system during this Reporting Period:

- Sewer and Drainage System Rehabilitation and Improvements Contract 7533 – The City accepted bids for Contract 7533 (Contract VI) in March 2022. The City awarded the contract to DeFelice Corporation for \$1,906,087.70 to complete the work, which began in July 2022. This work targets known structural, infiltration/inflow (I/I), illicit discharge, and drainage issues in the City, driven by the SSES findings and historical flooding areas. The contract was completed in July 2024.
- Sewer and Drainage System Improvements Contract VII – Contract VII is in the design phase and is targeting known structural, infiltration/inflow (I/I) and illicit discharge issues in the City's sewer system, driven by the SSES findings. This contract is expected to be bid in April 2025.
- Sanitary Sewer Evaluation Survey (SSES) – During calendar year 2024, the City and its subcontractors completed approximately 15,600 linear feet (LF) of sewer pipe cleaning and CCTV inspection and conducted 183 sewer manhole inspections in various areas of the City. Review of data, summary of work, and recommendations are currently underway. A SSES Phase XI Report is scheduled to be completed by March 2025. It is important to note that since the majority of the City's sewer system has been inspected, the remaining pipes for inspection are typically harder to access or difficult to televise. As a result, the efficiency televising this footage is often reduced, resulting in fewer LF of sewer pipe cleaned and CCTV inspected. The 2023 SSES report discusses an updated approach to future inspections based on geography or sewer catchment rather than remaining uninspected pipes. This will help re-inspect City sewers more cost effectively and would allow the City to address any uninspected pipes within the area at that time. Regardless, the City is committed to inspecting all accessible pipes and continued review and evaluation of the collection system.



- On-Call Services – The City continues to complete emergency work under its On-Call Water, Sewer, and Drain Services contracts. The FY2022-FY2024 On-Call Water, Sewer, and Drain Services contract with DeFelice Corp. of Dracut, MA ended in August 2024. The FY2025 through FY2027 Infrastructure On-Call Services contract was awarded to DeFelice Corp. of Dracut, MA for \$2,504,750 in September 2024. A summary of activities is reported annually in the SSES Report.
- Additional MS4 activities include the following: City staff IDDE training, Stormwater Pollution Plan Management, education and outreach message coordination, and continued City ordinance review.
- Hydraulic Model Updates – A sewer collection system hydraulic model was run as part of the CMOM Program Assessment in 2015. As part of the Municipal Vulnerability Preparedness (MVP) grant the City received in 2024, the hydraulic model is being updated and re-run to incorporate GIS and infrastructure updates made since the previous model iteration; incorporating model data from the Greater Lawrence Sanitary District (GLSD) interceptor model; and calibrated using metering data from GLSD, previous metering efforts in the City, and data being collected at temporary flow meters beginning in Fall of 2024 and extending through 2025. This updated model will be used for future risk analysis and capacity evaluations.

Should you have any questions, comments or need any additional information, please do not hesitate to contact me directly by phone at 914-513-2212 or by email at [lwilcox@woodardcurran.com](mailto:lwilcox@woodardcurran.com).

Sincerely,

WOODARD & CURRAN, INC.

A handwritten signature in black ink that reads "Lindsey Wilcox".

Lindsey Wilcox, P.E. (NY)  
Senior Project Manager

Attachments

cc: Chief, Environmental Enforcement Section, USDOJ (w/o enclosures)  
Mr. Joshua S. Levy, U.S. Attorney (w/o enclosures)  
Mr. Jeffrey Kopf, Senior Enforcement Counsel, USEPA (w/ enclosures)  
Mayor Brian A. De Peña, City of Lawrence (w/ enclosures)  
Mr. William Hale, Water & Sewer Commissioner, City of Lawrence (w/ enclosures)

PN: 0227206.05



## **ATTACHMENT A**

**Attachment A-1: Problem Catchment Investigation Summaries**

**Attachment A-2: Verified Direct Illicit Connections**

**Attachment A-3: Amount of Illicit Discharge Removed by Catchment**

**Attachment A-4: Amount of Illicit Discharge Removed by Watershed Area**

**Attachment A-5: Updated Priority Ranking of Catchment Areas**

**Attachment A-6: Outfall and Interconnection Monitoring Results**

**Attachment A-7: Bracket Sampling Results**

**Attachment A-8: Map of Verified Illicit Connections**

**Attachment A-9: 10/2/2024 Announced EPA MS4 Compliance Sampling Inspection Report**

## PROBLEM CATCHMENT INVESTIGATION SUMMARY

|                                                                                    |                                                                                  |                   |                       |                            |                   |
|------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|-------------------|-----------------------|----------------------------|-------------------|
| <b>Reporting Period:</b>                                                           | July 1, 2024 – December 31, 2024                                                 |                   |                       |                            |                   |
| <b>Catchment Name:</b>                                                             | Area tributary to the outfall to the east of the Abe Bashara Community Boathouse |                   |                       | <b>Outfall Feature ID:</b> | OF0004            |
| <b>Outfall Description:</b>                                                        | Size (in.):                                                                      | 32                | Material:             | RCP                        | Shape: Circular   |
|                                                                                    | Latitude:                                                                        | 42° 41' 34.428" N |                       | Longitude:                 | 71° 10' 31.068" W |
| <b>Outfall Photo:</b>                                                              | <b>Catchment Characteristics as of this Reporting Period:</b>                    |                   |                       |                            |                   |
|  | Priority Ranking:                                                                |                   |                       |                            | 1                 |
|                                                                                    | Receiving Water:                                                                 |                   |                       |                            | Merrimack         |
|                                                                                    | Total Catchment Area (acres):                                                    |                   |                       |                            | 158.5             |
|                                                                                    | Total Linear Feet (LF) of MS4 Drain Pipe:                                        |                   |                       |                            | 20,283            |
|                                                                                    | Total Drain Pipe Investigated to Date (# LF / %):                                |                   |                       |                            | 20,234 / 100%     |
|                                                                                    | Total Drain Pipe "Cleared" to Date (# LF / %):                                   |                   |                       |                            | 17,455 / 86%      |
|                                                                                    | Total # Illicit Discharges Verified to Date:                                     |                   |                       |                            | 0                 |
|                                                                                    | Total # Illicit Discharges Removed to Date:                                      |                   |                       |                            | 0                 |
|                                                                                    | Total # Illicit Discharges Outstanding ≤ 60 days:                                |                   |                       |                            | 0                 |
|                                                                                    | Total # Illicit Discharges Outstanding > 60 days:                                |                   |                       |                            | 0                 |
|                                                                                    | Most Recent Dry-Weather Outfall Monitoring Date:                                 |                   |                       |                            | 5/24/2022         |
|                                                                                    | Dry Results:                                                                     | Ammonia (mg/L):   | 0.25                  | Surfactants (mg/L):        | 0.25              |
|                                                                                    |                                                                                  | Chlorine (mg/L):  | ND (0.05)             | E. coli (MPN/100 mL):      | 16                |
|                                                                                    | Most Recent Wet-Weather Outfall Monitoring Date:                                 |                   |                       |                            | 7/12/2019         |
|                                                                                    | Wet Results:                                                                     | Ammonia (mg/L):   | 0.3                   | Surfactants (mg/L):        | ND (0.125)        |
| Chlorine (mg/L):                                                                   |                                                                                  | ND (0.05)         | E. coli (MPN/100 mL): | 15,531                     |                   |

### Narrative of Current Investigation Status as of this Reporting Period:

During this Reporting Period, dye testing was completed at two properties adjacent to MH6170-MH6167 resulting in a legal attachment to the sewer system, and no dye observed in neither the storm drain nor sewer. Dye testing was completed at one property adjacent to MH5383-MH5377 resulting in a legal attachment to the sewer system. All addresses adjacent to MH6170-MH6167 and MH5383-MH5377 were mailed communication on scheduling dye tests, but not all properties have scheduled dye tests as of the time of this report.

EPA conducted sampling on four pipes in this catchment, including sampling for E.Coli, Enterococcus, and Pharmaceuticals and Personal Care Products (PPCPs) which include Cotinine, Acetaminophen, Paraxanthine, Atenolol, Caffeine, Metoprolol, Diphenhydramine, and Carbamazepine. The PPCPs results are not official indicators in the MS4 and are, rather, an expanded panel that the EPA is using for their testing efforts. Accordingly, these results will not be used to influence ongoing investigations. Values for the PPCPs results will be included in Attachment A-9 for this Reporting Period. All pipes sampled contained concentrations of ammonia, surfactants, and/or chlorine above individual Permit threshold criteria for potential illicit discharges, but below combined Permit criteria, including, MH5274-MH6230, MH5247-MH5245, MH5280-MH5380 and MH5244-MH5245.



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**Narrative of Follow-Up Activities Planned for the next Reporting Period:**

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The City will continue to focus efforts on the Crestshire Drive area in the upcoming Reporting Period. The City will continue to attempt dye testing the properties adjacent to storm drain MH6170-MH6167 to help narrow down the source of contamination. In addition, the City will conduct lab sampling for ammonia, surfactants, Total Bacteroides and Human Bacteroides at MH6170-MH6167 to determine the precise levels for each indicator and if the contamination is a human impact.

Although all the pipes that were sampled by the EPA during this reporting period were below the combined Permit criteria, the City will continue upstream investigations to isolate the pipe segment where the elevated levels originated from.

**Verified Illicit Connections as of this Reporting Period:**

| Illicit Discharge Status | Type of Discharge | Street Name | Street No. | Estimated Flow (gpd) | Verification Date | Verification Method | Removal Date | # Days from Verification to Removal | # Days Outstanding (if not removed) |
|--------------------------|-------------------|-------------|------------|----------------------|-------------------|---------------------|--------------|-------------------------------------|-------------------------------------|
|                          |                   |             |            |                      |                   |                     |              |                                     |                                     |
|                          |                   |             |            |                      |                   |                     |              |                                     |                                     |

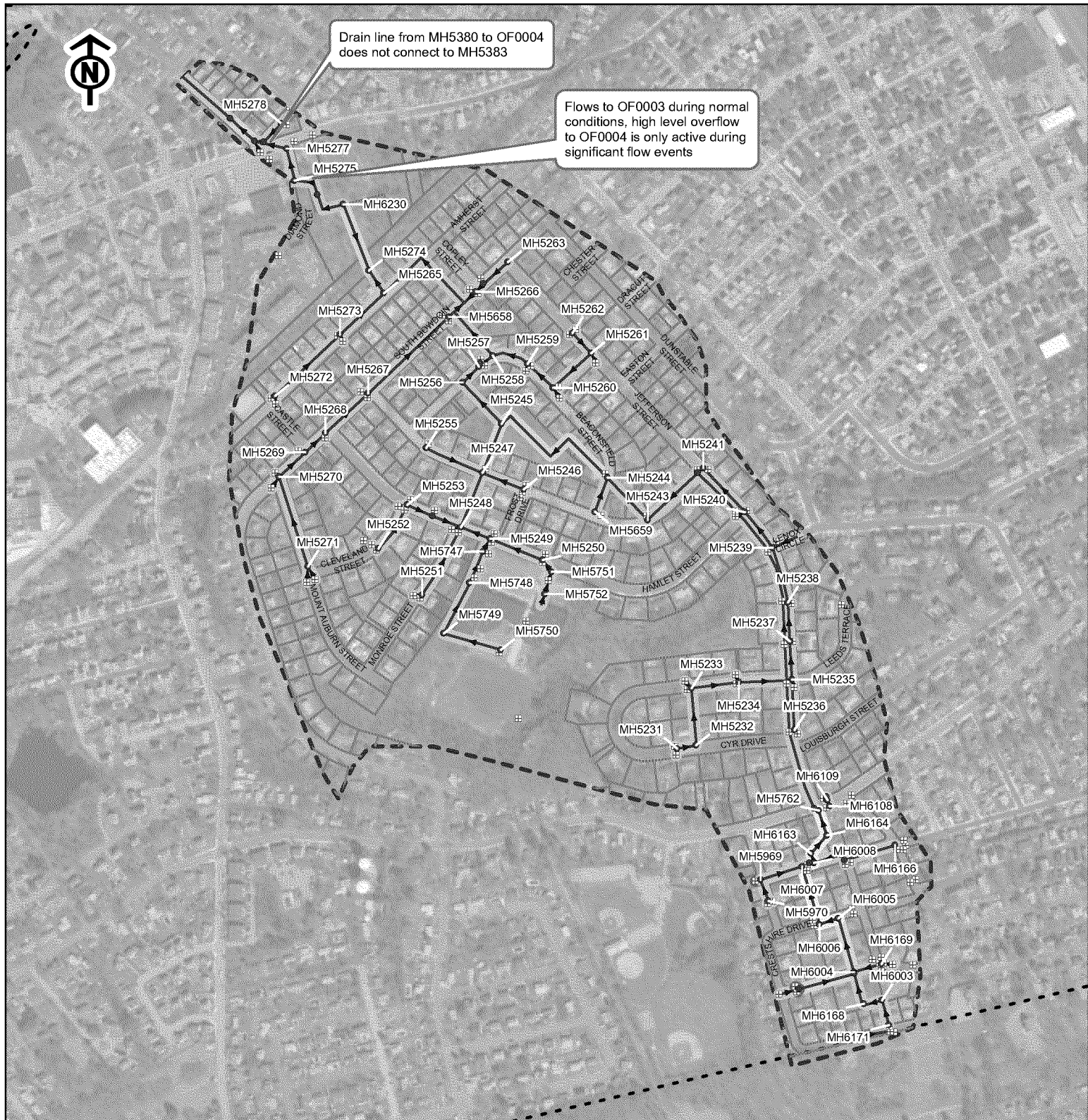
**Bracket Sampling Results this Reporting Period:**

| Manhole ID          | Location            | Inspection Date | Quantity Rain 24 hr | Pipe Direction | Standing Water | Flow | Flow Color | Velocity | Ammonia (mg/L) | Surfactants (mg/L) | Chlorine (mg/L) | E.Coli (MPN/100 mL) |
|---------------------|---------------------|-----------------|---------------------|----------------|----------------|------|------------|----------|----------------|--------------------|-----------------|---------------------|
| MH6230 <sup>1</sup> | Diamond Street      | 10/2/2024       | <0.1 inches         | SE             | No             | Yes  | Clear      | Medium   | 0.4            | 1.0                | 0.03            | 6,932               |
| MH5245 <sup>1</sup> | Beaconsfield Street | 10/2/2024       | <0.1 inches         | SW             | No             | Yes  | Clear      | Slow     | 1.0            | 0.15               | 0.1             | 68                  |
| MH5245 <sup>1</sup> | Beaconsfield Street | 10/2/2024       | <0.1 inches         | NE             | No             | Yes  | Clear      | Slow     | 0.4            | 0.4                | 0.03            | 91                  |
| MH5380 <sup>1</sup> | Tewksbury Street    | 10/2/2024       | <0.1 inches         | SE             | No             | Yes  | Clear      | Slow     | 0.4            | 0.35               | 0.04            | 762                 |
|                     |                     |                 |                     |                |                |      |            |          |                |                    |                 |                     |

(1) EPA facilitated sampling event on 10/2/2024, additional laboratory samples were conducted on PPCPs (Cotinine, Acetaminophen, Paraxanthine, Atenolol, Caffeine, Metoprolol, Diphenhydramine, and Carbamazepine). These results are shown in full within Attachment A-9.

N/A = Not applicable; NT = Not tested; ND ( ) = Not detected (method detection limit); \* = Ammonia was tested using Ammonia Test Strips

Figure Exported: 1/21/2025 By: p.poregan Using: \\woodardcurran.net\shared\Projects\0227206.05 Lawrence MA Phase V SSES\wp\p03\_Report\Report No. 21-Jan. 2025\GIS\Outfall Results\Outfall Result Figures 2.aprx



**Legend**

**Catchment Investigation Status**

- Cleared
- Upstream Contamination
- Suspected
- Suspected, Low Priority\*\*
- Confirmed
- Other

**Illicit Discharge Location**

- Abatement Status
  - Completed
  - Outstanding

**Discharge Type**

- MS4 Outfall
- Other Discharge Point
- Storm Manholes

**Catch Basin**

- Storm Lateral Lines
- Storm Gravity Main
- Storm Open Drain
- Storm Culvert
- Problem Catchment
- Lawrence Boundary

**OF0004 Catchment Area  
Catchment Investigation Results**

**City of Lawrence, Massachusetts**  
**July 1, 2024 - December 31, 2024**



Woodard & Curran shall assume no liability for any of the following; 1. Any errors, omissions, or inaccuracies in the information provided regardless of how caused or; 2. Any decision or action taken or not taken by the reader in reliance upon any information or data furnished hereunder.

SCALE: 1" = 600'

DOC: Outfall Result Figures 2.aprx

DATE: JANUARY 2025

PROJECT #: 227206.05

DRAWN BY: PBO

SOURCE: ESRI, MassGIS

\*\*Note: Segments symbolized as "Suspected, Low Priority" represent sample results that do not meet the criteria for likely sewer input established in the 2016 Massachusetts MS4 Permit.

## PROBLEM CATCHMENT INVESTIGATION SUMMARY

|                                                                                    |                                                               |                   |                       |                            |                    |
|------------------------------------------------------------------------------------|---------------------------------------------------------------|-------------------|-----------------------|----------------------------|--------------------|
| <b>Reporting Period:</b>                                                           | July 1, 2024 – December 31, 2024                              |                   |                       |                            |                    |
| <b>Catchment Name:</b>                                                             | Area tributary to the outfall near Dr. Nina Scarito Park      |                   |                       | <b>Outfall Feature ID:</b> | OF0015             |
| <b>Outfall Description:</b>                                                        | Size (in.):                                                   | 60                | Material:             | RCP                        | Shape: Rectangular |
|                                                                                    | Latitude:                                                     | 42° 42' 54.988" N |                       | Longitude:                 | 71° 9' 14.813" W   |
| <b>Outfall Photo:</b>                                                              | <b>Catchment Characteristics as of this Reporting Period:</b> |                   |                       |                            |                    |
|  | Priority Ranking:                                             |                   |                       |                            | 2                  |
|                                                                                    | Receiving Water:                                              |                   |                       |                            | Spicket            |
|                                                                                    | Total Catchment Area (acres):                                 |                   |                       |                            | 89.58              |
|                                                                                    | Total Linear Feet (LF) of MS4 Drain Pipe:                     |                   |                       |                            | 12,686             |
|                                                                                    | Total Drain Pipe Investigated to Date (# LF / %):             |                   |                       |                            | 12,564 / 99%       |
|                                                                                    | Total Drain Pipe "Cleared" to Date (# LF / %):                |                   |                       |                            | 7,669 / 60%        |
|                                                                                    | Total # Illicit Discharges Verified to Date:                  |                   |                       |                            | 9                  |
|                                                                                    | Total # Illicit Discharges Removed to Date:                   |                   |                       |                            | 9                  |
|                                                                                    | Total # Illicit Discharges Outstanding ≤ 60 days:             |                   |                       |                            | 0                  |
|                                                                                    | Total # Illicit Discharges Outstanding > 60 days:             |                   |                       |                            | 0                  |
|                                                                                    | Most Recent Dry-Weather Outfall Monitoring Date:              |                   |                       |                            | 5/24/2022          |
|                                                                                    | Dry Results:                                                  | Ammonia (mg/L):   | 0.25                  | Surfactants (mg/L):        | 0.5                |
|                                                                                    |                                                               | Chlorine (mg/L):  | ND (0.05)             | E. coli (MPN/100 mL):      | 318                |
|                                                                                    | Most Recent Wet-Weather Outfall Monitoring Date:              |                   |                       |                            | 10/16/2014         |
|                                                                                    | Wet Results:                                                  | Ammonia (mg/L):   | 5.0                   | Surfactants (mg/L):        | ND (0.125)         |
| Chlorine (mg/L):                                                                   |                                                               | 0.2               | E. coli (MPN/100 mL): | 54,000                     |                    |

### **Narrative of Current Investigation Status as of this Reporting Period:**

During this Reporting Period, dye testing was completed at four properties adjacent to MH5213-MH5215, MH5215-MH5503, MH5503-MH5218 and MH5230-FIT5083, resulting in a legal attachment to the sewer system of all properties tested. All addresses adjacent to MH5213-MH5215, MH5215-MH5503, MH5503-MH5218, MH5230-FIT5083 and other pipe segments from OF0015 upstream to MH5210 adjacent to the Bloody Brook culvert were mailed communication on scheduling dye tests, but did not schedule as of the time of this report.

In addition, the EPA attempted to sample pipes from storm pipe MH5503 on Logan Street, but inadvertently sampled from the sewer manhole MH0613. A follow up investigation completed by the City confirmed the sample was taken from MH0613, and that MH5503 could not be located. Results from EPA's sampling effort are included in Attachment A-9 for this Reporting Period.

### **Narrative of Follow-Up Activities Planned for the next Reporting Period:**

The City will continue the dye testing of properties along the Bloody Brook culvert to confirm there are no illicit connections.

During the next Reporting Period, the City will continue the investigation of the suspected contamination near 259 Prospect Street by conducting CCTV of the suspected stormwater line, CB8686-MH5731, and the line upstream from it, FIT5224-CB8686. Additional testing will be conducted for Total and Human Bacteroides at CB8686-MH5731 and FIT5224-CB8686 to determine the precise levels for each indicator and if the contamination is a human impact.

Additional investigation should be completed on Custer Street and Logan Street regarding the manhole that was noted as MH5503. CCTV should be completed to locate MH5503 and the surrounding infrastructure. If MH5503 cannot be recovered, the City should sample upstream Key Junction Manholes for ammonia, surfactants, chlorine, Total Bacteroides and Human Bacteroides.

**Verified Illicit Connections as of this Reporting Period:**

| Illicit Discharge Status | Type of Discharge                                        | Street Name     | Street No. | Estimated Flow (gpd) | Verification Date | Verification Method                  | Removal Date | # Days from Verification to Removal | # Days Outstanding (if not removed) |
|--------------------------|----------------------------------------------------------|-----------------|------------|----------------------|-------------------|--------------------------------------|--------------|-------------------------------------|-------------------------------------|
| Repaired by City         | Sewer Main Cross-Connection from Single-Family Residence | Custer Street   | 5          | 440                  | 10/9/2015         | Dye Test & CCTV                      | 11/6/2015    | 28                                  |                                     |
| Repaired by City         | Sewer Main Cross-Connection from Two-Family Residence    | Custer Street   | 9          | 440                  | 10/9/2015         | Dye Test & CCTV                      | 11/6/2015    | 28                                  |                                     |
| Repaired by City         | Sewer Main Cross-Connection from Two-Family Residence    | Custer Street   | 6-8        | 660                  | 10/9/2015         | Dye Test & CCTV                      | 11/6/2015    | 28                                  |                                     |
| Repaired by City         | Sewer Main Cross-Connection from Three-Family Residence  | Prospect Street | 397        | 770                  | 11/6/2015         | Dye Test & CCTV                      | 11/6/2015    | 0                                   |                                     |
| Repaired by City         | Three-Family Residence Direct Connection                 | Cornish Street  | 3-5        | 660                  | 11/10/2015        | Dye Test & CCTV                      | 12/23/2016   | 409                                 |                                     |
| Repaired by Owner        | Washing Machine Connection                               | Jackson Street  | 324        | 90                   | 12/22/2016        | Building Inspection & Dye Test       | 12/19/2017   | 362                                 |                                     |
| Repaired by City         | Three-Family Residence Direct Connection                 | Jackson Street  | 343-345    | 990                  | 12/22/2016        | Building Inspection & Dye Test       | 12/21/2017   | 364                                 |                                     |
| Repaired by City         | Sewer Main Cross-Connection from 3-Family Residence      | Prospect Street |            | 200                  | 1/3/2017          | Dye Test & CCTV                      | 5/22/2019    | 869                                 |                                     |
| Repaired by Owner        | Three-Family Residence Direct Connection                 | Prospect Street | 326        | 990                  | 10/17/2018        | Building Inspection, Dye Test & CCTV | 10/22/2018   | 5                                   |                                     |
|                          |                                                          |                 |            |                      |                   |                                      |              |                                     |                                     |

**Bracket Sampling Results this Reporting Period:**

| Manhole ID | Location | Inspection Date | Pipe Direction | Standing Water | Flow | Flow Color | Velocity | Value Ammonia | Value Surfactants | Value Chlorine | Total Bacteroides | Human Bacteroides |
|------------|----------|-----------------|----------------|----------------|------|------------|----------|---------------|-------------------|----------------|-------------------|-------------------|
|            |          |                 |                |                |      |            |          |               |                   |                |                   |                   |
|            |          |                 |                |                |      |            |          |               |                   |                |                   |                   |

N/A = Not applicable; NT = Not tested; ND ( ) = Not detected (method detection limit), \* = Ammonia was tested using Ammonia Test Strips, Bacteroides measured in CEs/100mL.





## OF0015 Catchment Area Catchment Investigation Results

**City of Lawrence, Massachusetts**  
**July 1, 2024 - December 31, 2024**



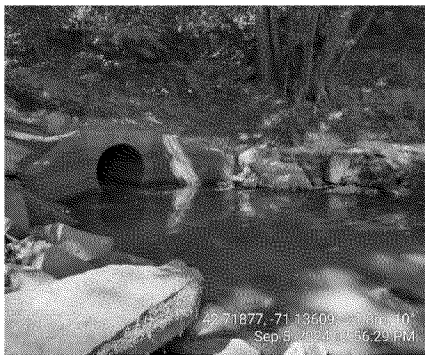
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|                    |                                    |
|--------------------|------------------------------------|
| SCALE: 1" = 532'   | DOC: Outfall Result Figures 2.aprx |
| DATE: JANUARY 2025 | PROJECT #: 227206.05               |
| DRAWN BY: PBO      | SOURCE: ESRI, MassGIS              |

| Legend                         |                            |                     |
|--------------------------------|----------------------------|---------------------|
| Catchment Investigation Status | Illicit Discharge Location | Catch Basin         |
| Cleared                        | Abatement Status           | Storm Lateral Lines |
| Upstream Contamination         | ★ Completed                | Storm Gravity Main  |
| Suspected                      | ★ Outstanding              | Storm Open Drain    |
| Suspected, Low Priority**      | Discharge Type             | Storm Culvert       |
| Confirmed                      | ▲ MS4 Outfall              | Problem Catchment   |
| Other                          | △ Other Discharge Point    | Lawrence Boundary   |
|                                | ● Storm Manholes           |                     |

\*\*Note: Segments symbolized as "Suspected, Low Priority" represent sample results that do not meet the criteria for likely sewer input established in the 2016 Massachusetts MS4 Permit.

## PROBLEM CATCHMENT INVESTIGATION SUMMARY

|                                                                                    |                                                                                     |                  |                       |                            |                  |
|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|------------------|-----------------------|----------------------------|------------------|
| <b>Reporting Period:</b>                                                           | July 1, 2024 – December 31, 2024                                                    |                  |                       |                            |                  |
| <b>Catchment Name:</b>                                                             | Area tributary to the outfall north of the Lawrence Correctional Alternative Center |                  |                       | <b>Outfall Feature ID:</b> | OF0006           |
| <b>Outfall Description:</b>                                                        | Size (in.):                                                                         | 48               | Material:             | RCP                        | Shape: Circular  |
|                                                                                    | Latitude:                                                                           | 42° 43' 7.461" N |                       | Longitude:                 | 71° 8' 10.204" W |
| <b>Outfall Photo:</b>                                                              | <b>Catchment Characteristics as of this Reporting Period:</b>                       |                  |                       |                            |                  |
|  | Priority Ranking:                                                                   |                  |                       |                            | 3                |
|                                                                                    | Receiving Water:                                                                    |                  |                       |                            | Merrimack        |
|                                                                                    | Total Catchment Area (acres):                                                       |                  |                       |                            | 167.73           |
|                                                                                    | Total Linear Feet (LF) of MS4 Drain Pipe:                                           |                  |                       |                            | 19,947           |
|                                                                                    | Total Drain Pipe Investigated to Date (# LF / %):                                   |                  |                       |                            | 18,363 / 92%     |
|                                                                                    | Total Drain Pipe "Cleared" to Date (# LF / %):                                      |                  |                       |                            | 14,132 / 71%     |
|                                                                                    | Total # Illicit Discharges Verified to Date:                                        |                  |                       |                            | 5                |
|                                                                                    | Total # Illicit Discharges Removed to Date:                                         |                  |                       |                            | 5                |
|                                                                                    | Total # Illicit Discharges Outstanding ≤ 60 days:                                   |                  |                       |                            | 0                |
|                                                                                    | Total # Illicit Discharges Outstanding > 60 days:                                   |                  |                       |                            | 0                |
|                                                                                    | Most Recent Dry-Weather Outfall Monitoring Date:                                    |                  |                       |                            | 09/05/2024       |
|                                                                                    | Dry Results:                                                                        | Ammonia (mg/L):  | 2                     | Surfactants (mg/L):        | 0.25             |
|                                                                                    |                                                                                     | Chlorine (mg/L): | 0.29                  | E. coli (MPN/100 mL):      | 609              |
|                                                                                    | Most Recent Wet-Weather Outfall Monitoring Date:                                    |                  |                       |                            | 10/16/2014       |
|                                                                                    | Wet Results:                                                                        | Ammonia (mg/L):  | 0.6                   | Surfactants (mg/L):        | ND (0.125)       |
| Chlorine (mg/L):                                                                   |                                                                                     | ND (0.05)        | E. coli (MPN/100 mL): | 100,000                    |                  |

### **Narrative of Current Investigation Status as of this Reporting Period:**

During this Reporting Period, dye testing was completed at four properties adjacent to MH5938-MH5038 resulting in three legal attachments to the sewer system and one dye observed in both the sewer and the drain.

Dye testing was completed at 174 Marston St adjacent to MH5938-MH5038 resulting in dye observed in both the sewer and the drain. Twenty linear feet of the existing sewer lateral was replaced with 6-inch PVC pipe, servicing 174 Marston St. Confirmatory dye testing was completed at 174 Marston St which resulted in a legal attachment to the sewer system.

All addresses adjacent to MH5938-MH5038 were mailed communication on scheduling dye tests; however, only four properties were scheduled as of the time of this report.

### **Narrative of Follow-Up Activities Planned for the next Reporting Period:**

The City will continue to attempt dye testing buildings adjacent to MH5938-MH5038.

By October 19, 2025, the City plans to complete Dry-Weather screening at the outfall due to the illicit discharge removal at 174 Marston St.

**Verified Illicit Connections as of this Reporting Period:**

| Illicit Discharge Status | Type of Discharge       | Street Name      | Street No. | Estimated Flow (gpd) | Verification Date | Verification Method                  | Removal Date | # Days from Verification to Removal | # Days Outstanding (if not removed) |
|--------------------------|-------------------------|------------------|------------|----------------------|-------------------|--------------------------------------|--------------|-------------------------------------|-------------------------------------|
| Repaired by Owner        | Two-Family Residence    | Hey Street       | 17         | 440                  | 1/27/2017         | Building Inspection, Dye test & CCTV | 4/27/2018    | 455                                 |                                     |
| Repaired by Owner        | Two-Family Residence    | Brookline Street | 10         | 220                  | 4/2/2018          | Building Inspection, Dye Test        | 5/1/2018     | 29                                  |                                     |
| Repaired by Owner        | Two-Family Residence    | Brookline Street | 2          | 220                  | 4/3/2018          | Building Inspection, Dye Test        | 5/2/2018     | 29                                  |                                     |
| Repaired by Owner        | Two-Family Residence    | Woodland Street  | 141        | 660                  | 6/28/2018         | Building Inspection, Dye Test & CCTV | 9/13/2018    | 77                                  |                                     |
| Repaired by City         | Single-Family Residence | Marston St       | 174        | 220 <sup>(1)</sup>   | 8/20/2024         | Building Inspection, Dye Test & CCTV | 10/19/2024   | 60                                  |                                     |

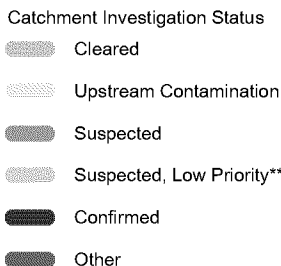
(1) Estimated flow calculations based on total water usage readings provided by the City.

**Bracket Sampling Results this Reporting Period:**

| Manhole ID | Location | Inspection Date | Quantity Rain 24 hr | Pipe Direction | Standing Water | Flow | Flow Color | Velocity | Ammonia (mg/L) | Surfactants (mg/L) | Chlorine (mg/L) |
|------------|----------|-----------------|---------------------|----------------|----------------|------|------------|----------|----------------|--------------------|-----------------|
|            |          |                 |                     |                |                |      |            |          |                |                    |                 |
|            |          |                 |                     |                |                |      |            |          |                |                    |                 |

N/A = Not applicable; NT = Not tested; ND ( ) = Not detected (method detection limit)





## Other Discharge

Lawrence Boundary

SOURCE: ESRI, MassGIS

## PROBLEM CATCHMENT INVESTIGATION SUMMARY

|                                                                                    |                                                               |                   |                       |                            |                         |
|------------------------------------------------------------------------------------|---------------------------------------------------------------|-------------------|-----------------------|----------------------------|-------------------------|
| <b>Reporting Period:</b>                                                           | July 1, 2024 – December 31, 2024                              |                   |                       |                            |                         |
| <b>Catchment Name:</b>                                                             | Area tributary to the outfall at Canal and Broadway           |                   |                       | <b>Outfall Feature ID:</b> | OF0097                  |
| <b>Outfall Description:</b>                                                        | Size (in.):                                                   | 38                | Material:             | RCP                        | Shape: Circular         |
|                                                                                    | Latitude:                                                     | 42° 42' 11.954" N |                       | Longitude:                 | 71° 9' 58.079" W        |
| <b>Outfall Photo:</b>                                                              | <b>Catchment Characteristics as of this Reporting Period:</b> |                   |                       |                            |                         |
|  | Priority Ranking:                                             |                   |                       |                            | 4                       |
|                                                                                    | Receiving Water:                                              |                   |                       |                            | Merrimack (North Canal) |
|                                                                                    | Total Catchment Area (acres):                                 |                   |                       |                            | 15.7                    |
|                                                                                    | Total Linear Feet (LF) of MS4 Drain Pipe:                     |                   |                       |                            | 3,093                   |
|                                                                                    | Total Drain Pipe Investigated to Date (# LF / %):             |                   |                       |                            | 3,098 / 100%            |
|                                                                                    | Total Drain Pipe "Cleared" to Date (# LF / %):                |                   |                       |                            | 139 / 5%                |
|                                                                                    | Total # Illicit Discharges Verified to Date:                  |                   |                       |                            | 4                       |
|                                                                                    | Total # Illicit Discharges Removed to Date:                   |                   |                       |                            | 3                       |
|                                                                                    | Total # Illicit Discharges Outstanding ≤ 60 days:             |                   |                       |                            | 0                       |
|                                                                                    | Total # Illicit Discharges Outstanding > 60 days:             |                   |                       |                            | 1                       |
|                                                                                    | Most Recent Dry-Weather Outfall Monitoring Date:              |                   |                       |                            | 7/7/2015                |
|                                                                                    | Dry<br>Results:                                               | Ammonia (mg/L):   | 8                     | Surfactants (mg/L):        | 0.25                    |
|                                                                                    |                                                               | Chlorine (mg/L):  | ND (0.05)             | E. coli (MPN/100 mL):      | 546                     |
|                                                                                    | Most Recent Wet-Weather Outfall Monitoring Date:              |                   |                       |                            | 7/1/2015                |
|                                                                                    | Wet<br>Results:                                               | Ammonia (mg/L):   | 0.4                   | Surfactants (mg/L):        | 0.25                    |
| Chlorine (mg/L):                                                                   |                                                               | ND (0.05)         | E. coli (MPN/100 mL): | 15,531                     |                         |

### **Narrative of Current Investigation Status as of this Reporting Period:**

During this Reporting Period, the City conducted dye testing at three properties adjacent to MH6213-MH6107. All tests resulted in a legal attachment to the sewer system, and no dye in the storm drain. Although all adjacent buildings have been dye tested, not all fixtures have been dye tested.

While conducting pipe sampling in the vicinity of Bradford St, the City observed someone sweeping runoff from a carwash located at 106 Bradford Street into the MS4 via catch basin CB9127. On November 17, 2023, a field screening was performed at CB9127-MH5898, which indicated concentrations of ammonia (0.25 mg/L) and surfactants (3.0 mg/L). Chlorine was not readable through the test equipment because of sediment.

On September 24, 2024, the City returned to attempt dye testing. The carwash employees did not facilitate dye testing and informed the City they would inform the owner of 106 Bradford St of the request. The City observed employees of the carwash sweeping runoff into CB9127 and determined this was a verified illicit discharge.

On December 4, 2024, construction began for a new catch basin in front of 106 Bradford St, connected directly to the sewer system to remove the illicit discharge. Construction of the sewer catch basin has not been completed as of the time of this report.

---

**Narrative of Follow-Up Activities Planned for the next Reporting Period:**

---

Once construction of the new sewer catch basin has been completed, confirmatory sampling will occur on CB9127-MH5898 to verify there are no remaining illicit contributions from the carwash at 106 Bradford St.

The City will conduct dye testing on buildings adjacent to drainpipe CB9127-MH5898 in efforts to identify any possible additional illicit discharges.

The City will conduct laboratory sampling for ammonia, human Bacteroides, and total Bacteroides in MH5899-MH5897 to get a better understanding of the source of the illicit discharge. Although all buildings adjacent to MH5899-MH5897 have been dye tested, additional attempts should be made to verify an illicit discharge in this area, if the laboratory sampling indicates a human impact. CCTV inspection will be completed at MH5899-MH5897 and MH0911-MH1355 to identify possible sources of illicit discharges.

Additionally, the City plans to complete Dry-Weather screening at OF0097 during the next Reporting Period.

**Verified Illicit Connections as of this Reporting Period:**

| Illicit Discharge Status | Type of Discharge                              | Street Name     | Street No. | Estimated Flow (gpd) | Verification Date | Verification Method                      | Removal Date | # Days from Verification to Removal | # Days Outstanding (if not removed) |
|--------------------------|------------------------------------------------|-----------------|------------|----------------------|-------------------|------------------------------------------|--------------|-------------------------------------|-------------------------------------|
| Repaired by City         | Sewage Exfiltration near MH5898                | Bradford Street |            | 100                  | 12/14/2016        | Dye Test & CCTV                          | 3/3/2017     | 79                                  | --                                  |
| Repaired by City         | Sewage Exfiltration near MH5898                | Bradford Street |            | 100                  | 7/6/2020          | Dye Test                                 | 3/29/2021    | 266                                 | --                                  |
| Repaired by City         | Commercial building – 1 Story (5 Store fronts) | Broadway        |            | 640 <sup>1</sup>     | 3/15/2024         | Dye Test, CCTV, and Building Inspections | 3/17/2024    | 2                                   | --                                  |
| Repair in Progress       | Commercial building – 1 Story (Carwash)        | Bradford St     | 106        | 1,030 <sup>1</sup>   | 9/24/2024         | Visual Inspection                        | --           | --                                  | 98 <sup>2</sup>                     |

(1) Estimated flow calculations based on total water usage readings provided by the City.

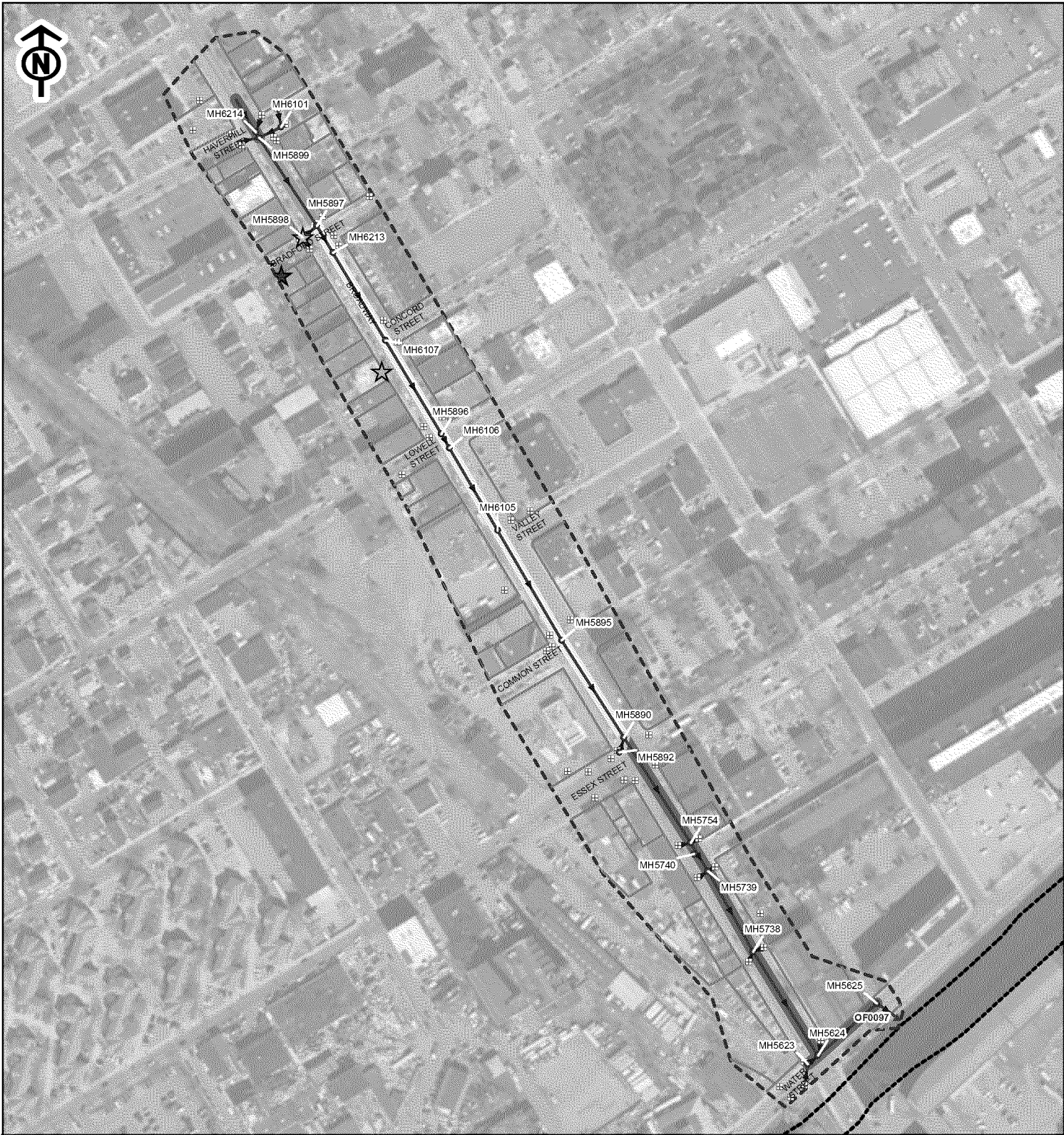
(2) Calculated based on number of days between Verification Date and end of Reporting Period (December 31, 2024).

**Bracket Sampling Results this Reporting Period:**

| Manhole ID | Location | Inspection Date | Quantity of Rain 24 hr | Pipe Direction | Standing Water | Flow | Flow Color | Velocity | Value Ammonia | Value Surfactants | Value Chlorine |
|------------|----------|-----------------|------------------------|----------------|----------------|------|------------|----------|---------------|-------------------|----------------|
|            |          |                 |                        |                |                |      |            |          |               |                   |                |
|            |          |                 |                        |                |                |      |            |          |               |                   |                |

N/A = Not applicable; NT = Not tested; ND ( ) = Not detected (method detection limit).





OF0097 Catchment Area

Catchment Investigation Results

City of Lawrence, Massachusetts

July 1, 2024 - December 31, 2024

Woodard & Curran

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|                    |                                    |
|--------------------|------------------------------------|
| SCALE: 1" = 286'   | DOC: Outfall Result Figures 2.aprx |
| DATE: JANUARY 2025 | PROJECT #: 227206.05               |
| DRAWN BY: PBO      | SOURCE: ESRI, MassGIS              |

Catchment Investigation Status

Cleared

Upstream Contamination

Suspected

Suspected, Low Priority\*\*

Confirmed

Other

Illicit Discharge Location

Abatement Status

★ Completed

★ Outstanding

Discharge Type

▲ MS4 Outfall

△ Other Discharge Point

● Storm Manholes

Catch Basin

Storm Lateral Lines

Storm Gravity Main

Storm Open Drain

Storm Culvert

Problem Catchment

Lawrence Boundary

\*\*Note: Segments symbolized as "Suspected, Low Priority" represent sample results that do not meet the criteria for likely sewer input established in the 2016 Massachusetts MS4 Permit.

## PROBLEM CATCHMENT INVESTIGATION SUMMARY

|                                                                                    |                                                                 |                   |                       |                            |                   |
|------------------------------------------------------------------------------------|-----------------------------------------------------------------|-------------------|-----------------------|----------------------------|-------------------|
| <b>Reporting Period:</b>                                                           | July 1, 2024 – December 31, 2024                                |                   |                       |                            |                   |
| <b>Catchment Name:</b>                                                             | Area tributary to the outfall at the Spicket River and Broadway |                   |                       | <b>Outfall Feature ID:</b> | OF0090            |
| <b>Outfall Description:</b>                                                        | Size (in.):                                                     | 48                | Material:             | RCP                        | Shape: Circular   |
|                                                                                    | Latitude:                                                       | 42° 42' 52.851" N |                       | Longitude:                 | 71° 10' 30.486" W |
| <b>Outfall Photo:</b>                                                              | <b>Catchment Characteristics as of this Reporting Period:</b>   |                   |                       |                            |                   |
|  | Priority Ranking:                                               |                   |                       |                            | 5                 |
|                                                                                    | Receiving Water:                                                |                   |                       |                            | Spicket           |
|                                                                                    | Total Catchment Area (acres):                                   |                   |                       |                            | 6.09              |
|                                                                                    | Total Linear Feet (LF) of MS4 Drain Pipe:                       |                   |                       |                            | 3,358             |
|                                                                                    | Total Drain Pipe Investigated to Date (# LF / %):               |                   |                       |                            | 3,358 / 100%      |
|                                                                                    | Total Drain Pipe "Cleared" to Date (# LF / %):                  |                   |                       |                            | 1,424 / 42%       |
|                                                                                    | Total # Illicit Discharges Verified to Date:                    |                   |                       |                            | 0                 |
|                                                                                    | Total # Illicit Discharges Removed to Date:                     |                   |                       |                            | 0                 |
|                                                                                    | Total # Illicit Discharges Outstanding ≤ 60 days:               |                   |                       |                            | 0                 |
|                                                                                    | Total # Illicit Discharges Outstanding > 60 days:               |                   |                       |                            | 0                 |
|                                                                                    | Most Recent Dry-Weather Outfall Monitoring Date:                |                   |                       |                            | 8/25/2022         |
|                                                                                    | Dry Results:                                                    | Ammonia (mg/L):   | No Flow               | Surfactants (mg/L):        | No Flow           |
|                                                                                    |                                                                 | Chlorine (mg/L):  | No Flow               | E. coli (MPN/100 mL):      | No Flow           |
|                                                                                    | Most Recent Wet-Weather Outfall Monitoring Date:                |                   |                       |                            | 6/27/2023         |
| Wet Results:                                                                       | Ammonia (mg/L):                                                 | 0.3               | Surfactants (mg/L):   | 0.50                       |                   |
|                                                                                    | Chlorine (mg/L):                                                | 1.15              | E. coli (MPN/100 mL): | 29,090                     |                   |

### Narrative of Current Investigation Status as of this Reporting Period:

No investigatory efforts took place during this Reporting Period.

Through various past investigations the City attempted to sample the pipes upstream from the outfall that were previously standing water, removing the water in each pipe segment and manholes before sandbagging the pipe segments for 48 hours. A majority of the pipes that were sandbagged resulted in resurgence of water over the 48-hour period, resulting in fouled sandbags. The source of the water is unknown but might have been from high ground water after consistent rain throughout the beginning of the reporting period.

### Narrative of Follow-Up Activities Planned for the next Reporting Period:

The City will reattempt to remove standing water from pipes that previously was found to have standing water. If water can be removed the City will bracket sample the pipes upstream from the outfall that were previously found to have standing water to find the source of contamination. If the water cannot be removed buildings adjacent to the pipes with standing water will be attempted for dye testing.

**Verified Illicit Connections as of this Reporting Period:**

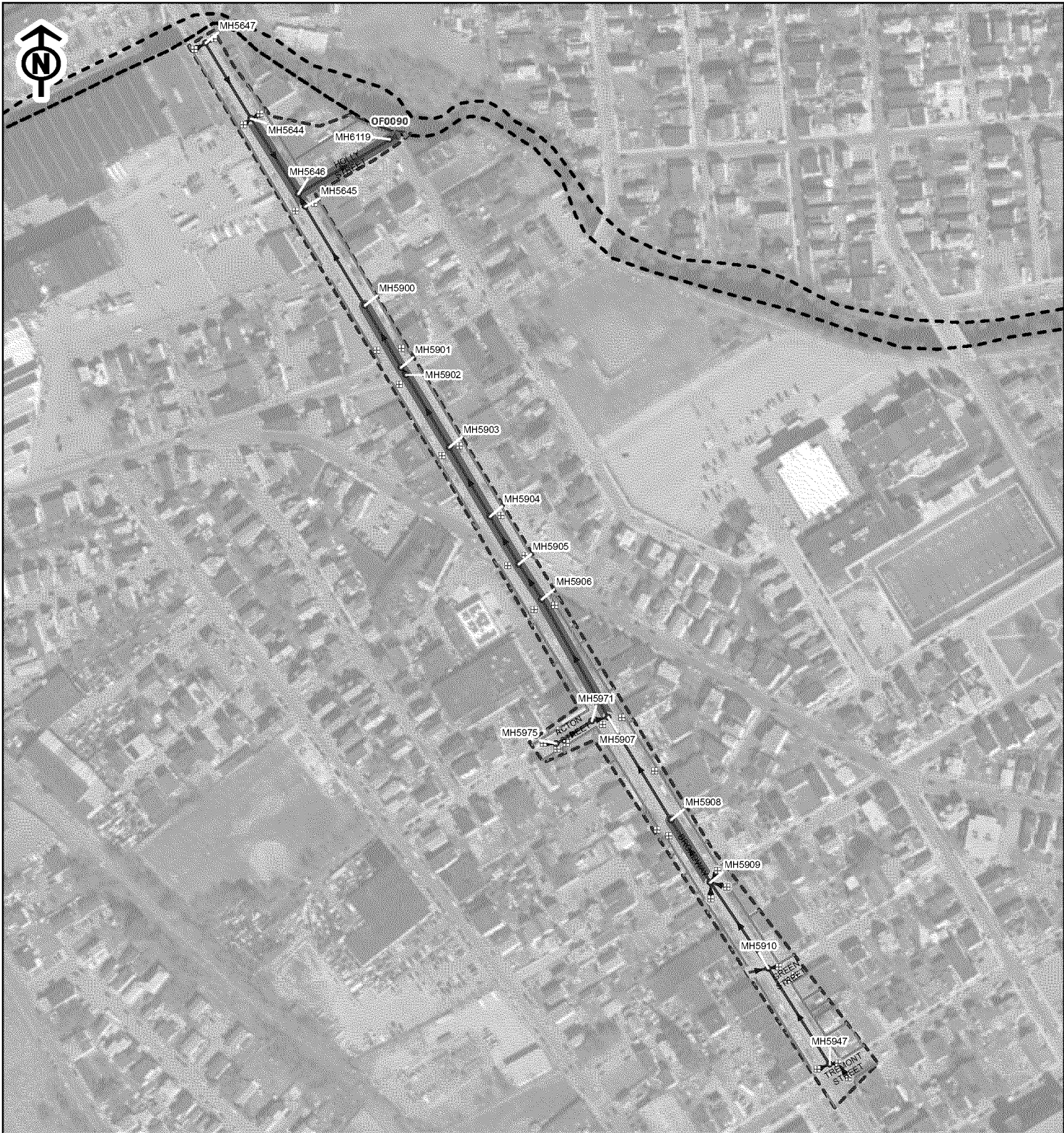
| Illicit Discharge Status | Type of Discharge | Street Name | Street No. | Estimated Flow (gpd) | Verification Date | Verification Method | Removal Date | # Days from Verification to Removal | # Days Outstanding (if not removed) |
|--------------------------|-------------------|-------------|------------|----------------------|-------------------|---------------------|--------------|-------------------------------------|-------------------------------------|
|                          |                   |             |            |                      |                   |                     |              |                                     |                                     |
|                          |                   |             |            |                      |                   |                     |              |                                     |                                     |

**Bracket Sampling Results this Reporting Period:**

| Manhole ID | Location | Inspection Date | Quantity Rain 24 hr | Pipe Direction | Standing Water | Flow | Flow Color | Velocity | Ammonia (mg/L) | Surfactants (mg/L) | Chlorine (mg/L) |
|------------|----------|-----------------|---------------------|----------------|----------------|------|------------|----------|----------------|--------------------|-----------------|
|            |          |                 |                     |                |                |      |            |          |                |                    |                 |

N/A = Not applicable; NT = Not tested; ND ( ) = Not detected (method detection limit); \*=Sandbagging event was inconclusive, fouled.





OF0090 Catchment Area  
Catchment Investigation Results

City of Lawrence, Massachusetts  
July 1, 2024 - December 31, 2024



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|                    |                                    |
|--------------------|------------------------------------|
| SCALE: 1" = 301'   | DOC: Outfall Result Figures 2.aprx |
| DATE: JANUARY 2025 | PROJECT #: 227206.05               |
| DRAWN BY: PBO      | SOURCE: ESRI, MassGIS              |

| Legend                         |                            |                     |
|--------------------------------|----------------------------|---------------------|
| Catchment Investigation Status | Illicit Discharge Location | Catch Basin         |
| Cleared                        | Abatement Status           | Storm Lateral Lines |
| Upstream Contamination         | ★ Completed                | Storm Gravity Main  |
| Suspected                      | ★ Outstanding              | Storm Open Drain    |
| Suspected, Low Priority**      | Discharge Type             | Storm Culvert       |
| Confirmed                      | ▲ MS4 Outfall              | Problem Catchment   |
| Other                          | △ Other Discharge Point    | Lawrence Boundary   |
|                                | ● Storm Manholes           |                     |

\*\*Note: Segments symbolized as "Suspected, Low Priority" represent sample results that do not meet the criteria for likely sewer input established in the 2016 Massachusetts MS4 Permit.



## PROBLEM CATCHMENT INVESTIGATION SUMMARY

|                                                                                    |                                                    |                                                               |                       |                            |                         |            |
|------------------------------------------------------------------------------------|----------------------------------------------------|---------------------------------------------------------------|-----------------------|----------------------------|-------------------------|------------|
| <b>Reporting Period:</b>                                                           | July 1, 2024 – December 31, 2024                   |                                                               |                       |                            |                         |            |
| <b>Catchment Name:</b>                                                             | Area that interconnects into Methuen from the East |                                                               |                       | <b>Outfall Feature ID:</b> | IN0005-E                |            |
| <b>Outfall Description:</b>                                                        | Size (in.):                                        | 12                                                            | Material:             | VCP                        | Shape: Circular         |            |
|                                                                                    | Latitude:                                          | 42° 42' 23.060" N                                             |                       | Longitude:                 | 71° 11' 24.885" W       |            |
| <b>Outfall Photo:</b>                                                              |                                                    | <b>Catchment Characteristics as of this Reporting Period:</b> |                       |                            |                         |            |
|  |                                                    | Priority Ranking:                                             |                       |                            | 6                       |            |
|                                                                                    |                                                    | Receiving Water:                                              |                       |                            | Methuen Interconnection |            |
|                                                                                    |                                                    | Total Catchment Area (acres):                                 |                       |                            | 44.3                    |            |
|                                                                                    |                                                    | Total Linear Feet (LF) of MS4 Drain Pipe:                     |                       |                            | 4,920                   |            |
|                                                                                    |                                                    | Total Drain Pipe Investigated to Date (# LF / %):             |                       |                            | 4,829 / 98%             |            |
|                                                                                    |                                                    | Total Drain Pipe "Cleared" to Date (# LF / %):                |                       |                            | 3,101 / 70%             |            |
|                                                                                    |                                                    | Total # Illicit Discharges Verified to Date:                  |                       |                            | 1                       |            |
|                                                                                    |                                                    | Total # Illicit Discharges Removed to Date:                   |                       |                            | 1                       |            |
|                                                                                    |                                                    | Total # Illicit Discharges Outstanding ≤ 60 days:             |                       |                            | 0                       |            |
|                                                                                    |                                                    | Total # Illicit Discharges Outstanding > 60 days:             |                       |                            | 0                       |            |
|                                                                                    |                                                    | Most Recent Dry-Weather Outfall Monitoring Date:              |                       |                            | 6/4/2015                |            |
|                                                                                    |                                                    | Dry Results:                                                  | Ammonia (mg/L):       | 0.1                        | Surfactants (mg/L):     | ND (0.125) |
|                                                                                    |                                                    |                                                               | Chlorine (mg/L):      | ND(0.05)                   | E. coli (MPN/100 mL):   | 98         |
|                                                                                    |                                                    | Most Recent Wet-Weather Outfall Monitoring Date:              |                       |                            | 9/11/2015               |            |
| Wet Results:                                                                       | Ammonia (mg/L):                                    | 0.1                                                           | Surfactants (mg/L):   | ND (0.125)                 |                         |            |
|                                                                                    | Chlorine (mg/L):                                   | ND(0.05)                                                      | E. coli (MPN/100 mL): | 12,033                     |                         |            |

### Narrative of Current Investigation Status as of this Reporting Period:

No investigatory efforts took place during this Reporting Period.

Through various past investigations on Warwick Street, it appears the source of existing contamination on Warwick Street originates in Methuen-owned infrastructure.

During this Reporting Period Lawrence scheduled a meeting with Methuen to discuss responsibilities of each municipality.

### Narrative of Follow-Up Activities Planned for the next Reporting Period:

The City has informed the City of Methuen of this issue. There is currently no further action required from the City of Lawrence. The City will continue its IDDE efforts in higher priority catchments.

**Verified Illicit Connections as of this Reporting Period:**

| Illicit Discharge Status | Type of Discharge                       | Street Name    | Street No. | Estimated Flow (gpd) | Verification Date | Verification Method           | Removal Date | # Days from Verification to Removal | # Days Outstanding (if not removed) |
|--------------------------|-----------------------------------------|----------------|------------|----------------------|-------------------|-------------------------------|--------------|-------------------------------------|-------------------------------------|
| Repaired by Owner        | One-Family Residence<br>Leaking lateral | Warwick Street | 126        | 330                  | 6/10/2019         | Building Inspection, Dye test | 8/28/2019    | 79                                  |                                     |

**Bracket Sampling Resulting this Reporting Period:**

| Manhole ID | Location | Inspection Date | Quantity of Rain 24 hr | Pipe Direction | Standing Water | Flow | Flow Color | Velocity | Value Ammonia | Value Surfactants | Value Chlorine |
|------------|----------|-----------------|------------------------|----------------|----------------|------|------------|----------|---------------|-------------------|----------------|
|            |          |                 |                        |                |                |      |            |          |               |                   |                |

N/A = Not applicable; NT = Not tested; ND ( ) = Not detected (method detection limit).



| Legend                         |                            |                     |
|--------------------------------|----------------------------|---------------------|
| Catchment Investigation Status | Illicit Discharge Location | Catch Basin         |
| Cleared                        | Abatement Status           | Storm Lateral Lines |
| Upstream Contamination         | ★ Completed                | Storm Gravity Main  |
| Suspected                      | ★ Outstanding              | Storm Open Drain    |
| Suspected, Low Priority**      | Discharge Type             | Storm Culvert       |
| Confirmed                      | ▲ MS4 Outfall              | Problem Catchment   |
| Other                          | △ Other Discharge Point    | Lawrence Boundary   |
|                                | ● Storm Manholes           |                     |

\*\*Note: Segments symbolized as "Suspected, Low Priority" represent sample results that do not meet the criteria for likely sewer input established in the 2016 Massachusetts MS4 Permit.

## IN0005-E Catchment Area Catchment Investigation Results

**City of Lawrence, Massachusetts**

**July 1, 2024 - December 31, 2024**



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SCALE: 1" = 284'

DOC: Outfall Result Figures 2.aprx

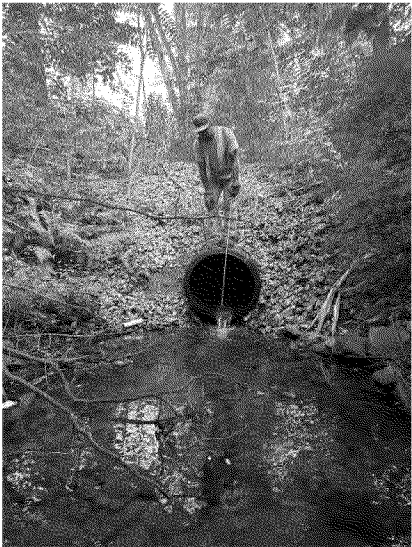
DATE: JANUARY 2025

PROJECT #: 227206.05

DRAWN BY: PBO

SOURCE: ESRI, MassGIS

## PROBLEM CATCHMENT INVESTIGATION SUMMARY

|                                                                                    |                                                               |                   |                       |                            |                  |
|------------------------------------------------------------------------------------|---------------------------------------------------------------|-------------------|-----------------------|----------------------------|------------------|
| <b>Reporting Period:</b>                                                           | July 1, 2024 – December 31, 2024                              |                   |                       |                            |                  |
| <b>Catchment Name:</b>                                                             | Area tributary to the outfall behind Market Basket Warehouse  |                   |                       | <b>Outfall Feature ID:</b> | OF0020           |
| <b>Outfall Description:</b>                                                        | Size (in.):                                                   | 36                | Material:             | HDPE                       | Shape: Circular  |
|                                                                                    | Latitude:                                                     | 42° 40' 56.525" N |                       | Longitude:                 | 71° 8' 55.639" W |
| <b>Outfall Photo:</b>                                                              | <b>Catchment Characteristics as of this Reporting Period:</b> |                   |                       |                            |                  |
|  | Priority Ranking:                                             |                   |                       |                            | 9                |
|                                                                                    | Receiving Water:                                              |                   |                       |                            | Shawsheen        |
|                                                                                    | Total Catchment Area (acres):                                 |                   |                       |                            | 95.49            |
|                                                                                    | Total Linear Feet (LF) of MS4 Drain Pipe:                     |                   |                       |                            | 12,185           |
|                                                                                    | Total Drain Pipe Investigated to Date (# LF / %):             |                   |                       |                            | 11,582 / 95%     |
|                                                                                    | Total Drain Pipe "Cleared" to Date (# LF / %):                |                   |                       |                            | 5,849 / 48%      |
|                                                                                    | Total # Illicit Discharges Verified to Date:                  |                   |                       |                            | 4                |
|                                                                                    | Total # Illicit Discharges Removed to Date:                   |                   |                       |                            | 4                |
|                                                                                    | Total # Illicit Discharges Outstanding ≤ 60 days:             |                   |                       |                            | 0                |
|                                                                                    | Total # Illicit Discharges Outstanding > 60 days:             |                   |                       |                            | 0                |
|                                                                                    | Most Recent Dry-Weather Outfall Monitoring Date:              |                   |                       |                            | 05/24/2022       |
|                                                                                    | Dry<br>Results:                                               | Ammonia (mg/L):   | 0.25                  | Surfactants (mg/L):        | 0.25             |
|                                                                                    |                                                               | Chlorine (mg/L):  | 0.12                  | E. coli (MPN/100 mL):      | 1,642            |
|                                                                                    | Most Recent Wet-Weather Outfall Monitoring Date:              |                   |                       |                            | 10/22/2014       |
|                                                                                    | Wet<br>Results:                                               | Ammonia (mg/L):   | 0.20                  | Surfactants (mg/L):        | ND (0.125)       |
| Chlorine (mg/L):                                                                   |                                                               | ND (0.05)         | E. coli (MPN/100 mL): | 2,400                      |                  |

### **Narrative of Current Investigation Status as of this Reporting Period:**

During this Reporting Period, dye testing was completed at three properties adjacent to MH5408-MH5409. All tests resulted in legal attachments to the sewer system and no dye observed in the storm drain. All addresses adjacent to MH5408-MH5409 were mailed communication on scheduling dye tests; however, only three properties scheduled a dye test at the time of this report.

### **Narrative of Follow-Up Activities Planned for the next Reporting Period:**

The City will continue to attempt dye testing buildings adjacent to MH5408-MH5409 to determine the source of the potential illicit discharge.

The City will conduct CCTV on FIT5392-MH5392 to determine if there is any additional infrastructure attached to this catchment.

Additionally, the City plans to complete Dry-Weather screening at OF0020 during the next Reporting Period.

**Verified Illicit Connections as of this Reporting Period:**

| Illicit Discharge Status                                                       | Type of Discharge                                       | Street Name                     | Street No. | Estimated Flow (gpd) | Verification Date | Verification Method                  | Removal Date | # Days from Verification to Removal | # Days Outstanding (if not removed) |
|--------------------------------------------------------------------------------|---------------------------------------------------------|---------------------------------|------------|----------------------|-------------------|--------------------------------------|--------------|-------------------------------------|-------------------------------------|
| Repaired by City                                                               | Two-Family Residence                                    | Gilbert St                      | 44         | 660                  | 12/19/2016        | Building Inspection, Dye Test & CCTV | 12/1/2017    | 365                                 |                                     |
| Repaired by City                                                               | Two-Family Residence                                    | Gilbert St                      | 42         | 550                  | 6/5/2017          | Dye Test & CCTV                      | 12/5/2017    | 183                                 |                                     |
| Responsible Party Notified, Abatement Complete, Confirmatory Sampling Complete | Commercial Building – 1 Story building (Dentist Office) | South Broadway                  | 525        | 110                  | 7/16/2019         | Building Inspection, Dye Test & CCTV | 10/3/2019    | 79                                  |                                     |
| Added to Sanitary Sewer Improvement Contract VI                                | Sewage Exfiltration near MH5411                         | Corbett Road @ Sylvester Street |            | 90                   | 7/8/2022          | Infrastructure Dye test and CCTV     | 3/1/2023     | 263                                 |                                     |

**Bracket Sampling Resulting this Reporting Period:**

| Manhole ID | Location | Inspection Date | Quantity of Rain 24 hr | Pipe Direction | Standing Water | Flow | Flow Color | Velocity | Value Ammonia | Value Surfactants | Value Chlorine |
|------------|----------|-----------------|------------------------|----------------|----------------|------|------------|----------|---------------|-------------------|----------------|
|            |          |                 |                        |                |                |      |            |          |               |                   |                |

N/A = Not applicable; NT = Not tested; ND ( ) = Not detected (method detection limit).





| Legend                         |                            |                     |
|--------------------------------|----------------------------|---------------------|
| Catchment Investigation Status | Illicit Discharge Location | ☒ Catch Basin       |
| Cleared                        | Abatement Status           | Storm Lateral Lines |
| Upstream Contamination         | ★ Completed                | Storm Gravity Main  |
| Suspected                      | ★ Outstanding              | Storm Open Drain    |
| Suspected, Low Priority**      | Discharge Type             | Storm Culvert       |
| Confirmed                      | ▲ MS4 Outfall              | Problem Catchment   |
| Other                          | △ Other Discharge Point    | Lawrence Boundary   |
|                                | ● Storm Manholes           |                     |

\*\*Note: Segments symbolized as "Suspected, Low Priority" represent sample results that do not meet the criteria for likely sewer input established in the 2016 Massachusetts MS4 Permit.

## OF0020 Catchment Area Catchment Investigation Results

**City of Lawrence, Massachusetts**

**July 1, 2024 - December 31, 2024**



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SCALE: 1" = 507'

DOC: Outfall Result Figures 2.aprx

DATE: JANUARY 2025

PROJECT #: 227206.05

DRAWN BY: PBO

SOURCE: ESRI, MassGIS



## PROBLEM CATCHMENT INVESTIGATION SUMMARY

|                                                                                    |                                                                                     |                   |           |                       |                   |
|------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------|-----------|-----------------------|-------------------|
| Reporting Period:                                                                  | July 1, 2024 – December 31, 2024                                                    |                   |           |                       |                   |
| Catchment Name:                                                                    | Area tributary to the outfall behind Beacon Street at the intersection of Lisa Lane |                   |           | Outfall Feature ID:   | OF0027            |
| Outfall Description:                                                               | Size (in.):                                                                         | 24                | Material: | RCP                   | Shape: Circular   |
|                                                                                    | Latitude:                                                                           | 42° 40' 41.460" N |           | Longitude:            | 71° 10' 23.113" W |
| Outfall Photo:                                                                     | Catchment Characteristics as of this Reporting Period:                              |                   |           |                       |                   |
|  | Priority Ranking:                                                                   |                   |           |                       | 11                |
|                                                                                    | Receiving Water:                                                                    |                   |           |                       | Shawsheen         |
|                                                                                    | Total Catchment Area (acres):                                                       |                   |           |                       | 37.63             |
|                                                                                    | Total Linear Feet (LF) of MS4 Drain Pipe:                                           |                   |           |                       | 7,500             |
|                                                                                    | Total Drain Pipe Investigated to Date (# LF / %):                                   |                   |           |                       | 7,500 / 100%      |
|                                                                                    | Total Drain Pipe "Cleared" to Date (# LF / %):                                      |                   |           |                       | 5,850 / 78%       |
|                                                                                    | Total # Illicit Discharges Verified to Date:                                        |                   |           |                       | 0                 |
|                                                                                    | Total # Illicit Discharges Removed to Date:                                         |                   |           |                       | 0                 |
|                                                                                    | Total # Illicit Discharges Outstanding ≤ 60 days:                                   |                   |           |                       | 0                 |
|                                                                                    | Total # Illicit Discharges Outstanding > 60 days:                                   |                   |           |                       | 0                 |
|                                                                                    | Most Recent Dry-Weather Outfall Monitoring Date:                                    |                   |           |                       | 5/21/2015         |
|                                                                                    | Dry Results:                                                                        | Ammonia (mg/L):   | 0.3       | Surfactants (mg/L):   | ND (0.125)        |
|                                                                                    |                                                                                     | Chlorine (mg/L):  | ND (0.05) | E. coli (MPN/100 mL): | <2                |
|                                                                                    | Most Recent Wet-Weather Outfall Monitoring Date:                                    |                   |           |                       | 6/2/2015          |
|                                                                                    | Wet Results:                                                                        | Ammonia (mg/L):   | 0.2       | Surfactants (mg/L):   | 0.25              |
|                                                                                    |                                                                                     | Chlorine (mg/L):  | ND (0.05) | E. coli (MPN/100 mL): | >24,196           |

### Narrative of Current Investigation Status as of this Reporting Period:

During this Reporting Period, dye testing was completed at three properties. All tests resulted in legal attachments to the sewer system and no dye observed in the storm drain. All addresses adjacent to MH5826-MH5827 were mailed communication on scheduling dye tests; however, only three properties scheduled a dye test as of the time of this report.

### Narrative of Follow-Up Activities Planned for the next Reporting Period:

During the next Reporting Period, the City will conduct lab sampling for ammonia, Total Bacteroides, and Human Bacteroides at MH5826-MH5827 to determine the precise levels for each indicator and if the contamination is a human impact. The City will return to clean manholes MH5826 and MH5827, and CCTV at MH5826-MH5827, which was previously sampled in 2021 and indicated elevated levels for ammonia and chlorine of 2.00 mg/L and 1.44 mg/L, respectively. The City will continue to attempt dye testing buildings adjacent to MH5826-MH5827 to determine the source of the potential illicit discharge.

Additionally, the City plans to complete Dry-Weather screening at OF0027 during the next Reporting Period.

**Verified Illicit Connections as of this Reporting Period:**

| Illicit Discharge Status | Type of Discharge | Street Name | Street No. | Estimated Flow (gpd) | Verification Date | Verification Method | Removal Date | # Days from Verification to Removal | # Days Outstanding (if not removed) |
|--------------------------|-------------------|-------------|------------|----------------------|-------------------|---------------------|--------------|-------------------------------------|-------------------------------------|
|                          |                   |             |            |                      |                   |                     |              |                                     |                                     |

**Bracket Sampling Resulting this Reporting Period:**

| Manhole ID | Location | Inspection Date | Quantity of Rain 24 hr | Pipe Direction | Standing Water | Flow | Flow Color | Velocity | Value Ammonia | Value Surfactants | Value Chlorine |
|------------|----------|-----------------|------------------------|----------------|----------------|------|------------|----------|---------------|-------------------|----------------|
|            |          |                 |                        |                |                |      |            |          |               |                   |                |

N/A = Not applicable; NT = Not tested; ND ( ) = Not detected (method detection limit).



| Legend                         |                            |                       |
|--------------------------------|----------------------------|-----------------------|
| Catchment Investigation Status | Illicit Discharge Location | ☒ Catch Basin         |
| ☐ Cleared                      | Abatement Status           | → Storm Lateral Lines |
| ☐ Upstream Contamination       | ★ Completed                | → Storm Gravity Main  |
| ☐ Suspected                    | ★ Outstanding              | ▶ Storm Open Drain    |
| ☐ Suspected, Low Priority**    | Discharge Type             | — Storm Culvert       |
| ☐ Confirmed                    | ▲ MS4 Outfall              | ☐ Problem Catchment   |
| ☐ Other                        | △ Other Discharge Point    | ☐ Lawrence Boundary   |
|                                | ● Storm Manholes           |                       |

\*\*Note: Segments symbolized as "Suspected, Low Priority" represent sample results that do not meet the criteria for likely sewer input established in the 2016 Massachusetts MS4 Permit.

OF0027 Catchment Area  
Catchment Investigation Results

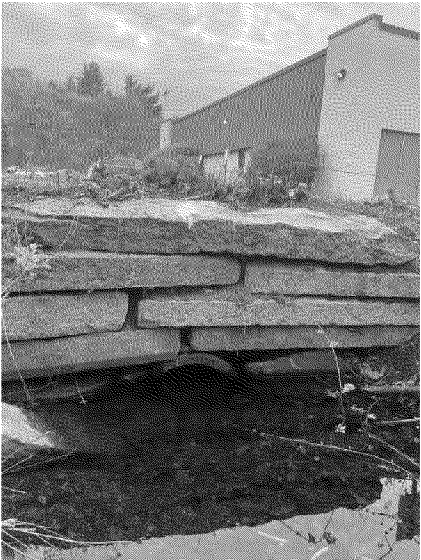
City of Lawrence, Massachusetts  
July 1, 2024 - December 31, 2024



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|                    |                                    |
|--------------------|------------------------------------|
| SCALE: 1" = 261'   | DOC: Outfall Result Figures 2.aprx |
| DATE: JANUARY 2025 | PROJECT #: 227206.05               |
| DRAWN BY: PBO      | SOURCE: ESRI, MassGIS              |

## PROBLEM CATCHMENT INVESTIGATION SUMMARY

|                                                                                    |                                                                                         |                   |                       |                            |                  |
|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|-------------------|-----------------------|----------------------------|------------------|
| <b>Reporting Period:</b>                                                           | July 1, 2024 – December 31, 2024                                                        |                   |                       |                            |                  |
| <b>Catchment Name:</b>                                                             | Area tributary to the outfall behind Community Day Charter Public School on Ballard Way |                   |                       | <b>Outfall Feature ID:</b> | OF0112           |
| <b>Outfall Description:</b>                                                        | Size (in.):                                                                             | 18                | Material:             | Precast Concrete           | Shape: Circular  |
|                                                                                    | Latitude:                                                                               | 42° 41' 0.3552" N |                       | Longitude:                 | 71° 11' 6.634" W |
| <b>Outfall Photo:</b>                                                              | <b>Catchment Characteristics as of this Reporting Period:</b>                           |                   |                       |                            |                  |
|  | Priority Ranking:                                                                       |                   |                       |                            | 10               |
|                                                                                    | Receiving Water:                                                                        |                   |                       |                            | Merrimack        |
|                                                                                    | Total Catchment Area (acres):                                                           |                   |                       |                            | 7.37             |
|                                                                                    | Total Linear Feet (LF) of MS4 Drain Pipe:                                               |                   |                       |                            | 1,150            |
|                                                                                    | Total Drain Pipe Investigated to Date (# LF / %):                                       |                   |                       |                            | 1,150 / 100%     |
|                                                                                    | Total Drain Pipe "Cleared" to Date (# LF / %):                                          |                   |                       |                            | 560 / 49%        |
|                                                                                    | Total # Illicit Discharges Verified to Date:                                            |                   |                       |                            | 1                |
|                                                                                    | Total # Illicit Discharges Removed to Date:                                             |                   |                       |                            | 1                |
|                                                                                    | Total # Illicit Discharges Outstanding ≤ 60 days:                                       |                   |                       |                            | 0                |
|                                                                                    | Total # Illicit Discharges Outstanding > 60 days:                                       |                   |                       |                            | 0                |
|                                                                                    | Most Recent Dry-Weather Outfall Monitoring Date:                                        |                   |                       |                            | 6/18/2024        |
|                                                                                    | Dry Results:                                                                            | Ammonia (mg/L):   | 2.0                   | Surfactants (mg/L):        | 0.5              |
|                                                                                    |                                                                                         | Chlorine (mg/L):  | 0.14                  | E. coli (MPN/100 mL):      | 121              |
|                                                                                    | Most Recent Wet-Weather Outfall Monitoring Date:                                        |                   |                       |                            | 4/16/2018        |
|                                                                                    | Wet Results:                                                                            | Ammonia (mg/L):   | ND (0.05)             | Surfactants (mg/L):        | ND (0.125)       |
| Chlorine (mg/L):                                                                   |                                                                                         | ND (0.05)         | E. coli (MPN/100 mL): | 185                        |                  |

### Narrative of Current Investigation Status as of this Reporting Period:

No investigatory efforts took place during this Reporting Period.

### Narrative of Follow-Up Activities Planned for the next Reporting Period:

During the next reporting period, the City should perform a dry weather outfall sampling effort for lab ammonia, surfactants, Total Bacteroides, and Human Bacteroides to determine the precise levels of each indicator and if the contamination is a human impact.

Upon receipt of outstanding lab results for UNK-CB5088, and in consideration of positive test results at this location in previous reporting periods, the City will discuss if further sampling and dye testing at this location is warranted.

**Verified Illicit Connections as of this Reporting Period:**

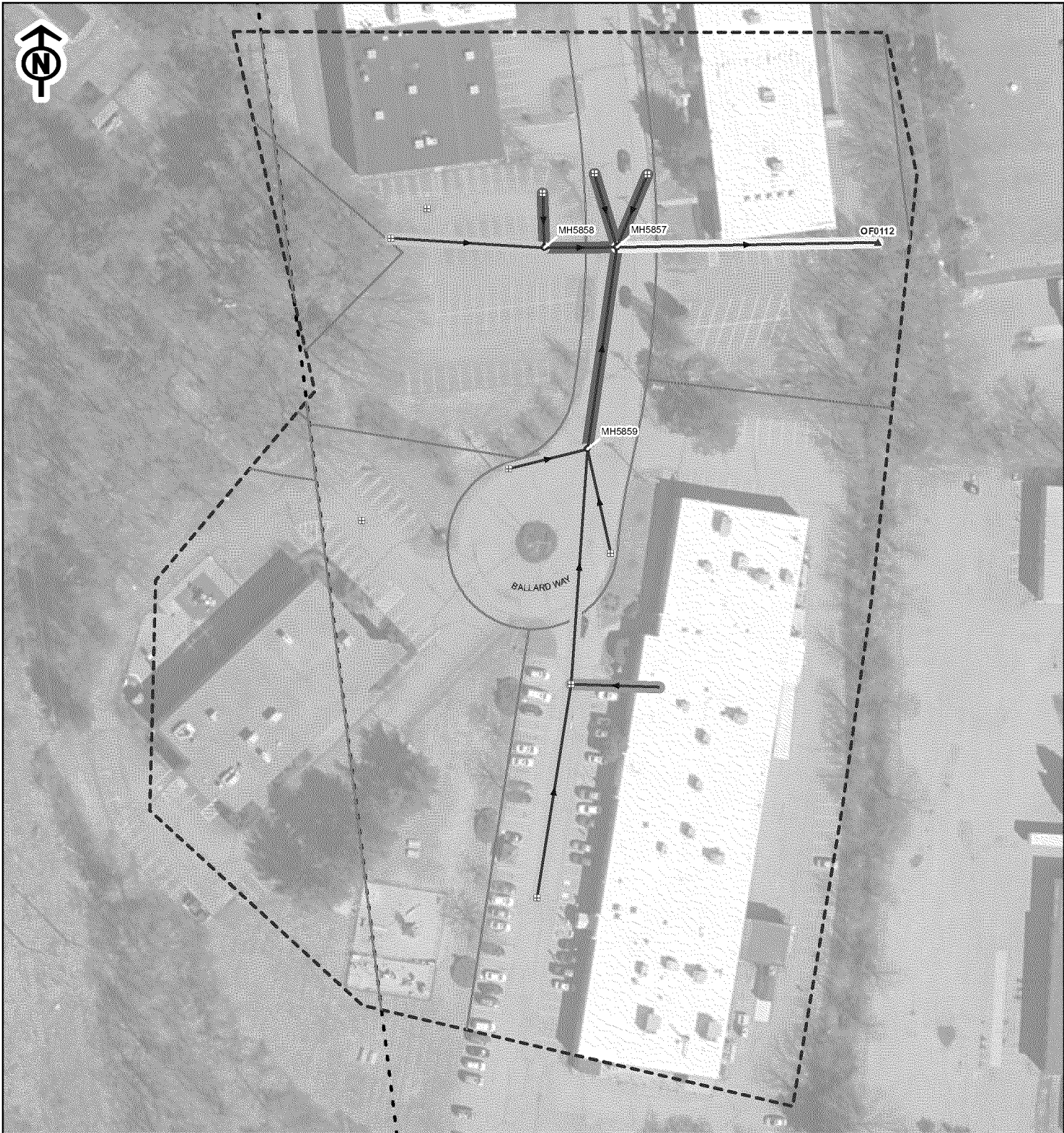
| Illicit Discharge Status | Type of Discharge | Street Name | Street No. | Estimated Flow (gpd) | Verification Date | Verification Method | Removal Date | # Days from Verification to Removal | # Days Outstanding (if not removed) |
|--------------------------|-------------------|-------------|------------|----------------------|-------------------|---------------------|--------------|-------------------------------------|-------------------------------------|
|                          |                   |             |            |                      |                   |                     |              |                                     |                                     |

**Bracket Sampling Resulting this Reporting Period:**

| Manhole ID | Location | Inspection Date | Pipe Direction | Standing Water | Flow | Flow Color | Velocity | Value Ammonia | Value Surfactants | Value Chlorine | Total Bacteroides | Human Bacteroides |
|------------|----------|-----------------|----------------|----------------|------|------------|----------|---------------|-------------------|----------------|-------------------|-------------------|
|            |          |                 |                |                |      |            |          |               |                   |                |                   |                   |

N/A = Not applicable; NT = Not tested; ND ( ) = Not detected (method detection limit).





| Legend                         |                            |                     |
|--------------------------------|----------------------------|---------------------|
| Catchment Investigation Status | Illicit Discharge Location | Catch Basin         |
| Cleared                        | Abatement Status           | Storm Lateral Lines |
| Upstream Contamination         | ★ Completed                | Storm Gravity Main  |
| Suspected                      | ★ Outstanding              | Storm Open Drain    |
| Suspected, Low Priority**      | Discharge Type             | Storm Culvert       |
| Confirmed                      | ▲ MS4 Outfall              | Problem Catchment   |
| Other                          | △ Other Discharge Point    | Lawrence Boundary   |
|                                | ● Storm Manholes           |                     |

\*\*Note: Segments symbolized as "Suspected, Low Priority" represent sample results that do not meet the criteria for likely sewer input established in the 2016 Massachusetts MS4 Permit.

## OF0112 Catchment Area Catchment Investigation Results

**City of Lawrence, Massachusetts**  
**July 1, 2024 - December 31, 2024**



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|                    |                                    |
|--------------------|------------------------------------|
| SCALE: 1" = 97'    | DOC: Outfall Result Figures 2.aprx |
| DATE: JANUARY 2025 | PROJECT #: 227206.05               |
| DRAWN BY: PBO      | SOURCE: ESRI, MassGIS              |

## PROBLEM CATCHMENT INVESTIGATION SUMMARY

|                                                                                    |                                                                                   |                   |           |                       |                     |             |
|------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------|-----------|-----------------------|---------------------|-------------|
| Reporting Period:                                                                  | July 1, 2024 – December 31, 2024                                                  |                   |           |                       |                     |             |
| Catchment Name:                                                                    | Area tributary to the outfall to the south of the Abe Bashara Community Boathouse |                   |           |                       | Outfall Feature ID: | OF0003      |
| Outfall Description:                                                               | Size (in.):                                                                       | 42                | Material: | RCP                   | Shape:              | Circular    |
|                                                                                    | Latitude:                                                                         | 42° 41' 31.830" N |           | Longitude:            | 71° 10' 33.006" W   |             |
| Outfall Photo:                                                                     | Catchment Characteristics as of this Reporting Period:                            |                   |           |                       |                     |             |
|  | Priority Ranking:                                                                 |                   |           |                       |                     | 7           |
|                                                                                    | Receiving Water:                                                                  |                   |           |                       |                     | Merrimack   |
|                                                                                    | Total Catchment Area (acres):                                                     |                   |           |                       |                     | 112.9       |
|                                                                                    | Total Linear Feet (LF) of MS4 Drain Pipe:                                         |                   |           |                       |                     | 12,322      |
|                                                                                    | Total Drain Pipe Investigated to Date (# LF / %):                                 |                   |           |                       |                     | 5,996 / 49% |
|                                                                                    | Total Drain Pipe "Cleared" to Date (# LF / %):                                    |                   |           |                       |                     | 1,872 / 15% |
|                                                                                    | Total # Illicit Discharges Verified to Date:                                      |                   |           |                       |                     | 2           |
|                                                                                    | Total # Illicit Discharges Removed to Date:                                       |                   |           |                       |                     | 2           |
|                                                                                    | Total # Illicit Discharges Outstanding ≤ 60 days:                                 |                   |           |                       |                     | 0           |
|                                                                                    | Total # Illicit Discharges Outstanding > 60 days:                                 |                   |           |                       |                     | 0           |
|                                                                                    | Most Recent Dry-Weather Outfall Monitoring Date:                                  |                   |           |                       |                     | 5/24/2022   |
|                                                                                    | Dry Results:                                                                      | Ammonia (mg/L):   | 0.25      | Surfactants (mg/L):   |                     | 0.35        |
|                                                                                    |                                                                                   | Chlorine (mg/L):  | ND (0.05) | E. coli (MPN/100 mL): |                     | 6,932       |
|                                                                                    | Most Recent Wet-Weather Outfall Monitoring Date:                                  |                   |           |                       |                     | 7/12/2019   |
|                                                                                    | Wet Results:                                                                      | Ammonia (mg/L):   | 0.1       | Surfactants (mg/L):   |                     | ND (0.125)  |
|                                                                                    |                                                                                   | Chlorine (mg/L):  | ND (0.05) | E. coli (MPN/100 mL): |                     | 14,136      |

### Narrative of Current Investigation Status as of this Reporting Period:

During this Reporting Period, dye testing was completed at two properties adjacent to MH5753-MH5379 resulting in a legal attachment to the sewer system. Dye testing was completed at 34 Eaton Street adjacent to MH5383-MH5377 resulting in dye observed in both the sewer and the drain. CCTV footage of sewer pipe FIT0383-MH2240 revealed defects in the sewer, which the sewer lateral for 34 Eaton Street is connected. Thirteen linear feet of the sewer was replaced with 8-inch PVC in sewer pipe FIT0383-MH2240. Confirmatory dye testing was completed at 34 Eaton Street which resulted in a legal connection to the sewer.

EPA conducted sampling on two pipes in this catchment, including sampling for E.Coli, Enterococcus, and Pharmaceuticals and Personal Care Products (PPCPs) which include Cotinine, Acetaminophen, Paraxanthine, Atenolol, Caffeine, Metoprolol, Diphenhydramine, and Carbamazepine. The PPCPs results are not official indicators in the MS4 and are, rather, an expanded panel that the EPA is using for their testing efforts. Accordingly, these results will not be used to influence ongoing investigations. Values for the PPCPs results will be included in Attachment A-9 for this Reporting Period. Since a sewer indicator threshold wasn't triggered, these sites do not warrant additional investigation.

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**Narrative of Follow-Up Activities Planned for the next Reporting Period:**

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The next Reporting Period, the city will attempt dye testing sewer pipe MH2396-MH2395 to determine if the sewer is exfiltrating into drainpipes MH5627-MH5366. The City will continue to dye test buildings adjacent to storm drain MH5627-MH5366, MH5383-MH5377, MH5363-MH5362, CB5014-MH5464, MH5276-MH5281, MH5281-MH5382, MH5383-MH5377, MH5370-MH5368, and MH5376-MH5377 to determine the source of the potential illicit discharge.

By October 18, 2025 the City plans to complete Dry-Weather screening at the outfall due to the illicit discharge removal at 34 Eaton Street.

**Verified Illicit Connections as of this Reporting Period:**

| Illicit Discharge Status   | Type of Discharge       | Street Name   | Street No. | Estimated Flow (gpd) | Verification Date | Verification Method | Removal Date | # Days from Verification to Removal | # Days Outstanding (if not removed) |
|----------------------------|-------------------------|---------------|------------|----------------------|-------------------|---------------------|--------------|-------------------------------------|-------------------------------------|
| Repaired by Property Owner | Single-Family Residence | Beacon Street | 70         | 330                  | 8/3/2015          | Dye Test & CCTV     | 5/3/2016     | 274                                 |                                     |
| Repaired by the City       | Two-Family Residence    | Eaton Street  | 34         | 250 <sup>1</sup>     | 8/19/2024         | Dye Test & CCTV     | 10/18/2024   | 60                                  |                                     |

(1) Estimated flow calculations based on total water usage readings provided by the City.

**Bracket Sampling Results this Reporting Period:**

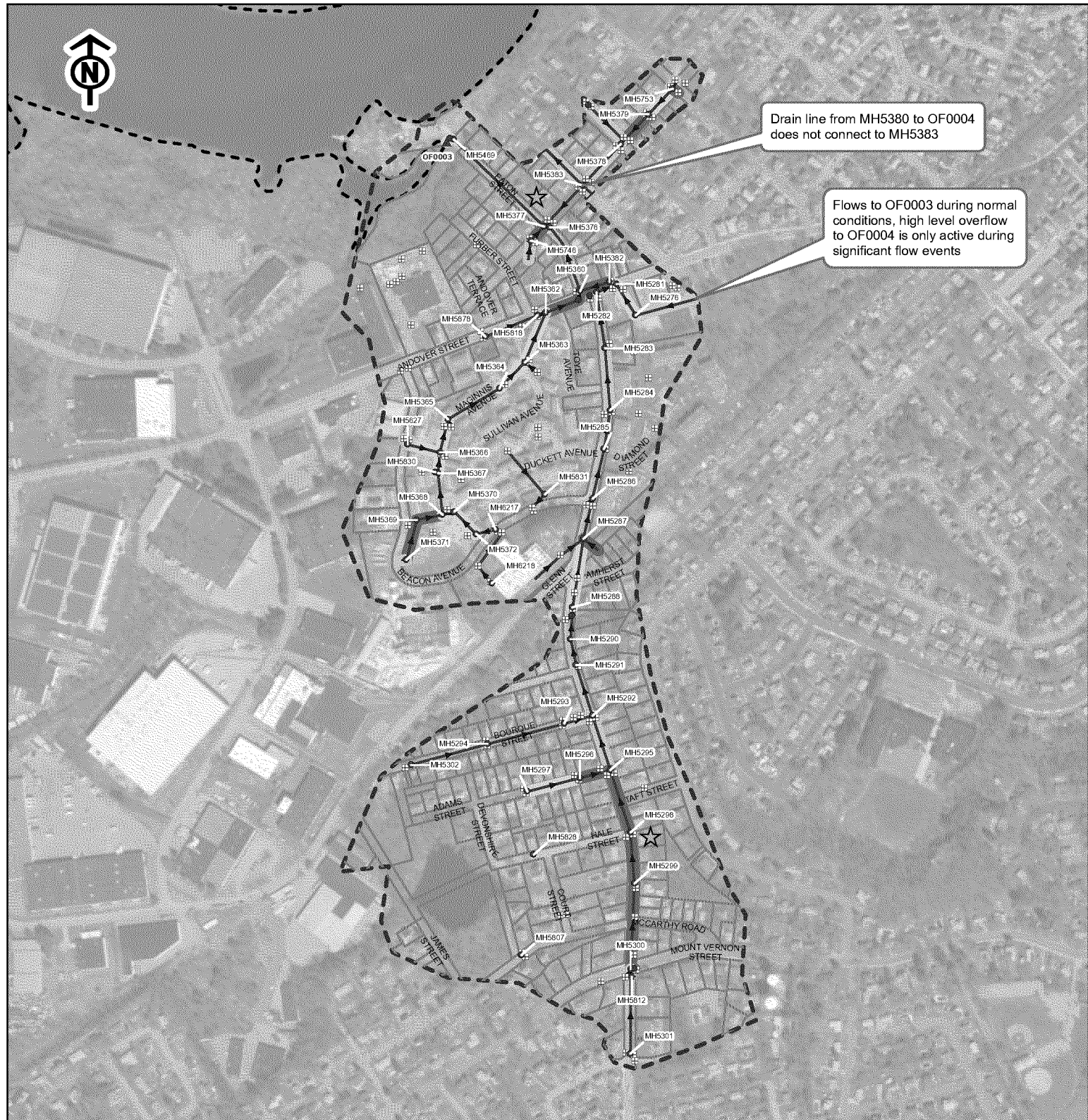
| Manhole ID          | Location     | Inspection Date | Pipe Direction | Standing Water | Flow | Flow Color | Velocity | Value Ammonia (mg/L) | Value Surfactants (mg/L) | Value Chlorine (mg/L) | Total Bacteroides (MPN/100mL) |
|---------------------|--------------|-----------------|----------------|----------------|------|------------|----------|----------------------|--------------------------|-----------------------|-------------------------------|
| MH5363 <sup>1</sup> | Sullivan Ave | 10/2/2024       | SW             | No             | Yes  | Clear      | Slow     | 0                    | 0.25                     | 0.1                   | 85                            |
| MH5366 <sup>1</sup> | Maginnis Ave | 10/2/2024       | S              | Yes            | Yes  | Clear      | Slow     | 0.15                 | 0.25                     | 0.12                  | 86                            |
|                     |              |                 |                |                |      |            |          |                      |                          |                       |                               |

(1) EPA facilitated sampling event on 10/2/2024, additional laboratory samples were conducted on PPCPs (Cotinine, Acetaminophen, Paraxanthine, Atenolol, Caffeine, Metoprolol, Diphenhydramine, and Carbamazepine). These results are shown in full within Attachment A-9.

N/A = Not applicable; NT = Not tested; ND ( ) = Not detected (method detection limit), \* =Inaccessible pipe, no sample taken.



Figure Exported: 1/21/2025 By: porenan Using: \\woodardcurran.net\shared\Projects\0227206.05 Lawrence MA Phase V SSES\wp103\_Compliance\07\_Reporting\Report No. 21-Jan. 2025\GIS\Outfall Results\Outfall Result Figures 2.0\Outfall Result Figures 2.aprx



**Legend**

| Catchment Investigation Status                                                     |                           | Illicit Discharge Location |                       |  | Catch Basin         |
|------------------------------------------------------------------------------------|---------------------------|----------------------------|-----------------------|-------------------------------------------------------------------------------------|---------------------|
|  | Cleared                   | Abatement Status           |                       |                                                                                     |                     |
|  | Upstream Contamination    | ★                          | Completed             |  | Storm Lateral Lines |
|  | Suspected                 | ★                          | Outstanding           |  | Storm Gravity Main  |
|  | Suspected, Low Priority** | Discharge Type             |                       |  | Storm Open Drain    |
|  | Confirmed                 | ▲                          | MS4 Outfall           |  | Storm Culvert       |
|  | Other                     | △                          | Other Discharge Point |  | Problem Catchment   |
|                                                                                    |                           | ●                          | Storm Manholes        |  | Lawrence Boundary   |

\*\*Note: Segments symbolized as "Suspected, Low Priority" represent sample results that do not meet the criteria for likely sewer input established in the 2016 Massachusetts MS4 Permit.

**OF0003 Catchment Area  
Catchment Investigation Results**

**City of Lawrence, Massachusetts**  
**July 1, 2024 - December 31, 2024**

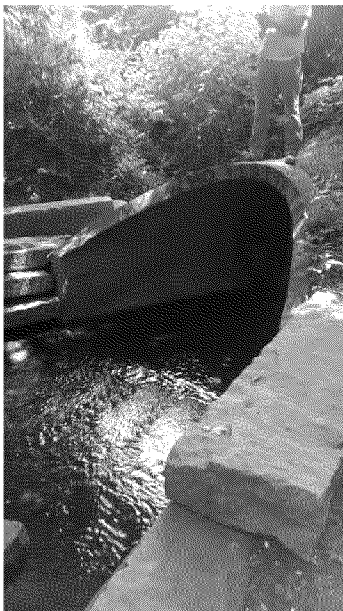


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|                    |                                    |
|--------------------|------------------------------------|
| SCALE: 1" = 600'   | DOC: Outfall Result Figures 2.aprx |
| DATE: JANUARY 2025 | PROJECT #: 227206.05               |
| DRAWN BY: PBO      | SOURCE: ESRI, MassGIS              |



## PROBLEM CATCHMENT INVESTIGATION SUMMARY

|                                                                                    |                                                                          |                   |                       |                            |                  |
|------------------------------------------------------------------------------------|--------------------------------------------------------------------------|-------------------|-----------------------|----------------------------|------------------|
| <b>Reporting Period:</b>                                                           | July 1, 2024 – December 31, 2024                                         |                   |                       |                            |                  |
| <b>Catchment Name:</b>                                                             | Area tributary to the outfall near South Lawrence East Elementary School |                   |                       | <b>Outfall Feature ID:</b> | OF0018           |
| <b>Outfall Description:</b>                                                        | Size (in.):                                                              | 60                | Material:             | RCP                        | Shape: Circular  |
|                                                                                    | Latitude:                                                                | 42° 41' 43.717" N |                       | Longitude:                 | 71° 8' 45.977" W |
| <b>Outfall Photo:</b>                                                              | <b>Catchment Characteristics as of this Reporting Period:</b>            |                   |                       |                            |                  |
|  | Priority Ranking:                                                        |                   |                       |                            | 8                |
|                                                                                    | Receiving Water:                                                         |                   |                       |                            | Shawsheen        |
|                                                                                    | Total Catchment Area (acres):                                            |                   |                       |                            | 123.5            |
|                                                                                    | Total Linear Feet (LF) of MS4 Drain Pipe:                                |                   |                       |                            | 16,069           |
|                                                                                    | Total Drain Pipe Investigated to Date (# LF / %):                        |                   |                       |                            | 6,308 / 39%      |
|                                                                                    | Total Drain Pipe "Cleared" to Date (# LF / %):                           |                   |                       |                            | 2,367 / 15%      |
|                                                                                    | Total # Illicit Discharges Verified to Date:                             |                   |                       |                            | 3                |
|                                                                                    | Total # Illicit Discharges Removed to Date:                              |                   |                       |                            | 3                |
|                                                                                    | Total # Illicit Discharges Outstanding ≤ 60 days:                        |                   |                       |                            | 0                |
|                                                                                    | Total # Illicit Discharges Outstanding > 60 days:                        |                   |                       |                            | 0                |
|                                                                                    | Most Recent Dry-Weather Outfall Monitoring Date:                         |                   |                       |                            | 05/24/2022       |
|                                                                                    | Dry<br>Results:                                                          | Ammonia (mg/L):   | ND (0.05)             | Surfactants (mg/L):        | 0.5              |
|                                                                                    |                                                                          | Chlorine (mg/L):  | ND (0.05)             | E. coli (MPN/100 mL):      | 3,683            |
|                                                                                    | Most Recent Wet-Weather Outfall Monitoring Date:                         |                   |                       |                            | 10/17/2019       |
|                                                                                    | Wet<br>Results:                                                          | Ammonia (mg/L):   | 0.1                   | Surfactants (mg/L):        | ND (0.125)       |
| Chlorine (mg/L):                                                                   |                                                                          | ND (0.05)         | E. coli (MPN/100 mL): | 2,419.6                    |                  |

### **Narrative of Current Investigation Status as of this Reporting Period:**

During this Reporting Period, dye testing was completed at six properties adjacent to or upstream of MH5440-MH5441 resulting in a legal attachment to the sewer system or no dye observed in either the sewer or the drain.

Dye testing was completed at 5 Durso Avenue adjacent to MH5438-MH5439 resulting in dye observed in both the sewer and the drain. Sixteen linear feet of the existing sewer lateral was replaced with 6-inch PVC pipe, servicing 5 Durso Avenue. Confirmatory dye testing was completed at 5 Durso Avenue which resulted in a legal connection to the sewer.

### **Narrative of Follow-Up Activities Planned for the next Reporting Period:**

The next Reporting Period, the City will conduct follow-up laboratory sampling at MH5440-MH5441 for ammonia, surfactants, E-Coli, total Bacteroides and human Bacteroides. If likely sewer input indicators remain, additional dye testing will be performed as needed.

By October 4, 2025 the City plans to complete Dry-Weather screening at the outfall due to the illicit discharge removal at 5 Durso Avenue.

**Verified Illicit Connections as of this Reporting Period:**

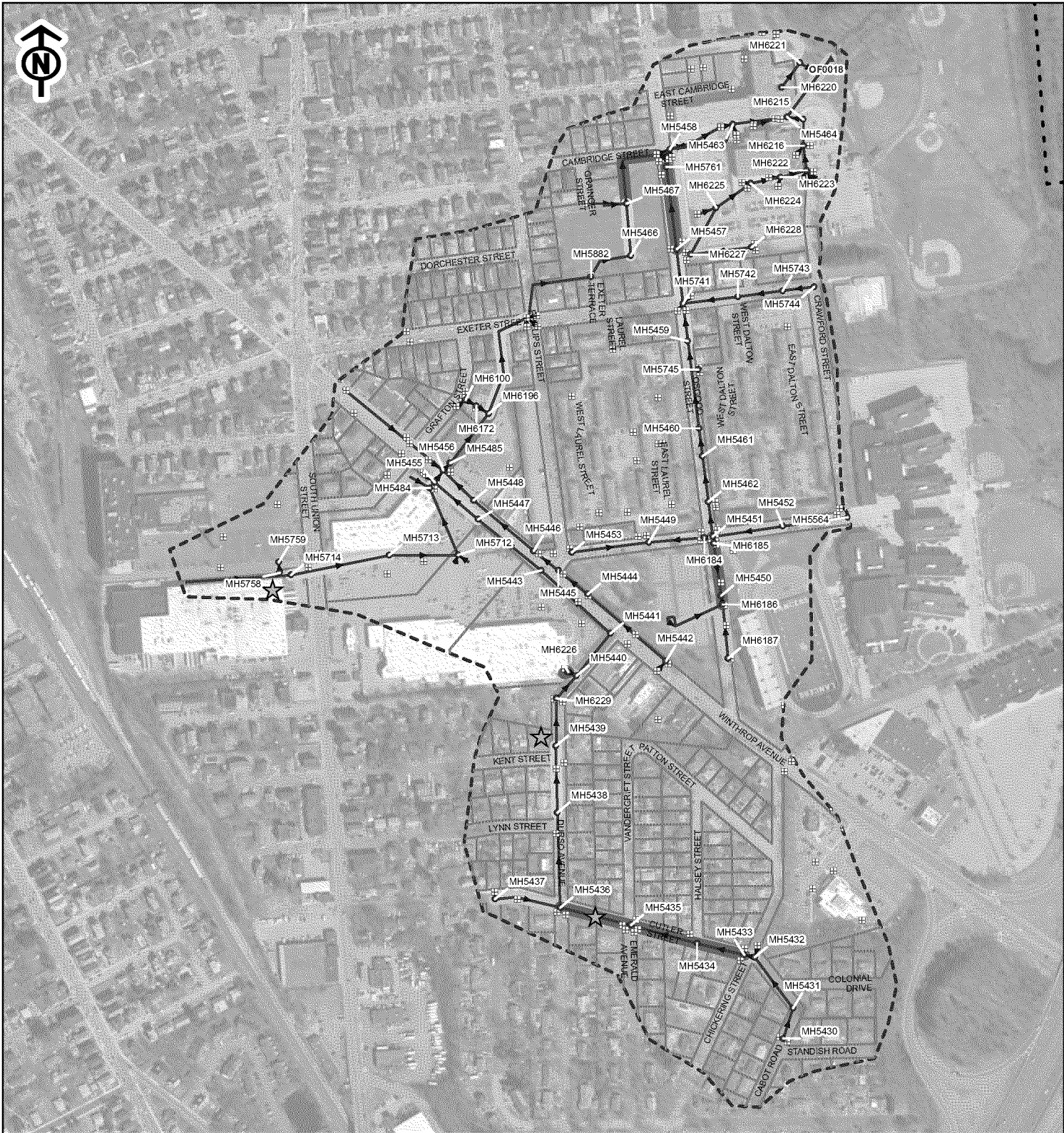
| Illicit Discharge Status   | Type of Discharge   | Street Name        | Street No. | Estimated Flow (gpd) | Verification Date | Verification Method | Removal Date | # Days from Verification to Removal | # Days Outstanding (if not removed) |
|----------------------------|---------------------|--------------------|------------|----------------------|-------------------|---------------------|--------------|-------------------------------------|-------------------------------------|
| Repaired by Property Owner | Industrial          | South Union Street | 485        | 60                   | 7/30/2015         | Dye Test & CCTV     | 9/24/2015    | 56                                  |                                     |
| Repaired by City           | Sewage exfiltration | Cutler Street      | N/A        | 715                  | 10/13/2015        | CCTV                | 12/12/2016   | 426                                 |                                     |
| Repaired by City           | Sewer exfiltration  | Durso Avenue       | 5          | 120 <sup>1</sup>     | 8/6/2024          | Dye test            | 10/4/2024    | 59                                  |                                     |
|                            |                     |                    |            |                      |                   |                     |              |                                     |                                     |

(1) Estimated flow calculations based on total water usage readings provided by the City.

**Bracket Sampling Results this Reporting Period:**

| Manhole ID | Location | Inspection Date | Pipe Direction | Standing Water | Flow | Flow Color | Velocity | Value Ammonia | Value Surfactants | Value Chlorine | Total Bacteroides | Human Bacteroides |
|------------|----------|-----------------|----------------|----------------|------|------------|----------|---------------|-------------------|----------------|-------------------|-------------------|
|            |          |                 |                |                |      |            |          |               |                   |                |                   |                   |
|            |          |                 |                |                |      |            |          |               |                   |                |                   |                   |

N/A = Not applicable; NT = Not tested; ND ( ) = Not detected (method detection limit), \* = Pipe was not assessed.



| Legend                         |                           |                            |                       |
|--------------------------------|---------------------------|----------------------------|-----------------------|
| Catchment Investigation Status |                           | Illicit Discharge Location |                       |
|                                | Cleared                   |                            | Completed             |
|                                | Upstream Contamination    |                            | Outstanding           |
|                                | Suspected                 | Discharge Type             |                       |
|                                | Suspected, Low Priority** |                            | MS4 Outfall           |
|                                | Confirmed                 |                            | Other Discharge Point |
|                                | Other                     |                            | Storm Manholes        |
|                                | Catch Basin               |                            | Storm Lateral Lines   |
|                                | Storm Gravity Main        |                            | Storm Open Drain      |
|                                | Storm Culvert             |                            | Problem Catchment     |
|                                | Lawrence Boundary         |                            |                       |

\*\*Note: Segments symbolized as "Suspected, Low Priority" represent sample results that do not meet the criteria for likely sewer input established in the 2016 Massachusetts MS4 Permit.

## OF0018 Catchment Area Catchment Investigation Results

**City of Lawrence, Massachusetts**

**July 1, 2024 - December 31, 2024**



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SCALE: 1" = 505'

DOC: Outfall Result Figures 2.aprx

DATE: JANUARY 2025

PROJECT #: 227206.05

DRAWN BY: PBO

SOURCE: ESRI, MassGIS

Attachment A-2:  
Verified Direct Illicit Connections  
(as of December 31, 2024)

| Illicit Discharge Unique ID | Illicit Discharge Status | Type of Discharge       | Street Name        | Street No. | Catchment Area | Watershed | Estimated Flow (gpd) | Verification Date | Verification Method | Removal Date | # Days from Verification to Removal | # Days Outstanding (if not removed) | Abatement Cost Paid by City | Abatement Cost Paid by Owner | Abatement Cost Reimbursed to City by Owner | Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------------------|--------------------------|-------------------------|--------------------|------------|----------------|-----------|----------------------|-------------------|---------------------|--------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1                           | Repaired by City         | Single-Family Residence | Congress Street    | 38         | INT0007        | Merrimack | 220                  | 1/17/2014         | Dye Test            | 3/7/2014     | 49                                  |                                     | \$ 6,427.86                 | \$ -                         | \$ -                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 2                           | Repaired by City         | Single-Family Residence | Congress Street    | 30         | INT0007        | Merrimack | 330                  | 3/7/2014          | Open Cut            | 3/7/2014     | 0                                   |                                     | \$ 6,427.86                 | \$ -                         | \$ -                                       | Homeowner unresponsive to multiple letters requesting access for confirmatory dye testing; verified & removed illicit connection during open cut repair of #38 Congress St.                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 3                           | Repaired by City         | Single-Family Residence | Congress Street    | 34         | INT0007        | Merrimack | 330                  | 3/7/2014          | Open Cut            | 3/7/2014     | 0                                   |                                     | \$ 6,427.86                 | \$ -                         | \$ -                                       | Homeowner unresponsive to multiple letters requesting access for confirmatory dye testing; verified & removed illicit connection during open cut repair of #38 Congress St.                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 4                           | Repaired by City         | Single-Family Residence | Congress Street    | 42         | INT0007        | Merrimack | 440                  | 3/7/2014          | Open Cut            | 3/7/2014     | 0                                   |                                     | \$ 6,427.86                 | \$ -                         | \$ -                                       | Homeowner unresponsive to multiple letters requesting access for confirmatory dye testing; verified & removed illicit connection during open cut repair of #38 Congress St.                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 5                           | Repaired by Owner        | Industrial              | South Union Street | 485        | OF0018         | Shawsheen | 60                   | 7/30/2015         | Dye Test & CCTV     | 9/24/2015    | 56                                  |                                     | \$ -                        | \$ 8,000.00                  | \$ -                                       | Responsibility of Owner to correct; City met with Owner's plumber onsite on 8/13/15 to verbally discuss findings and outline a plan to fix plumbing; written notice issued 8/25/15; correction completed and follow up site visit conducted 9/25/15, confirmatory bracket sampling verified removal and revealed no additional issues                                                                                                                                                                                                                                                                                                               |
| 6                           | Repaired by Owner        | Single-Family Residence | Beacon Street      | 70         | OF0003         | Merrimack | 330                  | 8/3/2015          | Dye Test & CCTV     | 5/3/2016     | 274                                 |                                     | \$ -                        | \$ 8,200.00                  | \$ -                                       | Responsibility of Owner to correct; written notice issued 8/25/15; 2nd notice issued 10/5/15; owner notified the City that they have a contractor for the work to be completed in Spring 2016; extension letter issued 12/28/15 - new deadline to select contractor is 3/15/2016 and new deadline to abate illicit is 5/15/16; notice issued from W&S Dept. 4/5/16 after contractor selection deadline passed; owner provided proof of contract with licensed contractor as of 4/12/16; Owner contacted City in April 2016 to provide notification of scheduled repairs on 5/3/16; confirmatory dry- and wet-weather sampling completed in May 2016 |
| 7                           | Repaired by Owner        | Two-Family Residence    | Ames Street        | 86-88      | OF0005         | Merrimack | 660                  | 8/21/2015         | Dye Test & CCTV     | 4/29/2016    | 252                                 |                                     | \$ -                        | \$ 6,400.00                  | \$ -                                       | Responsibility of Owner to correct; written notice issued 9/15/15; 2nd notice issued 10/29/15; extension letter issued 12/28/15 - new deadline to select contractor is 3/15/2016 and new deadline to abate illicit is 5/15/16; notice issued from W&S Dept. 4/5/16 after contractor selection deadline passed; Owner contacted City in April 2016 to provide notification of scheduled repairs on 4/30/16; confirmatory dry- and wet-weather sampling completed in May 2016                                                                                                                                                                         |
| 8                           | Repaired by Owner        | Single-Family Residence | Ames Street        | 90         | OF0005         | Merrimack | 330                  | 8/21/2015         | Dye Test & CCTV     | 4/29/2016    | 252                                 |                                     | \$ -                        | \$ 6,400.00                  | \$ -                                       | Responsibility of Owner to correct; written notice issued 9/15/15; 2nd notice issued 10/29/15; extension letter issued 12/28/15 - new deadline to select contractor is 3/15/2016 and new deadline to abate illicit is 5/15/16; notice issued from W&S Dept. 4/5/16 after contractor selection deadline passed; Owner contacted City in April 2016 to provide notification of scheduled repairs on 4/30/16; confirmatory dry- and wet-weather sampling completed in May 2016                                                                                                                                                                         |
| 9                           | Repaired by Owner        | Two-Family Residence    | Ames Street        | 82-84      | OF0005         | Merrimack | 880                  | 8/21/2015         | Dye Test & CCTV     | 4/29/2016    | 252                                 |                                     | \$ -                        | \$ 6,400.00                  | \$ -                                       | Responsibility of Owner to correct; written notice issued 9/15/15; 2nd notice issued 10/29/15; extension letter issued 12/28/15 - new deadline to select contractor is 3/15/16 and new deadline to abate illicit is 5/15/16; notice issued from W&S Dept. 4/5/16 after contractor selection deadline passed; Owner contacted City in April 2016 to provide notification of scheduled repairs on 4/30/16; confirmatory dry- and wet-weather sampling completed in May 2016                                                                                                                                                                           |



Attachment A-2:  
Verified Direct Illicit Connections  
(as of December 31, 2024)

| Illicit Discharge Unique ID | Illicit Discharge Status | Type of Discharge                                        | Street Name                       | Street No. | Catchment Area | Watershed              | Estimated Flow (gpd) | Verification Date | Verification Method     | Removal Date | # Days from Verification to Removal | # Days Outstanding (if not removed) | Abatement Cost Paid by City | Abatement Cost Paid by Owner | Abatement Cost Reimbursed to City by Owner | Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-----------------------------|--------------------------|----------------------------------------------------------|-----------------------------------|------------|----------------|------------------------|----------------------|-------------------|-------------------------|--------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 10                          | Repaired by Owner        | Two-Family Residence                                     | Dewey Street                      | 7-9        | OF0005         | Merrimack              | 660                  | 8/27/2015         | Dye Test & CCTV         | 11/25/2015   | 90                                  |                                     | \$ -                        | \$ 6,500.00                  | \$ -                                       | Responsibility of Owner to correct; written notice issued 9/15/15; 2nd notice issued 10/29/15; owner responded to initial notice but did not follow up afterward; final notice issued from W&S Dept. 2/10/16 requesting response within 7 days (first and second certified mailings were returned as 'unclaimed' from the post office); Notice of Enforcement Action issued from City Attorney's office 4/7/16; Owner contacted City in April 2016 to provide notification that the repairs were completed last fall (no date or cost provided, assumed by 11/25/15), dye testing completed on 4/27/16 verified repairs were completed, confirmatory dry-and wet-weather sampling completed in May 2016 |
| 11                          | Repaired by City         | Overflow Pipe                                            | Hampshire Street at Myrtle Street |            | OF0012         | Spicket (to Merrimack) | 100,000              | 9/30/2015         | Record Plans & Open Cut | 11/25/2015   | 56                                  |                                     | \$ 241,407.36               | \$ -                         | \$ -                                       | Sections of a 48" overflow pipe to Spicket R. (presumably abandoned) were removed during emergency sewer repairs in March 2015; the City determined in September 2015 after a large rain event that the overflow had been active and the existing 18" pipe connecting the Hampshire St. sewer to the Myrtle St. interceptor is hydraulically restricted during high flows; the 18" pipe was replaced with a new 48" pipe in November under the City's on-call emergency excavation contract                                                                                                                                                                                                             |
| 12                          | Repaired by City         | Sewer Main Cross-Connection from Single-Family Residence | Custer Street                     | 5          | OF0015         | Spicket (to Merrimack) | 440                  | 10/9/2015         | Dye Test & CCTV         | 11/6/2015    | 28                                  |                                     | \$ 12,241.15                | \$ -                         | \$ -                                       | City sewer line tied into the Bloody Brook culvert; abatement completed under the City's on-call emergency excavation contract                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 13                          | Repaired by City         | Sewer Main Cross-Connection from Two-Family Residence    | Custer Street                     | 6-8        | OF0015         | Spicket (to Merrimack) | 660                  | 10/9/2015         | Dye Test & CCTV         | 11/6/2015    | 28                                  |                                     | \$ 12,241.15                | \$ -                         | \$ -                                       | City sewer line tied into the Bloody Brook culvert; abatement completed under the City's on-call emergency excavation contract                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 14                          | Repaired by City         | Sewer Main Cross-Connection from Two-Family Residence    | Custer Street                     | 9          | OF0015         | Spicket (to Merrimack) | 440                  | 10/9/2015         | Dye Test & CCTV         | 11/6/2015    | 28                                  |                                     | \$ 12,241.15                | \$ -                         | \$ -                                       | City sewer line tied into the Bloody Brook culvert; abatement completed under the City's on-call emergency excavation contract                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 15                          | Repaired by City         | Sewage Exfiltration near MH5436                          | Cutler Street                     |            | OF0018         | Shawsheen              | 715                  | 10/13/2015        | CCTV                    | 12/12/2016   | 426                                 |                                     | \$ 25,856.00                | \$ -                         | \$ -                                       | Intruding lateral connection was causing 10" VC sewer line to surcharge and exfiltrate into drain line; lateral connection was repaired by a private contractor and eliminated the surcharged conditions; follow-up sampling completed in July 2016 indicated continued presence of wastewater contamination in the drain pipe; in December 2016, 640 LF of manhole-to-manhole CIPP liners were installed in sewer pipes on Cutler St. to remove the indirect connection and prevent further exfiltration from the sewer into the drain; confirmatory dry-weather sampling completed in December 2016                                                                                                   |



Attachment A-2:  
Verified Direct Illicit Connections  
(as of December 31, 2024)

| Illicit Discharge Unique ID | Illicit Discharge Status                  | Type of Discharge                                       | Street Name      | Street No. | Catchment Area | Watershed                  | Estimated Flow (gpd) | Verification Date | Verification Method                  | Removal Date | # Days from Verification to Removal | # Days Outstanding (if not removed) | Abatement Cost Paid by City | Abatement Cost Paid by Owner | Abatement Cost Reimbursed to City by Owner | Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|-----------------------------|-------------------------------------------|---------------------------------------------------------|------------------|------------|----------------|----------------------------|----------------------|-------------------|--------------------------------------|--------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------|--------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 16                          | Repaired by City                          | Sewer Main Cross-Connection from Three-Family Residence | Prospect Street  | 397        | OF0015         | Spicket (to Merrimack)     | 770                  | 11/6/2015         | Dye Test & CCTV                      | 11/6/2015    | 0                                   |                                     | \$ 12,241.15                | \$ -                         | \$ -                                       | City sewer line tied into the Bloody Brook culvert; abatement completed under the City's on-call emergency excavation contract                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 17                          | Repaired by City                          | Three-Family Residence                                  | Cornish Street   | 3-5        | OF0015         | Spicket (to Merrimack)     | 660                  | 11/10/2015        | Dye Test & CCTV                      | 12/23/2016   | 409                                 |                                     | \$ 7,944.32                 | \$ -                         | \$ -                                       | Responsibility of Owner to correct; written notice issued 11/17/15 requesting a response within 7 days, abatement by 12/17/15; extension letter issued 1/22/16 - new deadline to select contractor is 5/15/16 and new deadline to abate illicit is 7/15/16; Owner provided update to City on contractor selection on 5/16/16 that he is still seeking quotes and will provide an update in one month; Owner contacted the City on 6/21/16 explaining that he could not obtain financing for the project and has elected to have the City perform the necessary work and pass the charge on to him; abatement was completed on 12/23/16 under the FY2017 On-Call Services contract and the City plans to request reimbursement of construction costs from Owner; confirmatory dry-weather sampling completed in February 2017. |
| 18                          | Repaired by City                          | Historic Pipe Connection from MH0389                    | Highgate Street  |            | OF0011         | Spicket (to Merrimack)     | 8,000                | 8/25/2016         | Dye Test & CCTV                      | 10/14/2016   | 50                                  |                                     | \$ 2,500.00                 | \$ -                         | \$ -                                       | City sewer line tied into the Bellevue Cemetery drainage network via an old pipe connection noted as abandoned on City record plans; City staff bulkheaded the connection to the drainage network with brick and mortar and redirected flows to the proper sewer pipe; confirmatory dry-weather sampling was completed in November 2016                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 19                          | Repaired by City                          | Sewage Exfiltration near MH5898                         | Bradford Street  |            | OF0097         | North Canal (to Merrimack) | 100                  | 12/14/2016        | Dye Test & CCTV                      | 3/3/2017     | 79                                  |                                     | \$ 2,000.00                 | \$ -                         | \$ -                                       | City sewer line indirectly connects to a drain manhole on Bradford St.; dye test confirmed sewage entering drain through a defective brick repair in the manhole wall; City's on-call contractor repaired drain manhole on 3/3/17; confirmatory dry-weather sampling to be completed by May 2017; City plans to install a cured-in-place pipe liner in the sewer pipe as part of a future SSI contract to prevent further exfiltration                                                                                                                                                                                                                                                                                                                                                                                        |
| 20                          | Repaired by City; Owner to reimburse City | Two-Family Residence                                    | Gilbert Street   | 44         | OF0020         | Shawsheen                  | 660                  | 12/19/2016        | Building Inspection, Dye Test & CCTV | 12/19/2017   | 365                                 |                                     | \$ 3,269.06                 | \$ -                         | \$ -                                       | Responsibility of Owner to correct; initial written notice issued 01/03/17; 2nd notice issued 06/23/17; final violation notice issued 9/15/17; City mobilized a crew to complete the abatement on 12/19/17 and intends to recover the abatement cost from the property owner; confirmatory sampling to be scheduled within 60 days of the abatement                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 21                          | Repaired by Owner                         | Leaking Lateral                                         | Wachusett Avenue | 10         | OF0010         | Merrimack                  | 100                  | 12/20/2016        | Building Inspection, Dye Test & CCTV | 3/22/2017    | 92                                  |                                     | \$ -                        | \$ 500.00                    | \$ -                                       | Leaking lateral, responsibility of Owner to correct; initial written notice issued 01/03/17; RooterMan informed the City that the blockage in the lateral has been cleared; confirmatory dry-weather sampling was completed in April 2017                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| 22                          | Repaired by Owner                         | Washing Machine Connection                              | Jackson Street   | 324        | OF0015         | Spicket (to Merrimack)     | 90                   | 12/22/2016        | Building Inspection & Dye Test       | 12/19/2017   | 362                                 |                                     | \$ -                        | \$ 350.00                    | \$ -                                       | Washing machine incorrectly connected, responsibility of Owner to correct; initial written notice issued 01/10/17; 2nd notice issued 06/23/17; final violation notice issued 09/15/17; Owner contacted the City after receiving the final violation notice and plans to complete the necessary repairs under an alternate schedule; after no response from Owner, City mailed, posted, and hand-delivered by constable an enforcement notice on Legal Department letterhead 11/14/17; Owner responded and met with the City on 11/17/17; Owner completed repair on 12/19/17 by re-routing the washing machine to the sewer service and cutting/capping the internal plumbing connected to the drain; confirmatory dry-weather sampling was completed in February 2018.                                                        |
| 23                          | Repaired by City                          | Three-Family Residence                                  | Jackson Street   | 343-345    | OF0015         | Spicket (to Merrimack)     | 990                  | 12/22/2016        | Building Inspection & Dye Test       | 12/21/2017   | 364                                 |                                     | \$ 15,620.00                | \$ -                         | \$ -                                       | Responsibility of Owner to correct; initial written notice issued 01/03/17; 2nd notice issued 06/23/17; final violation notice issued 09/15/17; No response from the owner; City mailed, posted, and hand-delivered by constable an enforcement notice on Legal Department letterhead 11/14/17; abatement was completed on 12/21/17 under the FY2018 On-Call Services contract and the City plans to request reimbursement of construction costs from Owner; confirmatory dry-weather sampling was completed in February 2018.                                                                                                                                                                                                                                                                                                |

Attachment A-2:  
Verified Direct Illicit Connections  
(as of December 31, 2024)

| Illicit Discharge Unique ID | Illicit Discharge Status                                    | Type of Discharge               | Street Name      | Street No. | Catchment Area | Watershed              | Estimated Flow (gpd) | Verification Date | Verification Method                  | Removal Date | # Days from Verification to Removal | # Days Outstanding (if not removed) | Abatement Cost Paid by City | Abatement Cost Paid by Owner | Abatement Cost Reimbursed to City by Owner | Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------------------|-------------------------------------------------------------|---------------------------------|------------------|------------|----------------|------------------------|----------------------|-------------------|--------------------------------------|--------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 24                          | Repaired by City; CIPP completed under ongoing SSI contract | Sewage Exfiltration near MH5731 | Prospect Street  |            | OF0015         | Spicket (to Merrimack) | 200                  | 1/3/2017          | Dye Test & CCTV                      | 5/22/2019    | 869                                 |                                     | \$ -                        | \$ -                         | \$ -                                       | City sewer line indirectly connects to a drain manhole on Prospect St.; dye test confirmed sewage is exfiltrating from defects in the sewer pipe and entering drain between the concrete blocks of the manhole wall; A CIPP liner was installed under Sewer Rehabilitation Contract III/IV to address this illicit. Confirmatory sampling was completed 5/22/2019.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 25                          | Repaired by City                                            | Maintenance building            | Reservoir Street | 100        | OF0011         | Spicket (to Merrimack) | 60                   | 1/12/2017         | Dye Test & CCTV                      | 10/19/2018   | 645                                 |                                     | \$ 35,000.00                | \$ -                         | \$ -                                       | Bellevue Cemetery is owned and managed by the City; the Cemetery maintenance building has two bathrooms that are tied to the drain pipe on Reservoir St.; there no public sewer pipes located within ~1,000 feet of the building; W&S Dept. held a meeting with Cemetery staff on 1/31/17 to discuss special abatement options; alternatives analysis completed in May 2017; City has met with Cemetery staff again to review alternatives analysis and identify an alternative abatement schedule. Abatement planning includes installing a septic tank. The engineer has been hired and the septic tank is in the design phase. In the interim, Cemetery staff have been directed to avoid using the bathrooms at the maintenance building. On 10/19/2018 the illicit connection was corrected. Confirmatory sampling was completed on 12/4/2018. |
| 26                          | Repaired by Owner                                           | Two-Family Residence            | Hey Street       | 17         | OF0006         | Merrimack              | 440                  | 1/27/2017         | Building Inspection, Dye Test & CCTV | 4/27/2018    | 455                                 |                                     | \$ -                        | \$ 5,000.00                  | \$ -                                       | Responsibility of Owner to correct; initial written notice issued 02/15/17; 2nd notice issued 06/23/17; final violation notice issued 09/15/17; Owner contacted the City after receiving the final violation notice and plans to complete the necessary repairs under an alternate schedule; No additional response from the owner; City mailed, posted, and hand-delivered by constable an enforcement notice on Legal Department letterhead 11/14/17; Owner contacted the City reporting the abatement was corrected on 4/27/2018; Confirmatory sampling completed on 5/10/2018                                                                                                                                                                                                                                                                   |
| 27                          | Repaired by City; Owner to reimburse City                   | Two-Family Residence            | Gilbert Street   | 42         | OF0020         | Shawsheen              | 550                  | 6/5/2017          | Dye Test & CCTV                      | 12/5/2017    | 183                                 |                                     | \$ 3,560.48                 | \$ -                         | \$ -                                       | Responsibility of Owner to correct; initial written notice issued 07/05/17 requesting response within 7 days and abatement by 08/05/17; 2nd notice issued 09/15/17; final violation notices issued 11/10/17; No response from the owner; City mailed, posted, and hand-delivered by constable an enforcement notice on Legal Department letterhead 11/14/17 ; City mobilized a crew to complete the abatement on 12/5/17 and intends to recover the abatement cost from the property owner; confirmatory sampling to be scheduled within 60 days of the abatement. Sampling was completed on 2/14/2018                                                                                                                                                                                                                                              |
| 28                          | Repaired by Owner                                           | One-Family Residence            | Brookline Street | 10         | OF0006         | Merrimack              | 220                  | 4/2/2018          | Building Inspection, Dye Test        | 5/1/2018     | 29                                  |                                     | \$ -                        | \$ 5,800.00                  | \$ -                                       | Responsibility of Owner to correct; initial written notice issued 04/06/2018; Owner contacted the City after receiving the first violation notice and completed the necessary repairs on 05/01/2018; Confirmatory sampling completed on 5/10/2018                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 29                          | Repaired by Owner                                           | One-Family Residence            | Brookline Street | 2          | OF0006         | Merrimack              | 220                  | 4/3/2018          | Building Inspection, Dye Test        | 5/2/2018     | 29                                  |                                     | \$ -                        | \$ 5,800.00                  | \$ -                                       | Responsibility of Owner to correct; initial written notice issued 04/06/2018; Owner contacted the City after receiving the first violation notice and completed the necessary repairs on 05/02/2018; Confirmatory sampling completed on 5/10/2018                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 30                          | Repaired by Owner                                           | Two-Family Residence            | Woodland St      | 141        | OF0006         | Merrimack              | 660                  | 6/28/2018         | Building Inspection, Dye Test & CCTV | 9/13/2018    | 77                                  |                                     | \$ -                        | \$ 8,000.00                  | \$ -                                       | Also referred to as 28 Leslie Street. Responsibility of Owner to correct; initial written notice issued 07/13/2018; The owner's attorney sent a letter to the City on 8/6/2018 acknowledging receipt of the 1st notice and informed the City that they are trying to take corrective action. The owner is elderly and is working with family members to correct the issue. The owner corrected the issue in a letter sent to the City on 9/13/2018. Confirmatory sampling completed.                                                                                                                                                                                                                                                                                                                                                                |
| 31                          | Abatement Complete, Confirmatory Sampling Complete          | One-Family Residence            | Wesley Street    | 72         | OF0100         | Merrimack              | 330                  | 6/21/2018         | Dye Test & CCTV                      | 1/10/2019    | 203                                 |                                     | \$ -                        | \$ 6,000.00                  | \$ -                                       | Responsibility of Owner to correct; initial written notice issued 07/13/2018; On 7/27/2018, the owner requested more information on the investigation results. Owner removed illicit connection on 1/10/2019. Confirmatory sampling was completed on 1/15/2019.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

Attachment A-2:  
Verified Direct Illicit Connections  
(as of December 31, 2024)

| Illicit Discharge Unique ID | Illicit Discharge Status                                                              | Type of Discharge                                       | Street Name     | Street No.               | Catchment Area | Watershed                    | Estimated Flow (gpd) | Verification Date | Verification Method                  | Removal Date | # Days from Verification to Removal | # Days Outstanding (if not removed) | Abatement Cost Paid by City | Abatement Cost Paid by Owner | Abatement Cost Reimbursed to City by Owner | Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------|---------------------------------------------------------------------------------------|---------------------------------------------------------|-----------------|--------------------------|----------------|------------------------------|----------------------|-------------------|--------------------------------------|--------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 32                          | Repaired by Owner; Abatement Complete, Confirmatory Sampling Complete                 | One-Family Residence                                    | Wesley Street   | 76                       | OF0100         | Merrimack                    | 330                  | 6/21/2018         | Building Inspection, Dye Test & CCTV | 8/2/2018     | 42                                  |                                     | \$ -                        | \$ -                         | \$ -                                       | Responsibility of Owner to correct; initial written notice issued 07/13/2018; The owner corrected both defects identified during dye testing as the all of the dye tests came back as legal. Confirmatory sampling completed.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 33                          | Repaired by Owner; Abatement Complete, Confirmatory Sampling Complete or Not Required | Three-Family Residence                                  | Prospect Street | 326                      | OF0015         | Spicket (to Merrimack)       | 990                  | 10/17/2018        | Building Inspection, Dye Test & CCTV | 10/22/2018   | 5                                   |                                     | \$ -                        | \$ 5,000.00                  | \$ -                                       | Responsibility of Owner to correct; Illicit connection was corrected before 30-day notification was sent. Abatement confirmed via photos and site visit. Confirmatory sampling not applicable as downstream manholes are not accessible.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 34                          | Repaired By Owner, Abatement Complete, Confirmatory Sampling Complete                 | One-Family Residence Leaking Lateral                    | Warwick Street  | 126                      | IN0005-E       | NA - Discharges into Methuen | 330                  | 6/10/2019         | Building Inspection, Dye Test        | 8/28/2019    | 79                                  |                                     | \$ -                        | \$ 6,500.00                  | \$ -                                       | Responsibility of Owner to correct; first notification was sent on 6/24/2019. The owner corrected the defect by lining the lateral. Confirmatory sampling performed on 10/23/2019.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 35                          | Responsible Party Notified, Abatement Complete, Confirmatory Sampling Complete        | Commercial Building - 1 Story Building (Dentist Office) | South Broadway  | 525                      | OF0020         | Shawsheen                    | 110                  | 7/16/2019         | Building Inspection, Dye Test & CCTV | 10/3/2019    | 79                                  |                                     | \$ 8,000.00                 | \$ -                         | \$ 8,000.00                                | Responsibility of the Owner to correct; first notification was sent on 8/13/2019. Second letter from City's Legal Dept was mailed on 9/22/2019. City repaired lateral due to paving planned on Gilbert Street. Confirmatory sampling completed 1/14/2020.                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 36                          | Responsible Party Notified, Abatement Complete, Confirmatory Sampling Complete        | Commercial Building - 1 Story (Party Rentals)           | Andover Street  | 637                      | OF0024         | Merrimack                    | 110                  | 7/25/2019         | Building Inspection, Dye Test & CCTV | 1/6/2020     | 165                                 |                                     | \$ -                        | \$ 7,800.00                  | \$ -                                       | Responsibility of the Owner to correct; first notification was sent on 8/13/2019. Owner contacted City to let them know they are working on the issue. Issue abated and confirmatory sampling conducted.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 37                          | Abatement Complete, Confirmatory Sampling Complete                                    | Lawrence Housing Authority - Multiple Apartments        | Elm Street      | 353                      | OF0095         | Spicket (to Merrimack)       | 440                  | 10/22/2019        | Building Inspection, Dye Test & CCTV | 2/28/2020    | 129                                 |                                     | \$ -                        | \$ -                         | \$ -                                       | Responsibility of the Owner to correct; first notification was sent on 1/15/2020. Field tests show four one bedroom apartments tested Not Legal. Amount of flow is pending; need to confirm with Lawrence Housing Authority that these are one bedroom. Confirmatory sampling was performed on 6/16/2020 and showed no contamination.                                                                                                                                                                                                                                                                                                                                                                                          |
| 38                          | Repaired by City                                                                      | Sewage Exfiltration near MH5898                         | Bradford Street |                          | OF0097         | North Canal (to Merrimack)   | 100                  | 7/6/2020          | Dye Test                             | 3/29/2021    | 266                                 |                                     | \$ 33,402.00                | \$ -                         | \$ -                                       | City sewer line exfiltrating to drain infrastructure on Bradford Street.; dye test confirmed sewage entering drain through aging brick sewer pipe; City installed a cured-in-place pipe liner in the sewer pipe under Contract IV to prevent further exfiltration. SDE performed a post correction dye test on 8/17/2021. This dye test showed that CIPP liner installed in the sewer resolved the issue on Bradford Street.                                                                                                                                                                                                                                                                                                   |
| 39                          | Repaired by City                                                                      | Sewage Exfiltration near MH5411                         | Corbett Road    |                          | OF0020         | Shawsheen                    | 90                   | 7/8/2022          | Dye Test                             | 3/1/2023     | 236                                 |                                     | \$ 11,132.00                | \$ -                         | \$ -                                       | City sewer line broken and exfiltrating to drain infrastructure on Corbett Road; dye test conducted but did not come back as Dye In Both. A review of the sanitary sewer line CCTV was conducted and a break was found that is believed to be the issue. City completed the sewer repair as part of Contract VI. SDE performed post correction sampling and found that contamination levels were lower but not eliminated, indicating another unresolved illicit connection.                                                                                                                                                                                                                                                   |
| 40                          | Repaired by City                                                                      | Commercial Building - 1 Story (5 Store fronts)          | Broadway        | 190, 192, 194, 196 & 198 | OF0097         | Merrimack                    | 640*                 | 3/15/2024         | Building Inspection, Dye Test & CCTV | 3/17/2024    | 2                                   |                                     | \$ 26,024.38                | \$ -                         | \$ -                                       | Sewer lateral for 196 Broadway was not connected into the new sewer main during construction in October 2022. This property reported to the City of backups in their basement. The property was still connected to the old brick sewer main and had filled the abandoned sewer section for 18 months. Due to the condition of the brick pipe, it is believed that the flow had been infiltrating through the soil and into the storm drain pipe. Multiple addresses including 190, 192, 194, 196 and 198 Broadway discharged to the drain through the lateral at 196 Broadway. All addresses were dye tested after the lateral was connected to the new sewer which resulted in no further evidence of dye in the storm drain. |

Attachment A-2:  
Verified Direct Illicit Connections  
(as of December 31, 2024)

| Illicit Discharge Unique ID | Illicit Discharge Status             | Type of Discharge                                         | Street Name     | Street No. | Catchment Area | Watershed                  | Estimated Flow (gpd) | Verification Date | Verification Method                  | Removal Date | # Days from Verification to Removal | # Days Outstanding (if not removed) | Abatement Cost Paid by City | Abatement Cost Paid by Owner | Abatement Cost Reimbursed to City by Owner | Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------------|--------------------------------------|-----------------------------------------------------------|-----------------|------------|----------------|----------------------------|----------------------|-------------------|--------------------------------------|--------------|-------------------------------------|-------------------------------------|-----------------------------|------------------------------|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 41                          | City Notified, and confirmed receipt | One-Family Residential, need to confirm what is occurring | Durso Ave       | 5          | OF0018         | Shawsheen                  | 120*                 | 8/6/2024          | Building Inspection, Dye Test & CCTV | 10/4/2024    | 59                                  |                                     | \$ 8,938.11                 |                              |                                            | Sewer lateral for 5 Durso Ave was broken, leaking into MH5439-MH6229 by infiltration. City completed the sewer lateral repair as part of On Call. SDE performed post correction dye test after the lateral was repaired and resulted in a legal dye test.                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 42                          | City Notified, and confirmed receipt | Two-Family Residential, need to confirm what is occurring | Eaton Street    | 34         | OF0003         | Merrimack                  | 250*                 | 8/19/2024         | Building Inspection, Dye Test & CCTV | 10/18/2024   | 60                                  |                                     | \$ 9,092.25                 |                              |                                            | Sewer pipe FIT0383-MH2240 had defects, which runs from the intersection of Eaton Street and Everett Street northwest stopping near 33 Eaton Street. Based on this, a spot repair of FIT0383-MH2240 was completed. SDE performed post correction dye test after the sewer pipe was repaired and resulted in a legal dye test.                                                                                                                                                                                                                                                                                                                                                                                 |
| 43                          | City Notified, and confirmed receipt | One-Family Residential, need to confirm what is occurring | Marston Street  | 174        | OF0006         | Merrimack                  | 220*                 | 8/20/2024         | Building Inspection, Dye Test & CCTV | 10/19/2024   | 60                                  |                                     | \$ 11,631.47                |                              |                                            | Sewer lateral for 174 Marston Street was broken, leaking into MH5038-MH5037 by infiltration. City completed the sewer lateral repair as part of On Call. SDE performed post correction dye test after the lateral was repaired and resulted in a legal dye test.                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 44                          | City Notified, and confirmed receipt | Commercial Building - 1 Story (Car Wash)                  | Bradford Street | 106        | OF0097         | Spicket (to Merrimack)     | 1,030*               | 9/24/2024         | Visual Inspection                    | --           |                                     | 98†                                 |                             | \$ 5,500.00                  |                                            | Illicit discharge is from wash waters generated by adjacent car wash. This illicit wash water enters the MS4 through CB9126 and CB9127. The owner of 106 Bradford Street began installation of a catch basin to capture wash waters from car wash to direct discharge to the sewer. Construction was active at the end of this reporting period. Cost will be adjusted upon completion of the project.                                                                                                                                                                                                                                                                                                       |
| 45                          | City Notified, and confirmed receipt | Commercial Building - 4 Story (Justice Building)          | Canal Street    | 361        | OF0098         | North Canal (to Merrimack) | 4,800                | 10/22/2024        | Dye Test & Visual Inspection         | 10/22/2024   | 1                                   |                                     | \$ -                        | \$ -                         |                                            | Improper rooftop maintenance activities resulted in this illicit discharge. As the illicit response took place the day of the discharge and the day following the discharge field staff can confirm that no additional rooftop maintenance took place on 10/23/24. Given this, it's assumed that the 4,800 gpd of discharge took place over the course of a single day. This value assumes two cleaning hoses with flow rates of 20 gpm were used a total of two hours. To prevent future illicit discharges, good housekeeping practices should be followed. A summary of recommended good housekeeping practices were sent by the City in a certified letter to the maintenance staff at 361 Canal Street. |
| Total Costs:                |                                      |                                                           |                 |            |                |                            |                      |                   |                                      |              |                                     |                                     | \$ 490,391.64               | \$ 92,650.00                 |                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

(\*) - Estimated flow calculations based on water usage readings provided by the City.  
(†) - Calculated based on number of days between Verification Date and end of Reporting Period (December 31, 2024).



**Attachment A-3: Amount of Illicit Discharge Removed by Catchment  
(as of December 31, 2024)**

| Subcatchment Area | Watershed Area | Estimated Illicit Discharge Removed This Reporting Period (GPD) | Cumulative Illicit Discharge Removed To Date (GPD) |
|-------------------|----------------|-----------------------------------------------------------------|----------------------------------------------------|
| OF0001            | Merrimack      | 0                                                               | 0                                                  |
| OF0002            | Merrimack      | 0                                                               | 0                                                  |
| OF0003            | Merrimack      | 250                                                             | 580                                                |
| OF0004            | Merrimack      | 0                                                               | 0                                                  |
| OF0005            | Merrimack      | 0                                                               | 2,530                                              |
| OF0006            | Merrimack      | 220                                                             | 1,760                                              |
| OF0007            | Merrimack      | 0                                                               | 0                                                  |
| OF0008            | Merrimack      | 0                                                               | 0                                                  |
| OF0009            | Merrimack      | 0                                                               | 0                                                  |
| OF0010            | Merrimack      | 0                                                               | 100                                                |
| OF0011            | Spicket        | 0                                                               | 8,060                                              |
| OF0012            | Spicket        | 0                                                               | 100,000                                            |
| OF0014            | Spicket        | 0                                                               | 0                                                  |
| OF0015            | Spicket        | 0                                                               | 5,240                                              |
| OF0016            | Spicket        | 0                                                               | 0                                                  |
| OF0017            | Shawsheen      | 0                                                               | 0                                                  |
| OF0018            | Shawsheen      | 120                                                             | 895                                                |
| OF0019            | Shawsheen      | 0                                                               | 0                                                  |
| OF0020            | Shawsheen      | 0                                                               | 1,410                                              |
| OF0021            | Merrimack      | 0                                                               | 0                                                  |
| OF0022            | Spicket        | 0                                                               | 0                                                  |
| OF0024            | Merrimack      | 0                                                               | 110                                                |
| OF0025            | Merrimack      | 0                                                               | 0                                                  |
| OF0026            | Shawsheen      | 0                                                               | 0                                                  |
| OF0027            | Shawsheen      | 0                                                               | 0                                                  |
| OF0028            | Shawsheen      | 0                                                               | 0                                                  |
| OF0032            | Merrimack      | 0                                                               | 0                                                  |
| OF0033            | Shawsheen      | 0                                                               | 0                                                  |
| OF0034            | Spicket        | 0                                                               | 0                                                  |
| OF0035            | Spicket        | 0                                                               | 0                                                  |
| OF0036            | Spicket        | 0                                                               | 0                                                  |
| OF0037            | Spicket        | 0                                                               | 0                                                  |
| OF0038            | Spicket        | 0                                                               | 0                                                  |
| OF0040            | Spicket        | 0                                                               | 0                                                  |
| OF0041            | Spicket        | 0                                                               | 0                                                  |
| OF0042            | Spicket        | 0                                                               | 0                                                  |
| OF0043            | Spicket        | 0                                                               | 0                                                  |
| OF0044            | Spicket        | 0                                                               | 0                                                  |
| OF0045            | Spicket        | 0                                                               | 0                                                  |
| OF0046            | Spicket        | 0                                                               | 0                                                  |
| OF0047            | Spicket        | 0                                                               | 0                                                  |
| OF0048            | Spicket        | 0                                                               | 0                                                  |



**Attachment A-3: Amount of Illicit Discharge Removed by Catchment  
(as of December 31, 2024)**

| Subcatchment Area | Watershed Area | Estimated Illicit Discharge Removed This Reporting Period (GPD) | Cumulative Illicit Discharge Removed To Date (GPD) |
|-------------------|----------------|-----------------------------------------------------------------|----------------------------------------------------|
| OF0049            | Spicket        | 0                                                               | 0                                                  |
| OF0050            | Spicket        | 0                                                               | 0                                                  |
| OF0051            | Merrimack      | 0                                                               | 0                                                  |
| OF0052            | Merrimack      | 0                                                               | 0                                                  |
| OF0053            | Merrimack      | 0                                                               | 0                                                  |
| OF0054            | Merrimack      | 0                                                               | 0                                                  |
| OF0055            | Merrimack      | 0                                                               | 0                                                  |
| OF0056            | Merrimack      | 0                                                               | 0                                                  |
| OF0057            | Merrimack      | 0                                                               | 0                                                  |
| OF0058            | Merrimack      | 0                                                               | 0                                                  |
| OF0059            | Merrimack      | 0                                                               | 0                                                  |
| OF0060            | Merrimack      | 0                                                               | 0                                                  |
| OF0061            | Merrimack      | 0                                                               | 0                                                  |
| OF0062            | Merrimack      | 0                                                               | 0                                                  |
| OF0063            | Merrimack      | 0                                                               | 0                                                  |
| OF0064            | Merrimack      | 0                                                               | 0                                                  |
| OF0065            | Merrimack      | 0                                                               | 0                                                  |
| OF0066            | Merrimack      | 0                                                               | 0                                                  |
| OF0067            | Merrimack      | 0                                                               | 0                                                  |
| OF0068            | Merrimack      | 0                                                               | 0                                                  |
| OF0069            | Merrimack      | 0                                                               | 0                                                  |
| OF0070            | Merrimack      | 0                                                               | 0                                                  |
| OF0071            | Merrimack      | 0                                                               | 0                                                  |
| OF0072            | Merrimack      | 0                                                               | 0                                                  |
| OF0073            | Merrimack      | 0                                                               | 0                                                  |
| OF0074            | Merrimack      | 0                                                               | 0                                                  |
| OF0075            | Merrimack      | 0                                                               | 0                                                  |
| OF0076            | Merrimack      | 0                                                               | 0                                                  |
| OF0077            | Merrimack      | 0                                                               | 0                                                  |
| OF0078            | Merrimack      | 0                                                               | 0                                                  |
| OF0079            | Shawsheen      | 0                                                               | 0                                                  |
| OF0080            | Shawsheen      | 0                                                               | 0                                                  |
| OF0081            | Merrimack      | 0                                                               | 0                                                  |
| OF0082            | Merrimack      | 0                                                               | 0                                                  |
| OF0083            | Merrimack      | 0                                                               | 0                                                  |
| OF0084            | Merrimack      | 0                                                               | 0                                                  |
| OF0085            | Merrimack      | 0                                                               | 0                                                  |
| OF0086            | Merrimack      | 0                                                               | 0                                                  |
| OF0087            | Merrimack      | 0                                                               | 0                                                  |
| OF0088            | Merrimack      | 0                                                               | 0                                                  |
| OF0089            | Merrimack      | 0                                                               | 0                                                  |
| OF0090            | Spicket        | 0                                                               | 0                                                  |

**Attachment A-3: Amount of Illicit Discharge Removed by Catchment  
(as of December 31, 2024)**

| Subcatchment Area | Watershed Area | Estimated Illicit Discharge Removed This Reporting Period (GPD) | Cumulative Illicit Discharge Removed To Date (GPD) |
|-------------------|----------------|-----------------------------------------------------------------|----------------------------------------------------|
| OF0091            | Spicket        | 0                                                               | 0                                                  |
| OF0092            | Merrimack      | 0                                                               | 0                                                  |
| OF0093            | Merrimack      | 0                                                               | 0                                                  |
| OF0094            | Spicket        | 0                                                               | 0                                                  |
| OF0095            | Spicket        | 0                                                               | 440                                                |
| OF0096            | Spicket        | 0                                                               | 0                                                  |
| OF0097            | Merrimack      | 1,030                                                           | 1,870                                              |
| OF0098            | Merrimack      | 4,800                                                           | 4,800                                              |
| OF0099            | Shawsheen      | 0                                                               | 0                                                  |
| OF0100            | Merrimack      | 0                                                               | 660                                                |
| OF0101            | Shawsheen      | 0                                                               | 0                                                  |
| OF0102            | Shawsheen      | 0                                                               | 0                                                  |
| IN0001            | Methuen MS4    | 0                                                               | 0                                                  |
| IN0005-E          | Methuen MS4    | 0                                                               | 330                                                |
| IN0005-S          | Methuen MS4    | 0                                                               | 0                                                  |
| IN0007            | Methuen MS4    | 0                                                               | 1,320                                              |
| IN0008            | Methuen MS4    | 0                                                               | 0                                                  |
| OF0104            | Merrimack      | 0                                                               | 0                                                  |
| OF0105            | Merrimack      | 0                                                               | 0                                                  |
| OF0106            | Merrimack      | 0                                                               | 0                                                  |
| OF0107            | Merrimack      | 0                                                               | 0                                                  |
| OF0108            | Merrimack      | 0                                                               | 0                                                  |
| OF0109            | Merrimack      | 0                                                               | 0                                                  |
| OF0110            | Merrimack      | 0                                                               | 0                                                  |
| OF0111            | Merrimack      | 0                                                               | 0                                                  |
| OF0112            | Merrimack      | 0                                                               | 0                                                  |
| OF0113            | Merrimack      | 0                                                               | 0                                                  |
| OF0114            | Merrimack      | 0                                                               | 0                                                  |
| OF0115            | Merrimack      | 0                                                               | 0                                                  |
| OF0116            | Merrimack      | 0                                                               | 0                                                  |
| OF0117            | Merrimack      | 0                                                               | 0                                                  |
| OF0119            | Spicket        | 0                                                               | 0                                                  |
| OF0120            | Spicket        | 0                                                               | 0                                                  |
| OF0121            | Spicket        | 0                                                               | 0                                                  |
| OF0126            | Spicket        | 0                                                               | 0                                                  |
| OF0127            | Spicket        | 0                                                               | 0                                                  |
| OF0128            | Spicket        | 0                                                               | 0                                                  |
| OF0132            | Spicket        | 0                                                               | 0                                                  |
| OF0133            | Spicket        | 0                                                               | 0                                                  |
|                   |                |                                                                 |                                                    |
|                   | <b>Total:</b>  | <b>6,420</b>                                                    | <b>130,105</b>                                     |

**Attachment A-4: Amount of Illicit Discharge Removed by Watershed Area  
(as of December 31, 2024)**

| <b>Watershed Area</b> | <b>Sum of Estimated Illicit Discharge Removed This Reporting Period (GPD)</b> | <b>Sum of Cumulative Illicit Discharge Removed To Date (GPD)</b> |
|-----------------------|-------------------------------------------------------------------------------|------------------------------------------------------------------|
| Merrimack             | 6,300                                                                         | 12,410                                                           |
| Shawsheen             | 120                                                                           | 2,305                                                            |
| Spicket               | 0                                                                             | 113,740                                                          |
| Methuen MS4           | 0                                                                             | 1,650                                                            |
| <b>Total:</b>         | <b>6,420</b>                                                                  | <b>130,105</b>                                                   |

Attachment A-5: Updated Priority Ranking of Catchment Areas  
(as of December 31, 2024)

| MS4 Outfalls and Interconnections |           |                   |                   |           |                  |                        |                        | Dry-Weather Screening Results |          |                               |                 |                |                    |                 |                      | Wet-Weather Screening Results |       |                               |                 |                |                    |                 |                      | Priority Ranking | Scheduled Completion Date |
|-----------------------------------|-----------|-------------------|-------------------|-----------|------------------|------------------------|------------------------|-------------------------------|----------|-------------------------------|-----------------|----------------|--------------------|-----------------|----------------------|-------------------------------|-------|-------------------------------|-----------------|----------------|--------------------|-----------------|----------------------|------------------|---------------------------|
| Catchment Category                | Unique ID | Latitude          | Longitude         | Pipe Size | Pipe Material    | Catchment Area (acres) | Receiving Water        |                               | Flow?    | Flow Description (if present) | Sample Location | Ammonia (mg/L) | Surfactants (mg/L) | Chlorine (mg/L) | E. coli (MPN/100 mL) | Screening Date                | Flow? | Flow Description (if present) | Sample Location | Ammonia (mg/L) | Surfactants (mg/L) | Chlorine (mg/L) | E. coli (MPN/100 mL) |                  |                           |
| Problem                           | OF0004    | 42° 41' 34.428" N | 71° 10' 31.068" W | 32        | RCP              | 158.5                  | Merrimack              | 5/24/2022*                    | Yes      | Not Indicated                 | Not Indicated   | 0.25           | 0.25               | 0.0             | 16                   | 10/23/2014                    | Yes   | Heavy                         | MH5380          | 0.4            | 0.25               | 0.0             | 8,200                | 1                | 6/30/2015                 |
| Problem                           | OF0015    | 42° 42' 54.988" N | 71° 9' 14.813" W  | 60        | RCP              | 89.6                   | Spicket                | 5/24/2022*                    | Yes      | Not Indicated                 | Not Indicated   | 0.25           | 0.5                | 0.0             | 318                  | 10/16/2014                    | Yes   | Heavy                         | Outfall         | 5.0            | 0.0                | 0.2             | 54,000               | 2                | 9/1/2015                  |
| Problem                           | OF0006    | 42° 43' 7.461" N  | 71° 8' 10.204" W  | 48        | RCP              | 167.8                  | Merrimack              | 9/5/2024                      | Yes      | Fast                          | Outfall         | 2.0            | 0.3                | 0.3             | 609                  | 10/16/2014                    | Yes   | Heavy                         | Outfall         | 0.6            | 0.0                | 0.0             | 100,000              | 3                | 7/31/2016                 |
| Problem                           | OF0097    | 42° 42' 11.954" N | 71° 9' 58.079" W  | 38        | RCP              | 15.7                   | Merrimack(North Canal) | 7/7/2015                      | Yes      | Moderate                      | Outfall         | 8              | 0.25               | 0.0             | 546                  | 7/1/2015                      | Yes   | Heavy                         | Outfall         | 0.4            | 0.25               | 0.0             | 15,531               | 4                | 7/31/2016                 |
| Problem                           | OF0090    | 42° 42' 52.851" N | 71° 10' 30.486" W | 48        | RCP              | 6.2                    | Spicket                | 8/25/2022                     | No       | None                          | Outfall         |                |                    |                 |                      | 6/27/2023                     | Yes   | Slow                          | MH5646          | 0.3            | 0.5                | 1.2             | 29,090               | 5                | 7/31/2016                 |
| Problem                           | IN0005-E  | 42° 42' 23.060" N | 71° 11' 24.885" W | 12        | VCP              | 44.3                   | Methuen                | 6/4/2015                      | Yes      | Moderate                      | MH5086-E        | 0.1            | 0.0                | 0.0             | 98                   | 9/11/2015                     | Yes   | Moderate                      | MH5086-E        | 0.1            | 0.0                | 0.0             | 12,033               | 6                | 7/31/2016                 |
| Problem                           | OF0003    | 42° 41' 31.830" N | 71° 10' 33.006" W | 42        | RCP              | 112.9                  | Merrimack              | 5/24/2022*                    | Yes      | Not Indicated                 | Not Indicated   | 0.25           | 0.35               | 0.0             | 6,932                | 8/22/2016                     | Yes   | Moderate                      | MH5377          | 0.2            | 0.0                | 0.0             | 17,329               | 7                | 6/30/2015                 |
| Problem                           | OF0018    | 42° 41' 43.717" N | 71° 8' 45.977" W  | 60        | RCP              | 123.8                  | Shawsheen              | 5/29/2020                     | Yes      | Moderate                      | Outfall         | 0.0            | 0.0                | 0.0             | 140                  | 10/17/2019                    | Yes   | Fast                          | Outfall         | 0.1            | 0.0                | 0.0             | >2419.6              | 8                | 6/30/2015                 |
| High                              | OF0020    | 42° 40' 56.525" N | 71° 8' 55.639" W  | 36        | RCP              | 95.9                   | Shawsheen              | 5/24/2022*                    | Yes      | Not Indicated                 | Not Indicated   | 0.25           | 0.25               | 0.1             | 1,642                | 10/23/2014                    | Yes   | Heavy                         | MH5487          | 0.2            | 0.0                | 0.0             | 2,400                | 9                | 7/31/2016                 |
| Problem                           | OF0112    | 42° 41' 0.3552" N | 71° 11' 6.634" W  | 18        | Precast Concrete | 7.4                    | Merrimack              | 6/18/2024                     | Yes      | Slow                          | Outfall         | 2              | 0.5                | 0.14            | 121                  | 4/16/2018                     | Yes   | Fast                          | Outfall         | 0              | 0                  | 0.0             | 185                  | 10               | 4/29/2018                 |
| High                              | OF0027    | 42° 40' 41.460" N | 71° 10' 23.113" W | 24        | RCP              | 37.6                   | Shawsheen              | 5/21/2015                     | Yes      | Moderate                      | Outfall         | 0.3            | 0.0                | 0.0             | -                    | 6/2/2015                      | Yes   | Heavy                         | Outfall         | 0.2            | 0.25               | 0.0             | >24,196              | 11               | 7/31/2016                 |
| High                              | OF0080    | 42° 42' 11.365" N | 71° 8' 31.747" W  | 15        | RCP              | 3.0                    | Shawsheen              | 5/4/2023                      | Yes      | Moderate                      | MH5631          | 0.1            | 0                  | 0.4             | 428                  | 6/2/2015                      | Yes   | Trickle                       | Outfall         | 0.6            | 0.25               | 0.1             | >24,196              | 12               | 7/31/2016                 |
| High                              | OF0011    | 42° 42' 50.467" N | 71° 10' 49.203" W | Unknown   | Unknown          | 104.1                  | Spicket                | 5/4/2023                      | Yes      | Moderate                      | MH5126          | 0.3            | 0.0                | 0.0             | 581                  | 10/16/2014                    | Yes   | Moderate                      | MH5483          | 4.0            | 0.0                | 0.1             | 220,000              | 13               | 7/31/2016                 |
| High                              | OF0007    | 42° 41' 45.483" N | 71° 11' 6.716" W  | 15        | RCP              | 34.6                   | Merrimack              | 4/17/2023                     | Yes      | Trickle                       | Outfall         | 8.0            | 0.5                | 0.0             | 80,000               | 10/16/2014                    | Yes   | Heavy                         | Outfall         | 0.6            | 0.5                | 0.0             | 24,000               | 14               | 7/31/2016                 |
| High                              | OF0094    | 42° 42' 55.179" N | 71° 10' 37.256" W | 32        | RCP              | 6.7                    | Spicket                | 5/21/2015                     | Standing | None                          | MH5649          |                |                    |                 |                      | 7/1/2015                      | Yes   | Moderate                      | Outfall         | 0.3            | 0.25               | 0.0             | 41,060               | 15               | 7/31/2016                 |
| High                              | OF0100    | 42° 43' 14.437" N | 71° 8' 54.210" W  | 12        | VCP              | 11.9                   | Merrimack              | 5/4/2023                      | Yes      | Moderate                      | MH5770          | 0.3            | 0                  | 0.1             | 1,046                | 10/1/2015                     | Yes   | Trickle                       | MH5075          | 0.1            | 0.25               | 0.0             | 780                  | 16               | 7/31/2016                 |
| High                              | OF0022    | 42° 42' 48.688" N | 71° 9' 28.628" W  | 18        | Brick            | 3.3                    | Spicket                | 6/24/2014                     | No       | None                          | Outfall         |                |                    |                 |                      | 10/16/2014                    | Yes   | Heavy                         | Outfall         | 1.0            | 0.25               | 0.0             | 59,000               | 17               | 12/31/2017                |
| High                              | OF0026    | 42° 40' 39.435" N | 71° 10' 31.490" W | 18        | RCP              | 14.9                   | Shawsheen              | 3/27/2023                     | Yes      | Moderate                      | Outfall         | 0.1            | 0.25               | 0.0             | 80                   | 6/2/2015                      | Yes   | Moderate                      | Outfall         | 0              | 0.25               | 0.0             | 2,046                | 18               | 7/31/2016                 |
| Problem                           | OF0005    | 42° 41' 40.052" N | 71° 10' 35.922" W | 48        | RCP              | 48.6                   | Merrimack              | 7/14/2016                     | Yes      | Moderate                      | CB6244          | 0.8            | 0.0                | 0.3             | 10                   | 8/22/2016                     | Yes   | Moderate                      | Outfall         | 0.1            | 0.0                | 0.0             | 4,884                | 19               | 9/1/2015                  |
| High                              | OF0019    | 42° 41' 1.309" N  | 71° 8' 37.603" W  | 12        | CMP              | 23.4                   | Shawsheen              | 6/24/2014                     | No       | None                          | Outfall         |                |                    |                 |                      | 10/23/2014                    | Yes   | Heavy                         | MH5429          | 0.6            | 0.0                | 0.0             | 6,600                | 20               | 7/31/2016                 |
| High                              | OF0028    | 42° 41' 27.830" N | 71° 8' 33.732" W  | 12        | HDPE             | 1.8                    | Shawsheen              | 3/29/2023                     | No       | None                          | Outfall         |                |                    |                 |                      | 6/2/2015                      | Yes   | Moderate                      | Outfall         | 0.2            | 0.25               | 0.0             | 4,106                | 21               | 7/31/2016                 |
| High                              | OF0021    | 42° 40' 48.318" N | 71° 11' 1.701" W  | 24        | RCP              | 39.4                   | Merrimack              | 3/27/2023                     | Yes      | Trickle                       | MH5492          | 0.0            | 0.25               | 0.0             | -                    | 10/23/2014                    | Yes   | Heavy                         | Outfall         | 0.2            | 0.0                | 0.0             | 14,000               | 22               | 7/31/2016                 |
| High                              | IN0007    | 42° 42' 7.954" N  | 71° 11' 21.532" W | Unknown   | Unknown          | 37.7                   | Methuen                | 5/22/2015                     | Yes      | Moderate                      | MH5077          | 0.1            | 0.25               | 0.1             | -                    | 7/28/2015                     | Yes   | Moderate                      | MH5077          | 0.0            | 0.0                | 0.0             | 5,475                | 23               | 7/31/2016                 |
| High                              | OF0037    | 42° 42' 33.304" N | 71° 9' 4.559" W   | 18        | RCP              | 2.0                    | Spicket                | 3/29/2023                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/1/2015                      | Yes   | Moderate                      | Outfall         | 0.1            | 0.25               | 0.0             | 730                  | 24               | 7/31/2017                 |
| High                              | OF0008    | 42° 41' 50.260" N | 71° 11' 14.774" W | 15        | Cast Iron        | 10.9                   | Merrimack              | 6/24/2014                     | No       | None                          | Outfall         |                |                    |                 |                      | 10/16/2014                    | Yes   | Heavy                         | Outfall         | 10.0           | 1.0                | 0.0             | 5,600                | 25               | 7/31/2016                 |
| High                              | OF0065    | 42° 42' 18.826" N | 71° 9' 47.740" W  | 10        | VCP              | 0.2                    | Merrimack(North Canal) | 5/12/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/1/2015                      | Yes   | Trickle                       | MH5614          | 0.8            | 0.75               | 0.0             | 3,441                | 26               | 7/31/2017                 |
| High                              | OF0017    | 42° 41' 57.526" N | 71° 8' 41.619" W  | 12        | CMP              | 12.4                   | Shawsheen              | 6/24/2014                     | No       | None                          | Outfall         |                |                    |                 |                      | 10/23/2014                    | Yes   | Heavy                         | Outfall         | 0.2            | 0.0                | 0.0             | 7,500                | 27               | 7/31/2016                 |
| High                              | OF0044    | 42° 42' 47.666" N | 71° 9' 37.194" W  | 18        | RCP              | 0.5                    | Spicket                | 5/21/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/1/2015                      | Yes   | Trickle                       | Outfall         | 0.6            | 0.25               | 0.0             | 690                  | 28               | 12/31/2017                |
| High                              | OF0010    | 42° 41' 52.593" N | 71° 11' 20.637" W | 15        | Cast Iron        | 7.2                    | Merrimack              | 4/17/2023                     | Yes      | Slow                          | Outfall         | 0.1            | 0.5                | 1.4             | 20                   | 9/6/2017                      | Yes   | Fast                          | Outfall         | 0.4            | 0.25               | 0               | 61,310               | 29               | 7/31/2016                 |
| High                              | OF0054    | 42° 42' 22.428" N | 71° 9' 9.785" W   | 12        | Cast Iron        | 0.3                    | Merrimack(North Canal) | 5/12/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 6/2/2015                      | Yes   | Trickle                       | Outfall         | 0.0            | 0.25               | 0.0             | 1,056                | 30               | 12/31/2017                |
| High                              | IN0001    | 42° 43' 15.958" N | 71° 9' 2.938" W   | 12        | CMP              | 4.6                    | Methuen                | 5/22/2015                     | No       | None                          | MH5001          |                |                    |                 |                      | 7/1/2015                      | Yes   | Trickle                       | MH5494          | 0.1            | 0.0                | 0.0             | >2,400               | 31               | 12/31/2017                |
| High                              | OF0009    | 42° 41' 51.422" N | 71° 11' 17.515" W | 15        | Cast Iron        | 8.5                    | Merrimack              | 6/24/2014                     | No       | None                          | Outfall         |                |                    |                 |                      | 10/16/2014                    | Yes   | Moderate                      | Outfall         | 0.4            | 1.5                | 0.0             | 870                  | 32               | 7/31/2016                 |
| High                              | OF0063    | 42° 42' 20.677" N | 71° 9' 44.254" W  | 10        | Cast Iron        | 0.2                    | Merrimack(North Canal) | 5/12/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/1/2015                      | Yes   | Trickle                       | Outfall         | 0.8            | 0.75               | 0.0             | 504                  | 33               | 7/31/2017                 |
| High                              | OF0066    | 42° 42' 16.033" N | 71° 9' 51.945" W  | 10        | Cast Iron        | 0.1                    | Merrimack(North Canal) | 5/12/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/1/2015                      | Yes   | Trickle                       | Outfall         | 0.8            | 0.5                | 0.0             | 488                  | 34               | 7/31/2017                 |
| High                              | OF0068    | 42° 42' 13.238" N | 71° 9' 56.099" W  | 10        | Cast Iron        | 0.2                    | Merrimack(North Canal) | 5/12/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/1/2015                      | Yes   | Trickle                       | Outfall         | 0.6            | 0.25               | 0.0             | 465                  | 35               | 7/31/2017                 |
| High                              | OF0033    | 42° 41' 26.578" N | 71° 8' 33.649" W  | 18        | HDPE             | 10.7                   | Shawsheen              | 5/18/2023                     | Yes      | Slow                          | Outfall         | 0.1            | 0.25               | 0.1             | 10                   | 6/2/2015                      | Yes   | Trickle                       | Outfall         | 0.1            | 0.25               | 0.1             | 631                  | 36               | 7/31/2016                 |
| High                              | OF0081    | 42° 42' 12.357" N | 71° 9' 11.985" W  | 12        | RCP              | 0.1                    | Merrimack              | 5/12/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 6/2/2015                      | Yes   | Trickle                       | MH5639          | 0.2            | 0.0                | 0.0             | 8,164                | 37               | 7/31/2017                 |
| High                              | OF0082    | 42° 42' 12.429" N | 71° 9' 12.730" W  | 12        | Cast Iron        | 0.1                    | Merrimack              | 5/12/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 6/2/2015                      | Yes   | Trickle                       | Outfall         | 0.3            | 0.0                | 0.0             | 5,475                | 38               | 7/31/2017                 |
| High                              | OF0069    | 42° 42' 12.303" N | 71° 9' 57.497" W  | 10        | Cast Iron        | 0.1                    | Merrimack(North Canal) | 5/12/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/1/2015                      | Yes   | Heavy                         | Outfall         | 0.4            | 0.75               | 0.0             | 435                  | 39               | 7/31/2017                 |
| High                              | OF0053    | 42° 42' 22.539" N | 71° 9' 6.582" W   | 12        | Cast Iron        | 0.1                    | Merrimack(North Canal) | 5/12/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 6/2/2015                      | Yes   | Trickle                       | Outfall         | 0.2            | 0.25               | 0.0             | 450                  | 40               | 7/31/2017                 |
| High                              | OF0002    | 42° 41' 20.051" N | 71° 10' 45.344" W | 60        | RCP              | 3.9                    | Merrimack              | 6/24/2014                     | Yes      | Moderate                      | Outfall         | 0.0            | 0.0                | 0.0             | 210                  | 10/23/2014                    | Yes   | Heavy                         | MH5317          | 0.1            | 0.0                | 0.0             | 520                  | 41               | 12/31/2017                |
| High                              | OF0014    | 42° 42' 50.904" N | 71° 9' 49.978" W  | 24        | CMP              | 20.9                   | Spicket                | 6/24/2014                     | No       | None                          | Outfall         |                |                    |                 |                      | 10/23/2014                    | Yes   | Heavy                         | Outfall         | 0.0            | 0.0                | 0.0             | 980                  | 42               | 12/31/2017                |
| High                              | OF0032    | 42° 43' 14.071" N | 71° 8' 15.868" W  | 12        | CMP              | 0.9                    | Merrimack              | 5/12/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 6/2/2015                      | Yes   | Trickle                       | Outfall         | 0.1            | 0.0                | 0.0             | 644                  | 43               | 7/31/2016                 |
| High                              | OF0067    | 42° 42' 14.286" N | 71° 9' 54.528" W  | 10        | Cast Iron        | 0.2                    | Merrimack(North Canal) | 5/12/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/1/2015                      | Yes   | Trickle                       | Outfall         | 0.6            | 0.25               | 0.0             | 122                  | 44               | 7/31/2017                 |
| High                              | OF0107    | 42° 41' 24.882" N | 71° 11' 8.189" W  | 18        | Precast Concrete | 0.5                    | Merrimack              | 1/26/2018                     | No       | None                          | Outfall         |                |                    |                 |                      | 4/29/2018                     | Yes   | Fast                          | Outfall         | 0              | 0.25               | 0.0             | 2909                 | 45               | 4/29/2018                 |
| High                              | OF0113    | 42° 41' 4.5636" N | 71° 11' 2.076" W  | Unknown   | Unknown          | 98.9                   | Merrimack              | 3/27/2023                     | Yes      | Slow                          | Outfall         | 0              | 0.25               | 0               | 20                   | 4/29/2018                     | Yes   | Moderate                      | Outfall         | 0.1            | 0                  | 0.0             | 374                  | 46               | 4/29/2018                 |
| High                              | OF0012    | 42° 42' 48.896" N | 71° 10' 13.891" W | 18        | RCP              | 3.3                    | Spicket                | 6/24/2014                     | No       | None                          | Outfall         |                |                    |                 |                      | 10/16/2014                    | Yes   | Moderate                      | Outfall         | 0.1            | 0.0                | 0.0             | 420                  | 47               | 12/31/2017                |
| High                              | OF0040    | 42° 42' 51.393" N | 71° 9' 23.374" W  | 12        | Cast Iron        | 0.1                    | Spicket                | 5/12/2015                     | Standing | Submerged                     | Outfall         |                |                    |                 |                      | 7/28/2015                     | No    | None                          | Outfall         |                |                    |                 |                      | 48               | 12/31/2017                |
| High                              | OF0073    | 42° 42' 21.195" N | 71° 9' 42.964" W  | 10        | Cast Iron        | 0.1                    | Merrimack(North Canal) | 5/12/2015                     | Standing | Submerged                     | Outfall         |                |                    |                 |                      | 7/28/2015                     | No    | None                          | Outfall         |                |                    |                 |                      | 49               | 12/31/2017                |
| High                              | IN0008    | 42° 41' 57.908" N | 71° 11' 20.063" W | 15        | VCP              | 8.9                    | Methuen                | 5/22/2015                     | Standing | Submerged                     | MH5142          |                |                    |                 |                      | 7/28/2015                     | No    | None                          | MH5412          |                |                    |                 |                      | 50               | 12/31/2017                |
| Problem                           | OF0024    |                   |                   |           |                  |                        |                        |                               |          |                               |                 |                |                    |                 |                      |                               |       |                               |                 |                |                    |                 |                      |                  |                           |

Attachment A-5: Updated Priority Ranking of Catchment Areas  
(as of December 31, 2024)

| MS4 Outfalls and Interconnections |           |                    |                   |           |                      |                        |                        | Dry-Weather Screening Results |          |                               |                 |                |                    |                 |                      | Wet-Weather Screening Results |       |                               |                 |                |                    |                 | Priority Ranking | Scheduled Completion Date |                      |
|-----------------------------------|-----------|--------------------|-------------------|-----------|----------------------|------------------------|------------------------|-------------------------------|----------|-------------------------------|-----------------|----------------|--------------------|-----------------|----------------------|-------------------------------|-------|-------------------------------|-----------------|----------------|--------------------|-----------------|------------------|---------------------------|----------------------|
| Catchment Category                | Unique ID | Latitude           | Longitude         | Pipe Size | Pipe Material        | Catchment Area (acres) | Receiving Water        |                               | Flow?    | Flow Description (if present) | Sample Location | Ammonia (mg/L) | Surfactants (mg/L) | Chlorine (mg/L) | E. coli (MPN/100 mL) | Screening Date                | Flow? | Flow Description (if present) | Sample Location | Ammonia (mg/L) | Surfactants (mg/L) | Chlorine (mg/L) |                  |                           | E. coli (MPN/100 mL) |
| Low                               | OF0048    | 42° 42' 52.718" N  | 71° 9' 22.871" W  | 20        | Unknown              | 0.1                    | Spicket                | 5/12/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/1/2015                      | No    | None                          | Outfall         |                |                    |                 |                  | 77                        | 12/31/2017           |
| Low                               | OF0049    | 42° 42' 50.515" N  | 71° 10' 24.607" W | 8         | Cast Iron            | 0.2                    | Spicket                | 5/12/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/28/2015                     | No    | None                          | Outfall         |                |                    |                 |                  | 78                        | 12/31/2017           |
| Low                               | OF0050    | 42° 42' 50.404" N  | 71° 10' 24.472" W | 8         | Cast Iron            | 0.1                    | Spicket                | 5/12/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/28/2015                     | No    | None                          | Outfall         |                |                    |                 |                  | 79                        | 12/31/2017           |
| Low                               | OF0051    | 42° 42' 23.133" N  | 71° 9' 3.126" W   | 15        | HDPE                 | 0.1                    | Merrimack(North Canal) | 5/12/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 6/2/2015                      | No    | None                          | Outfall         |                |                    |                 |                  | 80                        | 12/31/2017           |
| Low                               | OF0052    | 42° 42' 23.203" N  | 71° 9' 2.871" W   | 8         | Cast Iron            | 0.1                    | Merrimack(North Canal) | 5/12/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/28/2015                     | No    | None                          | Outfall         |                |                    |                 |                  | 81                        | 12/31/2017           |
| Low                               | OF0056    | 42° 42' 25.970" N  | 71° 8' 53.996" W  | 18        | RCP                  | 1.2                    | Merrimack(North Canal) | 4/10/2023                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/28/2015                     | No    | None                          | Outfall         |                |                    |                 |                  | 82                        | 12/31/2017           |
| Low                               | OF0057    | 42° 42' 22.889" N  | 71° 9' 7.320" W   | 12        | Cast Iron            | 0.4                    | Merrimack(North Canal) | 5/12/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/28/2015                     | No    | None                          | Outfall         |                |                    |                 |                  | 83                        | 12/31/2017           |
| Low                               | OF0058    | 42° 42' 22.830" N  | 71° 9' 14.085" W  | 12        | Cast Iron            | 0.1                    | Merrimack(North Canal) | 5/12/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/28/2015                     | No    | None                          | Outfall         |                |                    |                 |                  | 84                        | 12/31/2017           |
| Low                               | OF0059    | 42° 42' 22.844" N  | 71° 9' 22.143" W  | 12        | Cast Iron            | 0.3                    | Merrimack(North Canal) | 5/12/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/28/2015                     | No    | None                          | Outfall         |                |                    |                 |                  | 85                        | 7/31/2017            |
| Low                               | OF0060    | 42° 42' 22.862" N  | 71° 9' 26.377" W  | 8         | Cast Iron            | 0.1                    | Merrimack(North Canal) | 5/12/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/28/2015                     | No    | None                          | Outfall         |                |                    |                 |                  | 86                        | 7/31/2017            |
| Low                               | OF0061    | 42° 42' 22.861" N  | 71° 9' 31.436" W  | 8         | Cast Iron            | 0.1                    | Merrimack(North Canal) | 5/12/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/28/2015                     | No    | None                          | Outfall         |                |                    |                 |                  | 87                        | 7/31/2017            |
| Low                               | OF0062    | 42° 42' 22.867" N  | 71° 9' 33.726" W  | 8         | Cast Iron            | 0.1                    | Merrimack(North Canal) | 5/12/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/28/2015                     | No    | None                          | Outfall         |                |                    |                 |                  | 88                        | 7/31/2017            |
| Low                               | OF0064    | 42° 42' 20.287" N  | 71° 9' 45.163" W  | 8         | PVC                  | 0.1                    | Merrimack(North Canal) | 5/12/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/1/2015                      | No    | None                          | Outfall         |                |                    |                 |                  | 89                        | 7/31/2017            |
| Low                               | OF0071    | 42° 42' 14.297" N  | 71° 9' 39.909" W  | 24        | RCP                  | 1.1                    | Merrimack              | 3/29/2023                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/28/2015                     | No    | None                          | Outfall         |                |                    |                 |                  | 90                        | 12/31/2017           |
| Low                               | OF0072    | 42° 42' 21.089" N  | 71° 9' 41.434" W  | 12        | RCP                  | 0.2                    | Merrimack(North Canal) | 5/12/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/28/2015                     | No    | None                          | Outfall         |                |                    |                 |                  | 91                        | 7/31/2017            |
| Low                               | OF0074    | 42° 42' 21.383" N  | 71° 9' 42.405" W  | 10        | Cast Iron            | 0.1                    | Merrimack(North Canal) | 5/12/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/28/2015                     | No    | None                          | Outfall         |                |                    |                 |                  | 92                        | 12/31/2017           |
| Low                               | OF0075    | 42° 42' 6.087" N   | 71° 9' 34.772" W  | 10 x 12   | RCP                  | 0.1                    | Merrimack(South Canal) | 5/13/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/28/2015                     | No    | None                          | Outfall         |                |                    |                 |                  | 93                        | 12/31/2017           |
| Low                               | OF0076    | 42° 42' 5.650" N   | 71° 9' 34.892" W  | 12        | Cast Iron            | 0.2                    | Merrimack(South Canal) | 5/12/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/28/2015                     | No    | None                          | Outfall         |                |                    |                 |                  | 94                        | 12/31/2017           |
| Low                               | OF0077    | 42° 42' 5.876" N   | 71° 9' 34.182" W  | 8         | PVC                  | 0.1                    | Merrimack(South Canal) | 5/13/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/28/2015                     | No    | None                          | Outfall         |                |                    |                 |                  | 95                        | 12/31/2017           |
| Low                               | OF0078    | 42° 42' 6.288" N   | 71° 9' 34.133" W  | Unknown   | Unknown              | 0.1                    | Merrimack(South Canal) | 5/13/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/28/2015                     | No    | None                          | Outfall         |                |                    |                 |                  | 96                        | 12/31/2017           |
| Low                               | OF0079    | 42° 42' 11.770" N  | 71° 8' 30.669" W  | 12        | CMP                  | 0.3                    | Shawsheen              | 5/12/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/28/2015                     | No    | None                          | Outfall         |                |                    |                 |                  | 97                        | 7/31/2016            |
| Low                               | OF0083    | 42° 42' 8.264" N   | 71° 9' 21.067" W  | 10        | Cast Iron            | 2.4                    | Merrimack(South Canal) | 4/10/2023                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/28/2015                     | No    | None                          | Outfall         |                |                    |                 |                  | 98                        | 7/31/2017            |
| Low                               | OF0084    | 42° 42' 6.569" N   | 71° 9' 31.893" W  | 10        | Cast Iron            | 0.2                    | Merrimack(South Canal) | 5/12/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/28/2015                     | No    | None                          | Outfall         |                |                    |                 |                  | 99                        | 7/31/2017            |
| Low                               | OF0085    | 42° 42' 5.888" N   | 71° 9' 33.534" W  | 10        | Cast Iron            | 0.1                    | Merrimack(South Canal) | 5/12/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/28/2015                     | No    | None                          | Outfall         |                |                    |                 |                  | 100                       | 7/31/2017            |
| Low                               | OF0086    | 42° 42' 2.967" N   | 71° 9' 42.565" W  | 10        | Cast Iron            | 0.1                    | Merrimack(South Canal) | 5/12/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/28/2015                     | No    | None                          | Outfall         |                |                    |                 |                  | 101                       | 7/31/2017            |
| Low                               | OF0087    | 42° 42' 2.312" N   | 71° 9' 44.435" W  | 10        | Unknown              | 0.1                    | Merrimack(South Canal) | 5/12/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/28/2015                     | No    | None                          | Outfall         |                |                    |                 |                  | 102                       | 7/31/2017            |
| Low                               | OF0088    | 42° 41' 58.449" N  | 71° 9' 51.665" W  | 10        | Cast Iron            | 0.1                    | Merrimack(South Canal) | 5/12/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/28/2015                     | No    | None                          | Outfall         |                |                    |                 |                  | 103                       | 7/31/2017            |
| Low                               | OF0089    | 42° 41' 58.052" N  | 71° 9' 52.398" W  | 6         | Unknown              | 0.1                    | Merrimack(South Canal) | 5/12/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/28/2015                     | No    | None                          | Outfall         |                |                    |                 |                  | 104                       | 7/31/2017            |
| Low                               | OF0091    | 42° 42' 55.304" N  | 71° 10' 36.909" W | 6         | Cast Iron            | 0.1                    | Spicket                | 5/13/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/28/2015                     | No    | None                          | Outfall         |                |                    |                 |                  | 105                       | 12/31/2017           |
| Low                               | OF0092    | 42° 42' 17.479" N  | 71° 9' 12.410" W  | 6         | Cast Iron            | 0.2                    | Merrimack              | 5/13/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/28/2015                     | No    | None                          | Outfall         |                |                    |                 |                  | 106                       | 12/31/2017           |
| Low                               | OF0093    | 42° 42' 17.471" N  | 71° 9' 12.103" W  | 10        | Cast Iron            | 0.2                    | Merrimack              | 5/13/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/28/2015                     | No    | None                          | Outfall         |                |                    |                 |                  | 107                       | 12/31/2017           |
| Low                               | OF0096    | 42° 42' 48.163" N  | 71° 10' 14.486" W | 12        | RCP                  | 0.2                    | Spicket                | 5/21/2015                     | No       | None                          | Outfall         |                |                    |                 |                      | 7/1/2015                      | No    | None                          | Outfall         |                |                    |                 |                  | 108                       | 12/31/2017           |
| Low                               | OF0099    | 42° 42' 11.463" N  | 71° 8' 31.523" W  | 12        | CMP                  | 0.1                    | Shawsheen              | 7/7/2015                      | No       | None                          | Outfall         |                |                    |                 |                      | 7/28/2015                     | No    | None                          | Outfall         |                |                    |                 |                  | 109                       | 7/31/2016            |
| Low                               | IN0005-S  | 42° 42' 23.060" N  | 71° 11' 24.885" W | 12        | VCP                  | 1.6                    | Methuen                | 6/4/2015                      | No       | None                          | MH5086-S        |                |                    |                 |                      | 7/28/2015                     | No    | None                          | MH5086-S        |                |                    |                 |                  | 110                       | 7/31/2016            |
| Low                               | OF0101    | 42° 40' 50.516" N  | 71° 10' 29.268" W | Unknown   | Unknown              | 3.1                    | Shawsheen              | 3/27/2023                     | No       | None                          | MH5816          |                |                    |                 |                      | 8/22/2016                     | No    | None                          | MH5816          |                |                    |                 |                  | 111                       | 12/31/2017           |
| Low                               | OF0102    | 42° 40' 49.587" N  | 71° 9' 59.853" W  | Unknown   | Unknown              | 2.7                    | Shawsheen              | 3/29/2023                     | No       | None                          | MH5822          |                |                    |                 |                      | 8/22/2016                     | No    | None                          | MH5557          |                |                    |                 |                  | 112                       | 12/31/2017           |
| Low                               | OF0119    | 42° 42' 45.018" N  | 71° 9' 13.2372" W | 12        | Cast Iron            | 0.1                    | Spicket                | 10/9/2018                     | No       | None                          | Outfall         |                |                    |                 |                      | 11/6/2018                     | No    | None                          | Outfall         |                |                    |                 |                  | 113                       | 12/31/2020           |
| Low                               | OF0120    | 42° 42' 50.904" N  | 71° 9' 44.9532" W | 12        | Vitrified Clay Pipe  | 7.0                    | Spicket                | 4/17/2023                     | No       | None                          | MH5377          |                |                    |                 |                      | 11/6/2018                     | No    | None                          | Outfall         |                |                    |                 |                  | 114                       | 12/31/2020           |
| Low                               | OF0121    | 42° 42' 48.3588" N | 71° 9' 38.7396" W | 18        | Cast Iron            | 0.1                    | Spicket                | 10/9/2018                     | No       | None                          | Outfall         |                |                    |                 |                      | 11/6/2018                     | No    | Submerged                     | MH5783          |                |                    |                 |                  | 115                       | 12/31/2020           |
| Low                               | OF0126    | 42° 42' 50.9004" N | 71° 9' 45.0216" W | 12        | Corrugated Metal Alu | 0.1                    | Spicket                | 10/9/2018                     | No       | None                          | Outfall         |                |                    |                 |                      | 11/6/2018                     | No    | None                          | Outfall         |                |                    |                 |                  | 116                       | 12/31/2020           |
| Low                               | OF0127    | 42° 41' 7.692" N   | 71° 9' 12.5172" W | Unknown   | Unknown              | 1.2                    | Spicket                | 5/8/2023                      | No       | None                          | MH5788          |                |                    |                 |                      | 11/6/2018                     | No    | None                          | MH5578          |                |                    |                 |                  | 117                       | 12/31/2020           |
| Low                               | OF0128    | 42° 42' 52.2792" N | 71° 9' 22.3164" W | Unknown   | Unknown              | 0.2                    | Spicket                | 10/9/2018                     | No       | None                          | MH5572          |                |                    |                 |                      | 11/6/2018                     | No    | Submerged                     | MH5572          |                |                    |                 |                  | 118                       | 12/31/2020           |
| Low                               | OF0132    |                    |                   |           |                      |                        | Spicket                | 3/29/2023                     | No       | No                            | Outfall         |                |                    |                 |                      |                               |       |                               |                 |                |                    |                 |                  | 119                       | 12/31/2020           |
| Low                               | OF0133    |                    |                   |           |                      |                        | Spicket                | 9/8/2020                      | No       | None                          | Outfall         |                |                    |                 |                      | 11/23/2020                    | No    | None                          | Outfall         |                |                    |                 |                  | 120                       | 12/31/2020           |
| N/A                               | IN0010    | 42° 43' 3.381" N   | 71° 10' 42.957" W | 12        | PVC                  | N/A                    | OF0094                 | 5/22/2015                     | No       | None                          | MH5657          |                |                    |                 |                      | 7/1/2015                      | Yes   | Trickle                       | MH5657          | 0.4            | 0.25               | 0.0             | 43,520           | 121                       | N/A                  |
| N/A                               | IN0004    | 42° 43' 17.713" N  | 71° 8' 45.007" W  | 32        | HDPE                 | N/A                    | OF0006                 | 5/22/2015                     | Yes      | Moderate                      | MH5027          | 0.3            | 0.25               | 0.0             | 2,092                | 7/28/2015                     | Yes   | Moderate                      | MH5027          | 0.4            | 0.0                | 0.0             | 9,804            | 122                       | N/A                  |
| N/A                               | IN0009    | 42° 40' 47.610" N  | 71° 9' 42.416" W  | 20        | RCP                  | N/A                    | OF0004                 | 5/21/2015                     | Standing | Submerged                     | Outfall         |                |                    |                 |                      | 6/2/2015                      | Yes   | Trickle                       | Outfall         | 0.6            | 0.25               | 0.0             | 8,164            | 123                       | N/A                  |
| N/A                               | IN0003    | 42° 43' 19.493" N  | 71° 9' 27.148" W  | 55 x 62   | RCP                  | N/A                    | OF0015                 | 5/22/2015                     | Yes      | Moderate                      | MH5211          | 0.3            | 0.25               | 0.0             | 757                  | 7/28/2015                     | Yes   | Moderate                      | MH5211          | 0.3            | 0.0                | 0.0             | 4,884            | 124                       | N/A                  |
| N/A                               | IN0006    | 42° 42' 11.616" N  | 71° 11' 23.406" W | 18        | RCP                  | N/A                    | IN0007                 | 5/22/2015                     | No       | None                          | MH5076          |                |                    |                 |                      | 7/2                           |       |                               |                 |                |                    |                 |                  |                           |                      |

Notes:

- 1) Sample was collected at the nearest upstream accessible drainage structure if outfall was inaccessible or submerged during screening. No sample was collected if no flow or Standing was observed.
- 2) Shaded values exceed screening thresholds (ammonia ≥ 0.5 mg/L, surfactants ≥ 0.25 mg/L, chlorine > 0.02 mg/L, E. coli ≥ 235 MPN/100 mL). E. coli results below 2 MPN/100 mL detection limit are shown as "-".
- 3) Interconnections entering Lawrence (IN0002, IN0003, IN0004, IN0006, IN0009, and IN0010) are excluded from ranking.
- 4) RCP = Reinforced Concrete Pipe, VCP = Vitrified Clay Pipe, PVC = Polyvinyl Chloride, HDPE = High Density Polyethylene, CMP = Corrugated Metal Pipe
- 5) Inspection dates indicted with an asterisk were completed by EPA.



Attachment A-6: Outfall and Interconnection Monitoring Results  
July 1, 2024 - December 31, 2024

| Outfall ID | Pipe Material       | Pipe Shape | Pipe Size (in) | Location Type       | Inspection Date | Inspecting Company | Weather | Quantity Rain 24 hr | Sampling Location | Manhole ID | Is There Flow | If Flow, Velocity | Samples Collected | If No, Reason | Surfactants (mg/L) | Ammonia (mg/L) | Chlorine (mg/L) | Comments | E. Coli (MPN/100ml) | Total Phosphorous |
|------------|---------------------|------------|----------------|---------------------|-----------------|--------------------|---------|---------------------|-------------------|------------|---------------|-------------------|-------------------|---------------|--------------------|----------------|-----------------|----------|---------------------|-------------------|
| OF0006     | Reinforced Concrete | Circular   | 48             | Storm Drain Outfall | 9/5/2024        | SDE, Inc.          | Sunny   | <0.1 inch           | Outfall           | --         | Yes           | Fast              | Yes               | --            | 0.25               | 2              | 0.29            |          | 609                 | 0.35              |
|            |                     |            |                |                     |                 |                    |         |                     |                   |            |               |                   |                   |               |                    |                |                 |          |                     |                   |
|            |                     |            |                |                     |                 |                    |         |                     |                   |            |               |                   |                   |               |                    |                |                 |          |                     |                   |

Notes: 1) ND = Not detected above screening thresholds (ammonia <0.05 mg/L, surfactants <0.125 mg/L, chlorine <0.02 mg/L, E.Coli <10 MPN/100mL)  
2) NT = Not Tested

Attachment A-7: Bracket Sampling Results  
July 1, 2024 - December 31, 2024

| Catchment Area | Location            | Manhole ID | Inspection Date | Pipe Direction | Standing Water | Flow | Flow Color | Velocity | Ammonia (mg/L) | Surfactants (mg/L) | Chlorine (mg/L) | E.Coli (MPN/100mL) | Pipe Comments                                                                                                  |
|----------------|---------------------|------------|-----------------|----------------|----------------|------|------------|----------|----------------|--------------------|-----------------|--------------------|----------------------------------------------------------------------------------------------------------------|
| OF0003         | Sullivan Avenue     | MH5363     | 10/2/2024       | SW             | No             | Yes  | Clear      | Slow     | 0              | 0.25               | 0.1             | 85                 | Reference Attachment A-9 for EPA Enterococcus and PPCP Results.                                                |
| OF0003         | Maginnis Avenue     | MH5366     | 10/2/2024       | S              | No             | Yes  | Clear      | Slow     | 0.15           | 0.25               | 0.12            | 86                 | Reference Attachment A-9 for EPA Enterococcus and PPCP Results.                                                |
| OF0004         | Diamond Street      | MH6230     | 10/2/2024       | SE             | No             | Yes  | Clear      | Medium   | 0.4            | 1                  | 0.03            | 6,932              | Reference Attachment A-9 for EPA Enterococcus and PPCP Results. MH6230 is referenced as "Park Manhole" in A-9. |
| OF0004         | Beaconsfield Street | MH5245     | 10/2/2024       | SW             | No             | Yes  | Clear      | Slow     | 1              | 0.15               | 0.1             | 68                 | Reference Attachment A-9 for EPA Enterococcus and PPCP Results.                                                |
| OF0004         | Tewksbury Street    | MH5380     | 10/2/2024       | SE             | No             | Yes  | Clear      | Slow     | 0.4            | 0.35               | 0.04            | 762                | Reference Attachment A-9 for EPA Enterococcus and PPCP Results.                                                |
| OF0004         | Beaconsfield Street | MH5245     | 10/2/2024       | NE             | No             | Yes  | Clear      | Slow     | 0.4            | 0.4                | 0.03            | 91                 | Reference Attachment A-9 for EPA Enterococcus and PPCP Results.                                                |
| OF0098         | Canal Street        | MH5755     | 10/22/2024      | E              | No             | No   | --         | --       | --             | --                 | --              | --                 | --                                                                                                             |
| OF0098         | Canal Street        | OF0098     | 10/22/2024      | N              | No             | Yes  | Other      | Fast     | 0.2            | 1.5                | 5.9             | --                 | Visual observation of suds on an intermittent basis. Strong chlorine odor coming from OF0098.                  |
| OF0098         | Canal Street        | MH5755     | 10/22/2024      | W              | No             | Yes  | Other      | Fast     | --             | --                 | --              | --                 | Visual observation of suds                                                                                     |

Notes: 1) ND = Not detected above screening thresholds (ammonia <0.05 mg/L, surfactants <0.125 mg/L, chlorine <0.02 mg/L)  
2) NT = Not tested



Figure Exported: 1/21/2025 By: poregan Using: \woodardcurran.net\shared\Projects\0227206.05 Lawrence MA Phase V SSES\wp\03\_Attachment\Figures\Attachment Figures 3.0.aprx





## REGION 1

NEW ENGLAND REGIONAL LABORATORY  
NORTH CHELMSFORD, MA 01863

**Subject:** Sampling Inspection Report  
Clean Water Act – National Pollutant Discharge Elimination System  
City of Lawrence, Massachusetts

**From:** Ryan Leo, Life Scientist  
Laboratory Services and Applied Science Division (LSASD)  
Field Services Branch (FSB)

SIGN HERE

### Reviewed

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

SIGN HERE

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

**CC:** Solanch Pastrana-Del Valle, Inspector, ECAD  
Water Compliance Section 1

### I. Facility Information

A. Facility Name: City of Lawrence, MA  
B. Facility Location: Lawrence, MA  
C. Facility Contact: William C. Hale (Water & Sewer Commissioner, Lawrence, MA)  
D. NPDES Permit ID: MAR041201 (MS4)

### II. Background Information

A. **Date/Start time of sampling inspection:** 10/02/2024 09:00  
B. **Weather conditions:** Overcast/cloudy in the 60-70s °F  
C. **USEPA Representatives:** Ryan Leo, Jerome Keefe, Nafisah Ali, Solanch Pastrana-Del Valle, and Sam Bosselait  
D. **State/Local Representatives:** William C. Hale  
E. **Federally Enforceable Requirements Investigated:** Stormwater discharges and certain non stormwater discharges from the City of Lawrence, MA's 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 MAR041201.  
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 compliance sampling inspection was to identify potential illicit connections or illegal discharges within the Lawrence, MA MS4 that may adversely impact the water quality in the Merrimack River, Spicket River, and Shawsheen River. Samples were collected from six manholes locations in accordance with the FSB Investigations Team Stormwater Program Plan.

### **V. Permittee Details**

The City of Lawrence occupies approximately 7.43 square miles in Essex County, Massachusetts, approximately 29.7 miles from, north of the state capital, Boston, MA. The City of Lawrence shares borders with the municipalities of Methuen to the north, North Andover to the east, and Andover to the southwest. According to the 2020 U.S. Census, the population of the City of Lawrence was 89,143. The Spicket River is listed as the MS4 receiving water in the city Notice of Intent (NOI) for coverage under the permit.

### **VI. 10/02/2024 Sampling Inspection Summary**

On 10/02/2024, EPA employees Ryan Leo, Nafisah Ali, Sam Bosselait, Solanch Pastrana-Del Valle, and Jerome Keefe ("the EPA Inspection Team") conducted an announced compliance sampling inspection of the City of Lawrence MS4 at the locations described in Section VII. The EPA Inspection Team was accompanied by the city representative and their consultants. The inspection was announced to the permittee via email on July 24<sup>th</sup>, 2024. The inspection started at Maginnis Ave, Lawrence, MA at approximately 09:00. At the time of the inspection, the weather was overcast/cloudy in the 60-70s °F. Light precipitation began shortly after the start of the inspection but stopped around 10:30.

According to the National Weather Service (NWS) for the Lawrence Municipal Airport (KLWM), the last precipitation event prior to the inspection occurred on 9/26/2024, with 0.48 inches recorded. There was no precipitation recorded within the 72 hours before the inspection. According to the NWS, in the month (to date) of October, the area observed zero inches of rain. In September, the area observed 1.20 inches of rain, which is approximately 32% of the 30-year normal value of 3.75 inches. According to the US Drought Monitor, as of 11/5/2024, Essex County is experiencing moderate drought conditions.

The sampling locations described in Section VII 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.

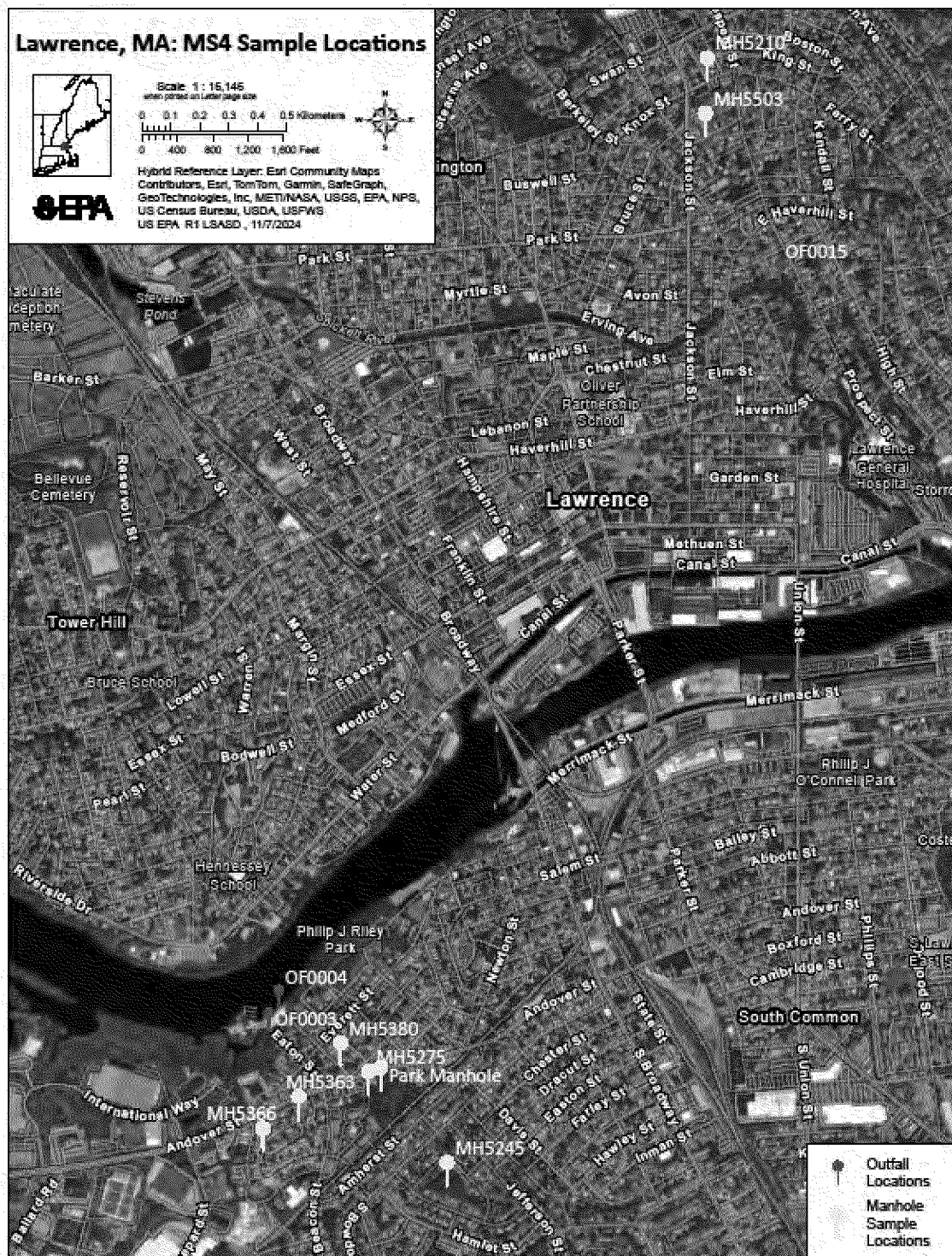


## **VII. Description of Sampling Locations (in order of collection time)**

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

- **MH5363**: A brick manhole, 14' 5" in depth, with one inlet/outlet present approximately 1 foot in diameter, located at the intersection of Maginnis Ave and Sullivan Ave. Discharge flow was low to medium into the OF0003 catchment. The sample was collected in the manhole at the main pipe. Turbidity of the sample was low, and the color was clear. No floatables or odor was present.
- **MH5366**: A brick manhole, 8' 7" in depth, with two inlets/ one outlet (one flowing main and one dripping perpendicular to the main pipe) approximately 2 feet and 1 foot in diameter, respectively. The manhole is located on Maginnis Ave. Discharge flow was stagnant to low into the OF0003 catchment. The sample was collected in the manhole at the main pipe. Turbidity of the sample was low, and the color was clear. Organic materials (sand and grass) were present in the sample. No odor was present.
- **MH5380**: A brick manhole, 13' in depth, with one inlet/outlet present approximately 2 feet in diameter, located on Tewksbury St. Discharge flow was low into the OF0004 catchment. The sample was collected in the manhole at the main pipe. Turbidity of the sample was low, and the color was clear brown. Organic particles were present as floatables and no odor was present.
- **Park Manhole**: A concrete manhole, 4' in depth, with one inlet/outlet present approximately 4 feet in diameter, located in a park adjacent to Diamond St. Discharge flow was medium into the OF0004 catchment. The sample was collected in the manhole at the main pipe. Turbidity was low, and the color was clear. No floatables or odor was present.
- **MH5245**: A brick and concrete manhole, 6' in depth, with two inlets/one outlet (one stagnant from the southeast from Beaconsfield St and one flowing into the manhole perpendicular from the southwest from Beresford St) approximately 3 feet and 1.5 feet in diameter, respectively. Discharge flow from the southeast in the main pipe was stagnant, while the flow from the southwest was medium into the OF0004 catchment. One sample, MH5245-SW, was collected from the flowing pipe coming from Beresford St. The second sample, MH5245-SE, was collected from the main pipe coming from Beaconsfield St. MH5245-SW had no turbidity or odor, and the color was clear. Iron flock was present as floatables in the MH5245-SW sample. MH5245-SE had no turbidity or odor, and the color was clear. Organic materials were present as floatables in the MH5245-SE sample.
- **MH5503**: A brick manhole, 10' in depth, with four inlets and one outlet (one main inlet with three flowing inlets into the main pipe) approximately 6 inches in diameter. Discharge flow was medium to high from all inlets into the OF0015 catchment. Three samples were collected, MH5503 from the main inlet/outlet, MH5503-E from a flowing inlet from the east, and MH5503-W from a flowing inlet from the west. MH5503 and MH5503-E had no turbidity and a clear color. White toilet paper was present as a floatable. MH5503-W had a cloudy milky color and an opaque turbidity. A sewer odor was present in the entire manhole.

Map of Sample Locations



**Notes:**

- MH5275 was dry when opened. Park Manhole was sampled on the same stormwater line in place of MH5275.
- MH5210 was not sampled due to sample holding time constraints.

**Table 1: Summary of Sampling and Analytical Data**

| Location                         | Site ID             | MH5363     | MH5366      | MH5380     | Park Manhole | MH5245-SW  |
|----------------------------------|---------------------|------------|-------------|------------|--------------|------------|
|                                  | Sample Date         | 10/02/202  | 10/02/2024  | 10/02/2024 | 10/02/2024   | 10/02/2024 |
|                                  | Sample Time         | 9:20       | 10:00       | 10:30      | 11:06        | 11:45      |
| Coordinates<br>(decimal degrees) | North               | 42.689383  | 42.688411   | 42.691045  | 42.6902795   | 42.687327  |
|                                  | West                | -71.174457 | -71.1759593 | -71.172688 | -71.1710024  | -71.168222 |
| YSI Meter                        | Salinity, ppt.      | 0.5        | 0.6         | 0.8        | 0.5          | 0.9        |
|                                  | Temperature, °C     | 18.4       | 18.5        | 15.9       | 16.5         | 17.6       |
|                                  | Conductivity, µS/cm | 921        | 1199        | 1587       | 964          | 1806       |
| Field Test Kits<br>(mg/L)        | Ammonia             | 0          | 0.15        | 0.4        | 0.4          | 1          |
|                                  | Total Chlorine      | 0.1        | 0.12        | 0.04       | 0.03         | 0.1        |
|                                  | Surfactants         | 0.25       | 0.25        | 0.35       | 1            | 0.15       |
| Bacteria<br>(MPN/100mL)          | E. coli             | 85         | 86          | 762        | 6932         | 68         |
|                                  | Enterococcus        | 41         | 158         | 1223       | 816          | 285        |
| PPCPs (ng/L)                     | Cotinine            | 2.4        | 2.1         | 0.86       | 6.4          | 0.79       |
|                                  | Acetaminophen       | 4.2        | ND [2.0]    | 28         | 3.8          | ND [2.0]   |
|                                  | Paraxanthine        | ND [2.0]   | ND [2.0]    | ND [2.0]   | 62           | 40         |
|                                  | Atenolol            | ND [2.0]   | ND [2.0]    | ND [2.0]   | 2.0          | 100        |
|                                  | Caffeine            | 6.7        | 3.8         | 4.3        | 190          | 38         |
|                                  | Metoprolol          | ND [2.0]   | ND [2.0]    | ND [2.0]   | 2.1          | 100        |
|                                  | Diphenhydramine     | 0.42       | 0.68        | ND [0.40]  | 41           | ND [0.40]  |
|                                  | Carbamazepine       | ND [0.40]  | ND [0.40]   | 1.9        | 0.88         | 1.3        |

**Abbreviations and Notes:**

\*Samples diluted see analytical report for more details.

N/A: Not Analyzed

ND: Not Detected above Reporting Limit. Reporting limit listed in brackets (ex: ND [RL]).

E. Coli/Fecal Coliform: Red ≥ 10,000 col/100ml, Orange ≥ 1,260 col/100ml, Yellow ≥ 410 col/100ml, Black < 410 col/100ml

Enterococcus: Red ≥ 1,000 col/100ml, Orange ≥ 350, Yellow ≥ 130 col/100ml, Black < 130 col/100ml

NH<sub>3</sub>: Red ≥ 6 mg/L, Orange ≥ 0.5 mg/L, Yellow ≥ 0.25 mg/L, Black < 0.25 mg/L

Cl<sub>2</sub>: Red ≥ 1.0 mg/L, Orange ≥ 0.3 mg/L, Yellow ≥ 0.02 mg/L, Black < 0.02 mg/L

Surfactants: Red ≥ 1.0 mg/L, 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: Red ≥ 100x the RL, Orange ≥ 10x the RL, Yellow ≥ 3x the RL; Black < 3x the RL<sup>1</sup>

<sup>1</sup>See Reporting Limit (RL) values for each compound in attached Laboratory Report for Source Tracking

<sup>2</sup> Sample ran on 10/3/2024.

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             | MH5245-SE  | MH5503     | MH5503-E   | MH5503-W        |
|----------------------------------|---------------------|------------|------------|------------|-----------------|
|                                  | Sample Date         | 10/02/2024 | 10/02/2024 | 10/02/2024 | 10/02/2024      |
|                                  | Sample Time         | 11:50      | 13:05      | 13:25      | 13:38           |
| Coordinates<br>(decimal degrees) | North               | 42.687327  | 42.719749  | 42.719749  | 42.719749       |
|                                  | West                | -71.168222 | -71.157184 | -71.157184 | -71.157184      |
| YSI Meter                        | Salinity, ppt.      | 0.6        | 0.5        | 0.6        | 0.5             |
|                                  | Temperature, °C     | 16.7       | 22.4       | 21.0       | 23.2            |
|                                  | Conductivity, µS/cm | 1131       | 1024       | 1146       | 962             |
| Field Test Kits<br>(mg/L)        | Ammonia             | 0.4        | >6         | 3          | >6 <sup>2</sup> |
|                                  | Total Chlorine      | 0.03       | 1.16       | 0.16       | 0.81            |
|                                  | Surfactants         | 0.4        | >3         | >3         | >3              |
| Bacteria<br>(MPN/100mL)          | E. coli             | 91         | >9678      | >9678      | >9678           |
|                                  | Enterococcus        | 404        | >9678      | 5172       | >9678           |
| PPCPs (ng/L)                     | Cotinine            | 0.42       | 1100*      | ND [40] *  | 180*            |
|                                  | Acetaminophen       | ND [2.0]   | 71000*     | 2400*      | 11000*          |
|                                  | Paraxanthine        | 10         | 15000*     | 1700*      | 5400*           |
|                                  | Atenolol            | 35         | 790*       | ND [200] * | ND [200] *      |
|                                  | Caffeine            | 14         | 62000*     | 26000*     | 26000*          |
|                                  | Metoprolol          | 36         | 850*       | ND [200] * | ND [200] *      |
|                                  | Diphenhydramine     | ND [0.40]  | 740*       | ND [40] *  | 370*            |
|                                  | Carbamazepine       | 0.83       | 100*       | ND [40] *  | ND [40] *       |

**Abbreviations and Notes:**

\*Samples diluted see analytical report for more details.

N/A: Not Analyzed

ND: Not Detected above Reporting Limit. Reporting limit listed in brackets (ex: ND [RL]).

E. Coli/Fecal Coliform: Red ≥ 10,000 col/100ml, Orange ≥ 1,260 col/100ml, Yellow ≥ 410 col/100ml, Black < 410 col/100ml

Enterococcus: Red ≥ 1,000 col/100ml, Orange ≥ 350, Yellow ≥ 130 col/100ml, Black < 130 col/100ml

NH<sub>3</sub>: Red ≥ 6 mg/L, Orange ≥ 0.5 mg/L, Yellow ≥ 0.25 mg/L, Black < 0.25 mg/L

Cl<sub>2</sub>: Red ≥ 1.0 mg/L, Orange ≥ 0.3 mg/L, Yellow ≥ 0.02 mg/L, Black < 0.02 mg/L

Surfactants: Red ≥ 1.0 mg/L, 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: Red ≥ 100x the RL, Orange ≥ 10x the RL, Yellow ≥ 3x the RL; Black < 3x the RL<sup>1</sup>

<sup>1</sup>See Reporting Limit (RL) values for each compound in attached Laboratory Report for Source Tracking

<sup>2</sup> Sample ran on 10/3/2024.

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.

## **VIII. Appendix**

Appendix A: Photograph Log

## **IX. 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**



**Photo 1: MH5363** (photo taken 10/2/2024 at approx. 09:39) Manhole located near the cross-section of Maginnis Ave and Sullivan Ave, discharging into the Merrimack River. Sample points are indicated by a red X.



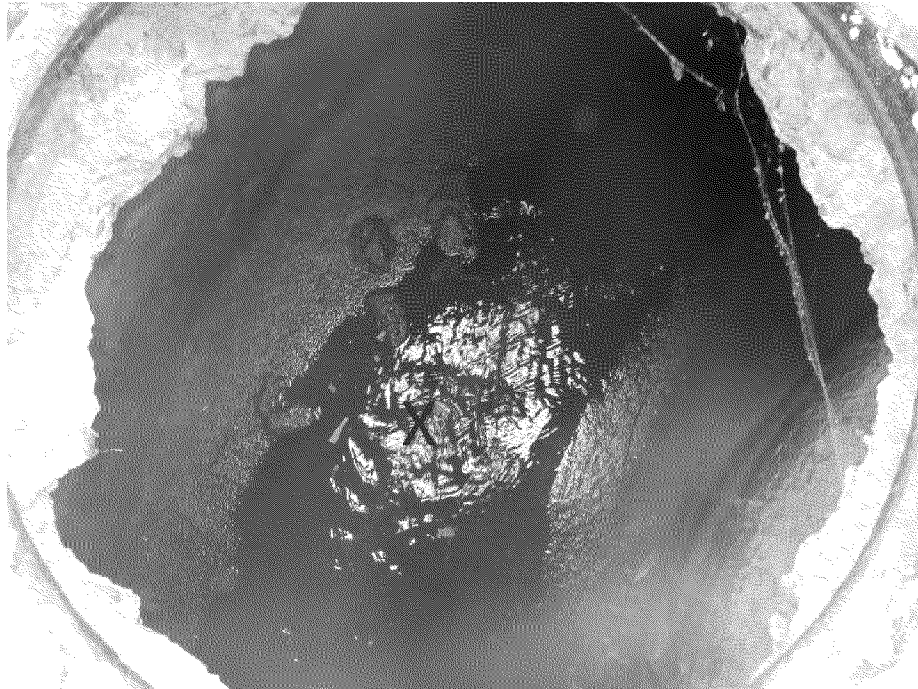
**Photo 2: MH5366** (photo taken 10/2/2024 at approx. 09:49) Manhole located near Maginnis Ave, discharging into the Merrimack River. Sample points are indicated by a red X.



**Photo 3: MH5380** (photo taken 10/2/2024 at approx. 10:26) Manhole located near Tewksbury St, discharging into the Merrimack River. Sample points are indicated by a red X.



**Photo 4: MH5275** (photo taken 10/2/2024 at approx. 10:53) Manhole located near Diamond St, closed off to receiving water.



**Photo 5: Park Manhole** (photo taken 10/2/2024 at approx. 10:59) Manhole located near Diamond St, discharging into the Merrimack River. Sample points are indicated by a red X.



**Photo 6: MH5245** (photo taken 10/2/2024 at approx. 11:33) Manhole located near Beaconsfield St, discharging into the Merrimack River. Sample points are indicated by a red X.





**Photo 7: MH5503** (photo taken 10/2/2024 at approx. 12:55) Manhole located on Logan St, discharging into the Spicket River. Sample points are indicated by a red X.



**Photo 8: MH5503** (photo taken 10/2/2024 at approx. 12:56) Manhole located on Logan St, discharging into the Spicket River. Sample points are indicated by a red X.



**Photo 9: MH5503** (photo taken 10/2/2024 at approx. 12:56) Manhole located on Logan St, discharging into the Spicket River. Sample points are indicated by a red X.



**Attachment A**  
**Laboratory Report for**  
**Source Tracking Analysis**

**Author: LSASD Laboratory Services Branch**  
**Pages: 18**

**Attachment B**  
**Laboratory Report for**  
**E. coli Analysis**

**Author: LSASD Laboratory Services Branch**  
**Pages: 4**

**Attachment C**  
**Laboratory Report for**  
**Enterococcus Analysis**

**Author: LSASD Laboratory Services Branch**  
**Pages: 4**

**End of Report**

## Laboratory Report

October 28, 2024

Ryan Leo  
US EPA New England R1

Project Number: 24100007  
Project: MS4 Lawrence, MA  
Analysis: HPLC/MS/MS Source Tracking Analysis  
EPA Chemist: Peter Philbrook

Date Samples Received by the Laboratory: 10/02/2024

### Analytical Procedure:

All samples were received and logged in by the laboratory according to the USEPA New England Laboratory SOP for Sample Log-in.

Sample preparation and analysis was done following the EPA Region I SOP, LSBSOP-LCMS\_STA.3.

The SOP is based on an EPA Regional Analytical Method developed at the EPA New England Laboratory.

Data were reviewed in accordance with the internal verification procedures described in the EPA New England Quality Manual for NERL.

Results relate only to the items tested or to the samples as received by the Laboratory. This analytical report shall not be reproduced except in full, without written approval of the laboratory.

If you have any questions please call me at 617-918-8340 .

Sincerely,

SIGN HERE

24100007\$STA

**Qualifiers:**

**RL** = Reporting limit

**ND** = Not Detected above Reporting limit

**NA** = Not Applicable due to high sample dilutions or sample interferences

**NC** = Not calculated since analyte concentration is ND.

**J** = Estimated value

**J1** = Estimated value due to MS recovery outside acceptance criteria

**J2** = Estimated value due to LFB result outside acceptance criteria

**J3** = Estimated value due to RPD result outside acceptance criteria

**J4** = Estimated value due to LCS result outside acceptance criteria

**E** = Estimated value exceeds the calibration range

**L** = Estimated value is below the calibration range

**B** = Analyte is associated with the lab blank or trip blank contamination. Values are qualified when the observed concentration of the contamination in the sample extract is less than 10 times the concentration in the blank.

**R** = No recovery was calculated since the analyte concentration is greater than four times the spike level.

**P** = The confirmation value exceeded 35% difference and is less than 100%. The lower value is reported.

**C** = The identification has been confirmed by GC/MS.

**A** = Suspected Aldol condensation product.

**N** = Tentatively identified compound.

24100007\$STA



MS4 Lawrence, MA

HPLC/MS/MS Source Tracking Analysis

|                      |            |                   |            |
|----------------------|------------|-------------------|------------|
| Client Sample ID:    | MH5363     | Lab Sample ID:    | AC16137    |
| Date of Collection:  | 10/02/2024 | Matrix:           | Stormwater |
| Date of Preparation: | 10/03/2024 | Amount Prepared:  | 500 mL     |
| Date of Analysis:    | 10/03/2024 | Percent Solids:   | N/A        |
| Dry Weight Prepared: | N/A        | Extract Dilution: | 1          |
| Wet Weight Prepared: | N/A        | pH:               | N/A        |

| CAS Number | Compound        | Concentration<br>ng/L | Dilution | RL<br>ng/L | Qualifier |
|------------|-----------------|-----------------------|----------|------------|-----------|
| 486-56-6   | Cotinine        | 2.4                   | 1        | 0.40       |           |
| 103-90-2   | Acetaminophen   | 4.2                   | 1        | 2.0        |           |
| 611-59-6   | Paraxanthine    | ND                    | 1        | 2.0        |           |
| 29122-68-7 | Atenolol        | ND                    | 1        | 2.0        |           |
| 58-08-2    | Caffeine        | 6.7                   | 1        | 4.0        |           |
| 56392-17-7 | Metoprolol      | ND                    | 1        | 2.0        |           |
| 58-73-1    | Diphenhydramine | 0.42                  | 1        | 0.40       |           |
| 298-46-4   | Carbamazepine   | ND                    | 1        | 0.40       |           |

| Surrogate Compounds | Recoveries (%) | QC Ranges |
|---------------------|----------------|-----------|
| Phentermine-D5      | 60             | 26 - 133  |
| Diphenhydramine-D3  | 90             | 56 - 113  |

Comments:

MS4 Lawrence, MA

HPLC/MS/MS Source Tracking Analysis

|                      |            |                   |            |
|----------------------|------------|-------------------|------------|
| Client Sample ID:    | MH5366     | Lab Sample ID:    | AC16138    |
| Date of Collection:  | 10/02/2024 | Matrix:           | Stormwater |
| Date of Preparation: | 10/03/2024 | Amount Prepared:  | 500 mL     |
| Date of Analysis:    | 10/03/2024 | Percent Solids:   | N/A        |
| Dry Weight Prepared: | N/A        | Extract Dilution: | 1          |
| Wet Weight Prepared: | N/A        | pH:               | N/A        |

| CAS Number | Compound        | Concentration<br>ng/L | Dilution | RL<br>ng/L | Qualifier |
|------------|-----------------|-----------------------|----------|------------|-----------|
| 486-56-6   | Cotinine        | 2.1                   | 1        | 0.40       |           |
| 103-90-2   | Acetaminophen   | ND                    | 1        | 2.0        |           |
| 611-59-6   | Paraxanthine    | ND                    | 1        | 2.0        |           |
| 29122-68-7 | Atenolol        | ND                    | 1        | 2.0        |           |
| 58-08-2    | Caffeine        | 3.8                   | 1        | 4.0        | L         |
| 56392-17-7 | Metoprolol      | ND                    | 1        | 2.0        |           |
| 58-73-1    | Diphenhydramine | 0.68                  | 1        | 0.40       |           |
| 298-46-4   | Carbamazepine   | ND                    | 1        | 0.40       |           |

| Surrogate Compounds | Recoveries (%) | QC Ranges |
|---------------------|----------------|-----------|
| Phentermine-D5      | 57             | 26 - 133  |
| Diphenhydramine-D3  | 67             | 56 - 113  |

Comments: L = Estimated value is below the calibration range

**MS4 Lawrence, MA**

**HPLC/MS/MS Source Tracking Analysis**

|                      |            |                   |            |
|----------------------|------------|-------------------|------------|
| Client Sample ID:    | MH5380     | Lab Sample ID:    | AC16139    |
| Date of Collection:  | 10/02/2024 | Matrix:           | Stormwater |
| Date of Preparation: | 10/03/2024 | Amount Prepared:  | 500 mL     |
| Date of Analysis:    | 10/03/2024 | Percent Solids:   | N/A        |
| Dry Weight Prepared: | N/A        | Extract Dilution: | 1          |
| Wet Weight Prepared: | N/A        | pH:               | N/A        |

| CAS Number | Compound        | Concentration<br>ng/L | Dilution | RL<br>ng/L | Qualifier |
|------------|-----------------|-----------------------|----------|------------|-----------|
| 486-56-6   | Cotinine        | 0.86                  | 1        | 0.40       |           |
| 103-90-2   | Acetaminophen   | 28                    | 1        | 2.0        |           |
| 611-59-6   | Paraxanthine    | ND                    | 1        | 2.0        |           |
| 29122-68-7 | Atenolol        | ND                    | 1        | 2.0        |           |
| 58-08-2    | Caffeine        | 4.3                   | 1        | 4.0        |           |
| 56392-17-7 | Metoprolol      | ND                    | 1        | 2.0        |           |
| 58-73-1    | Diphenhydramine | ND                    | 1        | 0.40       |           |
| 298-46-4   | Carbamazepine   | 1.9                   | 1        | 0.40       |           |

| Surrogate Compounds | Recoveries (%) | QC Ranges |
|---------------------|----------------|-----------|
| Phentermine-D5      | 80             | 26 - 133  |
| Diphenhydramine-D3  | 100            | 56 - 113  |

**Comments:**

**MS4 Lawrence, MA**

**HPLC/MS/MS Source Tracking Analysis**

|                      |            |                   |            |
|----------------------|------------|-------------------|------------|
| Client Sample ID:    | MH5245-SW  | Lab Sample ID:    | AC16140    |
| Date of Collection:  | 10/02/2024 | Matrix:           | Stormwater |
| Date of Preparation: | 10/03/2024 | Amount Prepared:  | 500 mL     |
| Date of Analysis:    | 10/03/2024 | Percent Solids:   | N/A        |
| Dry Weight Prepared: | N/A        | Extract Dilution: | 1          |
| Wet Weight Prepared: | N/A        | pH:               | N/A        |

| CAS Number | Compound        | Concentration<br>ng/L | Dilution | RL<br>ng/L | Qualifier |
|------------|-----------------|-----------------------|----------|------------|-----------|
| 486-56-6   | Cotinine        | 0.79                  | 1        | 0.40       |           |
| 103-90-2   | Acetaminophen   | ND                    | 1        | 2.0        |           |
| 611-59-6   | Paraxanthine    | 40                    | 1        | 2.0        |           |
| 29122-68-7 | Atenolol        | 100                   | 1        | 2.0        |           |
| 58-08-2    | Caffeine        | 38                    | 1        | 4.0        |           |
| 56392-17-7 | Metoprolol      | 100                   | 1        | 2.0        |           |
| 58-73-1    | Diphenhydramine | ND                    | 1        | 0.40       |           |
| 298-46-4   | Carbamazepine   | 1.3                   | 1        | 0.40       |           |

| Surrogate Compounds | Recoveries (%) | QC Ranges |
|---------------------|----------------|-----------|
| Phentermine-D5      | 60             | 26 - 133  |
| Diphenhydramine-D3  | 90             | 56 - 113  |

**Comments:**

**MS4 Lawrence, MA**

**HPLC/MS/MS Source Tracking Analysis**

|                      |            |                   |            |
|----------------------|------------|-------------------|------------|
| Client Sample ID:    | DUP-01     | Lab Sample ID:    | AC16141    |
| Date of Collection:  | 10/02/2024 | Matrix:           | Stormwater |
| Date of Preparation: | 10/03/2024 | Amount Prepared:  | 500 mL     |
| Date of Analysis:    | 10/03/2024 | Percent Solids:   | N/A        |
| Dry Weight Prepared: | N/A        | Extract Dilution: | 1          |
| Wet Weight Prepared: | N/A        | pH:               | N/A        |

| CAS Number | Compound        | Concentration<br>ng/L | Dilution | RL<br>ng/L | Qualifier |
|------------|-----------------|-----------------------|----------|------------|-----------|
| 486-56-6   | Cotinine        | 2.5                   | 1        | 0.40       |           |
| 103-90-2   | Acetaminophen   | ND                    | 1        | 2.0        |           |
| 611-59-6   | Paraxanthine    | ND                    | 1        | 2.0        |           |
| 29122-68-7 | Atenolol        | ND                    | 1        | 2.0        |           |
| 58-08-2    | Caffeine        | 4.2                   | 1        | 4.0        |           |
| 56392-17-7 | Metoprolol      | ND                    | 1        | 2.0        |           |
| 58-73-1    | Diphenhydramine | 0.60                  | 1        | 0.40       |           |
| 298-46-4   | Carbamazepine   | ND                    | 1        | 0.40       |           |

| Surrogate Compounds | Recoveries (%) | QC Ranges |
|---------------------|----------------|-----------|
| Phentermine-D5      | 50             | 26 - 133  |
| Diphenhydramine-D3  | 70             | 56 - 113  |

**Comments:**



**MS4 Lawrence, MA**

**HPLC/MS/MS Source Tracking Analysis**

|                      |              |                   |            |
|----------------------|--------------|-------------------|------------|
| Client Sample ID:    | Park Manhole | Lab Sample ID:    | AC16142    |
| Date of Collection:  | 10/02/2024   | Matrix:           | Stormwater |
| Date of Preparation: | 10/03/2024   | Amount Prepared:  | 500 mL     |
| Date of Analysis:    | 10/03/2024   | Percent Solids:   | N/A        |
| Dry Weight Prepared: | N/A          | Extract Dilution: | 1          |
| Wet Weight Prepared: | N/A          | pH:               | N/A        |

| CAS Number | Compound        | Concentration<br>ng/L | Dilution | RL<br>ng/L | Qualifier |
|------------|-----------------|-----------------------|----------|------------|-----------|
| 486-56-6   | Cotinine        | 6.4                   | 1        | 0.40       |           |
| 103-90-2   | Acetaminophen   | 3.8                   | 1        | 2.0        |           |
| 611-59-6   | Paraxanthine    | 62                    | 1        | 2.0        |           |
| 29122-68-7 | Atenolol        | 2.0                   | 1        | 2.0        |           |
| 58-08-2    | Caffeine        | 190                   | 1        | 4.0        |           |
| 56392-17-7 | Metoprolol      | 2.1                   | 1        | 2.0        |           |
| 58-73-1    | Diphenhydramine | 41                    | 1        | 0.40       |           |
| 298-46-4   | Carbamazepine   | 0.88                  | 1        | 0.40       |           |

| Surrogate Compounds | Recoveries (%) | QC Ranges |
|---------------------|----------------|-----------|
| Phentermine-D5      | 68             | 26 - 133  |
| Diphenhydramine-D3  | 90             | 56 - 113  |

**Comments:**

**MS4 Lawrence, MA**

**HPLC/MS/MS Source Tracking Analysis**

|                      |            |                   |            |
|----------------------|------------|-------------------|------------|
| Client Sample ID:    | MH5245-SE  | Lab Sample ID:    | AC16143    |
| Date of Collection:  | 10/02/2024 | Matrix:           | Stormwater |
| Date of Preparation: | 10/03/2024 | Amount Prepared:  | 500 mL     |
| Date of Analysis:    | 10/03/2024 | Percent Solids:   | N/A        |
| Dry Weight Prepared: | N/A        | Extract Dilution: | 1          |
| Wet Weight Prepared: | N/A        | pH:               | N/A        |

| CAS Number | Compound        | Concentration<br>ng/L | Dilution | RL<br>ng/L | Qualifier |
|------------|-----------------|-----------------------|----------|------------|-----------|
| 486-56-6   | Cotinine        | 0.42                  | 1        | 0.40       |           |
| 103-90-2   | Acetaminophen   | ND                    | 1        | 2.0        |           |
| 611-59-6   | Paraxanthine    | 10                    | 1        | 2.0        |           |
| 29122-68-7 | Atenolol        | 35                    | 1        | 2.0        |           |
| 58-08-2    | Caffeine        | 14                    | 1        | 4.0        |           |
| 56392-17-7 | Metoprolol      | 36                    | 1        | 2.0        |           |
| 58-73-1    | Diphenhydramine | ND                    | 1        | 0.40       |           |
| 298-46-4   | Carbamazepine   | 0.83                  | 1        | 0.40       |           |

| Surrogate Compounds | Recoveries (%) | QC Ranges |
|---------------------|----------------|-----------|
| Phentermine-D5      | 60             | 26 - 133  |
| Diphenhydramine-D3  | 70             | 56 - 113  |

**Comments:**

MS4 Lawrence, MA

HPLC/MS/MS Source Tracking Analysis

|                      |            |                   |            |
|----------------------|------------|-------------------|------------|
| Client Sample ID:    | MH5503     | Lab Sample ID:    | AC16144    |
| Date of Collection:  | 10/02/2024 | Matrix:           | Stormwater |
| Date of Preparation: | 10/03/2024 | Amount Prepared:  | 5 mL       |
| Date of Analysis:    | 10/03/2024 | Percent Solids:   | N/A        |
| Dry Weight Prepared: | N/A        | Extract Dilution: | 1          |
| Wet Weight Prepared: | N/A        | pH:               | N/A        |

| CAS Number | Compound        | Concentration<br>ng/L | Dilution | RL<br>ng/L | Qualifier |
|------------|-----------------|-----------------------|----------|------------|-----------|
| 486-56-6   | Cotinine        | 1100                  | 100      | 40         |           |
| 103-90-2   | Acetaminophen   | 71000                 | 100      | 200        | J         |
| 611-59-6   | Paraxanthine    | 15000                 | 100      | 200        |           |
| 29122-68-7 | Atenolol        | 790                   | 100      | 200        |           |
| 58-08-2    | Caffeine        | 62000                 | 100      | 400        | J         |
| 56392-17-7 | Metoprolol      | 850                   | 100      | 200        |           |
| 58-73-1    | Diphenhydramine | 740                   | 100      | 40         |           |
| 298-46-4   | Carbamazepine   | 100                   | 100      | 40         |           |

| Surrogate Compounds | Recoveries (%) | QC Ranges |
|---------------------|----------------|-----------|
| Phentermine-D5      | 66             | 26 - 133  |
| Diphenhydramine-D3  | 82             | 56 - 113  |

**Comments:** Sample looked like raw sewage - 5 mL was extracted (100X Dilution).

J = Estimated value was over the calibration curve

MS4 Lawrence, MA

HPLC/MS/MS Source Tracking Analysis

|                      |            |                   |            |
|----------------------|------------|-------------------|------------|
| Client Sample ID:    | MH5503-E   | Lab Sample ID:    | AC16145    |
| Date of Collection:  | 10/02/2024 | Matrix:           | Stormwater |
| Date of Preparation: | 10/03/2024 | Amount Prepared:  | 5 mL       |
| Date of Analysis:    | 10/03/2024 | Percent Solids:   | N/A        |
| Dry Weight Prepared: | N/A        | Extract Dilution: | 1          |
| Wet Weight Prepared: | N/A        | pH:               | N/A        |

| CAS Number | Compound        | Concentration<br>ng/L | Dilution | RL<br>ng/L | Qualifier |
|------------|-----------------|-----------------------|----------|------------|-----------|
| 486-56-6   | Cotinine        | ND                    | 100      | 40         |           |
| 103-90-2   | Acetaminophen   | 2400                  | 100      | 200        |           |
| 611-59-6   | Paraxanthine    | 1700                  | 100      | 200        |           |
| 29122-68-7 | Atenolol        | ND                    | 100      | 200        |           |
| 58-08-2    | Caffeine        | 26000                 | 100      | 400        |           |
| 56392-17-7 | Metoprolol      | ND                    | 100      | 200        |           |
| 58-73-1    | Diphenhydramine | ND                    | 100      | 40         |           |
| 298-46-4   | Carbamazepine   | ND                    | 100      | 40         |           |

| Surrogate Compounds | Recoveries (%) | QC Ranges |
|---------------------|----------------|-----------|
| Phentermine-D5      | 72             | 26 - 133  |
| Diphenhydramine-D3  | 90             | 56 - 113  |

**Comments:** Sample looked like raw sewage - extracted 5 mL instead of 500mL (100X higher reporting limit)

**MS4 Lawrence, MA**

**HPLC/MS/MS Source Tracking Analysis**

|                      |            |                   |            |
|----------------------|------------|-------------------|------------|
| Client Sample ID:    | MH5503-W   | Lab Sample ID:    | AC16146    |
| Date of Collection:  | 10/02/2024 | Matrix:           | Stormwater |
| Date of Preparation: | 10/03/2024 | Amount Prepared:  | 5 mL       |
| Date of Analysis:    | 10/03/2024 | Percent Solids:   | N/A        |
| Dry Weight Prepared: | N/A        | Extract Dilution: | 1          |
| Wet Weight Prepared: | N/A        | pH:               | N/A        |

| CAS Number | Compound        | Concentration<br>ng/L | Dilution | RL<br>ng/L | Qualifier |
|------------|-----------------|-----------------------|----------|------------|-----------|
| 486-56-6   | Cotinine        | 180                   | 100      | 40         |           |
| 103-90-2   | Acetaminophen   | 11000                 | 100      | 200        |           |
| 611-59-6   | Paraxanthine    | 5400                  | 100      | 200        |           |
| 29122-68-7 | Atenolol        | ND                    | 100      | 200        |           |
| 58-08-2    | Caffeine        | 26000                 | 100      | 400        |           |
| 56392-17-7 | Metoprolol      | ND                    | 100      | 200        |           |
| 58-73-1    | Diphenhydramine | 370                   | 100      | 40         |           |
| 298-46-4   | Carbamazepine   | ND                    | 100      | 40         |           |

| Surrogate Compounds | Recoveries (%) | QC Ranges |
|---------------------|----------------|-----------|
| Phentermine-D5      | 77             | 26 - 133  |
| Diphenhydramine-D3  | 95             | 56 - 113  |

**Comments:** Sample appears to be raw sewage. Extracted 5 mL (100X dilution)



**MS4 Lawrence, MA**

**Laboratory Blank**

|                      |            |                   |            |
|----------------------|------------|-------------------|------------|
| Client Sample ID:    | N/A        | Lab Sample ID:    | N/A        |
| Date of Collection:  | N/A        | Matrix:           | Stormwater |
| Date of Preparation: | 10/03/2024 | Amount Prepared:  | 500 mL     |
| Date of Analysis:    | 10/03/2024 | Percent Solids:   | N/A        |
| Dry Weight Prepared: | N/A        | Extract Dilution: | 1          |
| Wet Weight Prepared: | N/A        | pH:               | N/A        |

| CAS Number | Compound        | Concentration<br>ng/L | Dilution | RL<br>ng/L | Qualifier |
|------------|-----------------|-----------------------|----------|------------|-----------|
| 486-56-6   | Cotinine        | ND                    | 1        | 0.40       |           |
| 103-90-2   | Acetaminophen   | ND                    | 1        | 2.0        |           |
| 611-59-6   | Paraxanthine    | ND                    | 1        | 2.0        |           |
| 29122-68-7 | Atenolol        | ND                    | 1        | 2.0        |           |
| 58-08-2    | Caffeine        | ND                    | 1        | 4.0        |           |
| 56392-17-7 | Metoprolol      | ND                    | 1        | 2.0        |           |
| 58-73-1    | Diphenhydramine | ND                    | 1        | 0.40       |           |
| 298-46-4   | Carbamazepine   | ND                    | 1        | 0.40       |           |

| Surrogate Compounds | Recoveries (%) | QC Ranges |
|---------------------|----------------|-----------|
| Phentermine-D5      | 55             | 26 - 133  |
| Diphenhydramine-D3  | 66             | 56 - 113  |

**Comments:**

MS4 Lawrence, MA

MATRIX SPIKE (MS) RECOVERY

Sample ID: AC16142

| PARAMETER       | SPIKE<br>ADDED<br>ng/L | SAMPLE<br>CONCENTRATION<br>ng/L | MS<br>CONCENTRATION<br>ng/L | MS<br>%<br>REC | QC<br>LIMITS<br>(% REC) |
|-----------------|------------------------|---------------------------------|-----------------------------|----------------|-------------------------|
| Acetaminophen   | 120                    | 3.8                             | 85.4                        | 68             | 55 - 99                 |
| Atenolol        | 120                    | 2.0                             | 91.6                        | 75             | 24 - 160                |
| Caffeine        | 240                    | 187                             | 346                         | 66             | 34 - 131                |
| Carbamazepine   | 24.0                   | 0.88                            | 19.6                        | 78             | 61 - 107                |
| Cotinine        | 24.0                   | 6.4                             | 22.4                        | 67             | 48 - 112                |
| Diphenhydramine | 24.0                   | 41.0                            | 59.3                        | 77             | 17 - 112                |
| Metoprolol      | 120                    | 2.1                             | 92.0                        | 75             | 31 - 137                |
| Paraxanthine    | 120                    | 62.0                            | 112                         | 42             | 41 - 132                |

**MS4 Lawrence, MA**

**Laboratory Duplicate Results**

Sample ID: AC16138

| PARAMETER       | SAMPLE<br>RESULT<br>ng/L | SAMPLE DUPLICATE<br>RESULT<br>ng/L | PRECISION<br>RPD<br>% | QC<br>LIMITS |
|-----------------|--------------------------|------------------------------------|-----------------------|--------------|
| Acetaminophen   | ND                       | ND                                 | NC                    | 50           |
| Atenolol        | ND                       | ND                                 | NC                    | 50           |
| Caffeine        | 3.8                      | 5.0                                | 27                    | 50           |
| Carbamazepine   | ND                       | ND                                 | NC                    | 50           |
| Cotinine        | 2.1                      | 2.7                                | 25                    | 50           |
| Diphenhydramine | 0.68                     | 0.88                               | 26                    | 50           |
| Metoprolol      | ND                       | ND                                 | NC                    | 50           |
| Paraxanthine    | ND                       | ND                                 | NC                    | 50           |

**MS4 Lawrence, MA**

**Laboratory Fortified Blank (LFB) Results**

| PARAMETER       | LFB AMOUNT<br>SPIKED<br>ng/L | LFB<br>RESULT<br>ng/L | LFB<br>RECOVERY<br>% | QC<br>LIMITS<br>% |
|-----------------|------------------------------|-----------------------|----------------------|-------------------|
| Acetaminophen   | 120                          | 100                   | 83                   | 45 - 106          |
| Atenolol        | 120                          | 110                   | 92                   | 33 - 129          |
| Caffeine        | 240                          | 178                   | 74                   | 41 - 120          |
| Carbamazepine   | 24                           | 22.1                  | 92                   | 63 - 108          |
| Cotinine        | 24                           | 14.9                  | 62                   | 55 - 106          |
| Diphenhydramine | 24                           | 18.0                  | 75                   | 15 - 113          |
| Metoprolol      | 120                          | 109                   | 91                   | 41 - 122          |
| Paraxanthine    | 120                          | 105                   | 88                   | 52 - 115          |

**Comments:**

**Samples in Batch:** AC16137, AC16138, AC16139, AC16140, AC16141, AC16142, AC16143, AC16144, AC16145, AC16146



**US EPA REGION 1  
SAMPLE RECEIPT CHECKLIST**

|                                                                   |                                                                                   |
|-------------------------------------------------------------------|-----------------------------------------------------------------------------------|
| <b>PROJ #:</b> 24100007                                           | <b>RECEIPT DATE:</b> 10/2/24                                                      |
| <b>SURVEY NAME:</b> MS4 Lawrence<br><b>LOCATION:</b> Lawrence, MA | <b>REC'D BY:</b> Laura Glowacki (ESAT)                                            |
| <b>OSC/PO:</b> Ryan Leo                                           | <b>SITE ID:</b> <input type="text"/> <b>SUPERFUND:</b> N <input type="checkbox"/> |

|                                                                                                                                                                                                                                    |                                                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
| WERE SAMPLES SHIPPED? _____<br>TRACKING #: _____<br>DATE/SENT: _____<br>NO. <input checked="" type="checkbox"/> Hand Delivered <input type="checkbox"/> _____<br>COOLER TEMPERATURE UPON ARRIVAL <sup>55</sup> _____ °C / NA _____ | COMMENTS:<br><br>Stormwater samples<br><br>10 #STA |
| CHAIN OF CUSTODY PRESENT? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N<br>COMPLETE? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N                                                           |                                                    |
| CUSTODY SEALS PRESENT ON COOLER? <input checked="" type="checkbox"/> N <input type="checkbox"/> Y<br>SAMPLES? <input checked="" type="checkbox"/> N <input type="checkbox"/> Y                                                     |                                                    |
| WERE SAMPLE CONTAINERS INTACT? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N                                                                                                                                    |                                                    |
| WAS SAMPLE PRESERVATION DOCUMENTED? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N<br>COC <input checked="" type="checkbox"/> Sample Container                                                                   |                                                    |
| APPROPRIATE SAMPLES VOLUME <input checked="" type="checkbox"/> Y <input type="checkbox"/> N<br>FOR REQUESTED ANALYSIS?                                                                                                             |                                                    |
| SAMPLES AND COC MATCH? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N                                                                                                                                            |                                                    |
| IF ANY PROBLEMS WAS PROJECT MANAGER NOTIFIED?<br>BY WHOM? <sup>NA</sup> _____                                                                                                                                                      |                                                    |
| APPROPRIATE SAMPLE CONTAINERS? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N                                                                                                                                    |                                                    |
| SAMPLES WITHIN HOLDING TIMES? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N                                                                                                                                     |                                                    |
| ALL ANALYSIS SPECIFIED ON COC? <input checked="" type="checkbox"/> Y <input type="checkbox"/> N                                                                                                                                    |                                                    |
| DATE/TIME OF COLLECTION ON COC <input checked="" type="checkbox"/> Y <input type="checkbox"/> N                                                                                                                                    |                                                    |
| TURN-AROUND TIME: 4 weeks                                                                                                                                                                                                          |                                                    |





United States Environmental Protection Agency  
Laboratory Services and Applied Science Division  
11 Technology Drive  
North Chelmsford, MA 01863-2431

Microbiology Laboratory Report

October 08, 2024

Ryan Leo  
US EPA New England R1

Project Number: 24100006  
Project: MS4 Lawrence, MA  
Analysis: E. Coli Defined Substrate  
Analyst: Brooke Harris

Date Samples Received by the Laboratory: 10/02/2024

**Analytical Procedure:**

All samples were received and logged in by the laboratory according to the USEPA New England Laboratory SOP for Sample Log-in.

Sample preparation and analysis was done following the EPA Region I SOP, TC/ECColilert4.

Data were reviewed in accordance with the internal verification procedures described in the EPA New England LSASD Biology QA Plan.

Results relate only to the items tested or to the samples as received by the Laboratory. This analytical report shall not be reproduced except in full, without written approval of the laboratory.

If you have any questions please call me at 617-918-8604.

Sincerely,

SIGN HERE

Jack A. Paar, III  
Biology Laboratory Manager

24100006ECMM

**Water Microbiology Laboratory**  
**Data Qualifier Codes**

**J** = Estimate  
**H** = Exceeds holding time  
**I** = Exceeds incubation time  
**At** = Atypical overgrowth  
**S** = Lost sample  
**V** = Insufficient sample volume  
**TNTC** = Too numerous to count  
**MB** = Media blank  
**+++** = Positive control  
**---** = Negative control  
**SP** = Spiked Sample  
**L** = Estimated, result below reporting limit (RL)  
**ND** = Not Detected, result less than RL  
**D** = Lab Duplicate  
**P** = Plate counts outside preferred range  
**FDUP** = Field Duplicate collect time not specified on Chain of Custody. Field duplicate  
LIMS default time = 12:00AM

24100006ECMM

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 1 - NEW ENGLAND  
LABORATORY SERVICES BRANCH  
MS4 Lawrence, MA  
E. Coli Defined Substrate

Matrix: Stormwater

| Sample Number | Lab ID  | Date/Time of Collection | Date/Time of Analysis | Compound                  | Concentration MPN/100 mL | RL MPN/100 mL | Qualifier |
|---------------|---------|-------------------------|-----------------------|---------------------------|--------------------------|---------------|-----------|
| MH5363        | AC16128 | 10/02/24 9:20 am        | 10/02/24 2:30 pm      | E. Coli Defined Substrate | 85                       | 4             |           |
| MH5366        | AC16129 | 10/02/24 10:00 am       | 10/02/24 2:30 pm      | E. Coli Defined Substrate | 86                       | 4             |           |
| MH5380        | AC16130 | 10/02/24 10:30 am       | 10/02/24 2:30 pm      | E. Coli Defined Substrate | 762                      | 4             |           |
| Park Manhole  | AC16131 | 10/02/24 11:06 am       | 10/02/24 2:30 pm      | E. Coli Defined Substrate | 6932                     | 4             |           |
| MH5245-SW     | AC16132 | 10/02/24 11:45 am       | 10/02/24 2:30 pm      | E. Coli Defined Substrate | 68                       | 4             |           |
| MH5245-SE     | AC16133 | 10/02/24 11:50 am       | 10/02/24 2:30 pm      | E. Coli Defined Substrate | 91                       | 4             |           |
| MH5503        | AC16134 | 10/02/24 1:05 pm        | 10/02/24 2:30 pm      | E. Coli Defined Substrate | >9678                    | 4             |           |
| MH5503-E      | AC16135 | 10/02/24 1:25 pm        | 10/02/24 2:30 pm      | E. Coli Defined Substrate | >9678                    | 4             |           |
| MH5503-W      | AC16136 | 10/02/24 1:38 pm        | 10/02/24 2:30 pm      | E. Coli Defined Substrate | >9678                    | 4             |           |

Number of Samples: 9



## US EPA Region 1

11 Technology Drive, N. Chelmsford, MA 01863

## CHAIN OF CUSTODY RECORD

Page: 1 of 1

|                                                                                                                                                                                                   |  |                                                                                                                                                                                                                                            |      |      |      |                                                                                      |                          |       |   |         |  |  |  |  |  |  |            |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|--------------------------------------------------------------------------------------|--------------------------|-------|---|---------|--|--|--|--|--|--|------------|
| EPA Project No:<br><b>24100006</b>                                                                                                                                                                |  | Project Name & Location:<br><b>Lawrence MS4</b>                                                                                                                                                                                            |      |      |      | Sampler's Name and Signature:<br><b>Ryan Leo [Signature] Nafisah Ali [Signature]</b> |                          |       |   |         |  |  |  |  |  |  |            |
| Matrix (insert letter in column below)                                                                                                                                                            |  | Preservative (insert # in box to the right) -->                                                                                                                                                                                            |      |      |      | Analysis Requested                                                                   |                          |       |   |         |  |  |  |  |  |  |            |
| A. Drinking water<br>B. Ground/Well water<br>C. Storm water<br>D. Surface water<br>E. Wastewater<br>F. Soil/Sediment/Solid<br>G. Oil/Solvent/Liquid<br>H. Soil Gas<br>I. Air Canister<br>J. _____ |  | 1. Ice<br>2. H <sub>2</sub> SO <sub>4</sub> , pH<2<br>3. HNO <sub>3</sub> , pH<2<br>4. HCl, pH<2<br>5. Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub><br>6. NaOH, pH>12<br>7. Ascorbic Acid<br>8. MeOH<br>9. Other _____<br>10. Other _____ |      |      |      | # of Containers<br>E. COL<br>E. ENO                                                  |                          |       |   |         |  |  |  |  |  |  |            |
| Sample ID                                                                                                                                                                                         |  | Date                                                                                                                                                                                                                                       | Time | Comp | Grab | Matrix                                                                               | Sample Specific Comments |       |   |         |  |  |  |  |  |  |            |
| MH5363                                                                                                                                                                                            |  | 10/2/24                                                                                                                                                                                                                                    | 920  |      | ✓    | C                                                                                    | 1                        | ✓     | ✓ |         |  |  |  |  |  |  |            |
| MH5366                                                                                                                                                                                            |  | 10/2/24                                                                                                                                                                                                                                    | 1000 |      | ✓    | C                                                                                    | 1                        | ✓     | ✓ |         |  |  |  |  |  |  |            |
| MH5380                                                                                                                                                                                            |  | 10/2/24                                                                                                                                                                                                                                    | 1030 |      | ✓    | C                                                                                    | 1                        | ✓     | ✓ |         |  |  |  |  |  |  |            |
| <del>RA-HH-52</del>                                                                                                                                                                               |  |                                                                                                                                                                                                                                            |      |      |      |                                                                                      |                          |       |   |         |  |  |  |  |  |  |            |
| Park Manhole                                                                                                                                                                                      |  | 10/2/24                                                                                                                                                                                                                                    | 1106 |      | ✓    | C                                                                                    | 1                        | ✓     | ✓ |         |  |  |  |  |  |  |            |
| MH5245-SW                                                                                                                                                                                         |  | 10/2/24                                                                                                                                                                                                                                    | 1145 |      | ✓    | C                                                                                    | 1                        | ✓     | ✓ |         |  |  |  |  |  |  |            |
| MH5245-SE                                                                                                                                                                                         |  | 10/2/24                                                                                                                                                                                                                                    | 1150 |      | ✓    | C                                                                                    | 1                        | ✓     | ✓ |         |  |  |  |  |  |  |            |
| MH5503                                                                                                                                                                                            |  | 10/2/24                                                                                                                                                                                                                                    | 1305 |      | ✓    | C                                                                                    | 1                        | ✓     | ✓ |         |  |  |  |  |  |  | Sewer odor |
| MH5503-E                                                                                                                                                                                          |  | 10/2/24                                                                                                                                                                                                                                    | 1325 |      | ✓    | C                                                                                    | 1                        | ✓     | ✓ |         |  |  |  |  |  |  | Sewer odor |
| MH5503-W                                                                                                                                                                                          |  | 10/2/24                                                                                                                                                                                                                                    | 1338 |      | ✓    | C                                                                                    | 1                        | ✓     | ✓ |         |  |  |  |  |  |  | Sewer odor |
|                                                                                                                                                                                                   |  |                                                                                                                                                                                                                                            |      |      |      |                                                                                      |                          |       |   |         |  |  |  |  |  |  |            |
|                                                                                                                                                                                                   |  |                                                                                                                                                                                                                                            |      |      |      |                                                                                      |                          |       |   |         |  |  |  |  |  |  |            |
|                                                                                                                                                                                                   |  |                                                                                                                                                                                                                                            |      |      |      |                                                                                      |                          |       |   |         |  |  |  |  |  |  |            |
|                                                                                                                                                                                                   |  |                                                                                                                                                                                                                                            |      |      |      |                                                                                      |                          |       |   |         |  |  |  |  |  |  |            |
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|                                                                                                                                                                                                   |  |                                                                                                                                                                                                                                            |      |      |      |                                                                                      |                          |       |   |         |  |  |  |  |  |  |            |
|                                                                                                                                                                                                   |  |                                                                                                                                                                                                                                            |      |      |      |                                                                                      |                          |       |   |         |  |  |  |  |  |  |            |
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| Relinquished by: (Signature)                                                                                                                                                                      |  | Received by: (Signature)                                                                                                                                                                                                                   |      |      |      | Date                                                                                 |                          | Time  |   | Remarks |  |  |  |  |  |  |            |
| [Signature]                                                                                                                                                                                       |  |                                                                                                                                                                                                                                            |      |      |      | 10/2/24                                                                              |                          | 1425  |   |         |  |  |  |  |  |  |            |
| Relinquished by: (Signature)                                                                                                                                                                      |  | Received by: (Signature)                                                                                                                                                                                                                   |      |      |      | Date                                                                                 |                          | Time  |   |         |  |  |  |  |  |  |            |
| Relinquished by: (Signature)                                                                                                                                                                      |  | Received for Laboratory by: (Signature)                                                                                                                                                                                                    |      |      |      | Date                                                                                 |                          | Time  |   |         |  |  |  |  |  |  |            |
|                                                                                                                                                                                                   |  | [Signature]                                                                                                                                                                                                                                |      |      |      | 10/2/24                                                                              |                          | 14:25 |   |         |  |  |  |  |  |  |            |

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FSBFORM-CHAINCUSTODY1  
Revision 1  
05/16/2022



United States Environmental Protection Agency  
Laboratory Services and Applied Science Division  
11 Technology Drive  
North Chelmsford, MA 01863-2431

Microbiology Laboratory Report

October 08, 2024

Ryan Leo  
US EPA New England R1

Project Number: 24100006  
Project: MS4 Lawrence, MA  
Analysis: Enterococcus in Water  
Analyst: Brooke Harris

Date Samples Received by the Laboratory: 10/02/2024

**Analytical Procedure:**

All samples were received and logged in by the laboratory according to the USEPA New England Laboratory SOP for Sample Log-in.

Sample preparation and analysis was done following the EPA Region I SOP, ECA Enterolert3.

Data were reviewed in accordance with the internal verification procedures described in the EPA New England LSASD Biology QA Plan.

Results relate only to the items tested or to the samples as received by the Laboratory. This analytical report shall not be reproduced except in full, without written approval of the laboratory.

If you have any questions please call me at 617-918-8604.

Sincerely,

SIGN HERE

Jack A. Paar, III  
Biology Laboratory Manager

24100006ENTERO

**Water Microbiology Laboratory**  
**Data Qualifier Codes**

**J** = Estimate  
**H** = Exceeds holding time  
**I** = Exceeds incubation time  
**At** = Atypical overgrowth  
**S** = Lost sample  
**V** = Insufficient sample volume  
**TNTC** = Too numerous to count  
**MB** = Media blank  
**+++** = Positive control  
**---** = Negative control  
**SP** = Spiked Sample  
**L** = Estimated, result below reporting limit (RL)  
**ND** = Not Detected, result less than RL  
**D** = Lab Duplicate  
**P** = Plate counts outside preferred range  
**FDUP** = Field Duplicate collect time not specified on Chain of Custody. Field duplicate  
LIMS default time = 12:00AM

24100006ENTERO



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 1 - NEW ENGLAND  
LABORATORY SERVICES BRANCH  
**MS4 Lawrence, MA**  
**Enterococcus in Water**

Matrix: Stormwater

| Sample Number | Lab ID  | Date/Time of Collection | Date/Time of Analysis | Compound              | Concentration MPN/100mL | RL MPN/100mL | Qualifier |
|---------------|---------|-------------------------|-----------------------|-----------------------|-------------------------|--------------|-----------|
| MH5363        | AC16128 | 10/02/24 9:20 am        | 10/02/24 2:30 pm      | Enterococcus in Water | <b>41</b>               | 10           |           |
| MH5366        | AC16129 | 10/02/24 10:00 am       | 10/02/24 2:30 pm      | Enterococcus in Water | <b>158</b>              | 10           |           |
| MH5380        | AC16130 | 10/02/24 10:30 am       | 10/02/24 2:30 pm      | Enterococcus in Water | <b>1223</b>             | 10           |           |
| Park Manhole  | AC16131 | 10/02/24 11:06 am       | 10/02/24 2:30 pm      | Enterococcus in Water | <b>816</b>              | 10           |           |
| MH5245-SW     | AC16132 | 10/02/24 11:45 am       | 10/02/24 2:30 pm      | Enterococcus in Water | <b>285</b>              | 10           |           |
| MH5245-SE     | AC16133 | 10/02/24 11:50 am       | 10/02/24 2:30 pm      | Enterococcus in Water | <b>404</b>              | 10           |           |
| MH5503        | AC16134 | 10/02/24 1:05 pm        | 10/02/24 2:30 pm      | Enterococcus in Water | <b>&gt;9678</b>         | 10           |           |
| MH5503-E      | AC16135 | 10/02/24 1:25 pm        | 10/02/24 2:30 pm      | Enterococcus in Water | <b>5172</b>             | 10           |           |
| MH5503-W      | AC16136 | 10/02/24 1:38 pm        | 10/02/24 2:30 pm      | Enterococcus in Water | <b>&gt;9678</b>         | 10           |           |

Number of Samples: 9



## US EPA Region 1

11 Technology Drive, N. Chelmsford, MA 01863

## CHAIN OF CUSTODY RECORD

Page: 1 of 1

|                                                                                                                                                                                                   |         |                                                                                                                                                                                                                                            |                                         |      |        |                 |                                                                                      |        |       |  |         |  |  |  |  |  |                                                                                                                                                                                        |                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|------|--------|-----------------|--------------------------------------------------------------------------------------|--------|-------|--|---------|--|--|--|--|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| EPA Project No:<br><b>24100006</b>                                                                                                                                                                |         | Project Name & Location:<br><b>Lawrence MS4</b>                                                                                                                                                                                            |                                         |      |        |                 | Sampler's Name and Signature:<br><b>Ryan Leo [Signature] Nafisah Ali [Signature]</b> |        |       |  |         |  |  |  |  |  |                                                                                                                                                                                        |                          |
| Matrix (insert letter in column below)                                                                                                                                                            |         | Preservative (insert # in box to the right) -->                                                                                                                                                                                            |                                         |      |        |                 | Analysis Requested                                                                   |        |       |  |         |  |  |  |  |  | <b>For EPA Staff Only:</b> If after hours or nobody is available, leave cooler(s) and signed COC in the walk-in fridge (Room 190A) and notify appropriate staff for next day check-in. |                          |
| A. Drinking water<br>B. Ground/Well water<br>C. Storm water<br>D. Surface water<br>E. Wastewater<br>F. Soil/Sediment/Solid<br>G. Oil/Solvent/Liquid<br>H. Soil Gas<br>I. Air Canister<br>J. _____ |         | 1. Ice<br>2. H <sub>2</sub> SO <sub>4</sub> , pH<2<br>3. HNO <sub>3</sub> , pH<2<br>4. HCl, pH<2<br>5. Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub><br>6. NaOH, pH>12<br>7. Ascorbic Acid<br>8. MeOH<br>9. Other _____<br>10. Other _____ |                                         |      |        |                 | # of Containers<br>E. COL<br>E. ENO                                                  |        |       |  |         |  |  |  |  |  |                                                                                                                                                                                        |                          |
| Sample ID                                                                                                                                                                                         | Date    | Time                                                                                                                                                                                                                                       | Comp                                    | Grab | Matrix | # of Containers | E. COL                                                                               | E. ENO |       |  |         |  |  |  |  |  |                                                                                                                                                                                        | Sample Specific Comments |
| MH5363                                                                                                                                                                                            | 10/2/24 | 920                                                                                                                                                                                                                                        |                                         | ✓    | C      | 1               | ✓                                                                                    | ✓      |       |  |         |  |  |  |  |  |                                                                                                                                                                                        |                          |
| MH5366                                                                                                                                                                                            | 10/2/24 | 1000                                                                                                                                                                                                                                       |                                         | ✓    | C      | 1               | ✓                                                                                    | ✓      |       |  |         |  |  |  |  |  |                                                                                                                                                                                        |                          |
| MH5380                                                                                                                                                                                            | 10/2/24 | 1030                                                                                                                                                                                                                                       |                                         | ✓    | C      | 1               | ✓                                                                                    | ✓      |       |  |         |  |  |  |  |  |                                                                                                                                                                                        |                          |
| <del>RA-HH-SR</del>                                                                                                                                                                               |         |                                                                                                                                                                                                                                            |                                         |      |        |                 |                                                                                      |        |       |  |         |  |  |  |  |  |                                                                                                                                                                                        |                          |
| Park Manhole                                                                                                                                                                                      | 10/2/24 | 1106                                                                                                                                                                                                                                       |                                         | ✓    | C      | 1               | ✓                                                                                    | ✓      |       |  |         |  |  |  |  |  |                                                                                                                                                                                        |                          |
| MH5245-SW                                                                                                                                                                                         | 10/2/24 | 1145                                                                                                                                                                                                                                       |                                         | ✓    | C      | 1               | ✓                                                                                    | ✓      |       |  |         |  |  |  |  |  |                                                                                                                                                                                        |                          |
| MH5245-SE                                                                                                                                                                                         | 10/2/24 | 1150                                                                                                                                                                                                                                       |                                         | ✓    | C      | 1               | ✓                                                                                    | ✓      |       |  |         |  |  |  |  |  |                                                                                                                                                                                        |                          |
| MH5503                                                                                                                                                                                            | 10/2/24 | 1305                                                                                                                                                                                                                                       |                                         | ✓    | C      | 1               | ✓                                                                                    | ✓      |       |  |         |  |  |  |  |  |                                                                                                                                                                                        | Sewer odor               |
| MH5503-E                                                                                                                                                                                          | 10/2/24 | 1325                                                                                                                                                                                                                                       |                                         | ✓    | C      | 1               | ✓                                                                                    | ✓      |       |  |         |  |  |  |  |  |                                                                                                                                                                                        | Sewer odor               |
| MH5503-W                                                                                                                                                                                          | 10/2/24 | 1338                                                                                                                                                                                                                                       |                                         | ✓    | C      | 1               | ✓                                                                                    | ✓      |       |  |         |  |  |  |  |  |                                                                                                                                                                                        | Sewer odor               |
|                                                                                                                                                                                                   |         |                                                                                                                                                                                                                                            |                                         |      |        |                 |                                                                                      |        |       |  |         |  |  |  |  |  |                                                                                                                                                                                        |                          |
|                                                                                                                                                                                                   |         |                                                                                                                                                                                                                                            |                                         |      |        |                 |                                                                                      |        |       |  |         |  |  |  |  |  |                                                                                                                                                                                        |                          |
|                                                                                                                                                                                                   |         |                                                                                                                                                                                                                                            |                                         |      |        |                 |                                                                                      |        |       |  |         |  |  |  |  |  |                                                                                                                                                                                        |                          |
|                                                                                                                                                                                                   |         |                                                                                                                                                                                                                                            |                                         |      |        |                 |                                                                                      |        |       |  |         |  |  |  |  |  |                                                                                                                                                                                        |                          |
|                                                                                                                                                                                                   |         |                                                                                                                                                                                                                                            |                                         |      |        |                 |                                                                                      |        |       |  |         |  |  |  |  |  |                                                                                                                                                                                        |                          |
| Relinquished by: (Signature)                                                                                                                                                                      |         |                                                                                                                                                                                                                                            | Received by: (Signature)                |      |        |                 | Date                                                                                 |        | Time  |  | Remarks |  |  |  |  |  |                                                                                                                                                                                        |                          |
| Relinquished by: (Signature)                                                                                                                                                                      |         |                                                                                                                                                                                                                                            | Received by: (Signature)                |      |        |                 | Date                                                                                 |        | Time  |  |         |  |  |  |  |  |                                                                                                                                                                                        |                          |
| Relinquished by: (Signature)                                                                                                                                                                      |         |                                                                                                                                                                                                                                            | Received for Laboratory by: (Signature) |      |        |                 | Date                                                                                 |        | Time  |  |         |  |  |  |  |  |                                                                                                                                                                                        |                          |
|                                                                                                                                                                                                   |         |                                                                                                                                                                                                                                            |                                         |      |        |                 | 10/2/24                                                                              |        | 1425  |  |         |  |  |  |  |  |                                                                                                                                                                                        |                          |
|                                                                                                                                                                                                   |         |                                                                                                                                                                                                                                            |                                         |      |        |                 |                                                                                      |        |       |  |         |  |  |  |  |  |                                                                                                                                                                                        |                          |
|                                                                                                                                                                                                   |         |                                                                                                                                                                                                                                            | [Signature]                             |      |        |                 | 10/2/24                                                                              |        | 14:25 |  |         |  |  |  |  |  |                                                                                                                                                                                        |                          |

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Revision 1  
05/16/2022

# **ATTACHMENT B**



## **Attachment B-1: Sanitary Sewer Overflows**

Attachment B-1: Sanitary Sewer Overflows  
July 1, 2024 - December 31, 2024

| SSO ID                                   | SSO Begin Date | Discovered Date | Discovered By | SSO Stopped | SSO End Date | Nearest Address | Discharged From | Discharged To | Estimated Gallons Released | Estimated Gallons Surface Water | Estimated Gallons from CB to Surface Water | Estimation Method | Distance Nearest Downstream CB (ft) | Nearest Downstream Surface Water | Cause | Action Taken to Stop SSO | Follow Up Correction Action | General Comments | Cleaning Comments | MassDEP Initial Contact Date/Time | EPA Intitial Contact Date/Time | Other Notifications | Measures Implemented to Reduce Future SSO's |
|------------------------------------------|----------------|-----------------|---------------|-------------|--------------|-----------------|-----------------|---------------|----------------------------|---------------------------------|--------------------------------------------|-------------------|-------------------------------------|----------------------------------|-------|--------------------------|-----------------------------|------------------|-------------------|-----------------------------------|--------------------------------|---------------------|---------------------------------------------|
| NO SSOs discovered this reporting period |                |                 |               |             |              |                 |                 |               |                            |                                 |                                            |                   |                                     |                                  |       |                          |                             |                  |                   |                                   |                                |                     |                                             |

# **ATTACHMENT C**



**Attachment C-1: CMOM Program Implementation Update**

**Attachment C-2: Collection System Budget Summary**

**Attachment C-3: GLSD Contributions & Projections**

**Attachment C-4: Job Postings**

**Attachment C-1:  
CMOM Program Implementation Update**

| Corrective Action Plan Ref. | Description                                                                                                                                                                                                                                                                                                                                                                                                     | Schedule                                                                                                             | Status      | Notes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1                           | The current collection system inventory remains substantially complete. The Water & Sewer Department should make it standard procedure to verify and add missing data during field activities.                                                                                                                                                                                                                  | Ongoing                                                                                                              | Ongoing     | The collection system GIS inventory continues to grow. Assets are updated or added to the system continually as new information is discovered in the field during ongoing investigative efforts.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 2                           | Integrate GIS updates into the Hydraulic Model and re-run the model to update results as necessary for use in the risk analysis and other capacity investigations.                                                                                                                                                                                                                                              | Update model at a minimum of every 5 years or as required                                                            | On Schedule | The latest hydraulic model was run as part of the CMOM Program Assessment in 2015. The model is being re-run and calibrated. The City performed additional flow monitoring to calibrate the model. The model update is expected to be complete in 2025.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 3                           | Update the risk analysis annually to be used during the CIP project development and prioritization process. Updates should include re-evaluating the criteria for CoF and LoF to ensure that the analysis is set up to best meet the City's needs.                                                                                                                                                              | Annually                                                                                                             | Ongoing     | An update to the City's collection system risk analysis has been completed to incorporate information gathered during the 2024 SSES Phase XI pipe inspections to date. As of this Reporting Period, approximately 96% of collection system pipes and 95% of collection system manholes have been inspected as part of SSES fieldwork (SSES Phases I - XI) and has been fully integrated into the City's asset management program. Despite an increase in pipes inspected during this Reporting Period, the percent inspected remained nearly the same due to the fact that some previously inspected pipes were discovered to have only been attempted and not fully inspected. These linear footages were removed from the total footage inspected and are expected to be added to the next phase of inspections. It should be noted that all known manholes were inspected as of SSES Phase XI but during further parallel investigations, additional manholes have been discovered throughout the City. These manholes will be inspected in future SSES Phases.                                                                                                                           |
| 4                           | Select and procure a CMMS software program.                                                                                                                                                                                                                                                                                                                                                                     | Q1 2016                                                                                                              | Complete    | The City continues to use the custom-developed CMMS procured in Q1 2016, and plans to transition to using a City-wide, multi-departmental Work Order Management System (WOMS) platform in the near future.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 5                           | Implement CMMS into the O&M practices of the department including asset information storage, work order generation, tracking performance indicators, etc.                                                                                                                                                                                                                                                       | Beginning 2016                                                                                                       | Complete    | See response for #4.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 6                           | Select and procure a Service Request Management System.                                                                                                                                                                                                                                                                                                                                                         | Q1 2016                                                                                                              | Complete    | See response for #4.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 7                           | Develop and implement a standard workflow process for managing service requests.                                                                                                                                                                                                                                                                                                                                | Complete                                                                                                             | Complete    | The City has transitioned to PeopleGIS, a multi-departmental WOMS platform, which includes a work order system and standard workflow process for managing service requests. The City had a supplemental training for staff held November 2019.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 8                           | Use the risk analysis to plan predictive maintenance activities (inspection and cleaning) for sewer pipes and manholes. The current analysis recommends cleaning and inspecting 11.6 miles of sewer pipe and about 150 manholes annually.                                                                                                                                                                       | Ongoing                                                                                                              | Ongoing     | The City has nearly televised every pipe in the system. The approximately 21,000 linear feet (LF) (approx. 4 miles) of sewer pipe for cleaning and inspection scheduled as part of the 2025 SSES Phase XII includes the pipes remaining to be televised, which includes hard to access segments, and high risk pipes that were televised over five years ago. All known manholes in the system have been inspected during previous SSES phases, but further inspections will be conducted for recently discovered manholes and annual inspections. Fieldwork and analysis is ongoing. The 2024 SSES Phase XI report is anticipated to be complete by March 2025.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 9                           | Pressure test force mains to check for leaks. It is recommended that this test be performed every five years for Lisa Lane, Pembroke Drive, and Pilgrim Road pump stations based on their relatively small size and low CoF. A higher frequency once every two or three years is recommended for the Route 114 station due its larger size and proximity to the Shawsheen River and a state highway.            | Inspection Frequency:<br>Pembroke and Pilgrim: every 15 years<br>Lisa Lane: every 10 years<br>Rt. 114: every 5 years | Ongoing     | Since the original recommendation to pressure test the force mains was made, it has been established that pressure testing is not the most cost efficient or safest method to assess the condition of the force main. Additionally, more comprehensive inspection technologies will provide better data and information. The latest risk analysis of the system was performed in 2018, noting that inspection frequencies of every 5, 10 and 15 years for Rt. 114, Lisa Lane, and Pembroke and Pilgrim, respectively. It is recommended the force mains be inspected rather than pressure tested at these frequencies moving forward.<br><br>The Pilgrim Road force main was replaced and pressure tested in Q4 2015. The Pembroke Drive force main was successfully CCTV inspected in May 2017, and cured-in-place pipe lining was completed in December 2017. The Lisa Lane force main was inspected in February 2021. Alternative technologies such as the SmartBall were evaluated and summarized in a technical memo. The City is expected to employ one of these technologies for full inspection of the Rt. 114 force main and continue to use the technology for future inspections. |
| 10                          | Target inspection activities to identify possible siphons in the collection system. Plan regular maintenance such as inspections and cleanings for identified siphons. Incorporate higher CoF of siphons into risk analysis and prioritize any siphons with structural problems for renewal.                                                                                                                    | Ongoing                                                                                                              | Ongoing     | The City has not identified any siphons in the collection system during investigation efforts thus far. Based on field investigations and record plan review, it is believed that there are no siphons in the system. Continued investigative efforts will target pipes flowing near or under surface water, and if siphons are discovered, they will be inspected and maintained as high criticality assets.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 11                          | Purchase a CCTV push camera. Currently, the staff has no method of inspecting pipes to assess the cause of backups/SSOs. A full CCTV truck would be expensive and would require a skilled operator. A push camera would be a less expensive option for quick inspections to locate blockages and verify they have been cleared. A push camera (approx. \$3000) is capable of inspecting up to 200 feet of pipe. | Demonstrated March 2019,<br>Purchase pending funds                                                                   | Ongoing     | In March 2019, a demonstration of a portable CCTV unit was provided to City staff. The portable unit was received favorably by City staff to be an effective tool for investigations. The City will consider purchasing the unit when funding is available. The City is also considering purchasing a zoom cam in the interim.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |



**Attachment C-1:  
CMOM Program Implementation Update**

| Corrective Action Plan Ref. | Description                                                                                                                                                                                                                                                                                                                                                                                                    | Schedule                                    | Status                                       | Notes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|----------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 12                          | Purchase several bags of hydrated lime. Woodard & Curran recommends that the Water & Sewer Department keep bags of hydrated lime on site for disinfecting SSOs. A lime spreader and dust masks, and other chemical handling PPE should be available as well. The staff should be trained to handle this chemical and clean up appropriately.                                                                   | Q1 2016                                     | Complete                                     | The City has purchased and uses bags of hydrated lime for SSO disinfection.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 13                          | Purchase additional layflat hose for bypass pumping. The Water & Sewer Department should have at least 300-feet or more to be capable of spanning all manholes in the system plus at least one spare length.                                                                                                                                                                                                   | FY2020                                      | N/A<br>City will utilize on-call contractors | The City has 200 linear feet of rigid plastic piping for bypass pumping. After evaluating the layflat hose option, the City has opted not to purchase and will not perform work that requires additional bypass. The City will continue to utilize its on-call contractors in the event that additional bypass pumping is required. The City has several on-call contractors in the area who would be able to respond quickly in the event of an emergency.                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 14                          | Obtain gas meters for manhole and other confined space entry. Ensure that staff are properly trained and well-practiced in the use of gas meters and confined space entry prior to conducting any of these activities.                                                                                                                                                                                         | Q4 2015                                     | Complete                                     | The City has purchased and uses two Altair four-gas meters.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| 15                          | Acquire debris boom of sufficient length to span the Spicket or Shawsheen Rivers or encircle an inflow into the Canal. Train staff on effective use of booms.                                                                                                                                                                                                                                                  | Q1 2016                                     | N/A<br>City will utilize on-call contractors | Rather than purchase and store debris booms, the City will utilize its on-call contractors in the event that containment is required. The City has several on-call contractors in the area who would be able to respond quickly in the event of an emergency.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| 16                          | Ensure that the City's on-call contractor will be able to serve as a backup for bypass pumping if the City does not want to store and maintain redundant equipment.                                                                                                                                                                                                                                            | Ongoing                                     | Ongoing                                      | The ability to provide bypass pumping is stipulated in the City's contract with its on-call emergency contractor. The City accepted bids for the Fiscal Year (FY) 2025-2027 On-Call Water, Sewer & Drain Services contract on August 21, 2024 and the three-year contract was awarded to DeFelice, Corp. of Dracut, MA.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 17                          | Track maintenance and repair of critical sewer maintenance equipment fleet using the inventory tools in CMMS.                                                                                                                                                                                                                                                                                                  | Ongoing                                     | Ongoing                                      | See response for #7.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 18                          | Develop a formal process using CMMS to schedule and track pump station maintenance. Perform standard preventative maintenance, record operational data, include pump discharge pressures, and store all data in CMMS.                                                                                                                                                                                          | Ongoing                                     | Ongoing                                      | See response for #7.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| 19                          | Continue to follow the SSO response and reporting procedures documented in the ERP.                                                                                                                                                                                                                                                                                                                            | Ongoing                                     | Ongoing                                      | SSO response and reporting procedures are ongoing and are being performed as described in Attachment B. Refer to the Semiannual Compliance Report for additional information pertaining to sanitary sewer overflows. The City has developed an SSO Notification Plan to align with DEP's latest requirements of Non-CSO.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 20                          | Continue to identify "off-street" assets located in easements and private property. Also develop SOPs to identify means of access and appropriate maintenance of these assets.                                                                                                                                                                                                                                 | Complete                                    | Complete                                     | The Standard Operating Procedures (SOPs) submitted as part of the City's September 1, 2015, CD deliverable included an SOP for Off-Street Asset Identification and O&M. Easement data has been integrated into the City's GIS system, and off-street assets in easements or private parcels have been identified. Parcel numbers were assigned to these assets and GIS maps have been developed to assist with field investigations. Each of the identified easements was visited in the Fall of 2017 to assess unique clearing and/or maintenance requirements. A Final Report has been completed and incorporates SOP for the Off-Street Assets.                                                                                                                                                                                                                                      |
| 21                          | Pass new FOG Ordinance.                                                                                                                                                                                                                                                                                                                                                                                        | Complete                                    | Complete                                     | The City has developed a FOG Program for Lawrence, which includes ordinance updates, coordination with the Board of Health and the development of a FOG Program document. Implementation of the FOG program is ongoing.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| 22                          | Draft FOG Program Document.                                                                                                                                                                                                                                                                                                                                                                                    | Complete                                    | Complete                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 23                          | Work with the Board of Health and inspectional services to implement the FOG program as described by the ordinance and program document.                                                                                                                                                                                                                                                                       | Ongoing                                     | Ongoing                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 24                          | Continue to use a focused analytical approach (as described in Section 6.4 of the CMOM report) toward identifying and removing I/I in the collection system.                                                                                                                                                                                                                                                   | Ongoing                                     | Ongoing                                      | The City's approach to I/I removal has continued to be focused on removing the numerous structural issues in the collection system, which are the most prevalent contributor to I/I in the system. The City has been continuing to address major collection system problems as they have been identified through SSES work, resulting in a number of various repair projects. Construction on the first comprehensive CIP project, which targeted high risk issues in the collection system, was completed in January 2017 and the second major CIP was completed in the winter of 2018. A third CIP project began in March 2019 and a fourth CIP project began March 2020, both of which were completed in 2021. A fifth CIP project began in 2022 and was completed in 2024. Additional CIP projects are planned for 2025 and beyond to address additional I/I and structural issues. |
| 25                          | Develop and implement an employee-training program.                                                                                                                                                                                                                                                                                                                                                            | Develop Q4 2019 and Implement during FY2020 | Ongoing                                      | The City's Water & Sewer Supervisor is actively working on developing and managing a new and existing employee-training program. A memo denoting recommended trainings was provided to the City in February 2019 that the City has been using as a guideline. The City provided another IDDE training to operators in May 2024 and expects to provide another training in 2025. A SWPPP/SPCC update training was held in May 2024.                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 26                          | Establish a Public Outreach program for the Water & Sewer Department, and identify a staff member who can be in charge. Use a variety of media and methods for communication, including web and social media, traditional media, and face-to-face communication at events and workshops. Coordinate with other City departments and local organizations wherever possible. Communications should be bilingual. | Ongoing                                     | Ongoing                                      | The City's public outreach program is ongoing. They have been communicating important information to the public through neighborhood meetings, targeted direct mail campaigns and through social media. Important updates and educational information is provided in the annual Consumer Confidence Report. Additional outreach materials have been developed as a part of the new MS4 Permit requirements and are distributed annually between March and September.                                                                                                                                                                                                                                                                                                                                                                                                                    |

**Attachment C-1:  
CMOM Program Implementation Update**

| Corrective<br>Action<br>Plan Ref. | Description                                                                                                                   | Schedule       | Status                                                                                      | Notes                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------|----------------|---------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 27                                | Institute an enhanced Capital Improvement Planning model which prioritizes projects based on risk analysis.                   | Ongoing        | Complete for Contracts I thru IV, Contracts 6982 and 7533, and Ongoing for Future Contracts | The City's collection system capital improvement projects are currently in development. The CIP process institutes risk, and other data and observations collected during the ongoing SSES work, to make informed decisions about how to optimize money spent on capital improvement. Contract III & IV construction began in March 2019 and is was completed in December 2021. Contract 6982 began construction in March 2020 and was completed in Summer 2021. Contract 7533 (Contract VI) began construction July 2022 and was completed in July 2024. |
| 28                                | Follow staffing and organizational recommendations laid out in the forthcoming staffing and organizational assessment report. | Beginning 2016 | Ongoing                                                                                     | Completing the Organizational Assessment Report and developing an implementation schedule is an ongoing process. The Department of Public Works (DPW) is currently drafting a modified version in-house, taking a synergetic approach by integrating both the DPW and the Water and Sewer Departments into the analysis. This approach is different from the draft report completed in 2015. This will be an ongoing effort, however, the City is well positioned to accomplish organizational change.                                                    |

Attachment C-2: Collection System Budget Summary

LAWRENCE WATER & SEWER ENTERPRISE FUND  
Summary of Revenue and Expense Projections

|                            |           |      |
|----------------------------|-----------|------|
| Rate Increase              | 2H FY2023 | 7.0% |
| Rate Increase              | 1H FY2024 | 7.0% |
| Rate Increase              | 2H FY2024 | 3.0% |
| Rate Increase              | 1H FY2025 | 3.0% |
| Rate Increase              | 2H FY2025 | 0.0% |
| Rate Increase <sup>1</sup> | FY2026    | 3.0% |
| Rate Increase <sup>1</sup> | FY2027    | 3.0% |
| Rate Increase <sup>1</sup> | FY2028    | 3.0% |

1. Exact rate increase not yet determined.

| Proposed Rates                  | FY2021 <sup>A</sup> | FY2022 <sup>A</sup> | FY2023 <sup>A</sup> | FY2024 <sup>A</sup> | FY2025 <sup>B</sup> | FY2026 <sup>P</sup> | FY2027 <sup>P</sup> | FY2028 <sup>P</sup> | FY2029 <sup>P</sup> | FY2030 <sup>P</sup> | FY2031 <sup>P</sup> | FY2032 <sup>P</sup> |
|---------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Base Water Rate (\$/HCF)        | 4.50                | 4.50                | 3.32                | 3.66                | 3.77                | 3.88                | 4.00                | 4.12                | 4.12                | 4.12                | 4.12                | 4.12                |
| Large Meter Water Rate (\$/HCF) | N/A                 | N/A                 | N/A                 | N/A                 | N/A                 | 3.88                | 4.00                | 4.12                | 4.12                | 4.12                | 4.12                | 4.12                |
| Base Sewer Rate (\$/HCF)        | 4.86                | 4.86                | 3.58                | 3.95                | 4.07                | 4.19                | 4.32                | 4.45                | 4.45                | 4.45                | 4.45                | 4.45                |
| Large Meter Water Rate (\$/HCF) | N/A                 | N/A                 | N/A                 | N/A                 | N/A                 | 4.19                | 4.32                | 4.45                | 4.45                | 4.45                | 4.45                | 4.45                |
| Revenue Streams                 |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |
| Taxes and Excise                | \$ 128,837          | \$ 130,061          | \$ 239,926          | \$ 168,106          | \$ 130,000          | \$ 130,000          | \$ 130,000          | \$ 130,000          | \$ 130,000          | \$ 130,000          | \$ 130,000          | \$ 130,000          |
| Water Service Charges           | \$ 9,468,260        | \$ 8,317,002        | \$ 9,065,980        | \$ 9,587,279        | \$ 10,259,258       | \$ 10,567,036       | \$ 10,884,047       | \$ 11,210,569       | \$ 11,210,569       | \$ 11,210,569       | \$ 11,210,569       | \$ 11,210,569       |
| Sewer Service Charges           | \$ 9,939,725        | \$ 8,821,253        | \$ 9,473,868        | \$ 10,023,797       | \$ 10,779,255       | \$ 11,102,632       | \$ 11,435,711       | \$ 11,778,783       | \$ 11,778,783       | \$ 11,778,783       | \$ 11,778,783       | \$ 11,778,783       |
| Misc. Revenues                  | \$ 750,609          | \$ 603,161          | \$ 506,952          | \$ 589,463          | \$ 851,000          | \$ 851,000          | \$ 851,000          | \$ 851,000          | \$ 851,000          | \$ 851,000          | \$ 851,000          | \$ 851,000          |
| Leins                           | \$ -                | \$ -                | \$ 18,677           | \$ 983,469          | \$ 600,000          | \$ 600,000          | \$ 600,000          | \$ 600,000          | \$ 600,000          | \$ 600,000          | \$ 600,000          | \$ 600,000          |
| One time Bill reduction         | \$ -                |                     |                     |                     |                     | \$ -                | \$ -                | \$ -                | \$ -                | \$ -                | \$ -                | \$ -                |
| Recession Impact                | 0%                  | 0%                  | 0%                  |                     |                     |                     |                     |                     |                     |                     |                     |                     |
| Transfer In                     | \$ 3,533,728        | \$ 4,047,913        | \$ 4,637,100        | \$ 1,874,639        | \$ -                | \$ -                | \$ -                | \$ -                | \$ -                | \$ -                | \$ -                | \$ -                |
| Total Revenue                   | \$ 23,821,160       | \$ 21,919,391       | \$ 23,942,504       | \$ 23,226,754       | \$ 22,619,513       | \$ 23,250,668       | \$ 23,900,758       | \$ 24,570,351       | \$ 24,570,351       | \$ 24,570,351       | \$ 24,570,351       | \$ 24,570,351       |

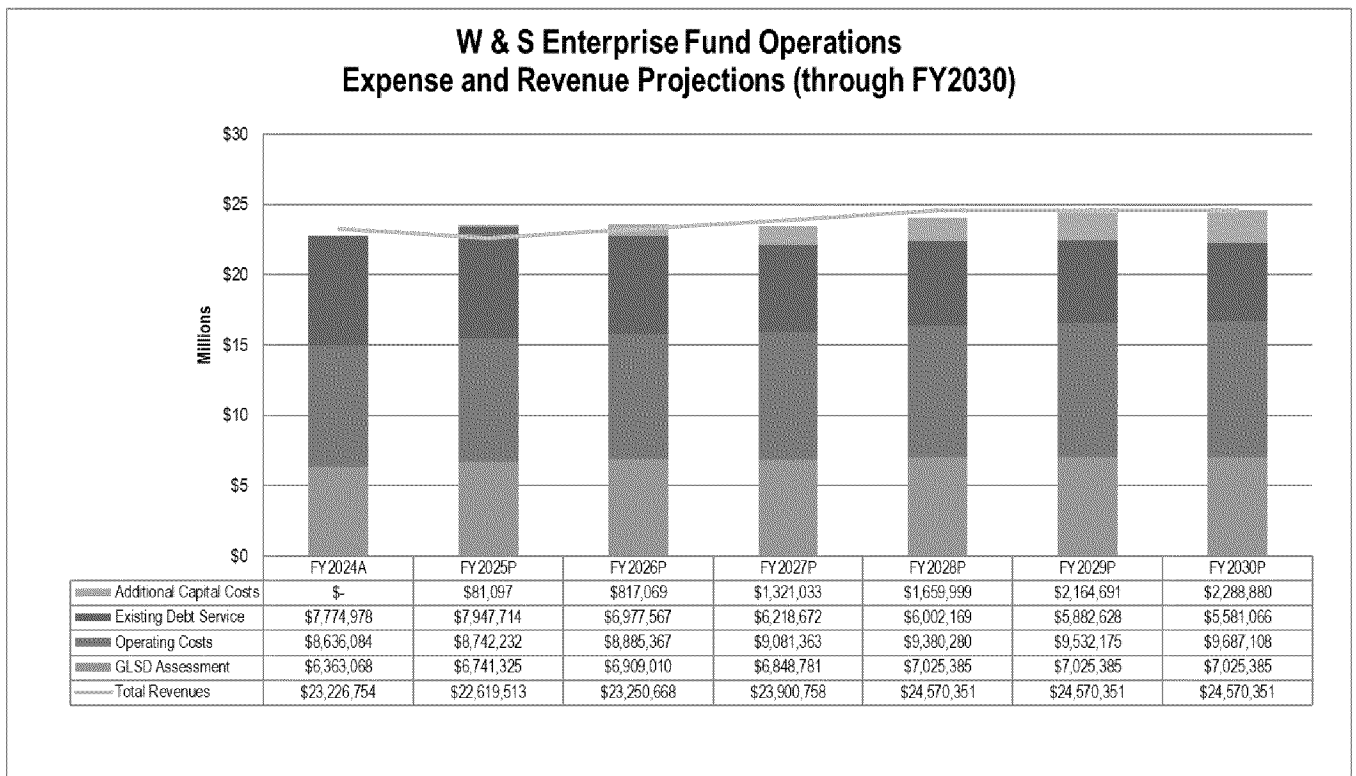
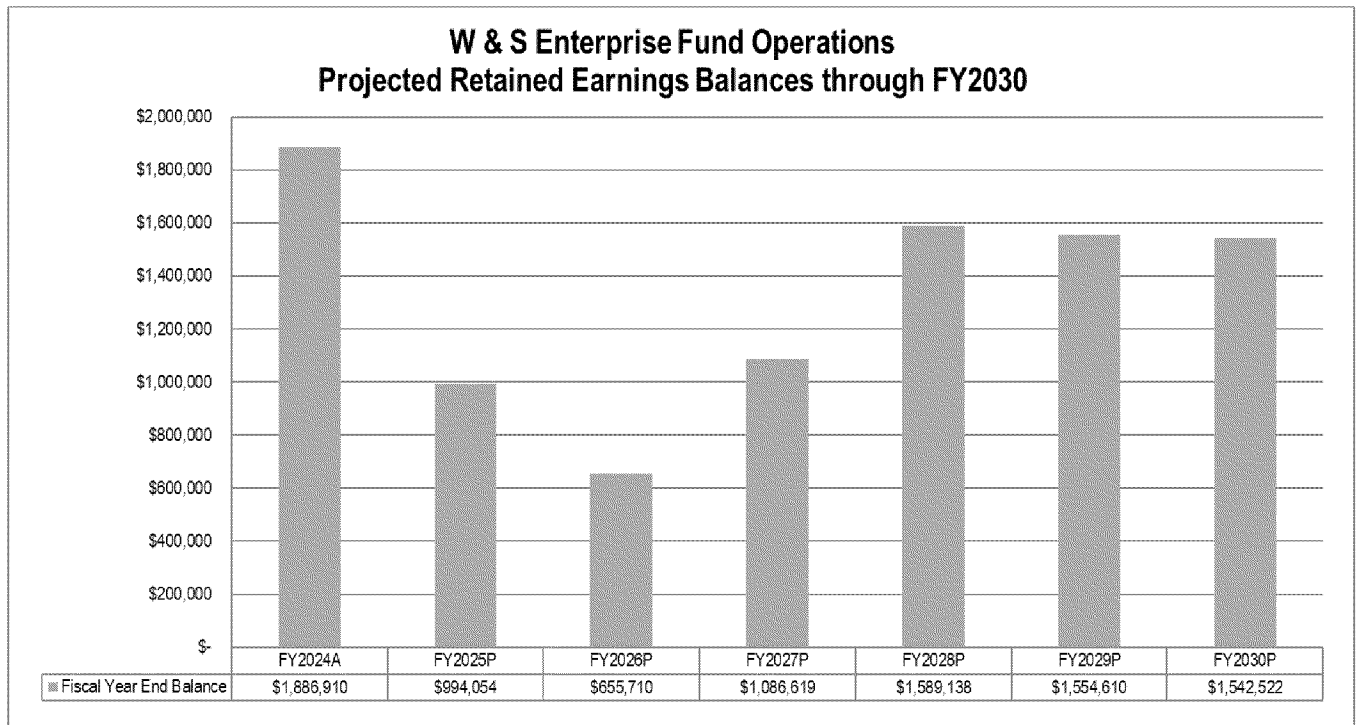
| Expense Budget                       | FY2021 <sup>A</sup> | FY2022 <sup>A</sup> | FY2023 <sup>A</sup> | FY2024 <sup>A</sup> | FY2025 <sup>P</sup> | FY2026 <sup>P</sup> | FY2027 <sup>P</sup> | FY2028 <sup>P</sup> | FY2029 <sup>P</sup> | FY2030 <sup>P</sup> | FY2031 <sup>P</sup> | FY2032 <sup>P</sup> |
|--------------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Expense by Division                  |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |
| 51 PERSONAL SERVICES                 | \$ 2,375,113        | \$ 2,573,641        | \$ 2,420,807        | \$ 2,606,240        | \$ 2,658,365        | \$ 2,711,532        | \$ 2,765,763        | \$ 2,821,078        | \$ 2,877,499        | \$ 2,935,049        | \$ 2,993,750        | \$ 3,053,625        |
| 52 PURCHASE OF SERVICES              | \$ 1,308,560        | \$ 1,729,048        | \$ 1,561,914        | \$ 1,425,797        | \$ 1,454,313        | \$ 1,483,399        | \$ 1,513,067        | \$ 1,543,328        | \$ 1,574,195        | \$ 1,605,679        | \$ 1,637,793        | \$ 1,670,548        |
| 53 PROFESSIONAL SERVICE              | \$ 1,669,167        | \$ 1,649,636        | \$ 1,650,000        | \$ 1,650,000        | \$ 1,650,000        | \$ 1,683,000        | \$ 1,716,660        | \$ 1,750,993        | \$ 1,786,013        | \$ 1,821,733        | \$ 1,858,168        | \$ 1,895,331        |
| 54 SUPPLIES                          | \$ 290,349          | \$ 314,791          | \$ 246,514          | \$ 262,825          | \$ 268,081          | \$ 273,443          | \$ 278,912          | \$ 284,490          | \$ 290,180          | \$ 295,983          | \$ 301,903          | \$ 307,941          |
| 56 INTERGOVERNMENTAL (Non-GLSD)      | \$ 563,581          | \$ 553,195          | \$ 530,422          | \$ 576,956          | \$ 588,495          | \$ 600,265          | \$ 612,270          | \$ 624,515          | \$ 637,006          | \$ 649,746          | \$ 662,741          | \$ 675,996          |
| 56 INTERGOVERNMENTAL (GLSD)          | \$ 5,934,740        | \$ 5,451,695        | \$ 5,782,736        | \$ 6,363,068        | \$ 6,741,325        | \$ 6,909,010        | \$ 6,848,781        | \$ 7,025,385        | \$ 7,025,385        | \$ 7,025,385        | \$ 7,025,385        | \$ 7,025,385        |
| 57 OTHER CHARGES & EXP               | \$ 476,297          | \$ 518,342          | \$ 520,611          | \$ 526,915          | \$ 537,453          | \$ 548,202          | \$ 559,166          | \$ 570,349          | \$ 581,756          | \$ 593,391          | \$ 605,259          | \$ 617,364          |
| 58 CAPITAL OUTLAY                    | \$ 931,486          | \$ 412,581          | \$ 846,538          | \$ 741,826          | \$ 740,000          | \$ 740,000          | \$ 790,000          | \$ 940,000          | \$ 940,000          | \$ 940,000          | \$ 940,000          | \$ 940,000          |
| 59 DEBT SERVICE                      | \$ 6,177,528        | \$ 6,861,460        | \$ 6,920,086        | \$ 7,774,978        | \$ 7,947,714        | \$ 6,977,567        | \$ 6,218,672        | \$ 6,002,169        | \$ 5,882,628        | \$ 5,581,066        | \$ 5,572,604        | \$ 5,452,807        |
| 60 OTHER USES                        | \$ 845,526          | \$ 845,526          | \$ 845,526          | \$ 845,526          | \$ 845,526          | \$ 845,526          | \$ 845,526          | \$ 845,526          | \$ 845,526          | \$ 845,526          | \$ 845,526          | \$ 845,526          |
| Additional Capital Costs             |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |
| Future Debt Service & LIC            | \$ -                | \$ -                | \$ -                | \$ -                | \$ 81,097           | \$ 817,069          | \$ 1,321,033        | \$ 1,659,999        | \$ 2,164,691        | \$ 2,288,680        | \$ 2,453,554        | \$ 2,453,554        |
| Less Savings due to ongoing projects |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |                     |
| Solar Electricity                    | \$ -                | \$ -                | \$ -                | \$ -                |                     |                     |                     |                     |                     |                     |                     |                     |
| Pump Upgrades                        | \$ -                | \$ -                | \$ -                | \$ -                |                     |                     |                     |                     |                     |                     |                     |                     |
| Total Expenses                       | \$ 20,572,346       | \$ 20,909,916       | \$ 21,325,154       | \$ 22,774,130       | \$ 23,512,369       | \$ 23,589,012       | \$ 23,469,850       | \$ 24,067,833       | \$ 24,604,879       | \$ 24,582,439       | \$ 24,896,684       | \$ 24,938,079       |

|                            |              |              |              |            |              |              |            |            |             |             |              |              |
|----------------------------|--------------|--------------|--------------|------------|--------------|--------------|------------|------------|-------------|-------------|--------------|--------------|
| Fiscal Year Excess/Deficit | \$ 3,248,814 | \$ 1,009,475 | \$ 2,617,350 | \$ 452,624 | \$ (892,856) | \$ (338,344) | \$ 430,909 | \$ 502,518 | \$ (34,528) | \$ (12,088) | \$ (326,332) | \$ (367,727) |
|----------------------------|--------------|--------------|--------------|------------|--------------|--------------|------------|------------|-------------|-------------|--------------|--------------|

| Retained Earning Balance             | FY2021 <sup>A</sup> | FY2022 <sup>A</sup> | FY2023 <sup>A</sup> | FY2024 <sup>A</sup> | FY2025 <sup>P</sup> | FY2026 <sup>P</sup> | FY2027 <sup>P</sup> | FY2028 <sup>P</sup> | FY2029 <sup>P</sup> | FY2030 <sup>P</sup> | FY2031 <sup>P</sup> | FY2032 <sup>P</sup> |
|--------------------------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|---------------------|
| Fiscal Year Start                    | \$ 15,343,378       | \$ 7,707,109        | \$ 4,600,000        | \$ 3,127,979        | \$ 1,886,910        | \$ 994,054          | \$ 655,710          | \$ 1,086,619        | \$ 1,589,138        | \$ 1,554,610        | \$ 1,542,522        | \$ 1,216,189        |
| Fiscal Year Excess/Deficit           | \$ 3,248,814        | \$ 1,009,475        | \$ 2,617,350        | \$ 452,624          | \$ (892,856)        | \$ (338,344)        | \$ 430,909          | \$ 502,518          | \$ (34,528)         | \$ (12,088)         | \$ (326,332)        | \$ (367,727)        |
| Transfers                            | \$ (3,533,728)      | \$ (4,047,913)      | \$ (4,637,100)      |                     |                     |                     |                     |                     |                     |                     |                     |                     |
| Fiscal Year End Balance (Right Axis) | \$ 7,707,109        | \$ 4,600,000        | \$ 3,127,979        | \$ 1,886,910        | \$ 994,054          | \$ 655,710          | \$ 1,086,619        | \$ 1,589,138        | \$ 1,554,610        | \$ 1,542,522        | \$ 1,216,189        | \$ 848,462          |

- Notes:
- In Fiscal periods, A=actual, B=budgeted, P=projected
  - Revenue projections post FY2024 are based average volumes from FY20/FY21. Miscellaneous revenues are based upon actuals received in FY2022.
  - Non-debt service expense budgets have been escalated at 2% per annum from the FY2024 budget.
  - Debt service budgets reflect actual expected payments assuming the full amount of bonded debt and proposed capital spending.
  - Additional proposed spending amounts and schedule are show to the top right of the summary table.
  - Budgetary under-runs shown are based upon the low end of historical values.
  - Projections for GLSD assessments assume the debt-financed implementation of its LTCP.
  - Projections for GLSD assessments now include community credits, which are discretionary but which have occurred in past years.

## Attachment C-2: Collection System Budget Summary



## Attachment C-3

### Attachment C-3: GLSD Contributions & Projections

|                       | O&M Costs    | Capital Projects | Total Contribution |
|-----------------------|--------------|------------------|--------------------|
| FY2007 <sup>A</sup>   | \$ 4,524,391 | \$ 1,386,515     | \$ 5,910,906       |
| FY2008 <sup>A</sup>   | \$ 4,778,938 | \$ 1,249,594     | \$ 6,028,532       |
| FY2009 <sup>A</sup>   | \$ 4,721,464 | \$ 1,348,255     | \$ 6,069,719       |
| FY2010 <sup>A</sup>   | \$ 3,882,168 | \$ 1,775,590     | \$ 5,657,758       |
| FY2011 <sup>A</sup>   | \$ 3,673,749 | \$ 1,918,967     | \$ 5,592,716       |
| FY2012 <sup>A</sup>   | \$ 4,025,348 | \$ 2,080,273     | \$ 6,105,621       |
| FY2013 <sup>A</sup>   | \$ 3,889,565 | \$ 2,152,084     | \$ 6,041,650       |
| FY2014 <sup>A</sup>   | \$ 3,776,505 | \$ 2,459,190     | \$ 6,235,696       |
| FY2015 <sup>A</sup>   | \$ 3,935,911 | \$ 2,395,943     | \$ 6,331,853       |
| FY2016 <sup>A</sup>   | \$ 4,351,204 | \$ 2,162,207     | \$ 6,513,412       |
| FY2017 <sup>A</sup>   | \$ 4,365,861 | \$ 2,153,738     | \$ 6,519,599       |
| FY2018 <sup>A</sup>   | \$ 4,397,494 | \$ 2,193,339     | \$ 6,590,833       |
| FY2019 <sup>A,1</sup> | \$ 4,617,571 | \$ 2,043,336     | \$ 6,660,907       |
| FY2020 <sup>A,1</sup> | \$ 4,772,667 | \$ 2,119,454     | \$ 6,892,121       |
| FY2021 <sup>A,1</sup> | \$ 4,803,087 | \$ 2,291,337     | \$ 7,094,424       |
| FY2022 <sup>A,1</sup> | \$ 4,399,724 | \$ 2,615,610     | \$ 7,015,334       |
| FY2023 <sup>A,1</sup> | \$ 4,814,817 | \$ 2,324,886     | \$ 7,139,703       |
| FY2024 <sup>A,1</sup> | \$ 5,143,692 | \$ 2,201,386     | \$ 7,345,078       |
| FY2025 <sup>P</sup>   | \$ 4,789,193 | \$ 2,952,133     | \$ 7,741,325       |
| FY2026 <sup>P</sup>   | \$ 4,957,512 | \$ 2,951,498     | \$ 7,909,010       |
| FY2027 <sup>P</sup>   | \$ 5,566,335 | \$ 2,282,447     | \$ 7,848,781       |
| FY2028 <sup>P</sup>   | \$ 5,742,366 | \$ 2,283,020     | \$ 8,025,385       |

A=actual, P=projected

1. GLSD Past financial statements were not available at the time of the report.

Associated O&M and Capital Costs have been estimated based on projected budgets presented in Operating Budget documents.

## Attachment C-4: Job Postings

**Title:** Heavy Motor Equipment Operator (HMEO)  
**Department:** Sewer Division – Department of Public Works  
**Union:** Local 3  
**Salary Range:** Grade 7 – Step 1 \$21.0663 - \$22.548

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**Duties:** Under supervision of a classified or Working Foreman perform semi-skilled duties in support of departmental operations, involving considerable activity and use of heavy trucks and vehicles.

Drive and operate trucks and vehicles, such as snow fighters, snowplows, sanders, cement trucks, vacuum trucks and/or comparable heavy vehicles. Assist in performing operational duties related to specific vehicles, such as assisting with manual shoveling or spreading of salt and sand when involved with snow and ice removal; and similar activities with other types of heavy vehicles.

Report equipment malfunctions to supervisor; will be responsible for assisting in basic vehicles maintenance such as changing oil, filters, brushes, cleaning vehicles, etc. May operate more specialized vehicles or equipment but not as regular and routine part of the job. Perform all duties in conformance with established schedules and applicable safety rules and regulations. Perform other related duties as assigned.

**Qualifications:** Duties require knowledge of equipment operation equivalent to completion of high school. Work requires one (1) to two (2) years of related experience plus proper license (Class 2/Commercial Drivers' License) for the type of equipment operated.

## Job Opportunities

Use the Government Jobs tab to search through your municipality's employment opportunities. Subscribe to job posting notifications to be automatically alerted of the latest career opportunities by clicking on the Notify Me® button.

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### City of Lawrence Job Opportunities

Heavy  
Motor  
Equipment  
Operator  
(HMEO) -  
Department  
of Public  
Works

Under supervision of a classified or Working Foreman, employee performs semi-skilled duties in support of departmental operations, involving considerable activity and use of heavy trucks and vehicles.

### Job Details

#### Category

City of Lawrence Job Opportunities

#### Status

Open

Local 3, SEIU

#### Salary

Range: \$21.0663 -  
\$22.548 per hour

#### Posted

August 20, 2024

#### Closing

September 10, 2024  
11:59 PM

### Tools

[Apply Online](#)

[Volunteer Application Form](#)

[Police Application](#)

Select Language



#### Attachment C-4: Job Postings

**Duties:** Drive and operate trucks and vehicles, such as snow fighters, snowplows, sanders, cement trucks, vacuum trucks and/or comparable heavy vehicles. Assist in performing operational duties related to specific vehicles, such as assisting with manual shoveling or spreading of salt and sand when involved with snow and ice removal; and similar activities with other types of heavy vehicles.

Report equipment malfunctions to supervisor; will be responsible for assisting in basic vehicles maintenance such as changing oil, filters, brushes, cleaning vehicles, etc. May operate more specialized vehicles or equipment but not as regular and routine part of the job. Perform all duties in conformance with established schedules and applicable safety rules and regulations. Perform other related duties as assigned.

#### **Qualifications**

Duties require knowledge of equipment operation equivalent to completion of high school. Work requires one (1) to two (2) years of related experience plus proper license (Class 2/Commercial Drivers' License) for the type of equipment operated.

[Download](#)  
[Employment](#)  
[Application](#)

## Attachment C-4: Job Postings

### Miscellaneous Information

APPLICATIONS ARE AVAILABLE IN THE PERSONNEL OFFICE Application and Full Job Description Available in the City Personnel Department.

The City of Lawrence is an Equal Opportunity Employer.

REASONABLE ACCOMMODATIONS are provided to applicants with disabilities. If you need reasonable accommodations for any part of the application and/or hiring process, please notify the Personnel Director at (978) 620-3060. The decision to grant reasonable accommodations will be made on a case-by-case basis.

## Attachment C-4: Job Postings

### **HI-SHMEO**

**Duties:** Under the supervision of the classified or working foreman, perform skilled operator duties in support of departmental projects, involving considerable physical activity and use of specialized heavy equipment.

Drive and/or operate specialized vehicles and equipment (frequently involving multiple complex hydraulic controls), such as backhoes, front-end loaders, sidewalk sweeper, vacuum truck, and comparable heavy equipment. Coordinate equipment operations with activities of assigned work crews and with local utility companies regarding projects involving digging near underground or overhead lines, cables, etc.

Check vehicle or equipment for proper operation before commencing assigned work project; report equipment malfunctions to supervisor when more substantial maintenance efforts are required. Perform routine maintenance on vehicles and equipment; report equipment malfunctions to supervisor when more substantial maintenance efforts are required. Perform all duties in conformance with established schedules and applicable safety rules and regulations.

May operate more basic level heavy equipment or perform manual labor as required in support of project assignments. Operation of special heavy equipment may also involve hoisting, though not as a regularly. Perform other duties as assigned.

**Qualifications:** Duties required knowledge of specialized equipment and operation. Requires a 1C hoisting license, 2B excavation license, and Commercial Driver's License (CDL).

# **ATTACHMENT D**



**Attachment D-1: GIS Basemaps D-1.1 through D-1.4**

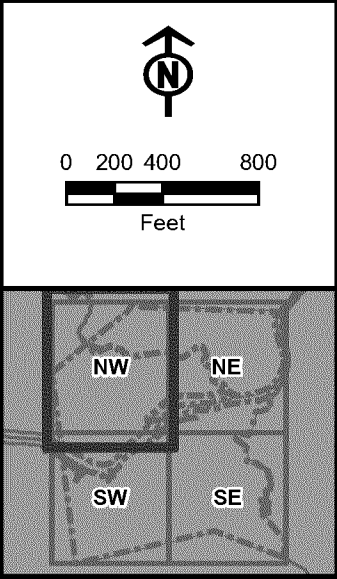
**Attachment D-2: MS4 Infrastructure GIS Maps D-2.1 through D-2.4**

**Attachment D-3: Collection System GIS Maps D-3.1 through D-3.4**

**Attachment D-4: MS4 Capital Improvement Planning (CIP) Maps D-4.1 through D-4.4**

**Attachment D-5: Collection System Capital Improvement Planning (CIP) Maps D-5.1 through D-5.4**

**Attachment D-6: Descriptions of Digital GIS Mapping Items**



| Legend                               |                                |
|--------------------------------------|--------------------------------|
| 2022 Integrated Waters List Category |                                |
|                                      | 2 (Attaining some uses)        |
|                                      | 3 (No uses assessed)           |
|                                      | 4A (Impaired , TMDL completed) |
|                                      | 4C (Impairment, non-pollutant) |
|                                      | 5 (Impaired, TMDL required)    |
|                                      | Highway                        |
|                                      | Major Road                     |
|                                      | Minor Road                     |
|                                      | Parcels                        |
|                                      | Perennial Stream               |
|                                      | Intermittent Stream            |
|                                      | Ditch/Canal                    |
|                                      | Pond, Lake, Ocean              |
|                                      | Wetland                        |
|                                      | Submerged Wetland              |
|                                      | Inundated Area                 |
|                                      | Contours (1:5000)              |
|                                      | Lawrence Boundary              |
|                                      | Town Boundaries                |

GIS Mapping

MS4 & Collection System

City of Lawrence,  
Massachusetts

Attachment D-1.1:

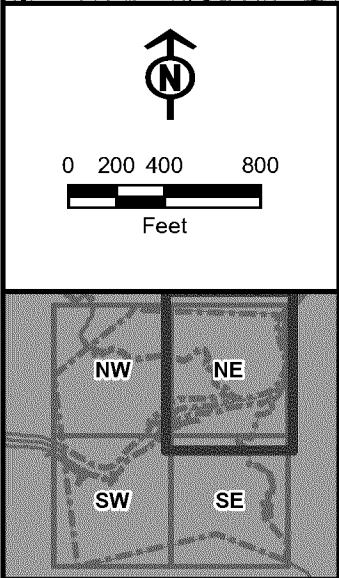
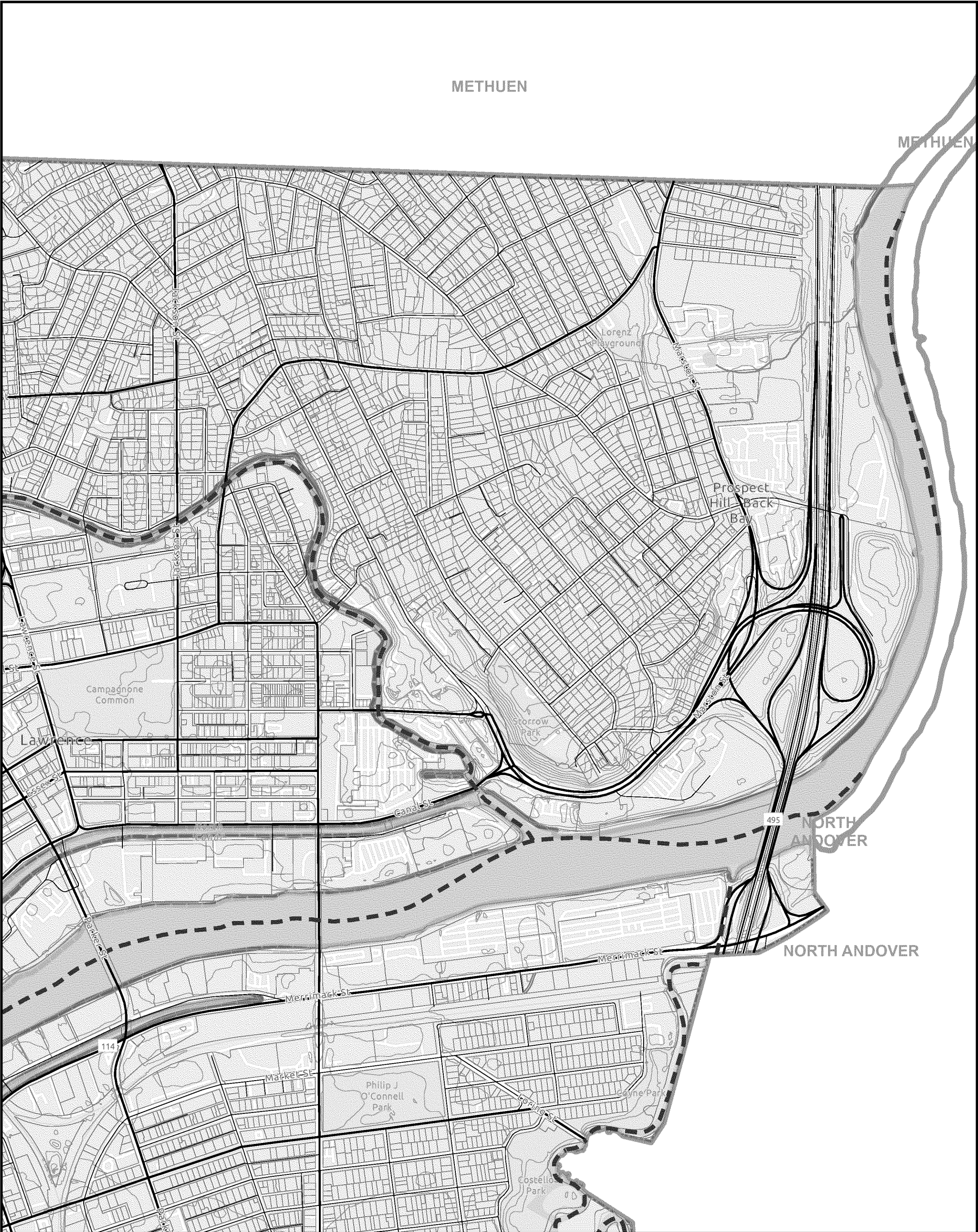
Basemap (NW)

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| DRAWN BY: PBO      | SOURCE: Lawrence, ESRI, MassGIS  |

Figure Exported: 1/21/2025 By: poregan Using: \\woodardcurran.net\shared\Projects\0227206.05 Lawrence MA Phase V SSES\wp\03\_Compliance\07\_Reporting\Report No. 21-Jan. 2025\GIS\Attachment Figures\Attachment Figures 3.0.aprx





### Legend

#### 2022 Integrated Waters List Category

- 2 (Attaining some uses)
- 3 (No uses assessed)
- 4A (Impaired , TMDL completed)
- 4C (Impairment, non-pollutant)
- 5 (Impaired, TMDL required)

- Highway
- Major Road
- Minor Road
- Parcels

- Perennial Stream
- Intermittent Stream
- Ditch/Canal
- Pond, Lake, Ocean
- Wetland
- Submerged Wetland
- Inundated Area
- Contours (1:5000)
- Lawrence Boundary
- Town Boundaries

## GIS Mapping MS4 & Collection System

### City of Lawrence, Massachusetts

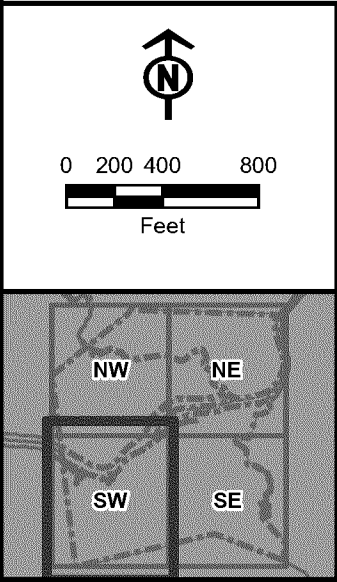
## Attachment D-1.2: Basemap (NE)

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- Legend**

**2022 Integrated Waters List Category**

  - 2 (Attaining some uses)
  - 3 (No uses assessed)
  - 4A (Impaired , TMDL completed)
  - 4C (Impairment, non-pollutant)
  - 5 (Impaired, TMDL required)
  - Highway
  - Major Road
  - Minor Road
  - Parcels
- Perennial Stream
  - Intermittent Stream
  - Ditch/Canal
  - Pond, Lake, Ocean
  - Wetland
  - Submerged Wetland
  - Inundated Area
  - Contours (1:5000)
  - Lawrence Boundary
  - Town Boundaries

GIS Mapping  
MS4 & Collection System  
**City of Lawrence,  
Massachusetts**  
**Attachment D-1.3:  
Basemap (SW)**

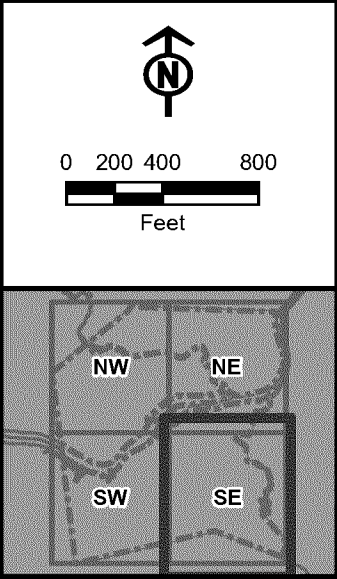


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- Legend

2022 Integrated Waters List Category

2 (Attaining some uses)

3 (No uses assessed)

4A (Impaired , TMDL completed)

4C (Impairment, non-pollutant)

5 (Impaired, TMDL required)

Highway

Major Road

Minor Road

Parcels

Perennial Stream

Intermittent Stream

Ditch/Canal

Pond, Lake, Ocean

Wetland

Submerged Wetland

Inundated Area

Contours (1:5000)

Lawrence Boundary

Town Boundaries

GIS Mapping

MS4 & Collection System

City of Lawrence,  
Massachusetts

Attachment D-1.4:

Basemap (SE)

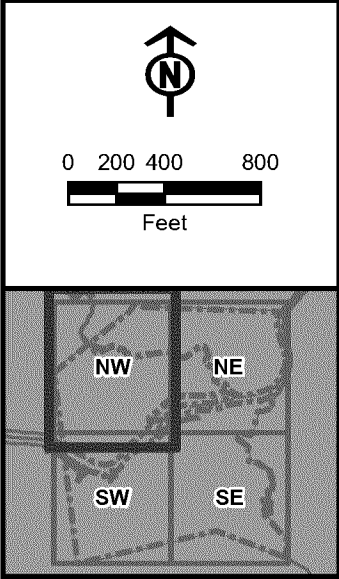


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- Legend**

  - Stormwater Management Structures
  - MS4 Outfall
  - Other Discharge Point
  - MS4 Interconnection (Entering Lawrence)
  - MS4 Interconnection (Leaving Lawrence)
  - Storm Manhole
  - Catch Basin
  - Storm Lateral Lines
  - Stormwater Gravity Main
  - Storm Open Drains
- Storm Culverts
  - Mapped Stream
  - Drainage Catchment
  - Perennial Stream
  - Intermittent Stream
  - Ditch/Canal
  - Pond, Lake, Ocean
  - Wetland
  - Submerged Wetland
  - Inundated Area
  - Storm Off Street Assets

GIS Mapping  
MS4 & Collection System  
*City of Lawrence,  
Massachusetts*  
**Attachment D-2.1:  
MS4 Infrastructure (NW)**

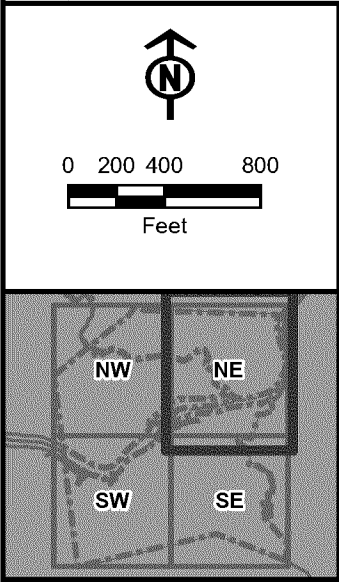
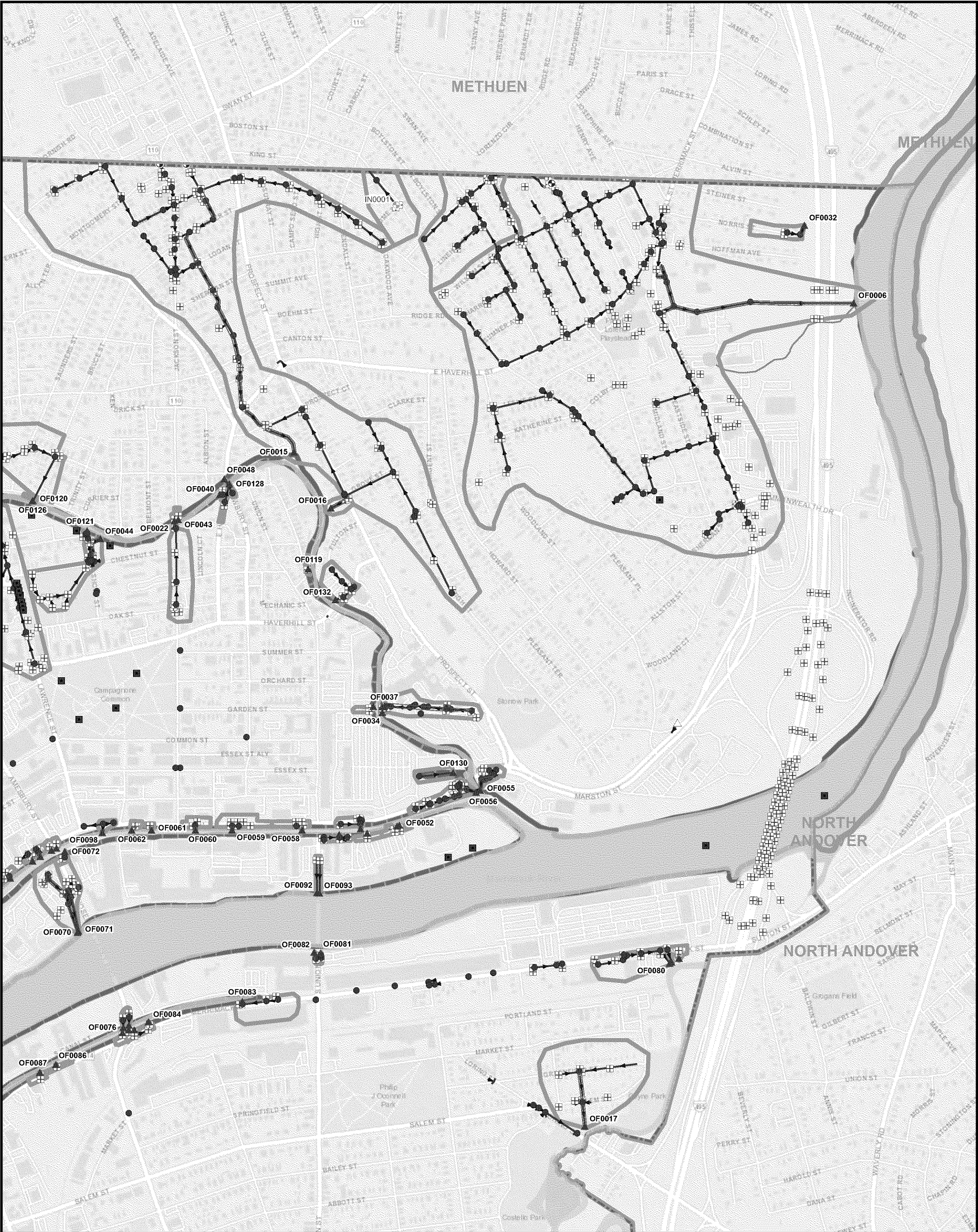


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- Legend**

  - Stormwater Management Structures
  - MS4 Outfall
  - Other Discharge Point
  - MS4 Interconnection (Entering Lawrence)
  - MS4 Interconnection (Leaving Lawrence)
  - Storm Manhole
  - Catch Basin
  - Storm Lateral Lines
  - Stormwater Gravity Main
  - Storm Open Drains
- Storm Culverts
  - Mapped Stream
  - Drainage Catchment
  - Perennial Stream
  - Intermittent Stream
  - Ditch/Canal
  - Pond, Lake, Ocean
  - Wetland
  - Submerged Wetland
  - Inundated Area
  - Storm Off Street Assets

GIS Mapping  
MS4 & Collection System  
*City of Lawrence,  
Massachusetts*  
**Attachment D-2.2:  
MS4 Infrastructure (NE)**

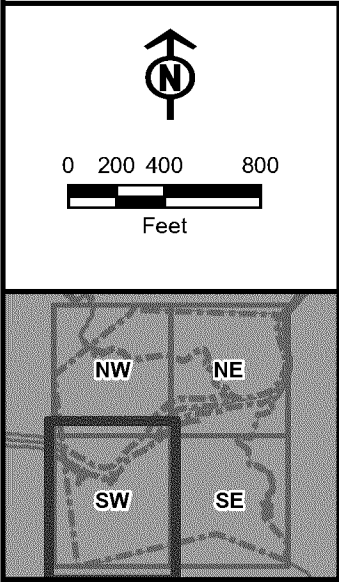


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| Legend |                                         |
|--------|-----------------------------------------|
|        | Stormwater Management Structures        |
|        | MS4 Outfall                             |
|        | Other Discharge Point                   |
|        | MS4 Interconnection (Entering Lawrence) |
|        | MS4 Interconnection (Leaving Lawrence)  |
|        | Storm Manhole                           |
|        | Catch Basin                             |
|        | Storm Lateral Lines                     |
|        | Stormwater Gravity Main                 |
|        | Storm Open Drains                       |
|        | Storm Culverts                          |
|        | Mapped Stream                           |
|        | Drainage Catchment                      |
|        | Perennial Stream                        |
|        | Intermittent Stream                     |
|        | Ditch/Canal                             |
|        | Pond, Lake, Ocean                       |
|        | Wetland                                 |
|        | Submerged Wetland                       |
|        | Inundated Area                          |
|        | Storm Off Street Assets                 |

# GIS Mapping

## MS4 & Collection System

**City of Lawrence,**  
**Massachusetts**

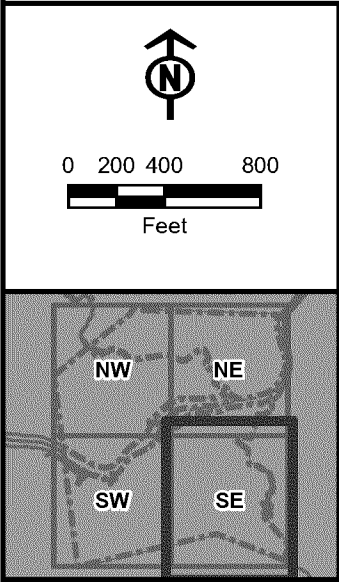
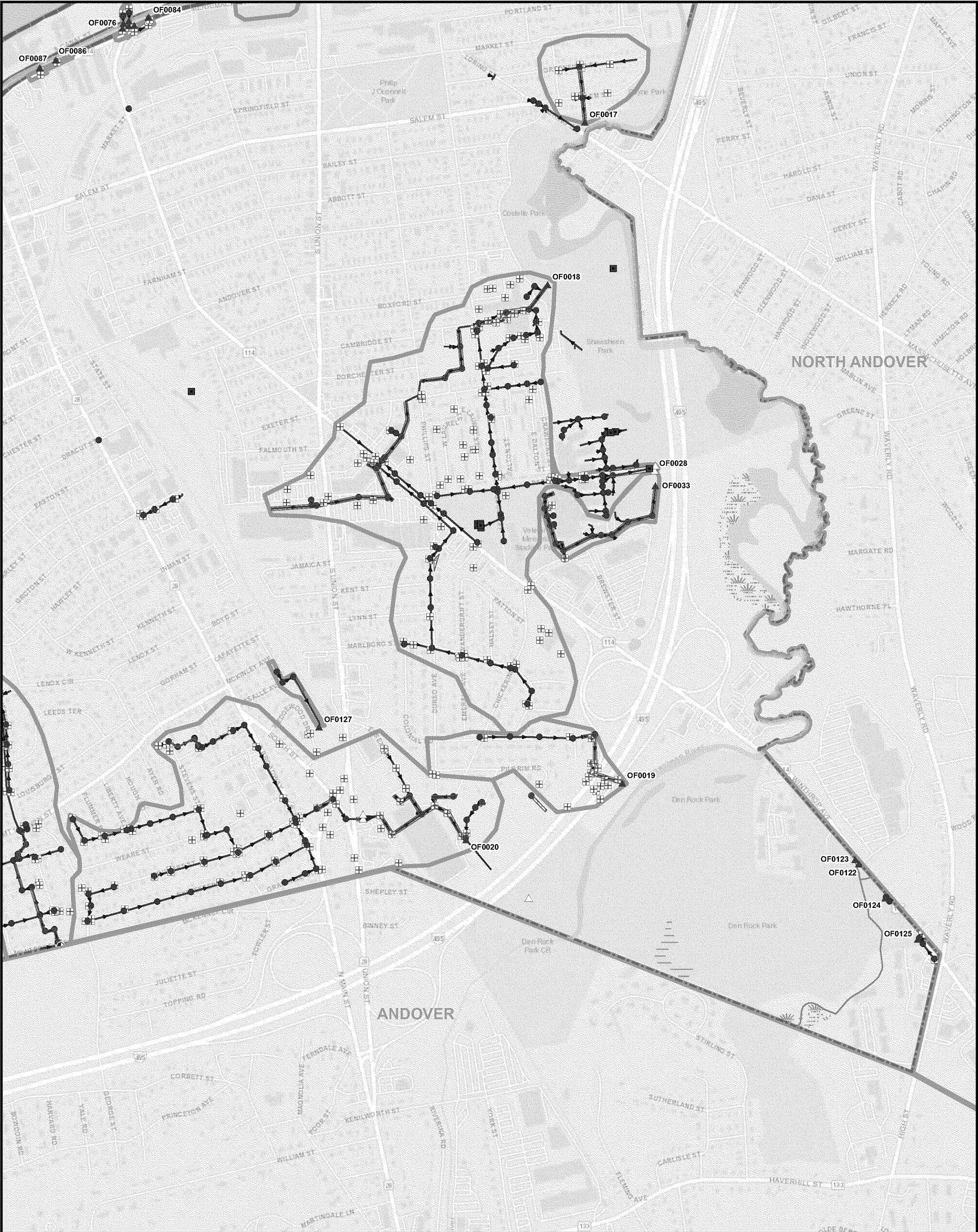
### Attachment D-2.3:

### MS4 Infrastructure (SW)

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### Legend

■

Stormwater Management Structures

▲

MS4 Outfall

△

Other Discharge Point

⊕

MS4 Interconnection (Entering Lawrence)

⊗

MS4 Interconnection (Leaving Lawrence)

●

Storm Manhole

⊞

Catch Basin

→

Storm Lateral Lines

→

Stormwater Gravity Main

→

Storm Open Drains

Storm Culverts

Mapped Stream

Drainage Catchment

Perennial Stream

Intermittent Stream

Ditch/Canal

Pond, Lake, Ocean

Wetland

Submerged Wetland

Inundated Area

Storm Off Street Assets

## GIS Mapping

## MS4 & Collection System

### City of Lawrence, Massachusetts

## Attachment D-2.4:

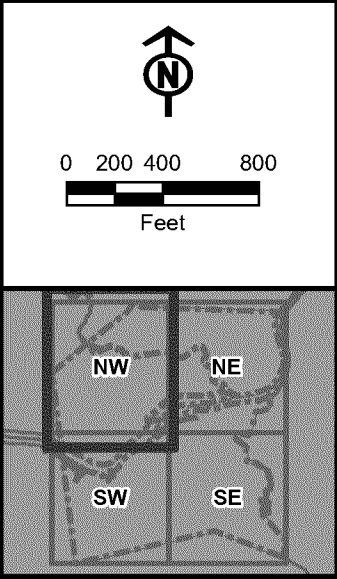
## MS4 Infrastructure (SE)

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# Legend



CSOs (GLSD)



Twin Manholes



Meter Station



Pump Station



Sewer Manhole



Andover



GLSD



Forcemain



Underdrain



HDPE (Smooth Bore)



Asbestos Concrete



Brick



Cast Iron



Ductile Iron



Polyvinyl Chloride



Reinforced Concrete



Vitrified Clay



Other/ Unknown



≤ 12"



14 - 20"



21 - 30"



> 30"



Sewer Off Street Assets



Sewer Catchment



Lawrence Boundary



Town Boundaries

GIS Mapping  
MS4 & Collection System  
*City of Lawrence,  
Massachusetts*

Attachment D-3.1:  
Collection System GIS (NW)

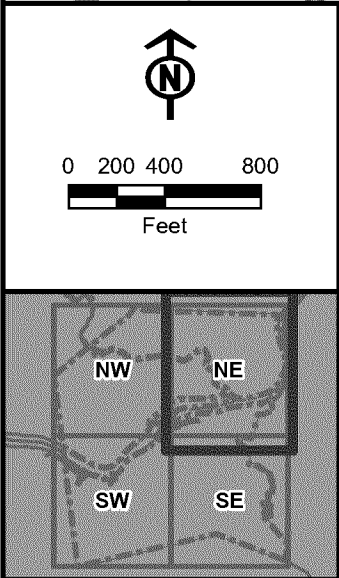
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| Legend        |                      |                           |
|---------------|----------------------|---------------------------|
| CSOs (GLSD)   | <b>Pipe Material</b> | <b>Pipe Diameter (in)</b> |
| Twin Manholes | HDPE (Smooth Bore)   | ≤ 12"                     |
| Meter Station | Asbestos Concrete    | 14 - 20"                  |
| Pump Station  | Brick                | 21 - 30"                  |
| Sewer Manhole | Cast Iron            | > 30" symbol"/> > 30"     |
| Andover       | Ductile Iron         | Sewer Off Street Assets   |
| GLSD          | Polyvinyl Chloride   | Sewer Catchment           |
| Forcemain     | Reinforced Concrete  | Lawrence Boundary         |
| Underdrain    | Vitrified Clay       | Town Boundaries           |
|               | Other/ Unknown       |                           |

GIS Mapping  
MS4 & Collection System  
*City of Lawrence,  
Massachusetts*

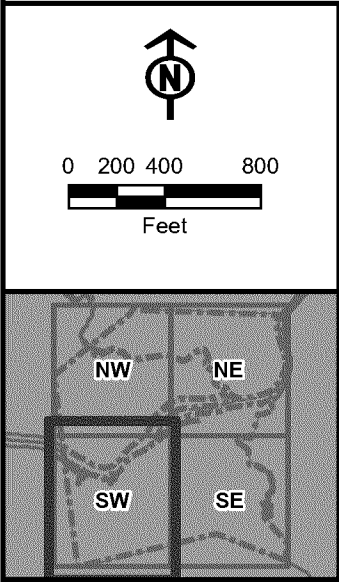
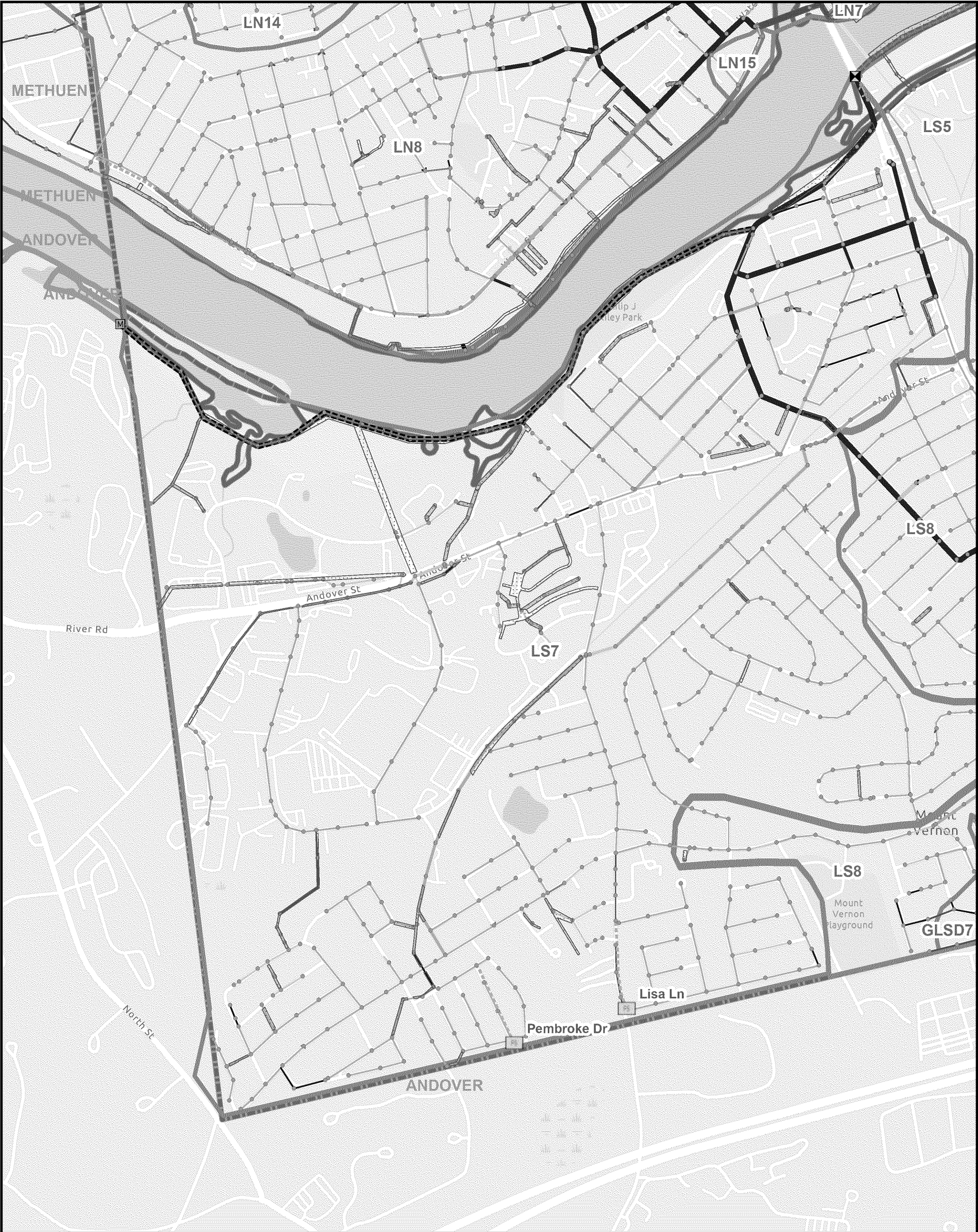
Attachment D-3.2:  
Collection System GIS (NE)

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| DRAWN BY: PBO      | SOURCE: Lawrence, ESRI, MassGIS  |

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# Legend

 CSOs (GLSD)
 Twin Manholes
 Meter Station
 Pump Station
 Sewer Manhole
 Andover
 GLSD
 Forcemain
 Underdrain

## Pipe Material

 HDPE (Smooth Bore)
 Asbestos Concrete
 Brick
 Cast Iron
 Ductile Iron
 Polyvinyl Chloride
 Reinforced Concrete
 Vitrified Clay
 Other/ Unknown

## Pipe Diameter (in)

 ≤ 12"
 14 - 20"
 21 - 30"
 > 30"
 Sewer Off Street Assets
 Sewer Catchment
 Lawrence Boundary
 Town Boundaries

GIS Mapping

MS4 & Collection System

City of Lawrence,  
Massachusetts

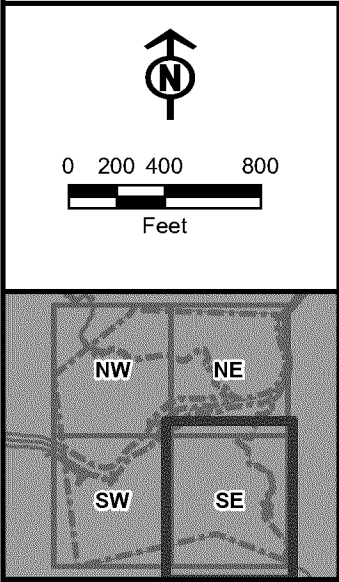
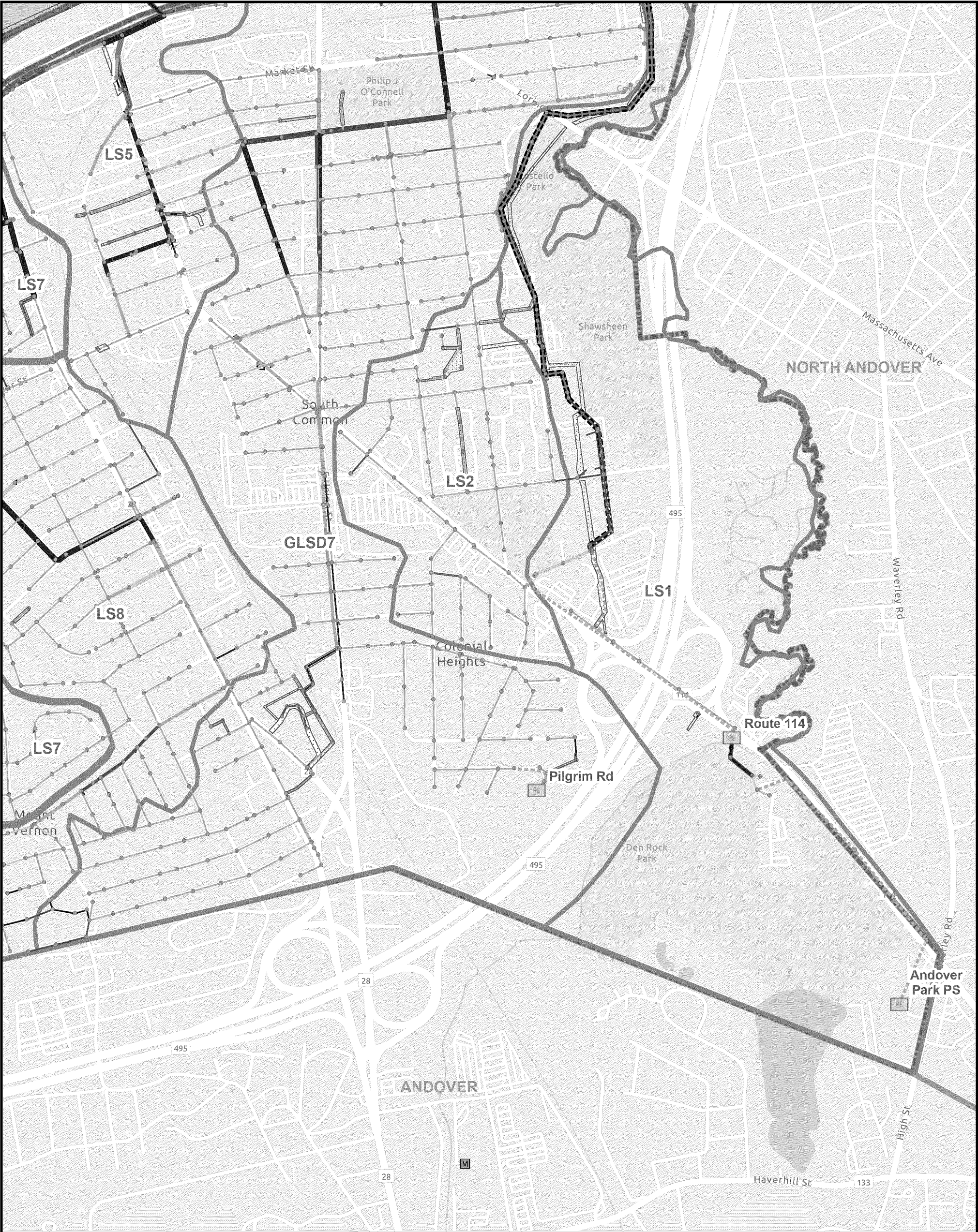
Attachment D-3.3:

Collection System GIS (SW)

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| DRAWN BY: PBO      | SOURCE: Lawrence, ESRI, MassGIS  |





| Legend        |                      |                           |
|---------------|----------------------|---------------------------|
| CSOs (GLSD)   | <b>Pipe Material</b> | <b>Pipe Diameter (in)</b> |
| Twin Manholes | HDPE (Smooth Bore)   | ≤ 12"                     |
| Meter Station | Asbestos Concrete    | 14 - 20"                  |
| Pump Station  | Brick                | 21 - 30"                  |
| Sewer Manhole | Cast Iron            | > 30"                     |
| Andover       | Ductile Iron         | Sewer Off Street Assets   |
| GLSD          | Polyvinyl Chloride   | Sewer Catchment           |
| Forcemain     | Reinforced Concrete  | Lawrence Boundary         |
| Underdrain    | Vitrified Clay       | Town Boundaries           |
|               | Other/ Unknown       |                           |

GIS Mapping  
MS4 & Collection System  
*City of Lawrence,  
Massachusetts*

Attachment D-3.4:  
Collection System GIS (SE)

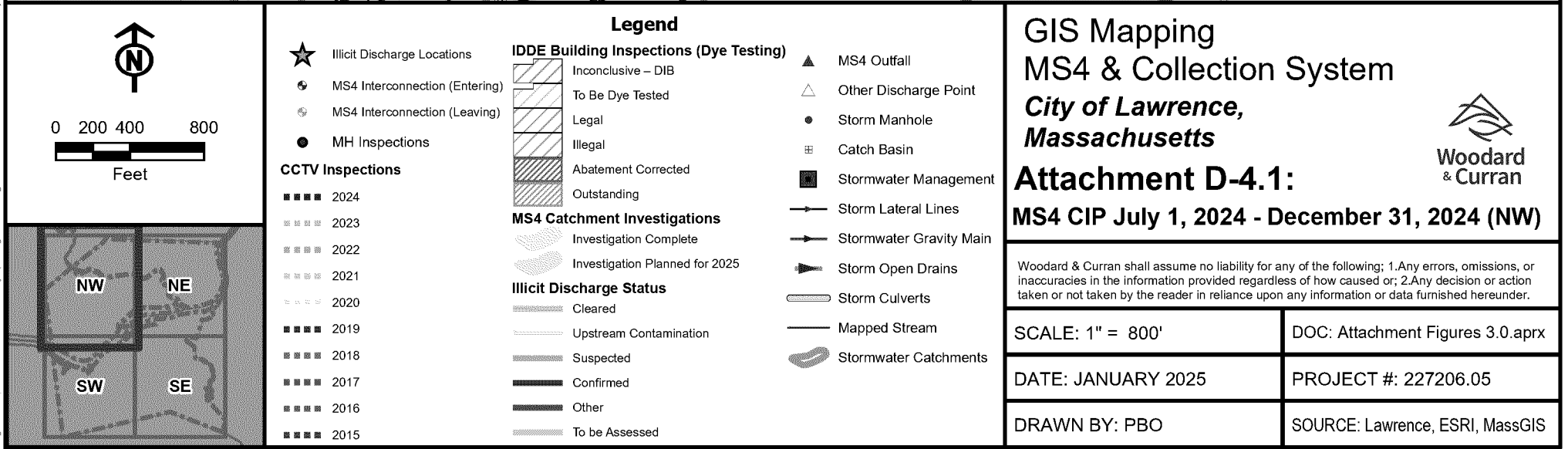
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0200400800

Feet

NWNE

SWSE

★ Illicit Discharge Locations

⬤ MS4 Interconnection (Entering)

⬤ MS4 Interconnection (Leaving)

● MH Inspections

**CCTV Inspections**

■ 2024

■ 2023

■ 2022

■ 2021

■ 2020

■ 2019

■ 2018

■ 2017

■ 2016

■ 2015

**IDDE Building Inspections (Dye Testing)**

Inconclusive – DIB

To Be Dye Tested

Legal

Illegal

Abatement Corrected

Outstanding

**MS4 Catchment Investigations**

Investigation Complete

Investigation Planned for 2025

**Illicit Discharge Status**

Cleared

Upstream Contamination

Suspected

Confirmed

Other

To Be Assessed

▲ MS4 Outfall

△ Other Discharge Point

● Storm Manhole

■ Catch Basin

■ Stormwater Management

— Storm Lateral Lines

— Stormwater Gravity Main

— Storm Open Drains

— Storm Culverts

— Mapped Stream

— Stormwater Catchments

GIS Mapping

MS4 & Collection System

City of Lawrence,

Massachusetts

Attachment D-4.2:

MS4 CIP July 1, 2024 - December 31, 2024 (NE)

Woodard  
& Curran

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SCALE: 1" = 800'

DOC: Attachment Figures 3.0.aprx

DATE: JANUARY 2025

PROJECT #: 227206.05

DRAWN BY: PBO

SOURCE: Lawrence, ESRI, MassGIS

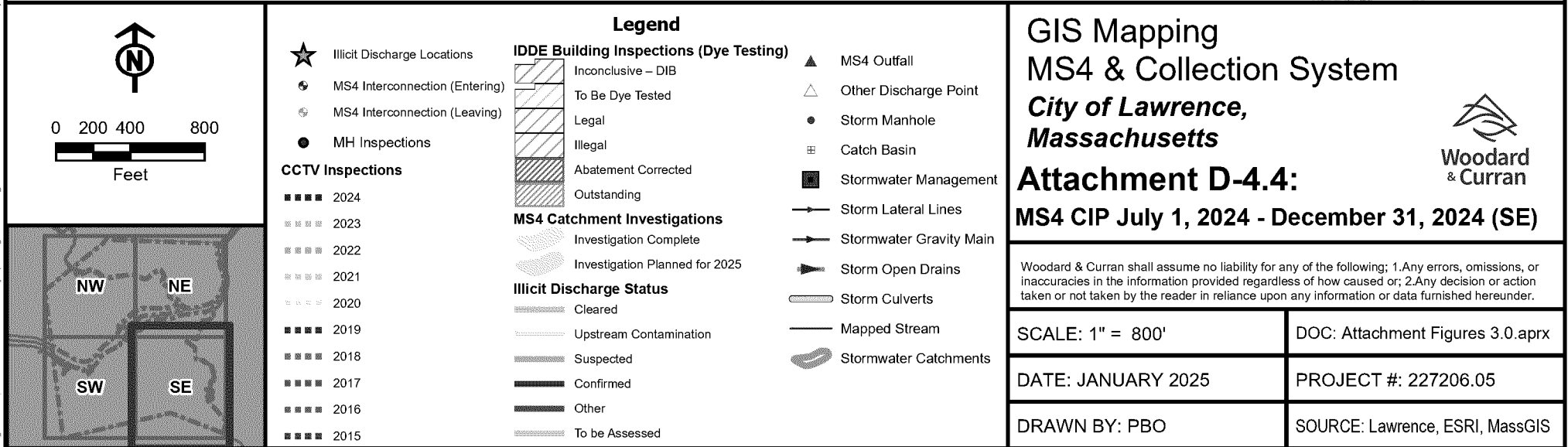
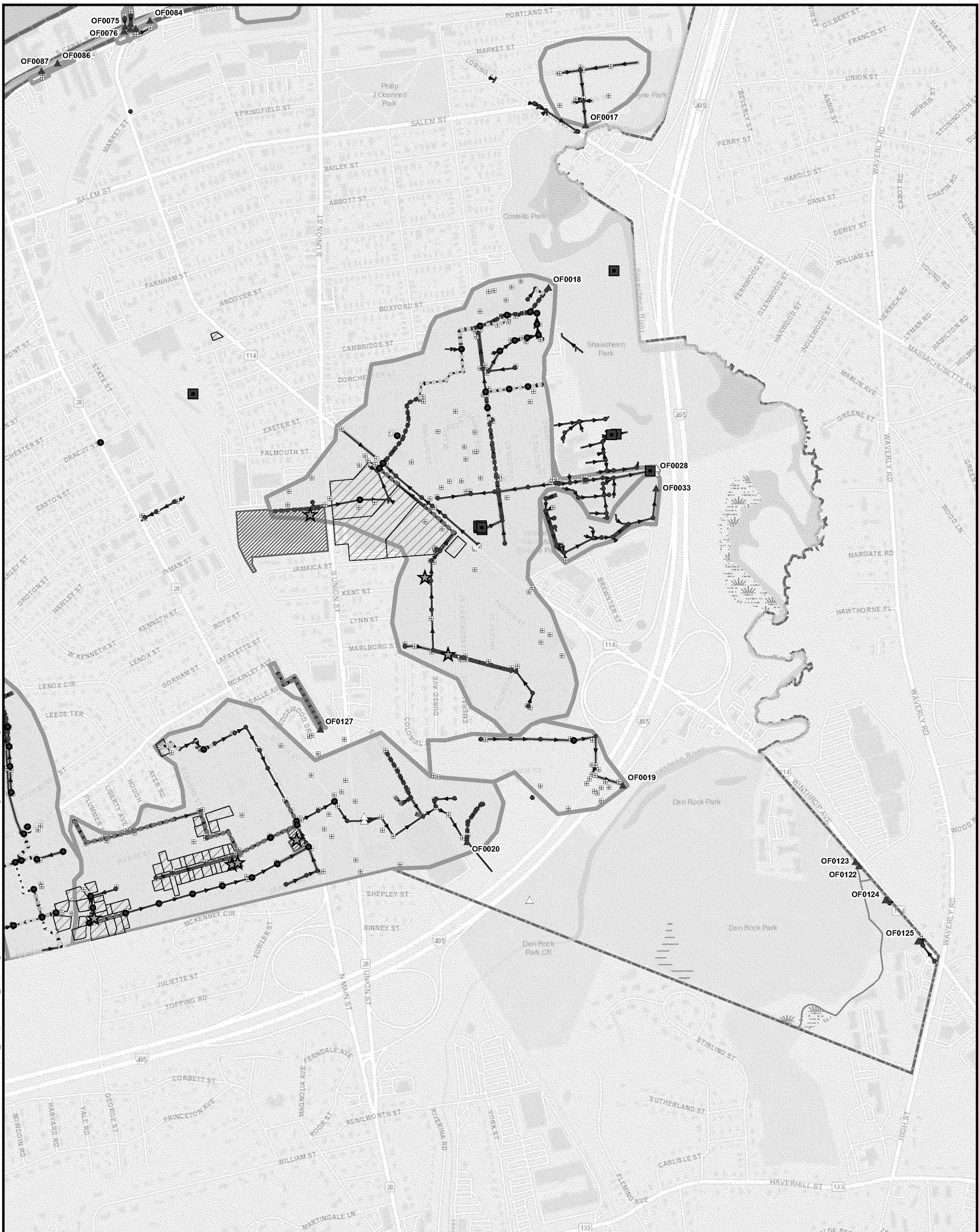
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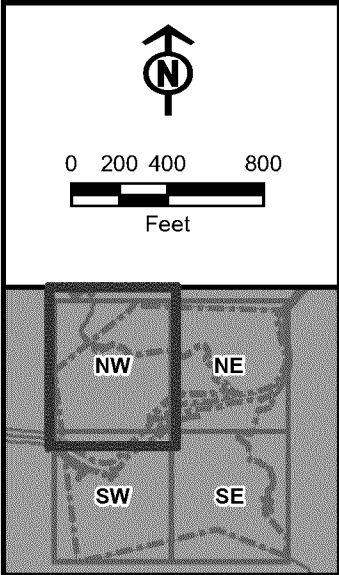












**Legend**

○ Planned MH Investigations

--- Planned CCTV Sewer Inspections

■ Remediation Projects (On Call)

■ Future SSES (2026)

**MH Inspections**

○ 2024

○ 2017

○ 2016

○ 2015

○ 2014

**CCTV Sewer Inspections**

■ 2024

■ 2023

■ 2022

■ 2021

■ 2020

■ 2019

■ 2018

■ 2017

■ 2016

■ 2015

■ 2014

**Sewer Pipe Remediation Projects**

■ Contract I - Completed

■ Contract II - Completed

■ Contract III - Completed

■ Contract IV - Completed

■ Contract V - Completed

■ Contract VI - Completed

■ Contract VII - Planned

■ Emergency Sewer Replacement

■ Emergency Sewer Replacement - Planned

■ Pembroke PS Force Main Replacement - Completed

**Sewer MH Remediation Projects**

○ Contract I - Completed

○ Contract II - Completed

○ Contract III - Completed

○ Contract IV - Completed

○ Contract V - Completed

○ Contract VI - Completed

○ Contract VII - Planned

○ Emergency Sewer Replacement - Completed

○ Andover Asset

— GLSD Asset

■ PS Sewer Pump Stations

○ Sanitary Sewer Manhole

○ Forcemain

— Combined Waste Water

— Sanitary Sewer

○ Sewer Catchment

# GIS Mapping MS4 & Collection System

## City of Lawrence, Massachusetts

### Attachment D-5.1: Collection System CIP (NW)

July 1, 2024 - December 31, 2024

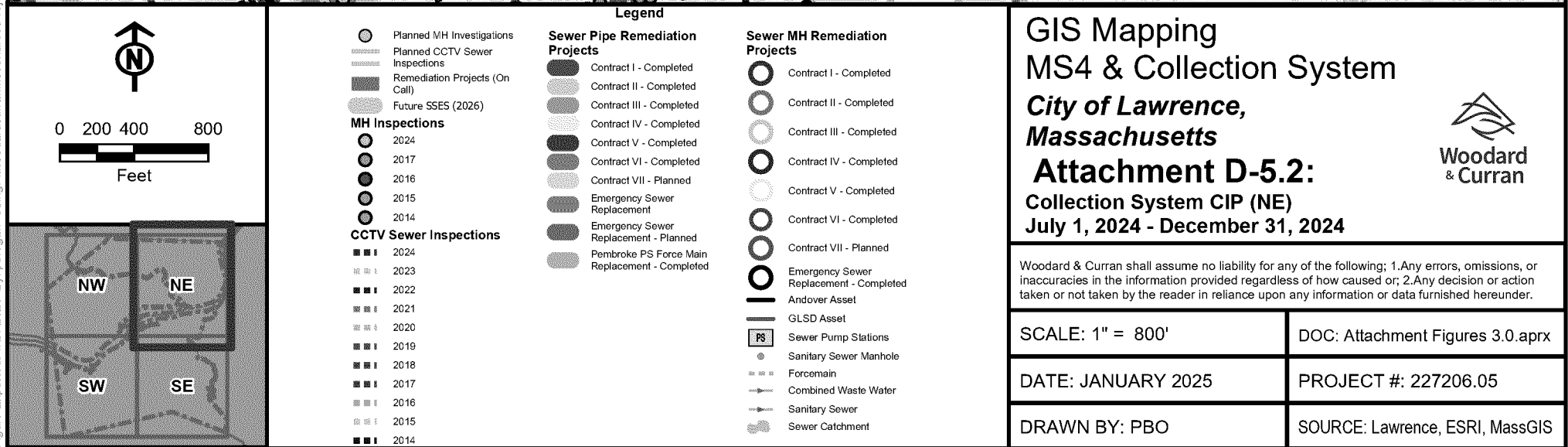
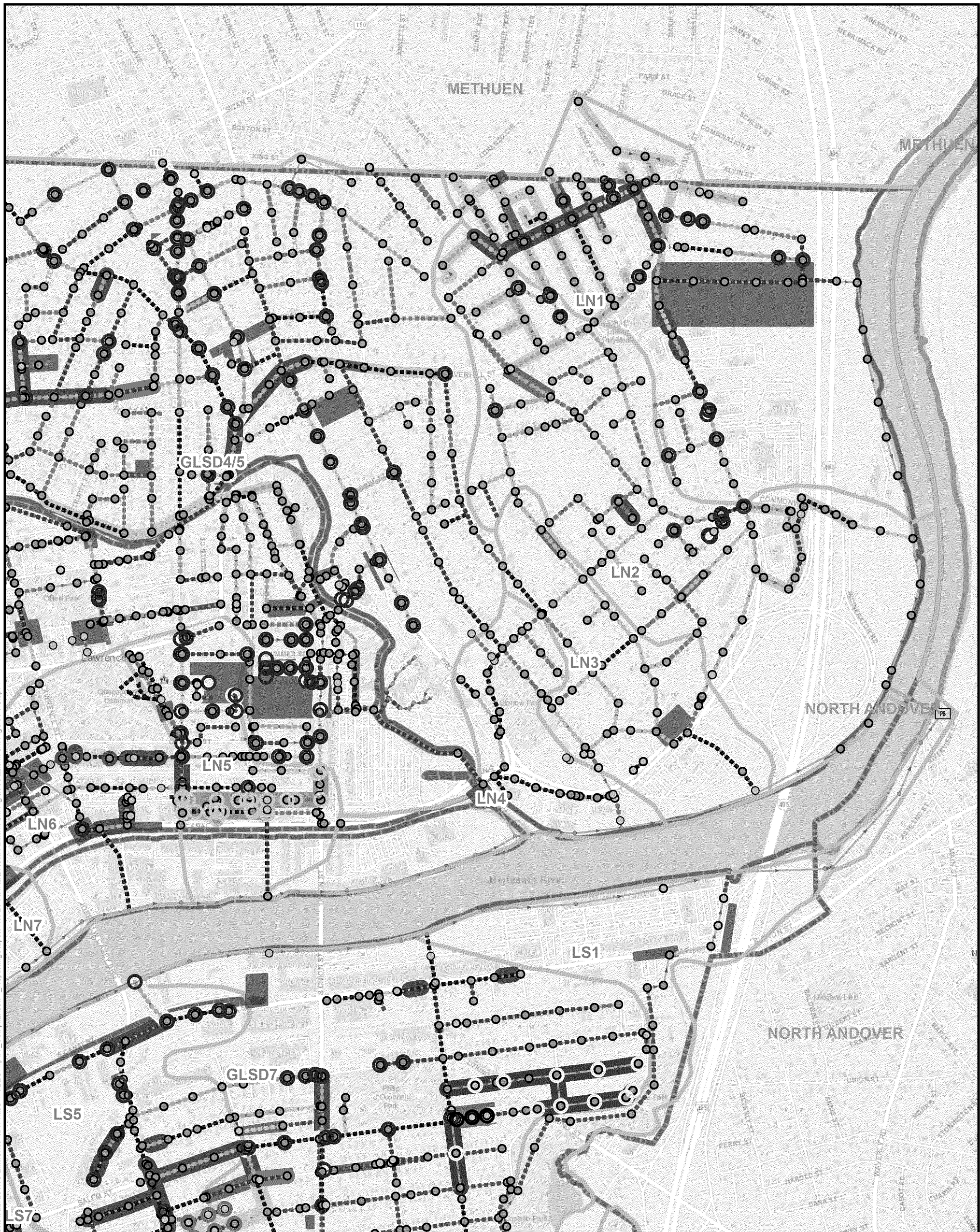


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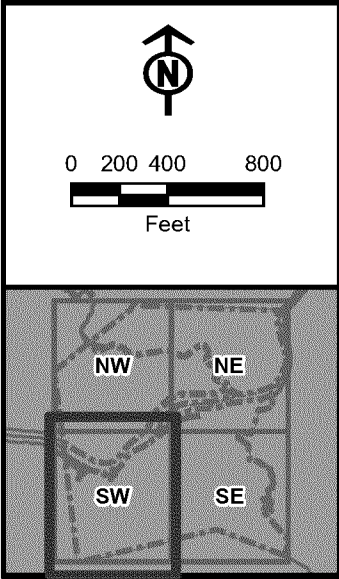
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| DATE: JANUARY 2025 | PROJECT #: 227206.05             |
| DRAWN BY: PBO      | SOURCE: Lawrence, ESRI, MassGIS  |

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**Legend**

**Sewer Pipe Remediation Projects**

- Contract I - Completed
- Contract II - Completed
- Contract III - Completed
- Contract IV - Completed
- Contract V - Completed
- Contract VI - Completed
- Contract VII - Planned
- Emergency Sewer Replacement
- Emergency Sewer Replacement - Planned
- Pembroke PS Force Main Replacement - Completed

**Sewer MH Remediation Projects**

- Contract I - Completed
- Contract II - Completed
- Contract III - Completed
- Contract IV - Completed
- Contract V - Completed
- Contract VI - Completed
- Contract VII - Planned
- Emergency Sewer Replacement - Completed
- Andover Asset
- GLSD Asset
- Sewer Pump Stations
- Sanitary Sewer Manhole
- Forcemain
- Combined Waste Water
- Sanitary Sewer
- Sewer Catchment

**MH Inspections**

- 2024
- 2017
- 2016
- 2015
- 2014

**CCTV Sewer Inspections**

- 2024
- 2023
- 2022
- 2021
- 2020
- 2019
- 2018
- 2017
- 2016
- 2015
- 2014

**Planned MH Investigations**

- Planned CCTV Sewer Inspections
- Remediation Projects (On Call)
- Future SSES (2026)

# GIS Mapping MS4 & Collection System

## City of Lawrence, Massachusetts

### Attachment D-5.3: Collection System CIP (SW)

July 1, 2024 - December 31, 2024

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| SCALE: 1" = 800'   | DOC: Attachment Figures 3.0.aprx |
| DATE: JANUARY 2025 | PROJECT #: 227206.05             |
| DRAWN BY: PBO      | SOURCE: Lawrence, ESRI, MassGIS  |





### Attachment D-6: Descriptions of Digital GIS Mapping Items

| Description in Item 37 of Consent Decree |                                                   | Location of Item |                 |                                         |                                                                  | Item Details                        |                  |       |
|------------------------------------------|---------------------------------------------------|------------------|-----------------|-----------------------------------------|------------------------------------------------------------------|-------------------------------------|------------------|-------|
| Type                                     | Details                                           | Database         | Feature Dataset | Feature Class                           | Description                                                      | Source                              | Publication Date | Notes |
| Base Map                                 | Municipal Boundaries                              | MassGIS_Data     | NA              | TownSurveyBoundary_Lawrence             | Lawrence Town Boundary                                           | MassGIS                             | May 2024         |       |
|                                          |                                                   | MassGIS_Data     | NA              | TownSurveyBoundary_MA                   | Massachusetts Town Boundaries                                    | MassGIS                             | May 2024         |       |
|                                          | Street Names                                      | MassGIS_Data     | NA              | MassDOT_Roads_Lawrence                  | Roads from MassDOT, clipped by Town Boundary                     | MassGIS                             | January 2025     |       |
|                                          | Private Property Delineations                     | MassGIS_Data     | NA              | M149TaxPar                              | Parcel Delineations                                              | MassGIS                             | January 2024     |       |
|                                          |                                                   | MassGIS_Data     | NA              | M149OthLeg                              | Easements                                                        | MassGIS                             | January 2024     |       |
|                                          |                                                   | MassGIS_Data     | NA              | M149Assess                              | Assessor Table                                                   | MassGIS                             | January 2024     |       |
| Water Resources and Topographic Features | Water Bodies                                      | MassGIS_Data     | NA              | Hydro25K_Arc                            | Streams, Rivers                                                  | MassGIS/ MassDEP                    | December 2019    |       |
|                                          |                                                   | MassGIS_Data     | NA              | Hydro25K_Poly                           | Lakes, Ponds, Waterbodies                                        | MassGIS/ MassDEP                    | December 2019    |       |
|                                          | Integrated List of Waters                         | MassGIS_Data     | NA              | MassDEP_IntegratedListofWaters_2022_Arc | MassDEP 2022 Integrated List of Waters, clipped by Town Boundary | MassGIS/ MassDEP                    | August 2023      |       |
|                                          | Topography                                        | MassGIS_Data     | NA              | Contours5K_Arc                          | 3 Meter Contours (1:5,000)                                       | MassGIS                             | June 2013        |       |
| Infrastructure-MS4                       | Outfalls                                          | Lawrence         | Stormwater      | swDischargePoint                        | Outfalls and other discharge features                            | City of Lawrence, field inspections | December 2024    |       |
|                                          | Pipes (size & material)                           | Lawrence         | Stormwater      | swGravityMain                           | Gravity Mains, CB Laterals, Underdrains                          | City of Lawrence, field inspections | December 2024    |       |
|                                          |                                                   | Lawrence         | Stormwater      | swPressurizedMain                       | Force Mains                                                      | City of Lawrence, field inspections | December 2024    |       |
|                                          |                                                   | Lawrence         | Stormwater      | swLateralLine                           | Building Laterals                                                | City of Lawrence, field inspections | December 2024    |       |
|                                          | Open channel conveyances                          | Lawrence         | Stormwater      | swOpenDrain, swCulvert                  | Open Drains, Culverts                                            | City of Lawrence, field inspections | December 2024    |       |
|                                          | Catch Basins                                      | Lawrence         | Stormwater      | swInlets (Catchbasin type)              | Catchbasins and Other Inlets                                     | City of Lawrence, field inspections | December 2024    |       |
|                                          | Manholes                                          | Lawrence         | Stormwater      | swManhole                               | Manholes                                                         | City of Lawrence, field inspections | December 2024    |       |
|                                          | Inter-Municipal Connections                       | Lawrence         | Stormwater      | swInterconnections                      | Interconnections                                                 | City of Lawrence, field inspections | December 2024    |       |
|                                          | Municipally Owned Stormwater Treatment Structures | Lawrence         | Stormwater      | swManagement                            | Type field in place for different structure types                | City of Lawrence, field inspections | December 2024    |       |
|                                          | Off Street Asset/ Easement Areas                  | Lawrence         | Stormwater      | swOffStreetAssets                       | Off Street Asset/ Easement Areas                                 | City of Lawrence, field inspections | December 2024    |       |
|                                          | Catchment Areas                                   | Lawrence         | Stormwater      | swCatchment                             | Catchments for all outfalls                                      | City of Lawrence, field inspections | December 2024    |       |

**Attachment D-6: Descriptions of Digital GIS Mapping Items**

| Description in Item 37 of Consent Decree |                                                                                                                       | Location of Item |                 |                   |                                         | Item Details                        |                  |                                                                          |
|------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|------------------|-----------------|-------------------|-----------------------------------------|-------------------------------------|------------------|--------------------------------------------------------------------------|
| Type                                     | Details                                                                                                               | Database         | Feature Dataset | Feature Class     | Description                             | Source                              | Publication Date | Notes                                                                    |
| Infrastructure-Collection System         | Pipes (size, material, age)                                                                                           | Lawrence         | SewerStormwater | ssGravityMain     | Gravity Mains, CB Laterals, Underdrains | City of Lawrence, field inspections | December 2024    | Includes risk criteria, CoF and LoF from updated Risk Analysis May 2019. |
|                                          |                                                                                                                       | Lawrence         | SewerStormwater | ssPressurizedMain | Force Mains                             | City of Lawrence, field inspections | December 2024    |                                                                          |
|                                          |                                                                                                                       | Lawrence         | SewerStormwater | ssLateralLine     | Building Laterals                       | City of Lawrence, field inspections | December 2024    |                                                                          |
|                                          | Flow Type (see Pipes above)                                                                                           |                  |                 |                   |                                         |                                     |                  |                                                                          |
|                                          | Manholes                                                                                                              | Lawrence         | SewerStormwater | ssManhole         | Manholes                                | City of Lawrence, field inspections | December 2024    |                                                                          |
|                                          | Pump Stations                                                                                                         | Lawrence         | SewerStormwater | ssLiftStation     | Pump Stations                           | City of Lawrence, field inspections | December 2024    |                                                                          |
|                                          | Locations of GLSD Interceptors                                                                                        | Lawrence         | SewerStormwater | ssGravityMain     | See note                                | City of Lawrence, GLSD              | December 2024    | See Owner field in Gravity Mains for GLSD Interceptors                   |
|                                          | GLSD Catchments                                                                                                       | Lawrence         | SewerStormwater | ssCatchment       | All sewer catchments                    | City of Lawrence, field inspections | December 2024    |                                                                          |
|                                          | Sewersheds or alignments with inadequate levels of service                                                            | Lawrence         | SewerStormwater |                   |                                         | City of Lawrence, field inspections | December 2024    | No known features as of 12/2021                                          |
|                                          | Common/Twin Invert Manholes                                                                                           | Lawrence         | SewerStormwater | ssManhole         | See type Split Manhole                  | City of Lawrence, field inspections | December 2024    |                                                                          |
|                                          | Underdrain Systems                                                                                                    | Lawrence         | SewerStormwater | ssGravityMain     | See type Underdrain                     | City of Lawrence, field inspections | December 2024    |                                                                          |
|                                          | Off Street Asset/ Easement Areas                                                                                      | Lawrence         | SewerStormwater | ssOffStreetAssets | Off Street Asset/ Easement Areas        | City of Lawrence, field inspections | December 2024    |                                                                          |
|                                          | Sewer alignments with common trench construction/ areas with high potential for communication during high groundwater | Lawrence         | SewerStormwater |                   |                                         | City of Lawrence, field inspections | December 2024    | No known features as of 12/2021                                          |



Attachment D-6: Descriptions of Digital GIS Mapping Items

| Description in Item 37 of Consent Decree         |                                                                  | Location of Item |                 |                                      |                                                                                                                       | Item Details     |                  |                            |
|--------------------------------------------------|------------------------------------------------------------------|------------------|-----------------|--------------------------------------|-----------------------------------------------------------------------------------------------------------------------|------------------|------------------|----------------------------|
| Type                                             | Details                                                          | Database         | Feature Dataset | Feature Class                        | Description                                                                                                           | Source           | Publication Date | Notes                      |
| Investigations, Remediation and Capital Projects | Past Investigations (alignments, dates, thematic representation) | Lawrence_CIP     | CapitalPlanning | ssInvestigations_BuildingInspections | Building Inspection Locations and results (SSES 2014, 2015, 2016, 2017, 2018, 2019, 2020, & 2021)                     | Woodard & Curran | December 2024    | Updated Through 12/31/2024 |
|                                                  |                                                                  | Lawrence_CIP     | CapitalPlanning | ssInvestigations_CCTVInspections     | Sewer CCTV Inspected Gravity Main locations (SSES 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, & 2024) | Woodard & Curran | December 2024    | Updated Through 12/31/2024 |
|                                                  |                                                                  | Lawrence_CIP     | CapitalPlanning | ssInvestigations_DyeFloodTesting     | Sewer Dye Flood Testing locations and results (SSES 2014 & 2021)                                                      | Woodard & Curran | December 2024    | Updated Through 12/31/2024 |
|                                                  |                                                                  | Lawrence_CIP     | CapitalPlanning | ssInvestigations_DyeTesting          | Sewer main dye testing locations and results (SSES 2014)                                                              | Woodard & Curran | December 2024    | Updated Through 12/31/2024 |
|                                                  |                                                                  | Lawrence_CIP     | CapitalPlanning | ssInvestigations_FlowIsolation       | Sewer main flow isolation investigation locations and results (SSES 2014)                                             | Woodard & Curran | December 2024    | Updated Through 12/31/2024 |
|                                                  |                                                                  | Lawrence_CIP     | CapitalPlanning | ssInvestigations_MHInspections       | Sewer MH inspection locations and results (SSES 2014, 2015, 2016, 2017, 2018, & 2024)                                 | Woodard & Curran | December 2024    | Updated Through 12/31/2024 |
|                                                  |                                                                  | Lawrence_CIP     | CapitalPlanning | ssInvestigations_SmokeTesting        | Sewer main Smoke Testing investigation locations and results (SSES 2014)                                              | Woodard & Curran | December 2024    | Updated Through 12/31/2024 |
|                                                  |                                                                  | Lawrence_CIP     | CapitalPlanning | swInvestigations_MHInspections       | Stormwater MH inspection locations and results (SSES 2014, 2015, 2019, 2020, 2021, 2022, 2023, & 2024)                | Woodard & Curran | December 2024    | Updated Through 12/31/2024 |
|                                                  |                                                                  | Lawrence_CIP     | CapitalPlanning | swInvestigations_CCTVInspections     | Stormwater CCTV Inspected Gravity Main locations (2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, & 2024) | Woodard & Curran | December 2024    | Updated Through 12/31/2024 |
|                                                  |                                                                  | Lawrence_CIP     | CapitalPlanning | swInvestigations_DyeTesting          | IDDE dye testing locations and results                                                                                | Woodard & Curran | December 2024    | Updated Through 12/31/2024 |
|                                                  |                                                                  | Lawrence_CIP     | CapitalPlanning | swInvestigations_IDDE                | Stormwater IDDE bracket sampling results (IDDE 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, & 2024)    | Woodard & Curran | December 2024    | Updated Through 12/31/2024 |

**Attachment D-6: Descriptions of Digital GIS Mapping Items**

| Description in Item 37 of Consent Decree               |                                                               | Location of Item |                 |                                |                                                                                               | Item Details     |                  |                            |
|--------------------------------------------------------|---------------------------------------------------------------|------------------|-----------------|--------------------------------|-----------------------------------------------------------------------------------------------|------------------|------------------|----------------------------|
| Type                                                   | Details                                                       | Database         | Feature Dataset | Feature Class                  | Description                                                                                   | Source           | Publication Date | Notes                      |
| Investigations, Remediation and Capital Projects Cont. | Illicit Discharge Locations (dates and flow estimates)        | Lawrence_CIP     | CapitalPlanning | swIllicitDischarges_Point      | Locations of direct and indirect illicit connections to the City's MS4.                       | Woodard & Curran | December 2024    | Updated Through 12/31/2024 |
|                                                        | Alignments and Dates of Past and Planned Remediation Projects | Lawrence_CIP     | CapitalPlanning | RemediationProjects_OnCall     | Locations of repairs completed under Woodard & Curran's On-Call Engineering Services contract | Woodard & Curran | December 2024    | Updated Through 12/31/2024 |
|                                                        |                                                               | Lawrence_CIP     | CapitalPlanning | ssSSO_Locations                | SSO locations and documentation of repairs                                                    | Woodard & Curran | December 2024    | Updated Through 12/31/2024 |
|                                                        |                                                               | Lawrence_CIP     | CapitalPlanning | ssRemediationProjects_Line     | Contracts I-VII - Pipe segments that have been rehabilitated or are scheduled for repair      | Woodard & Curran | December 2024    | Updated Through 12/31/2024 |
|                                                        |                                                               | Lawrence_CIP     | CapitalPlanning | ssRemediationProjects_Point    | Contracts I-VII - Manholes that have been rehabilitated or that are scheduled for repair      | Woodard & Curran | December 2024    | Updated Through 12/31/2024 |
|                                                        | Planned Collection System and MS4 Capital Projects            | Lawrence_CIP     | CapitalPlanning | swInvestigationCatchments_IDDE | MS4 drainage catchments with planned investigation year.                                      | Woodard & Curran | December 2024    | Updated Through 12/31/2024 |
|                                                        |                                                               | Lawrence_CIP     | CapitalPlanning | ssPlannedInvestigations_Point  | Phase XII SSES MACP                                                                           | Woodard & Curran | December 2024    | Updated Through 12/31/2024 |
|                                                        |                                                               | Lawrence_CIP     | CapitalPlanning | ssPlannedInvestigations_Line   | Phase XII SSES PACP                                                                           | Woodard & Curran | December 2024    | Updated Through 12/31/2024 |
|                                                        |                                                               | Lawrence_CIP     | CapitalPlanning | ssRemediationProjects_Line     | Contracts I-VII - Pipe segments that have been rehabilitated or are scheduled for repair      | Woodard & Curran | December 2024    | Updated Through 12/31/2024 |
|                                                        |                                                               | Lawrence_CIP     | CapitalPlanning | swPlannedInvestigations_Line   | Stormwater pipes recommended for PACP as part of IDDE Investigations.                         | Woodard & Curran | December 2024    | Updated Through 12/31/2024 |
|                                                        | Proposed Future Capital Projects                              | Lawrence_CIP     | CapitalPlanning | swInvestigationCatchments_IDDE | MS4 drainage catchments with investigation year.                                              | Woodard & Curran | December 2024    | Updated Through 12/31/2024 |
|                                                        |                                                               | Lawrence_CIP     | CapitalPlanning | ssFutureSSES_Line              | Pipe segments planned for SSES in 2026                                                        | Woodard & Curran | December 2024    | Updated Through 12/31/2024 |