

Consent Decree Compliance Report #2

(Civil Action No. 1:24-cv-10290)

October 2024

(April 2024 to September 2024)

Lowell Regional Wastewater Utility



NPDES Permit Number: MA0100633

Report Due Date: October 31, 2024

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CONCENT DECREE COMPLIANCE REPORT #2

CERTIFICATION STATEMENT

I certify under penalty of perjury that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Aaron Fox
Executive Director
Lowell Regional Wastewater Utility

Date

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1. Introduction

1.1 Overview

The Lowell Regional Wastewater Utility (The Utility) is a public utility located in Lowell, Massachusetts that owns, operates, and maintains a wastewater collection system comprised of a combined sewer system dating to the 1800s, newer separated sewer conveyance systems, an extensive stormwater drainage system, and a flood protection system. Wastewater flow is conveyed to the Duck Island Wastewater Treatment Facility (Duck Island) that delivers efficient secondary-level treatment of dry-weather sewage flows as well as wet-weather flows up to 112 million gallons per day (MGD).

The Utility's mission is to effectively manage wastewater and stormwater transport and treatment systems in a professional manner and strives to provide reliable, cost-effective, high-quality services that protect public health, promote environmental stewardship, and deliver outstanding service to our customers.

1.2 Utility Operations

The Utility's sewer system consists of approximately 226 miles of gravity sewers with 14 sewage pumping stations. Nine miles of large-diameter (36-inch to 120-inch) interceptors are located along the banks of the Merrimack and Concord Rivers and collect wastewater from the sewer system and convey it to Duck Island. Duck Island was designed to provide biological (activated sludge) treatment for an average dry-weather design flow of 32 million gallons per day (MGD). A map of the interceptor system is provided in [Figure 1-1](#).

During wet-weather conditions, a maximum flow of approximately 112 MGD is processed at Duck Island. Flow exceeding the capacity of the biological and secondary clarifier systems (secondary systems) results in activation of the High-Flow Treatment mode (as discussed in the Utility's High Flow Management Plan, [Appendix A](#)). Under the High-Flow Treatment mode, wet weather flow in excess of secondary treatment capacity receives screening and primary clarification and then the flow is bypassed around the secondary treatment system and is pre-chlorinated before being mixed with secondary treatment effluent. This mixture is then disinfected and discharged into the Merrimack River in compliance with the Utility's National Pollutant Discharge Elimination System (NPDES) effluent permit (MA0100633) requirements.

Flow in excess of the Duck Island High-Flow Treatment capacity is stored in the interceptor system through an automated network of gates controlled by computational algorithms designed for this purpose and implemented in a Supervisory Control and Data Acquisition (SCADA) system. Flows to the collection system that exceed this interceptor storage capacity are diverted as combined sewer overflows (CSOs) to the Merrimack River, the Concord River and Beaver Brook, as necessary to prevent sewer system surcharges that may cause sewage back-ups into homes and streets.

Lowell Wastewater Collection and Treatment Systems Overview

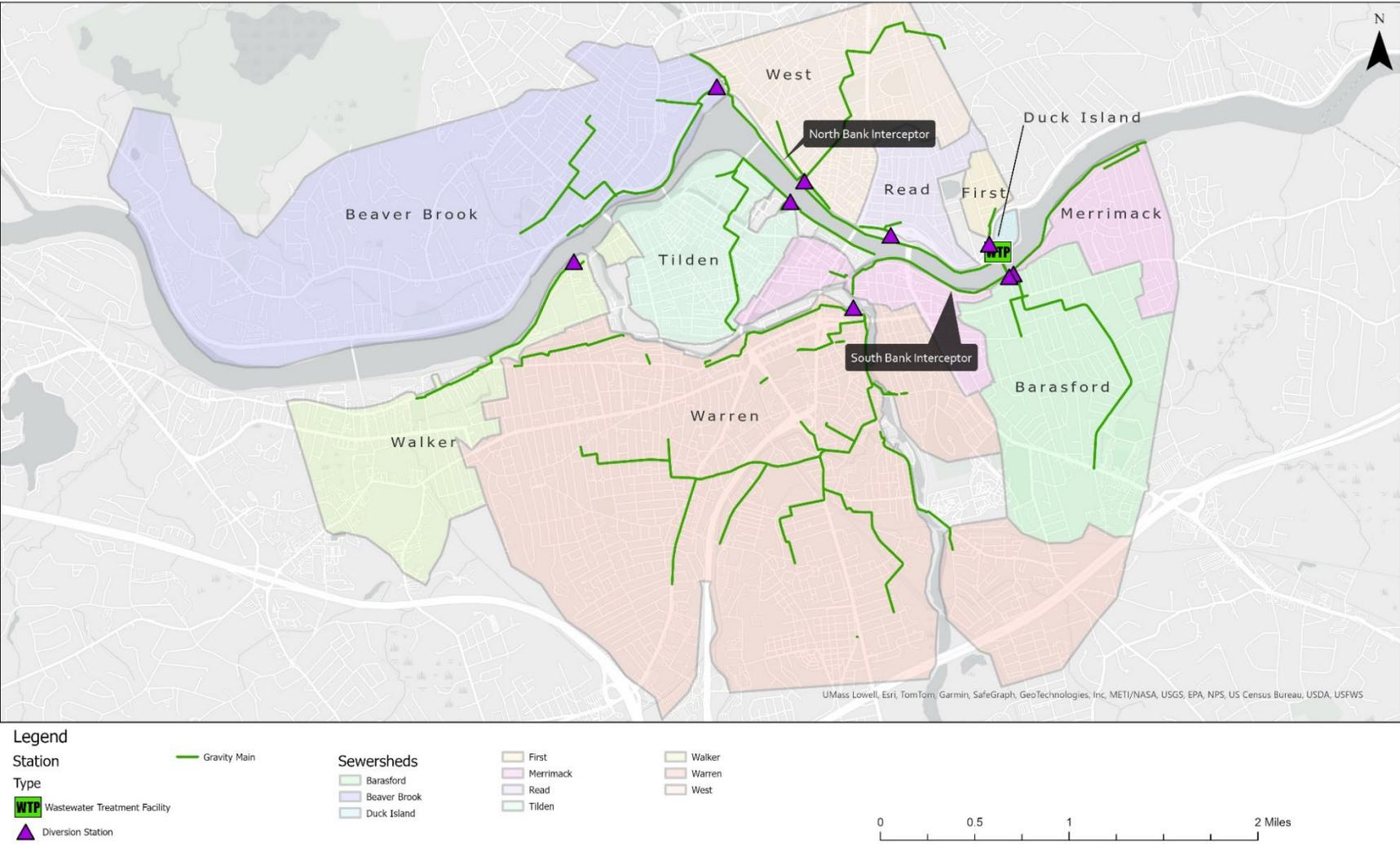


Figure 1-1. Lowell Wastewater Collection and Treatment Systems Overview

1.3 Consent Decree

In 2023, the regulatory agencies, along with the U.S. Department of Justice and the Commonwealth of Massachusetts Department of Justice, and the City and the Utility completed negotiations to develop a new Consent Decree (CD) with remedial measures to address violation findings (NPDES permit, Section 301(a) of the Clean Water Act and provisions of the 2003 Small MS4 General Permit). The CD was fully executed and filed with the US District Court on May 17, 2024 (Case: 1:24-cv-1290-DJC, Document 13).

As part of the CD, the City is required to submit a Compliance Report to the state and federal agencies for the previous six-month period, referred to as the Reporting Period (CD Paragraph 40). The bi-annual Reporting Periods run from October 1st thru March 31st and from April 1st thru September 30th, with the Compliance Reports due on April 30th and October 31st for the previous period.

The Compliance Report shall include:

- a) A description of the activities undertaken during the Reporting Period directed at achieving compliance with the Consent Decree,
- b) Identification of all plans, reports, and other deliverables required the Consent Decree that have been completed and submitted during the Reporting Period, and
- c) A description of the expected activities to be taken during the next Reporting Period in order to achieve compliance with the Consent Decree.

This October 2024 Six-Month Compliance Report (Compliance Report #2) summarizes the Utility's compliance with the CD. [Appendix A](#) provides links to the NPDES and CD compliance reports that are submitted to the regulator agencies.

1.4 Unanticipated Compliance Challenges

No unanticipated compliance challenges occurred in the last six months. However, the implementation schedule for the Centralville Sewer Separation Program Phase 1 – Mainline Conduit and Separation Outfalls project may be impacted by the challenges of land acquisition required for the separation outfalls working through the state's Article 97 conversion process, which requires extensive discussions with state agencies and an approval vote by the state legislature.

2. Overview of the Compliance Activities

Table 1 provides a summary of the CD Deliverables (with associated Paragraph), and a summary of activities performed by the Utility for the last six months of the reporting period and the next six months of the reporting period. In some cases, the Utility will provide additional information on the current status of each of these activities in the following sections of this report. Additional information can be found in the following sections:

- [Section 3 - Centralville \(Humphrey's Brook\) Drain Area Sewer Separation Program](#)
- [Section 4 - Phase 3 Sewer Separation Program](#)
- [Section 5 - Infiltration/Inflow Reduction Program](#)
- [Section 6 - Capacity, Management, Operation, & Maintenance \(CMOM\) Program](#)
- [Section 7 - Stormwater \(MS4\) Compliance Program](#)
- [Section 8 - Geographical Information System \(GIS\)](#)
- [Appendix A - NPDES and CD compliance reports.](#)

Table 1 Summary of Consent Decree Activities

Document Deliverable	CD Paragraph	Deadline	Compliance Progress in the Respective Period	
			Last Six Months (April 1, 2024, to September 30, 2024)	Next Six Months (October 1, 2024, to March 31, 2025)
Centralville Area Sewer Separation Preliminary Design Report (PDR) (Humphrey's Brook)	10	Dec. 31, 2023	The revised Centralville PDR was submitted on July 31 st , 2024 to address comments from MassDEP and USEPA provided in a letter dated March 5, 2024 (on the original PDR submitted on December 31, 2023). The Revised PDR recommended that the City separate Sewer Area 40 (Lakeview/Ennell area) in lieu of the Coburn/Jewett/Hampshire combined area (which had separation challenge because it is behind the Centralville flood protection system). Separation of the Lakeview/Ennell area results in the separation of more combined sewer acreage. The full PDR report is in Appendix A .	No planned work will occur.
Centralville Area Sewer Separation Removal of Humphrey's Brook and Dracut Surface Flows (Phase 1)	10.b.i	Dec. 31, 2027	Finalized 60% design drawings for the main drain conduit and identified the final outfall locations at Bunker Hill Avenue and Aiken Street for the separation of the two main combined sewer areas. Coordination/Integration meetings occurred with other City Departments - Finance/City Administration, DPW, DPD, and the Water department - to discuss impacts and coordinate construction activities. The City Law department continues to work with the state on Article 97 land conversion. Attended a meeting with the Centralville Neighborhood Association on April 1, 2024 to discuss the project and construction impacts.	The Final Design Project Bid Documents (Plans and Specifications) will be submitted for the 2024 SRF Loan Application approval. The project will be bid in March 2025. Additional meetings will be held with permitting agencies and MassDOT and other City Departments for project integration and permitting. Attend a meeting with the Centralville Neighborhood Association on November 4, 2024 to continue discussions on the project and construction impacts. Additional public meetings are planned for the spring 2025.
Centralville Area Sewer Separation (Phase 2)	10.b.ii	December 31, 2031	Phase 2 design development will continue to ensure compatibility with Phase 1 mainline conduit. The Utility is in the process of selecting an engineering consultant to perform design and construction administration for Phase 2A/2B.	The Utility will continue field activities and design for Phase 2A and 2B.
Phase 3 Areas Sewer Separation Report	11	Dec. 31, 2024	Calibration of the SWMM model for the combined sewer areas in the Tilden, Warren, West, and Merrimack CSO Basins to evaluate the proposed sewer separation projects and their CSO Reduction and SSO Mitigation Benefits; updated project drawings and cost estimates; evaluation of the constructability of the projects and the outfalls; and analysis of the Pevey/Boys and Girls Club SSO mitigation options. Development of pipe plan and profile drawings to identify	Coordinate a meeting with EPA and MassDEP to discuss the draft Phase 3 Sewer Separation PDR. The Phase 3 Sewer Separation PDR will be submitted for December 31, 2024.

			utility conflicts and pipe routes for the installation of new drains to separate these Phase 3 Candidate Sewer Separation Areas.	
LTCP Scope of Work	12	Sept. 1, 2032	No work occurred.	No planned work will occur.
LTCP Delivery	13	Sept. 1, 2034	No work occurred.	No planned work will occur.
CMOM Program Self-Assessment	14	Dec. 30, 2022	The CMOM Program Self-Assessment was submitted on December 30, 2022 (Appendix A).	
CMOM Corrective Action Plan	15/16	120 Days after comments	Received comments from EPA on the CMOM Self-Assessment on August 21 st , 2024. The City started preparing the CMOM Corrective Action Plan (CMOM CAP) to address comments from the agencies and action items addressed in the CMOM Self-Assessment.	Finalize and submit the CMOM CAP for the December 19 th , 2024 deadline.
CMOM Program Implementation Annual Report	17	April 30th yearly	No work occurred.	Submit with the 2024 NPDES Permit Annual Report (Appendix A) on March 31, 2025. The CMOM Program Implementation Annual Report, required by the CD, will continue to be submitted as part of the NPDES Annual Report.
I/I Analysis Report	18	Jan. 31, 2024	In April 2024, ADS Environmental Services (ADS) installed ten (10) temporary gravity sewer flow meters for a period of twenty-four (24) weeks from April 9, 2024 to September 23, 2024. The City inspected approximately 56,300 linear feet of interceptor, 21,300 linear feet of CCTV inspection, and 137 Manhole inspections. This was done to identify any potential sources of extraneous flow.	Develop and submit to the Utility the SSES Phase 1 Report, summarizing the 2024 field program and providing I/I reduction recommendations in the collection system. Kleinfelder will develop and submit a supplemental memorandum to the previously submitted I/I Analysis Report.
Co-Permittee I/I Analysis Annual Report	19	April 30th yearly	No work occurred.	Submit with the 2024 NPDES Permit Annual Report (Appendix A) on March 31, 2025. The Co-Permittee I/I Analysis Annual Report will continue to be submitted as part of the NPDES Annual Report.
High Flow Management Plan	20	April 30, 2023	The updated HFMP was submitted on April 30, 2023 and is linked in Appendix A . The Utility continues to implement and assess the performance of the High Flow Management Plan to minimize CSO discharges.	
Municipal Separate Stormwater Ordinances	21, 22, 23	March 31, 2024	Ordinances were voted on by City Council and became effective on January 2, 2024. The ordinances were submitted to the agencies on March 19, 2024.	
Implement Updated IDDE	24, 25, 26, 27 and 30	Dec. 31, 2023	The City continued to implement the draft IDDE program based on the December 31, 2023 submittal.	The City will continue to implement the draft IDDE program based on the December 31, 2023 submittal.
Wet Weather Sampling Program	28	June 15, 2031	Wet-weather outfall inspections resulted in the collection of eleven (11) samples. Results are included in Table 4 .	Continue monitoring and sampling drainage outfalls for wet-weather flow.

Illicit Discharge Removal/Abatement	29		The City continued enforcement of its IDDE ordinance. Two (2) illicit discharges were identified and removed from Lowell's MS4. GI/LID was not viable for removal.	The City will continue proper enforcement of its IDDE ordinance and to implement and enforce corrective measures to resolve known illicit discharges.
Semi-Annual IDDE Report	31	April 30th & Oct. 31st yearly	Work was performed to prepare the Semi-Annual Compliance Report for October 31, 2024.	Work will be performed to prepare the Semi-Annual Compliance. Report for April 30, 2025.
Best Management Practices	32		GI/LID was not viable for the removal of illicit discharges found during this reporting period.	To be considered in the IDDE Program Implementation as illicit discharges are discovered.
Updated SWMP	33.a	Dec. 31, 2023	The Stormwater Management Plan was submitted on December 31, 2023 (Appendix A). The City will report on its progress on the SWMP in the annual MS4 Compliance Report.	
Phosphorus Source Identification Report	33.c (ii)	January 31, 2026	City continues to work on identifying sub-catchments to each drainage pipe/subsystem.	City will continue to work on identification of sub-catchments to each drainage pipe/subsystem. City will begin preliminary work in establishing PSIR.
Phosphorus BMP Demonstration Plan	33.d	January 31, 2027	No work occurred.	No planned work will occur.
Existing Stormwater GIS	34	August 31, 2022	On August 31, 2022, the City submitted to EPA and MassDEP in electronic format the current version of the City's stormwater collection system and wastewater collection system geographic information system (GIS) map.	
Updated Stormwater GIS	35	Sept. 30, 2024	The updated Stormwater Collection System GIS Map was submitted on September 30, 2024 to MassDEP and EPA.	
Annual GIS Update	36	April 30th yearly	A link to the Updated GIS Map was submitted on April 30, 2024.	The Utility will continue to update the GIS Maps as new information is identified.
SSO and CSO Reporting Requirements	37, 38, & 39	Ongoing	The City is in compliance with State Regulations 314 CMR 12.03(8) and 314 CMR 16, and USEPA Regulations 40 CFR 122.63(f) for reporting and notification rules for SSO and CSO discharges. A summary of the annual SSO/CSO discharges for the City were provided in NPDES Permit Annual Report submitted on March 31, 2024.	
CD Semi-Annual Compliance Reports	40	April 30 th & Oct. 31 st yearly	Work was performed to prepare the CD Annual Compliance Report for October 31, 2024.	Work will be performed to prepare the CD Annual Compliance Report for April 30, 2025.
Maintenance of Website	41	Ongoing	The City of Lowell's Website was updated and will continue to be updated for deliverables submitted to the agencies or prepared for public comment.	

3. Centralville (Humphrey's Brook) Drain Area Sewer Separation Program

The Consent Decree (CD) requires the Utility to develop a program to separate the combined sewer system in the Humphrey's Brook Drainage Basin in several phases. This includes the preparation and submittal of a Preliminary Design Report (PDR) (Paragraph 10) and the completion of two phases of final design and construction of the Separation Program (Paragraphs 10.b.i and 10.b.ii). The intent of the sewer separation program is to reduce CSO discharges. Additionally, the projects will remove three surface water inflow sources from Dracut that will also reduce the base sewer flow treated at Duck Island shown in [Figure 3-1](#).

During the development of the PDR, the Utility renamed the project to Centralville to reflect the nomenclature the Lowell citizens utilize and the inclusion of additional combined sewer area within Centralville neighborhood that may also be considered for sewer separation to reduce CSO discharges.

3.1 PDR

The Utility contracted with CDM Smith to assist in the planning, development, and execution of this program. In December 2023, the Utility submitted the Centralville Sewer Separation PDR, summarizing an approach to separate the combined sewer system in this neighborhood. The report includes assessment based on field investigation, extensive modeling to determine pipe conveyance, and 30% design drawings of the proposed separation plan.

3.1.1 Last Six Months of the Reporting Period

MassDEP and USEPA completed a review of the PDR, submitted on December 31, 2023, and provided comments in a letter dated March 5, 2024. The comments focused on request for additional input on the use of green infrastructure strategies in the program, the Utility's proposal not to separate small portions of the combined sewer system because of hydraulic/river flood challenges, and the need to provide estimates of annual CSO discharge reduction and other benefits achieved by the separation program. The Utility and CDM Smith met with the agencies on May 10, 2024 to fully discuss the comments and provide further Utility input.

CDM Smith submitted the Centralville Revised PDR on July 31, 2024, based on the May 10, 2024 meeting, and established a recommended implementation plan for new drains to complete the sewer separation of the Centralville area, as shown in [Figure 3-1](#). The implementation plan includes three phases of construction work that will meet the CD objectives and deadlines.

3.1.2 Next Six Months of the Reporting Period

No work is anticipated.

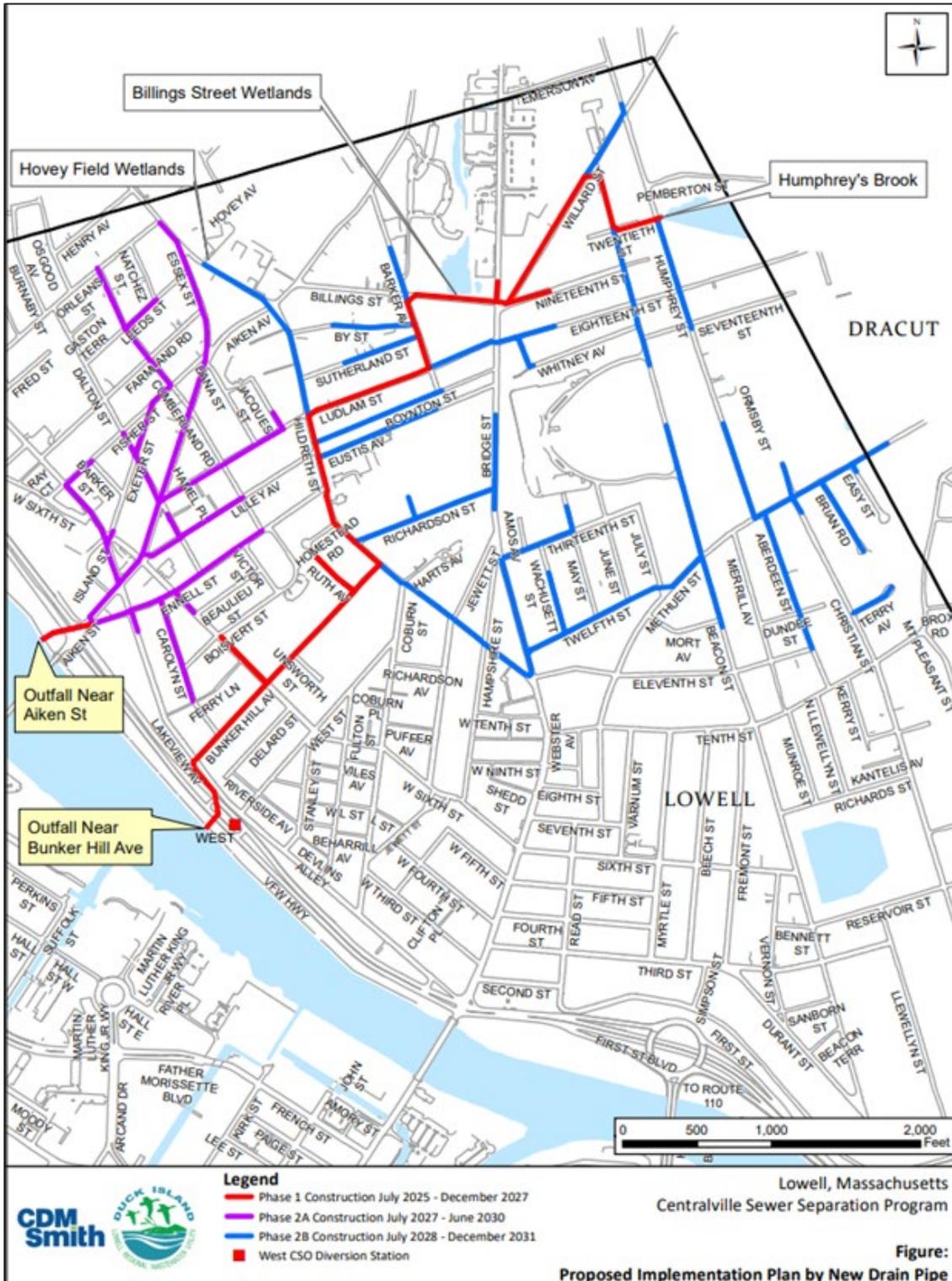


Figure 3-1 Centralville Sewer Separation

3.2 Phase 1 Design

The Phase 1 Final Design (Paragraph 10.b.i) requires the construction of the mainline drain conduit to remove the Humphrey's Brook and Billings Street Wetlands from the sewer system and this will entail the installation of a large diameter conveyance system ranging from 36 inches in diameter to a 5-foot by 8-foot box culvert and a new outfall to the Merrimack River near the West CSO Station.

In addition, the Phase 1 Final Design includes a new Aiken Street outfall and a connecting conduit (to the north side of VFW Highway near Aiken Street) for separation of the Lakeview/Ennell combined sewer area (Sewer Area 40). This pipe and a connecting conduit were included in the Phase 1 design to address coordination with the schedule established for a planned and concurrent paving and drainage improvements project by Massachusetts Department of Transportation (MassDOT) for VFW Highway (from Aiken Street to Bridge Street). The Phase 1 work is depicted in red on [Figure 3-1](#).

The design work involves extensive underground utility conflict resolutions, permitting and interagency integration, and public outreach. For this project, the Utility is coordinating with:

- All City Departments
- Executive Office of Energy and Environmental Affairs (EEA):
 - Environmental Justice (EJ) Community Notifications and coordination,
 - Massachusetts Environmental Protection Act (MEPA) compliance for submittal of an Environmental Notification Form (ENF)/Environmental Impact Report (EIR),
 - Department of Conservation and Recreation (DCR) for Article 97 property conversions along the riverbanks for the drain outfalls,
- US Army Corps of Engineers (USACE) for coordination of the construction through the earthen levee along the Lakeview portion of Lowell Flood Damage Reduction System and for the permitting of the outfalls along the river bank,
- Federal Emergency Management Act (FEMA) coordination with the work through the Flood Damage Reduction System,
- Massachusetts Department of Transportation (MassDOT) for access under VFW Highway for construction of the drain outfalls along with coordination with an ongoing MassDOT VFW paving and drain improvement project,
- Lowell Conservation Commission for Notice of Intent (NOI) for wetland disturbances,
- Massachusetts State Revolving Fund Program (SRF) for funding,
- USEPA for general CD compliance and approval of the planning documents, and
- MassDEP for general project coordination and approval of the planning and design documents

3.2.1 Last Six Months of the Reporting Period

In the last six months, the Final Design work included the:

- Continued review of comments received via public outreach online survey to request input on sewer system and street flooding issues.

- Meetings with internal City departments (DPD, DPW, and Water) and MassDOT to coordinate the design work and future construction impact mitigation program.
- Continued the design and layout of the two drain outfalls to be coordinated with DCR Article 97 conversions and some private property acquisition requirements.
- Continued with further permitting coordination.
- Continued the design development of the PDR plans and profiles including resolution of utility conflicts identified in the topographic survey and further optimization of drain pipe sizing.

3.2.2 Next Six Months of the Reporting Period

In the next six months, the Final Design work will include:

- Complete the Final Design Documents (Drawings and Specifications),
- Submit the MassDEP SRF Loan Application for submittal on October 11, 2024,
- Further land acquisition for the project,
- Attend neighborhood meeting(s) to further outreach to residents in the area,
- Continue internal City Department coordination, and
- Continue integration with USACE, EEA (MEPA, EJ, and DCR), MassDOT, MassDEP/USEPA, and FEMA for all potential permitting documents include the USACE Section 408 Application, USACE 404 Permit, ENF/EIR, Massachusetts Historical Commission notification, MassDOT coordination and access permits as required, and NOI.

3.3 Phase 2 Design

Work on the Phase 2 Design (Paragraph 10.b.ii) has been integrated with the Phase 1 Design (as it relates to the connection drains that convey flow to the Phase 1 mainline drain conduit and the relationship between connecting pipe inverts) in the Centralville Revised PDR (July 2024).

The City developed a Request for Proposals for Professional Engineering Services for Centralville Phase 2A and 2B in Fall 2024. The engineer will be engaged in Quarter 1 of 2025. Full design effort for the Phase 2 Design (survey and borings) will likely be initiated in late Winter 2025 after topographic survey of the area is completed.

4. Phase 3 Sewer Separation Program

The Phase 3 Candidate Area Sewer Separation Program (Paragraph 11) involves the preliminary design for potential sewer separation for 19 candidate combined sewer system subbasins in the Tilden, Warren, Barasford, West, and Merrimack CSO Basin shown in [Figure 4-1](#). [The West/Jewett/Coburn combined sewer area near the West CSO Station was removed from the Centralville PDR and MassDEP requested that the City consider the relative benefits and priority for separation of this area in the Phase 3 Sewer Separation Program.]

The intent of this program is to help to further reduce CSO discharges and to assess potential solutions using sewer separation to mitigate chronic sanitary sewer overflows (SSOs), or to consider other extraneous flow reduction approaches. The CD focuses on two chronic SSO locations – Douglas Road in the Barasford CSO Basin and the Pevey/Boys and Girls Club in the Warren CSO Basin. The Utility contracted with CDM Smith to assist in the planning, development, and execution of this Phase 3 Sewer Separation Program. The Preliminary Design Report is due on December 31, 2024.

4.1 Last Six Months in the Reporting Period

CDM Smith continues to develop sewer separation plans and profiles to identify utility conflicts and resolutions, develop drain pipe sizes, identify permit issues, and to location and evaluate the constructability of the outfalls. Many of the outfall locations will require coordination with Hull Street Energy, the owner and operator the canals and locks within the City to which some of the highest priority drain outfalls may discharge to, and DCR, who may own the canal walls. Meetings have occurred with Hull Street Energy and DCR to begin coordination for these project outfalls.

In addition, CDM Smith completed calibration of the SWMM model for the entire combined sewer interceptor system using data from the City's Spring 2023 flow metering program. SWMM is being used for extensive analysis of the SSO locations, including the Wentworth Avenue/Douglas Road and Boys and Girls Club SSOs for potential solutions. The effort included analysis of potential sizing for a Wet Weather Storage Tank along Douglas Road (under design by Tighe and Bond) and other CSO/SSO reduction strategies.

SWMM is being used to evaluate the benefits achieved by the separation of the 19 candidate sewer separation areas for SSO and CSO mitigation.

4.2 Next Six Months in the Reporting Period

CDM Smith and the Utility will continue work necessary to complete the PDR, which will be submitted on December 31, 2024. The work will include SWMM simulations of the combined sewer areas in the Tilden, Warren, Barasford, West, and Merrimack CSO Basins to evaluate the proposed sewer separation projects and their CSO Reduction and SSO Mitigation Benefits; updated project drawings and cost estimates; evaluation of the constructability of the projects and the outfalls; and analysis of the Pevey/Boys and Girls Club SSO mitigation options including sewer separation and wet weather flow storage.

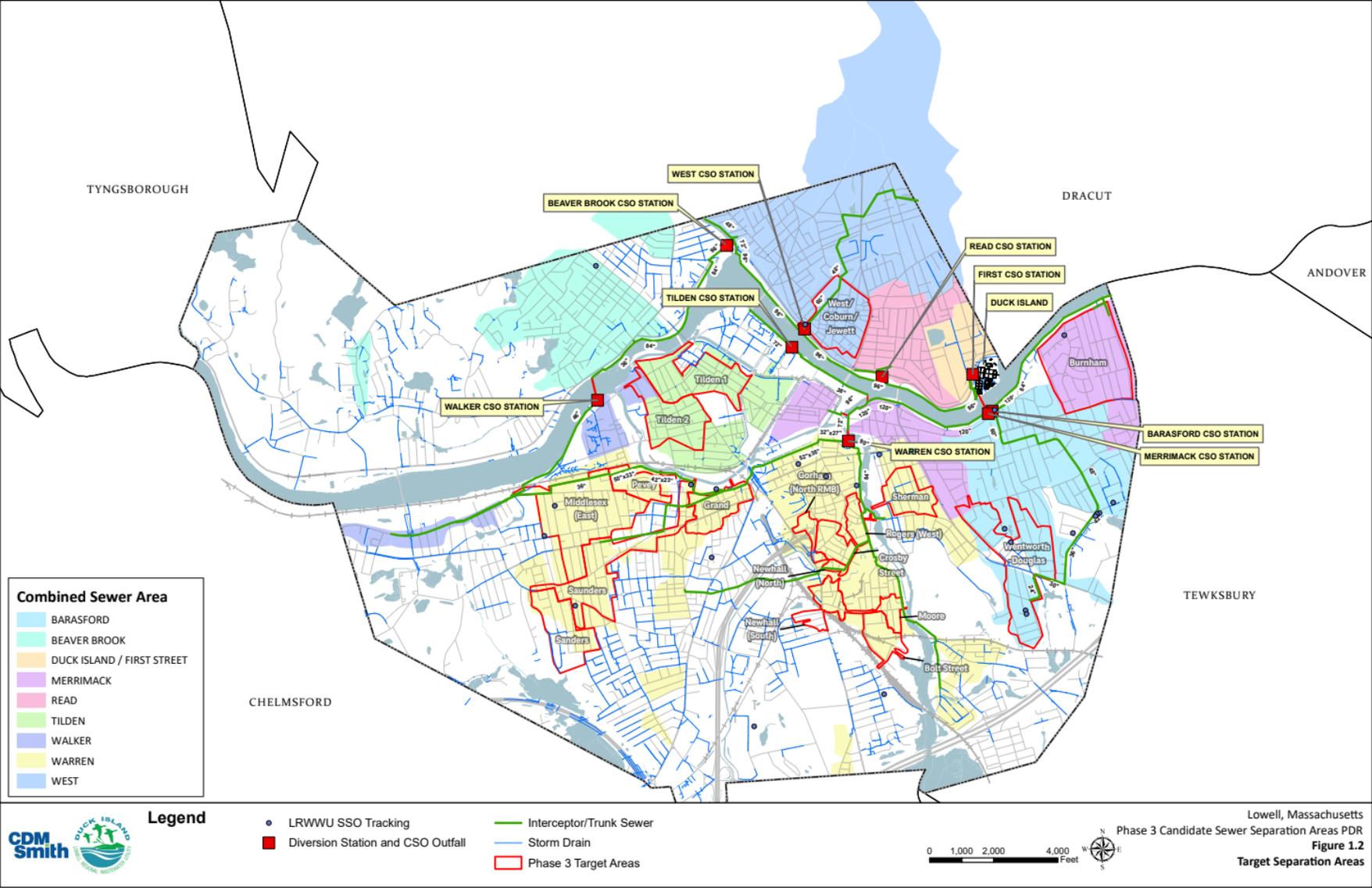


Figure 4-1 Phase 3 Sewer Separation Target Areas

5. Infiltration/Inflow Reduction Program

The Utility's Infiltration and Inflow (I/I) Reduction Program (Paragraph 18) was developed, in coordination with Kleinfelder, to identify and remove infiltration and inflow from the sewer system in accordance with 314 C.M.R. §12.04(2). The program is based on the I/I Analysis Report, submitted on January 31, 2024 ([Appendix A](#)), that provides recommendations, schedule, and projected costs for subsequent phases of Sewer System Evaluation Surveys (SSES). These recommendations serve as a road map for the Utility to implement an ongoing plan to execute I/I investigations and reduction efforts. The SSES phases are shown in [Figure 5-1](#).

5.1 Last Six Months in the Reporting Period

In April 2024, ADS Environmental Services (ADS) installed ten (10) temporary gravity sewer flow meters for a period of twenty-four (24) weeks from April 9, 2024 to September 23, 2024. The metering period, originally expected to terminate after 12 weeks, was extended due to the limited rainfall that occurred in the spring months. This additional metering program was performed to address data quality issues identified in the I/I Analysis Report ([Appendix A](#)). [Figure 5-2](#) provides an overview of the 10-meter areas that were re-metered in this effort.

The Utility completed the Phase 1 SSES field investigations as recommended in the I/I Analysis Report ([Appendix A](#)) and shown on [Figure 5-3](#). In May 2024, RedZone Robotics Inc. (RedZone) completed a comprehensive multi sensor inspection (Digital CCTV and Sonar) of the Utility's river-front interceptor piping network, which encompasses approximately 56,300 LF of sewer ranging in size from 36 to 120-inch in diameter. RedZone also completed 146 manhole inspections along the interceptor pipelines. Approximately 5,000 linear feet of interceptor pipe was not inspected due to the drop configuration limiting manhole access to deploy the camera equipment as well as a few connection pipes around various stations or special structures.

Additionally, as part of the Phase 1 SSES field investigations, National Water Main Cleaning Company conducted approximately 21,300 linear feet of CCTV inspections of some of the Utility's oldest infrastructure in the downtown area of the City in Meter Areas 51, 38, and 37. EST Associates, Inc. performed 137 manhole inspections within these meter areas, as well as some additional manholes in alignment on the interceptor pipelines. Approximately 4,000 linear feet of the pipelines and associated manholes in Meter Areas 51, 38, and 37 were not inspected due to inaccessible manholes or manholes unable to be located or opened.

In August 2024, the Utility collaborated with Hull Street Energy to discover the Kearney Square inflow source was due to a failed hatch that cross-connects the Canal to the sewer. Hull Street Energy made a temporary repair to limit the inflow and is working through installing a permanent solution soon.

5.2 Next Six Months in the Reporting Period

Kleinfelder will develop and submit to the Utility the SSES Phase 1 Report, summarizing the 2024 field program (NWMCC pipe inspections, RedZone pipe and manhole inspections, and EST manhole

inspections) and providing I/I reduction recommendations in the collection system. Design of the Phase 1 SSES Rehabilitation Project will begin based on the I/I reduction recommendations from the SSES Phase 1 Report, pending the project's placement on MassDEP's SRF Intended Use Plan (IUP).

It is anticipated that ADS will provide final data for the ten-meter areas in November 2024. Once received, Kleinfelder will develop and submit to the Utility a supplemental memorandum to the previously submitted *I/I Analysis Report* that will summarize the I/I analysis of the 10-meter areas and re-examine the SSES priority areas established in the I/I Analysis Report to include the I/I volumes from the 2024 metering areas. The Utility will work with Hull Street Energy to reduce Inflow sources from the canal.

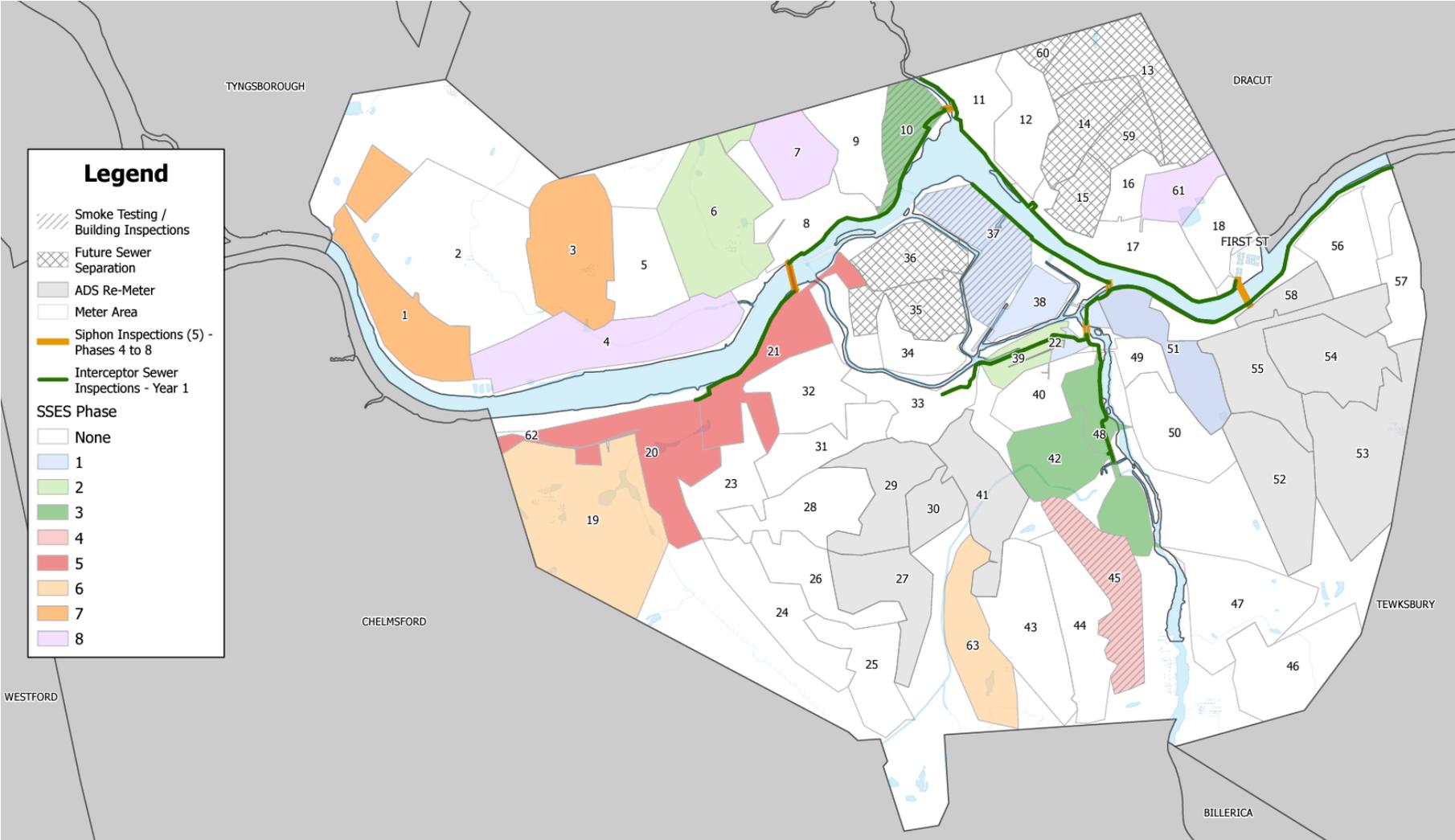


Figure 5-1 SSES Program Phases

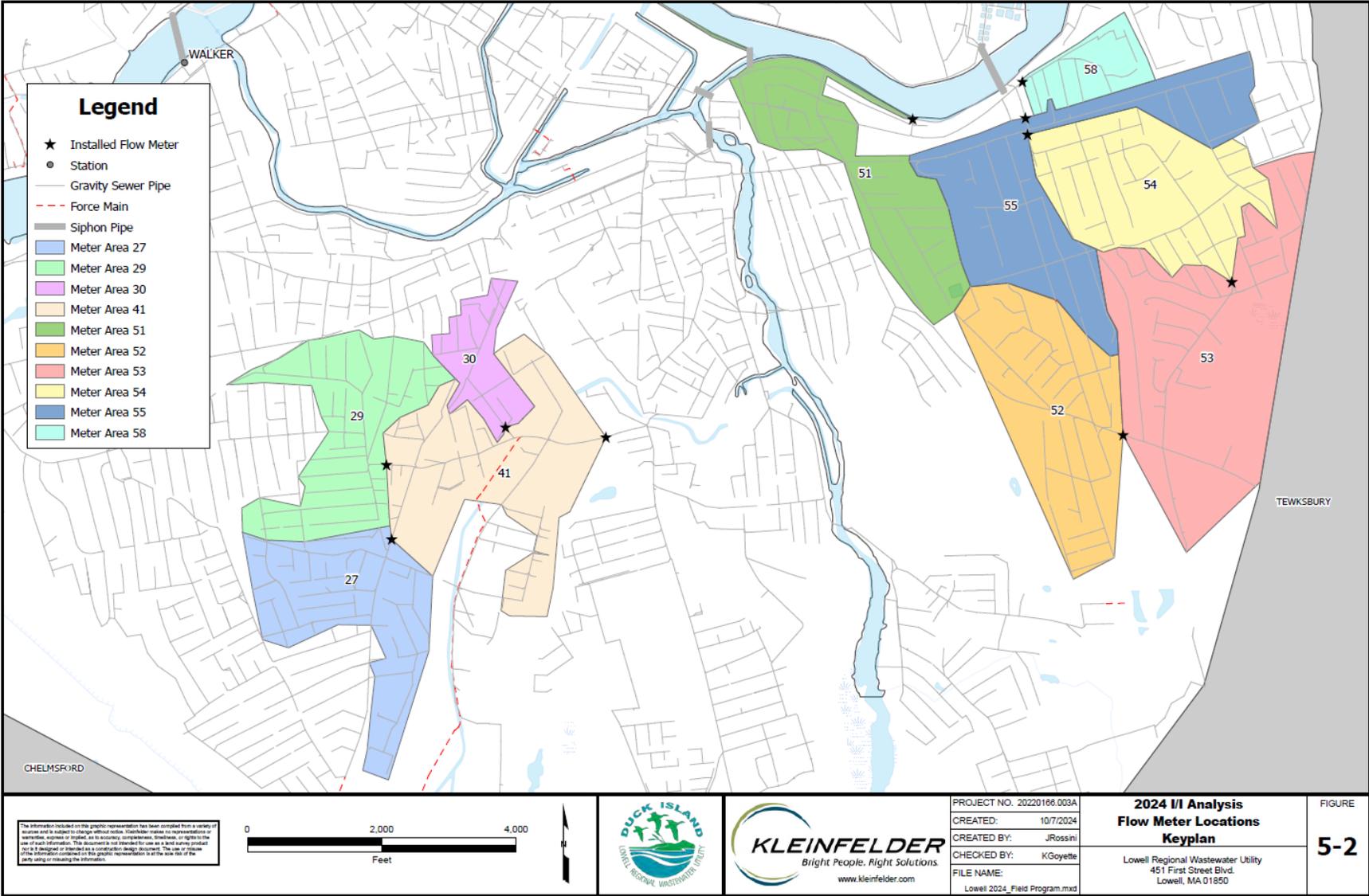


Figure 5-2 2024 Re-Metered Areas

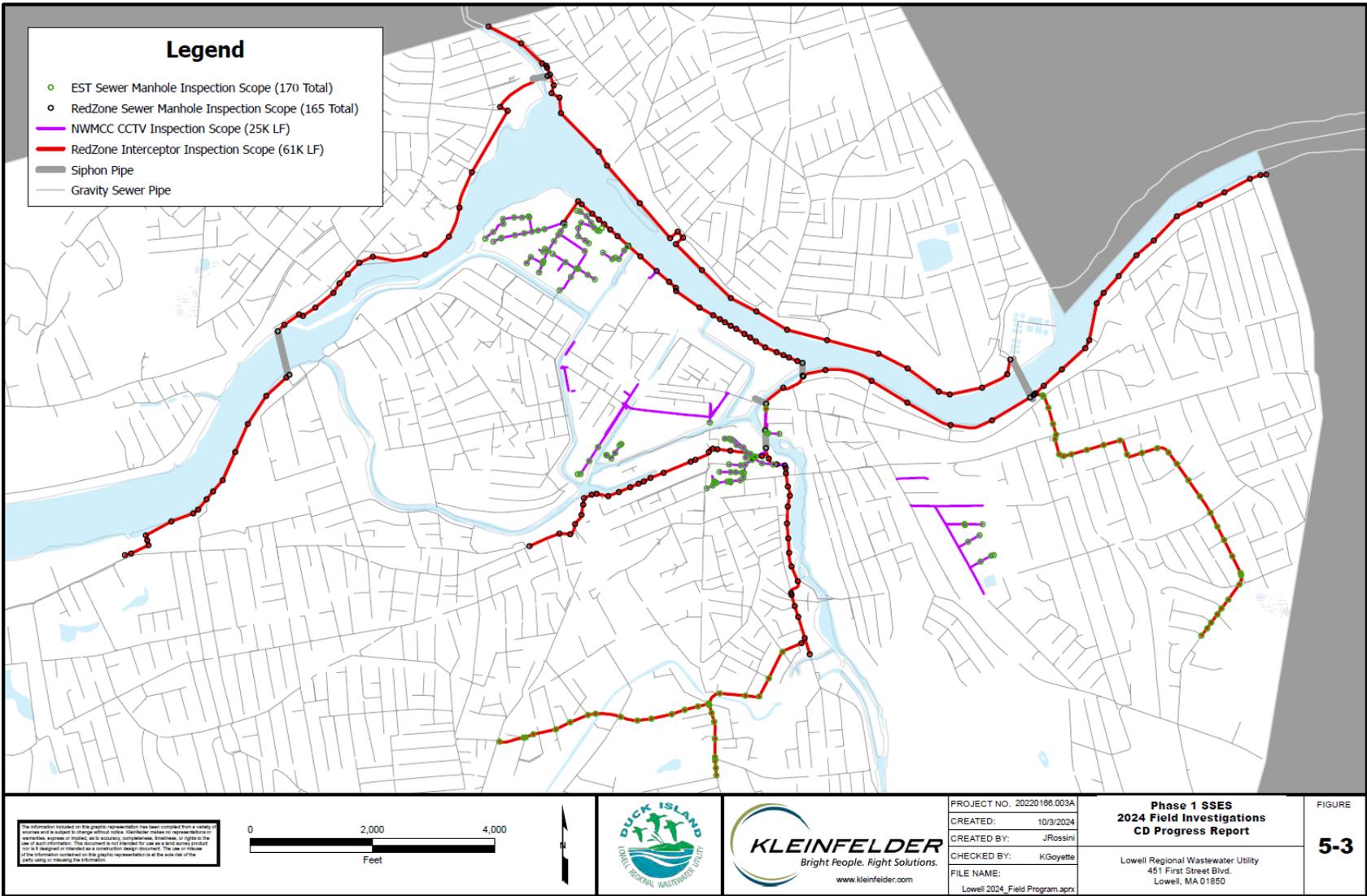


Figure 5-3 2024 Field Investigations

6. CMOM Program

The Utility's Capacity, Management, Operation, and Maintenance (CMOM) Program Self-Assessment (PSA) (CD Paragraph 14), developed in 2022 (*Appendix A*), was designed to evaluate the CMOM programs and identify areas needing improvement. Upon completing the assessment, it was found that Lowell's CMOM program is strong but could be enhanced in certain areas. The EPA and MassDEP provided comments on the CMOM PSA on August 21, 2024. Per Consent Decree Paragraph 15, a CMOM Corrective Action Plan (CAP) (CD Paragraph 16) is currently being developed with a target completion date of December 19, 2024. This plan will address the identified areas for improvement and incorporate feedback from the agency's review of the PSA. The CAP will serve as a roadmap for the Utility to implement ongoing improvements in its collection system.

6.1 Last Six Months in the Reporting Period

The Utility has initiated the development of the CAP. There were sixteen (16) areas with deficiencies identified as part of the PSA to be addressed in the CAP. Additionally, the CAP will responses to the comments from the EPA in collaboration with MassDEP regarding the CMOM PSA that were sent to the Utility on August 21, 2024. The comments from the EPA and MassDEP resulted in the identification of an additional two (2) deficiencies for a total of eighteen (18) deficiencies to be corrected as laid out in the CAP. Each corrective action and comment includes a description of the existing identified deficiency, the Utility's proposed short term and long-term corrective action, and a schedule for the implementation of these corrective actions.

6.2 Next Six Months In the Reporting Period

By December 19th, 2024, the Utility will finalize and submit the CAP in compliance with the requirements outlined in the CD. Following submission, the Utility will begin executing the actions detailed in the CAP, adhering to the timelines to ensure compliance and operational improvements within the collection system.

7. Stormwater (MS4) Compliance Program

For Federal and State stormwater regulations, the City is operating under the 2003 Massachusetts Small Municipal Separate Storm Sewer Systems (MS4) General Permit. An Annual Report on the City's compliance with the 2003 MS4 Program will be submitted on April 30, 2024 ([Appendix A](#)).

In accordance with the CD, the City shall remain under the 2003 MS4 permit with additional requirements stipulated per the CD. These requirements include:

- The development and implementation of an updated Illicit Discharge Detection Elimination (IDDE) program (Paragraphs 24, 25, 26, 27, 28, 29, and 30),
- Additional stormwater mapping requirements (Paragraph 36),
- Utilization of Best Management Practices in stormwater management design (Paragraph 32),
- Updates to ordinances to address pre- and post-construction stormwater controls (Paragraphs 21, 22, 23), and
- Updates to the Stormwater Management Program (initially issued in 2003) (Paragraph 33.a) to update the Minimum Control Measures (MCM) and Best Management Practices (BMPs) to minimize the impact of phosphorus, including a Phosphorus Source Identification Report (Paragraph 33.c) and development of an BMP demonstration project for phosphorus control on a municipal property. (Paragraph 33.d)

The Utility updated and submitted a Stormwater Management Plan (SWMP) and Illicit Discharge Detection Elimination (IDDE) Program to MassDEP and USEPA on December 31st, 2023 ([Appendix A](#)).

7.1 Last Six Months in the Reporting Period

In the last six months work included:

- The Utility sought, interviewed, and contracted private engineering services for MS4 support, including permitting, design, technology, and construction services.
- Seasonal spring, summer, and fall BMP messaging fliers were developed to promote "Clean Water Tips" pertaining to lawn care (spring grass clipping/fall leaf litter disposal, slow-release and phosphorous-free fertilizers) and pet waste management (summer, including noting local ordinances).
- Summer messaging was distributed alongside Lowell Wastewater branded pet waste bag dispensers to promote proper pet waste management practices.
- Lowell Wastewater participated in the City of Lowell's annual Folk Festival. Wastewater personnel staffed an official booth, promoted the IDDE program, and informed festivalgoers of proper stormwater management practices and habits to adopt into their day-to-day.
- One hundred ninety-eight (198) drainage structures, across fourteen (26) drainage catchments were mapped. Twenty-three (23) drainage BMPS were identified and recorded as part of this process.
- Site-specific SWPPPs were further developed for the City's Water Department, Department of Public Works, and Landfill. A *Good Housekeeping Manual* outlining best management practices

applicable to municipal facilities and drainage infrastructure within the MS4 was developed tangentially as part of this effort.

- Trainings related to proper sampling methodologies and catchment mapping procedures, and good housekeeping practices were held on April 16 and May 30, 2024. Three (3) municipal employees participated in the April and May trainings.
- Two (2) Illicit Discharges were discovered and removed during the reporting period. The first Illicit Discharge was brought on by a broken grinder pump in a private sewer service causing sewage to overflow into a nearby municipal catch basin. The second Illicit Discharge was brought on by a blockage in a commercial restaurant's sewer service, which caused the connecting grease trap to overflow used frying oils and grease into a private catch basin. Further summary of corrective actions taken are presented in [Table 2](#).
- SSO discovery and actions taken are presented in [Table 3](#).
- Seventeen (17) outfalls were inspected during dry-weather; dry-weather flows were absent in all inspected outfalls. Results can be found in [Table 4](#).
- Eleven (11) outfalls were inspected during wet-weather; wet-weather flows were present in all inspected outfalls. Samples were collected and analyzed from these outfalls. Sampling results can be found in [Table 4](#).
- Submission of the annual MS4 Report submitted April 30, 2024 ([Appendix A](#)).

7.2 Next Six Months in the Reporting Period

In the next six months, planned work includes:

- Conduct dry weather outfall screening and sampling.
- Update catchment priority ranking presented in the previous CD Semi Annual Submittal, [Table 4](#), with up-dated outfall screening and sampling results.
- Continue catchment investigations.
- Refine MS4 mapping based on field conditions observed during outfall screenings and catchment investigations.
- Conduct IDDE investigations into priority catchments.
- Begin Phosphorus Source Identification Report per CD Paragraph 33.c.
- Perform continued stormwater quality-related public education and outreach.

Table 2 Illicit Discharge Summary

Outfall Location		Illicit Discharge/Connection Verified				Illicit Discharge Removal Activities			Assessment: Is the City in compliance with schedule?
Basin ID	Outfall ID	Date Verified	Address Location	Type of Discharge ¹	Estimated Flow	Schedule for Removal	Actions Taken	Date Eliminated	
CB-009381	OUTGPS-000321	4/18/2024	35 Edwards Street	Residential	<10 gallons; total volume unknown	<ul style="list-style-type: none"> 4/18 – DPW field crew notified Lowell Wastewater personnel of sewage rising-up from a covered pit in front of residential property. Lowell maintenance personnel equipped with municipal Vac-Con were sent to clean impacted catch basin and ground. Resident was informed by City Inspector of the issue and agreed to limit water use until corrective actions were completed. Week of 4/22 – New grinder pump was installed and put into operation. 	Investigation revealed that sewage from a private service was flowing above-ground and into a nearby municipal catch basin. The receiving catch basin outfall was submerged under standing water and no signs of sewage were present at the outlet – the illicit discharge was contained to the catch basin. The impacted catch basin was cleaned, and sandbags and wood mulch were spread around the area of impact to contain and prevent additional surcharge from entering the MS4 while the homeowner repairs the grinder pump. GI/LID features are not being considered or implemented as a potential solution, given the nature of the source of the illicit.	4/18/2024	Yes
Private CB	Private Outfall	7/1/2024	1460 Middlesex Street	Commercial	>50 gallons; total volume unknown	<ul style="list-style-type: none"> 7/1 - Lowell Wastewater personnel conducted initial investigation of reported illicit grease overflow from a commercial restaurant. Upon confirmation, private business owner informed to by City Inspector to cease operations until issue was resolved. Lowell maintenance personnel equipped with municipal Vac-Con were sent to clean impacted infrastructure. Private cleaning services were brought in for environmental remedial cleaning. 	Investigation revealed that this catch basin was connected to local waterbody. MassDEP was promptly notified of environmental impact. As a result, the impacted infrastructure has been thoroughly cleaned, and the private business owner has been informed and that further corrective actions may be necessary. GI/LID features are not being considered or implemented as a potential solution, given the nature of the source of the illicit being from a lack of O&M.	7/1/2024	Yes

¹Type of Discharge single-family residential, multifamily residential, commercial, industrial, exfiltration from a sanitary sewer

Table 3 SSO Summary (Last 6 Months)

Surcharge Type	Date & Time Overflow Started/Discovered	Date & Time Overflow Stopped	Location	Source of Notification to Lowell	Cause	Estimated Volume (Gal)	Catch Basin or Surface Waterbody Reached and Estimated Volume	Corrective Actions Taken	Date Reported to EPA and MassDEP	Date of the Last Event that Occurred at Same Location
Backup into Property	4/10/2024 1:32 PM	4/10/2024 2:24 PM	21 Riverby Street	Civic plus request submitted to the Utility by resident	Debris accumulation in a dead-end manhole	Unknown	No release to surface water	Sewer line cleaned by jetting and affected area was cleaned and disinfected. Debris blockages has since been removed.	4/11/2023	No previous SSOs have occurred at this location
SSO (Sanitary Sewer Manhole)	4/11/2024 9:31 AM	4/11/2024 11:30 AM	240 Industrial Ave East	Civic plus request submitted to the Utility by resident	Pipe blockage due to grease	Unknown	No release to surface water	Sewer line cleaned by jetting and affected area was cleaned and disinfected. Grease blockages has since been removed.	4/11/2023	No previous SSOs have occurred at this location
SSO (Sanitary Sewer Manhole)	8/15/2024 3:43 PM	8/15/2024 3:58 PM	657 Middlesex Street (Eagle Ct)	Level monitor alert notification	Rain event		Pawtucket Canal	The area and alternative solutions are being evaluated as part of the Phase 3 PDR	8/16/2024	9/11/2023
SSO (Sanitary Sewer Manhole)	8/15/2024 3:44 PM	8/15/2024 3:57 PM	67 Payne Street	Level monitor alert notification	Rain event		Pawtucket Canal	The area and alternative solutions are being evaluated as part of the Phase 3 PDR	8/16/2024	9/11/2023
Backup into Property	8/15/2024 5:58 PM	8/15/2024 4:00 PM	21 Tyler Park	Civic Plus Request submitted by the resident	Rain Event	Unknown	No release to surface water	In response to the recent heavy rainfall. LRWWU is conducting thorough inspections of gravity sewer mains both upstream and downstream of impacted area. Our primary objective is to ensure continuous flow within the collection system. Additionally, we are performing comprehensive assessments of the affected sewer system to address any further issues and maintain system integrity.	8/16/2024	No previous SSOs have occurred at this location
Backup into Property	8/15/2024 4:30 PM	8/15/2024 4:00 PM	89 Mary Theresa Terrace	Direct call from the resident to our Collection System Supervisor	Rain Event	Unknown	No release to surface water	LRWWU has completed an initial inspection and jetting of the sewer main to resolve immediate concerns. We are currently undertaking a detailed evaluation of the affected sewer main to thoroughly assess the issue and devise a long-term solution.	8/16/2024	No previous SSOs have occurred at this location
SSO (Sanitary Sewer Manhole)	8/19/2024 8:54 PM	8/19/2024 8:55 PM	67 Payne St	Level Monitor alert notification	Rain Event	134 gallons	Pawtucket Canal	Alternative solutions being evaluated as part of the Phase 3 PDR	8/19/2024	8/15/2024
SSO (Sanitary Sewer Manhole)	8/19/2024 8:54 PM	8/19/2024 8:57 PM	657 Middlesex St (Eagle Ct)	Level Monitor alert notification	Rain Event	232 gallons	Pawtucket Canal	Alternative solutions being evaluated as part of the Phase 3 PDR	8/19/2024	8/15/2024
SSO (Sanitary Sewer Manhole)	8/19/2024 3:15 PM	8/19/2024 2:30 PM	Windward/Douglas Road	LRWWU Staff	Rain Event	Unknown	Unnamed wetland	The capacity-related issue is being effectively addressed through the installation of the Douglas Road storage tank, which will significantly enhance our system's ability to manage and accommodate increased flows. This strategic addition aims to bolster overall capacity and ensure reliable performance during peak conditions	8/19/2024	1/10/2024

Table 4 Outfall Priority Matrix

Outfall ID	Field Conditions	Active Flow	Odor	Surfactants (mg/L)	Ammonia (mg/L)	Chlorine (mg/L)	E. coli (cfu/100 mL)	Ranking ^{1,2,3,4,5}
OUTGPS-000026								Potential Illicit(A)
OUTGPS-000298								Potential Illicit(A)
OUTGPS-000330								Potential Illicit(A)
OUTGPS-000278								Potential Illicit(A)
OUTGPS-000047								Potential Illicit(A)
OUTGPS-000146								Potential Illicit(A)
OUTGPS-000028								Potential Illicit(A)
OUTGPS-000108								Potential Illicit(A)
OUTGPS-000352	Dry Weather	Yes - Dry Weather Flow	Yes	0.36	0	0.09	121	Potential Illicit(B)
OUTGPS-000096	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.26	0.5	0.9	2420	Potential Illicit(C)
OUTGPS-000097	Wet Weather	Yes - Dry Weather Flow	No - Scentless	0.27	0.5	0.89	1986	Potential Illicit(C)
OUTGPS-000184	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.29	6	0.3	1553	Potential Illicit(C)
OUTGPS-000268	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.35	0.5	0.24	5	Potential Illicit(D)
OUTGPS-000310	Dry Weather	Yes - Dry Weather Flow	No - Scentless	0.4	0.5	0.12	0	Potential Illicit(D)
OUTGPS-000194	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.39	0.25	1.31	2420	Potential Illicit(E)
OUTGPS-000382	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.25	0.25	0.14	2420	Potential Illicit(E)
OUTGPS-000184	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.24	0.25	0.71	2420	Potential Illicit(E)
OUTGPS-000145	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.22	0.25	0.13	1414	Potential Illicit(E)
OUTGPS-000388	Dry Weather	Yes - Dry Weather Flow	No - Scentless	0.07	0.25	0.17	961	Potential Illicit(E)
OUTGPS-000360	Dry Weather	Yes - Dry Weather Flow	No - Scentless	0.2	0.25	0.04	649	Potential Illicit(E)
OUTGPS-000195	Dry Weather	Yes - Dry Weather Flow	No - Scentless	0.06	0.5	0.1	548	Potential Illicit(E)
OUTGPS-000250	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.29	0	0.45	2,420	High Bacteria
OUTGPS-000248	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.22	0	0.2	1,300	High Bacteria
OUTGPS-000143	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.19	0	0.24	2,420	High Bacteria
OUTGPS-000249	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.16	0	0.15	816	High Bacteria
OUTGPS-000326	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.27	0	0.13	2420	High Bacteria
OUTGPS-000031	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.25	0	0.13	2420	High Bacteria
OUTGPS-000236	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.23	0	0.15	2420	High Bacteria
OUTGPS-000275	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.22	0	0.17	2420	High Bacteria
OUTGPS-000436	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.2	0	0.2	2420	High Bacteria
OUTGPS-000195	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.19	0	0.15	2420	High Bacteria
OUTGPS-000370	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.22	0	0.3	1553	High Bacteria

Outfall ID	Field Conditions	Active Flow	Odor	Surfactants (mg/L)	Ammonia (mg/L)	Chlorine (mg/L)	E. coli (cfu/100 mL)	Ranking ^{1,2,3,4,5}
OUTGPS-000228	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.06	0	0.11	2420	High Bacteria
OUTGPS-000399	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.14	0	0.02	2420	High Bacteria
OUTGPS-000253	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.25	0	0	770	High Bacteria
OUTGPS-000252	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.24	0	0	2420	High Bacteria
OUTGPS-000398	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.41	0	0	2420	High Bacteria
OUTGPS-000396	Wet Weather	Yes - Wet Weather Flow	No - Scentless	2.18	0	0.33	2,420	High Bacteria
OUTGPS-000237	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.37	0	0.19	649	High Bacteria
OUTGPS-000134	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.21	0	0	2,420	High Bacteria
OUTGPS-000135	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.42	0	0.1	688	High Bacteria
OUTGPS-000093	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.1	0	0.2	1414	High Bacteria
OUTGPS-000195	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0	0	0.22	649	High Bacteria
OUTGPS-000194	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.38	0	0.3	1733	High Bacteria
OUTGPS-000134	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.17	0	0.03	313	Low Potential Illicit
OUTGPS-000093	Wet Weather	Yes - Dry Weather Flow	No - Scentless	0.31	0	0.16	308	Low Potential Illicit
OUTGPS-000331	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.17	0	0.03	272	Low Potential Illicit
OUTGPS-000145	Dry Weather	Yes - Dry Weather Flow	No - Scentless	0.14	0	0.01	172	Low Potential Illicit
OUTGPS-000314	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.14	0	0.02	125	Low Potential Illicit
OUTGPS-000382	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.02	0.25	0.19	111	Low Potential Illicit
OUTGPS-000145	Dry Weather	Yes - Dry Weather Flow	No - Scentless	0.1	0	0.35	107	Low Potential Illicit
OUTGPS-000354	Dry Weather	Yes - Dry Weather Flow	No - Scentless	0.1	0	0.06	102	Low Potential Illicit
OUTGPS-000383	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.24	0.25	0.09	81	Low Potential Illicit
OUTGPS-000283	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0	0	0.04	74	Low Potential Illicit
OUTGPS-000310	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.46	0	0.24	16	Low Potential Illicit
OUTGPS-000193	Dry Weather	Yes - Dry Weather Flow	No - Scentless	0.14	2.5	0.05	7.2	Low Potential Illicit
OUTGPS-000093	Dry Weather	Yes - Dry Weather Flow	No - Scentless	0.06	0	0	6.1	Low Potential Illicit
OUTGPS-000382	Dry Weather	Yes - Dry Weather Flow	No - Scentless	0.07	0.25	0.09	3	Low Potential Illicit
OUTGPS-000275	Dry Weather	Yes - Dry Weather Flow	No - Scentless	0.07	0	0.16	3	Low Potential Illicit
OUTGPS-000331	Dry Weather	Yes - Dry Weather Flow	No - Scentless	0.23	0	0	2	Low Potential Illicit
OUTGPS-000043	Dry Weather	Yes - Dry Weather Flow	No - Scentless	0.1	0	0.08	0	Low Potential Illicit
OUTGPS-000400	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.22	0	0.02	236	Low Potential Illicit
OUTGPS-000342	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.12	0	0.09	187	Low Potential Illicit
OUTGPS-000096	Dry Weather	Yes - Dry Weather Flow	No - Scentless	0.12	0	0.13		Low Potential Illicit
OUTGPS-000329	Dry Weather	Yes - Dry Weather Flow	No - Scentless	0.12	0	0.06	1	Low Potential Illicit
OUTGPS-000400	Dry Weather	Yes - Dry Weather Flow	No - Scentless	0.12	0	0.07		Low Potential Illicit

Outfall ID	Field Conditions	Active Flow	Odor	Surfactants (mg/L)	Ammonia (mg/L)	Chlorine (mg/L)	E. coli (cfu/100 mL)	Ranking ^{1,2,3,4,5}
OUTGPS-000360	Wet Weather	Yes - Wet Weather Flow						Low Potential Illicit
OUTGPS-000097	Dry Weather	Yes - Dry Weather Flow						Low Potential Illicit
OUTGPS-000394	Wet Weather	Yes - Wet Weather Flow	No – Scentless	0.16	0	0	0	Low Potential Illicit
OUTGPS-000136	Wet Weather	Yes - Wet Weather Flow	No – Scentless	0.34	0	0.25		Low Potential Illicit
OUTGPS-000395	Wet Weather	Yes - Wet Weather Flow	No – Scentless	0.24	0	0		Low Potential Illicit
OUTGPS-000007	Wet Weather	No Flow						Low Potential Illicit
OUTGPS-000031	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000031	Wet Weather	No Flow						Low Potential Illicit
OUTGPS-000043	Wet Weather	No Flow						Low Potential Illicit
OUTGPS-000087	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000088	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000088	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000089	Wet Weather	No Flow						Low Potential Illicit
OUTGPS-000091	Wet Weather	No Flow						Low Potential Illicit
OUTGPS-000093	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000094	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000094	Wet Weather	No Flow						Low Potential Illicit
OUTGPS-000095	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000095	Wet Weather	No Flow						Low Potential Illicit
OUTGPS-000111	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000184	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000192	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000192	Wet Weather	No Flow						Low Potential Illicit
OUTGPS-000193	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000193	Wet Weather	No Flow						Low Potential Illicit
OUTGPS-000194	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000194	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000195	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000229	Wet Weather	No Flow						Low Potential Illicit
OUTGPS-000230	Wet Weather	No Flow						Low Potential Illicit
OUTGPS-000231	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000232	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000234	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000236	Dry Weather	No Flow						Low Potential Illicit

Outfall ID	Field Conditions	Active Flow	Odor	Surfactants (mg/L)	Ammonia (mg/L)	Chlorine (mg/L)	E. coli (cfu/100 mL)	Ranking ^{1,2,3,4,5}
OUTGPS-000236	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000239	Dry Weather	No Flow						Low Potential Illicit
POUTGPS-000239	Wet Weather	No Flow						Low Potential Illicit
OUTGPS-000240	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000251	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000252	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000253	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000254	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000273	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000274	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000327	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000330	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000359	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000367	Wet Weather	No Flow						Low Potential Illicit
OUTGPS-000369	Wet Weather	No Flow						Low Potential Illicit
OUTGPS-000370	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000386	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000387	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000387	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000400	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000401	Wet Weather	No Flow						Low Potential Illicit
OUTGPS-000401	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000401	Wet Weather	No Flow						Low Potential Illicit
OUTGPS-000412	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000413	Wet Weather	No Flow						Low Potential Illicit
OUTGPS-000414	Wet Weather	No Flow						Low Potential Illicit
OUTGPS-000427	Wet Weather	No Flow						Low Potential Illicit
OUTGPS-000427	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000432	Wet Weather	No Flow						Low Potential Illicit
OUTGPS-000432	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000436	Wet Weather	No Flow						Low Potential Illicit
OUTGPS-000235	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000650	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000347	Dry Weather	No Flow						Low Potential Illicit

Outfall ID	Field Conditions	Active Flow	Odor	Surfactants (mg/L)	Ammonia (mg/L)	Chlorine (mg/L)	E. coli (cfu/100 mL)	Ranking ^{1,2,3,4,5}
<i>OUTGPS-000651</i>	<i>Dry Weather</i>	<i>No Flow</i>						<i>Low Potential Illicit</i>
<i>OUTGPS-000652</i>	<i>Dry Weather</i>	<i>No Flow</i>						<i>Low Potential Illicit</i>
<i>OUTGPS-000653</i>	<i>Dry Weather</i>	<i>No Flow</i>						<i>Low Potential Illicit</i>
<i>OUTGPS-000341</i>	<i>Dry Weather</i>	<i>No Flow</i>						<i>Low Potential Illicit</i>
<i>OUTGPS-000396</i>	<i>Dry Weather</i>	<i>No Flow</i>						<i>Low Potential Illicit</i>
<i>OUTGPS-000397</i>	<i>Dry Weather</i>	<i>No Flow</i>						<i>Low Potential Illicit</i>
<i>OUTGPS-000390</i>	<i>Dry Weather</i>	<i>No Flow</i>						<i>Low Potential Illicit</i>
<i>OUTGPS-000141</i>	<i>Dry Weather</i>	<i>No Flow</i>						<i>Low Potential Illicit</i>
<i>OUTGPS-000142</i>	<i>Dry Weather</i>	<i>No Flow</i>						<i>Low Potential Illicit</i>
<i>OUTGPS-000221</i>	<i>Dry Weather</i>	<i>No Flow</i>						<i>Low Potential Illicit</i>
<i>OUTGPS-000222</i>	<i>Dry Weather</i>	<i>No Flow</i>						<i>Low Potential Illicit</i>
<i>OUTGPS-000253</i>	<i>Dry Weather</i>	<i>No Flow</i>						<i>Low Potential Illicit</i>
<i>OUTGPS-000252</i>	<i>Dry Weather</i>	<i>No Flow</i>						<i>Low Potential Illicit</i>
<i>OUTGPS-000420</i>	<i>Dry Weather</i>	<i>No Flow</i>						<i>Low Potential Illicit</i>

¹Outfalls are ranked into the following categories: “Potential Illicit”, “High Bacteria”, and “Low Potential Illicit”.

²Outfalls categorized as “Potential Illicit” are further ranked based on five criteria (A) through (E): (A) identified through EPA screening/sampling; (B) olfactory or visual evidence of sewage; (C) >410 cfu/mL E. coli and/or > 130 cfu/mL Enterococcus AND >0.25 mg/L surfactants AND >0.5 mg/L ammonia; (D) >0.25 mg/L surfactants AND >0.5 mg/L ammonia AND detectable chlorine; (E) = > 410 cfu/mL E. coli and/or > 130 cfu/mL Enterococcus AND detectable ammonia.

³Outfalls are categorized as “High Bacteria” when results show >410 cfu/mL E. coli and/or > 130 cfu/mL Enterococcus.

⁴Outfalls are categorized as “Low Potential Illicit” when sampling and screening results do not meet any of the aforementioned criteria.

⁵Results depicted in **bold** and *italics* were collected during the subject reporting period.

8. Geographical Information System (GIS)

The Utility engaged CDM Smith in 2007 to develop a GIS database of the wastewater collection system based on historic paper records that were digitized to include the information in electronic database. In 2017, additional requirements for improved data-management were identified in conversations with ESRI water-sector representatives, wherein it was made clear that the common ArcMap platform would be supplanted by ArcGIS Pro and the related Utility Network data schema. Lowell's GIS & Data Management team determined that it was in the Utility's best interest upgrade to ESRI's ArcGIS Enterprise. In Spring 2024 the Utility completed its upgrade to the ArcGIS Enterprise platform, improving field data collection capabilities and providing a more robust data structure. The Utility completed an initial delineation of drainage catchments throughout the City by overlaying existing mapped drainage systems with topographic data.

The annual updated GIS Map includes the best available information on the sewer and stormwater collection systems. A link to this Map (Paragraph 36a, 36b, 36c.i, & 26c.ii) was provided to the agencies in the CD Compliance Report transmittal email on April 30th, 2024. The Stormwater Collection System GIS Map includes the best available information on the stormwater collection systems. A link to this Map (Paragraph 35) was provided to the agencies in the CD Compliance Report transmittal email on September 30th, 2024. Additional information regarding the Utility's investigations, remediation, and capital projects completed for the City's MS4 and Collection System (Paragraph 36c.iii) are depicted in [Figure 3-1](#), [Figure 4-1](#), [Figure 5-1](#), [Figure 5-2](#), [Figure 5-3](#), [Figure 8-1](#), and [Figure 8-2](#).

Infrastructure Remediation Summary

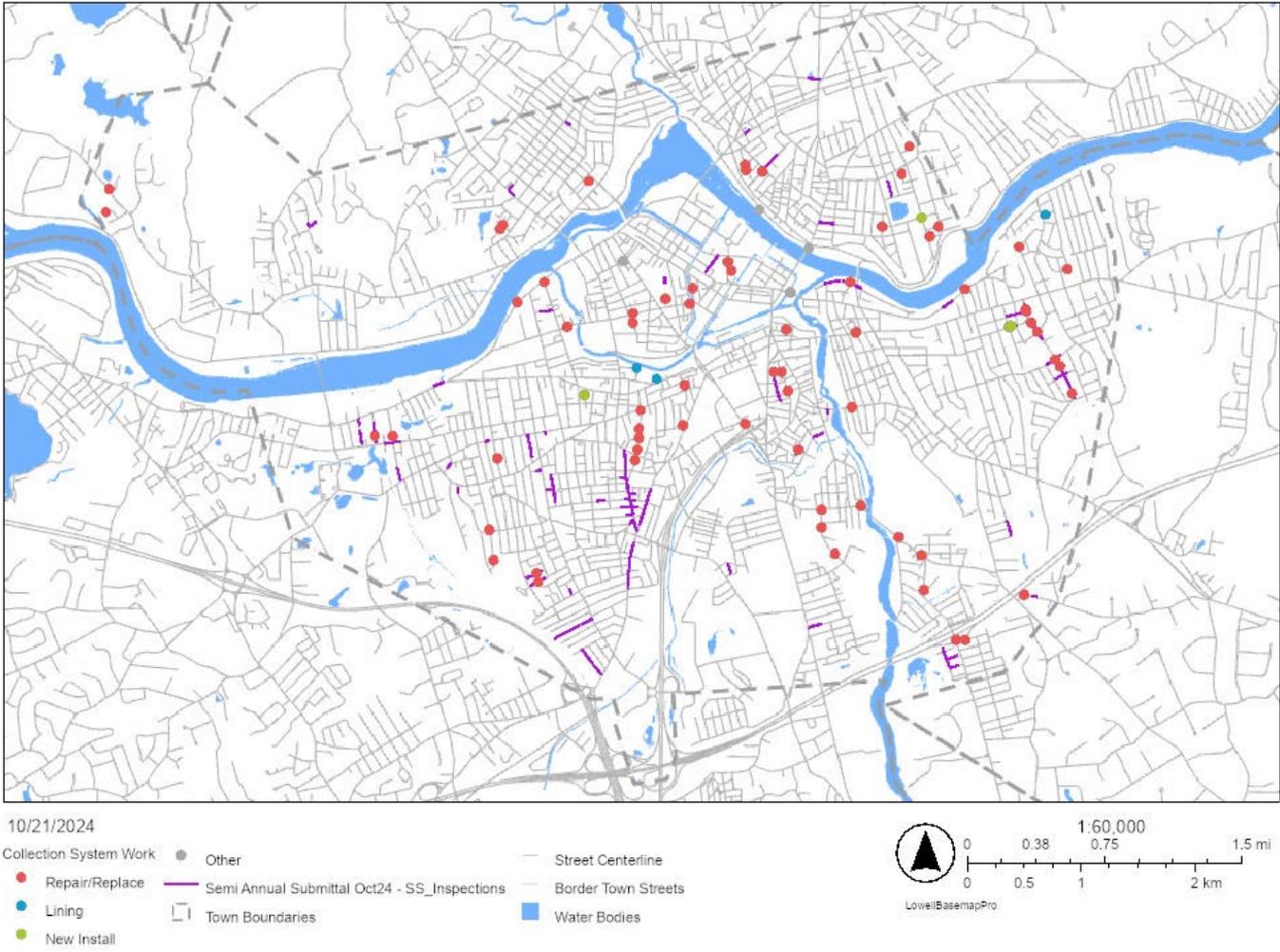


Figure 8-1 Infrastructure Remediation Summary

MS4 Investigations & Sampling

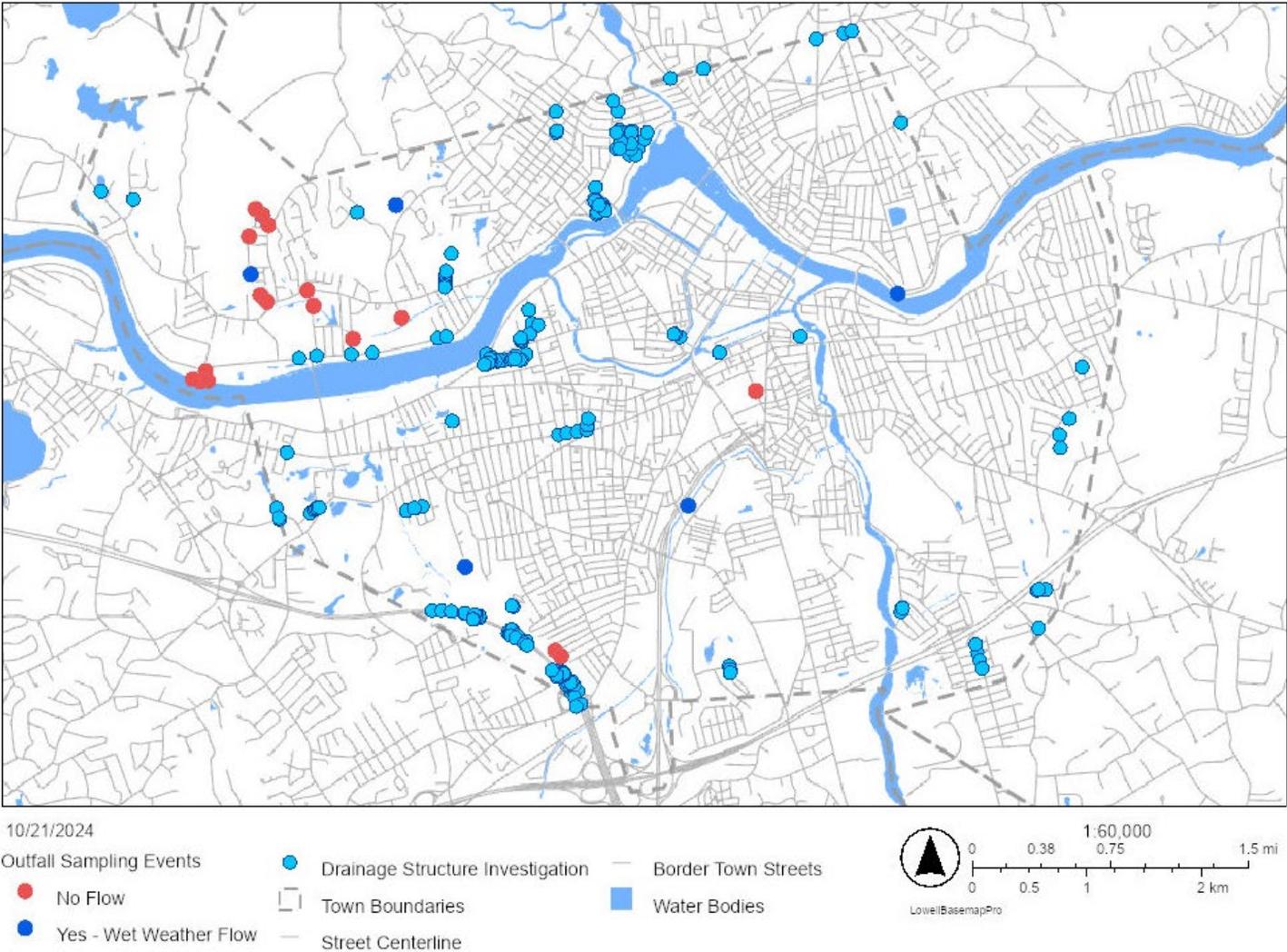


Figure 8-2 MS4 Investigations & Sampling

Appendix A: The Utility Online Webpage

The Utility makes electronic copies of all submissions to the regulatory agencies publicly available on the City's website. This includes supporting documentation to this Annual Report. This page is accessible via the following link: <https://www.lowellma.gov/1076/>

The reader is encouraged to review the posted documentation, referenced within this report, for a more detailed overview of the Utility's core operational programs related to the operation and maintenance of its collection system.

The following are links to specific reports and submissions referenced:

CMOM Self-Assessment: <https://lowellma.gov/DocumentCenter/View/20980>

Inflow and Infiltration Analysis Report: <https://lowellma.gov/DocumentCenter/View/25284>

Centralville Sewer Separation PDR: <https://lowellma.gov/DocumentCenter/View/25108>

Pretreatment Annual Report: <https://lowellma.gov/DocumentCenter/View/22634>

High Flow Management Plan: <https://lowellma.gov/DocumentCenter/View/22823>

Inflow and Infiltration Control Plan: <https://lowellma.gov/DocumentCenter/View/20979>

Stormwater Management Plan: www.lowellma.gov/DocumentCenter/View/21025

IDDE Plan: www.lowellma.gov/DocumentCenter/View/21026

CMOM and MS4 Annual Report: <https://www.lowellma.gov/1702>