

Consent Decree Compliance Report #1

(Civil Action No. XXXXXX)

April 2024

(October 2023 to March 2024)

Lowell Regional Wastewater Utility



NPDES Permit Number: MA0100633

Report Date: April 30, 2024

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CONCENT DECREE COMPLIANCE REPORT #1

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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Table of Contents

1. Introduction	3
1.1 Overview	3
1.2 Utility Operations.....	3
1.3 Consent Decree.....	5
1.4 Unanticipated Compliance Challenges	5
2. Overview of the Compliance Activities.....	6
3. Centralville (Humphrey’s Brook) Drain Area Sewer Separation Program	10
3.1 PDR.....	10
3.1.1 Last Six Months of the Reporting Period	10
3.1.2 Next Six Months of the Reporting Period	10
3.2 Phase 1 Design	12
3.2.1 Last Six Months of the Reporting Period	12
3.2.2 Next Six Months of the Reporting Period	13
3.3 Phase 2 Design	13
4. Phase 3 Sewer Separation Program.....	14
4.1 Last Six Months in the Reporting Period.....	14
4.2 Next Six Months in the Reporting Period	14
5. Infiltration/Inflow Reduction Program	16
5.1 Last Six Months in the Reporting Period.....	16
5.2 Next Six Months in the Reporting Period	16
6. Stormwater (MS4) Compliance Program.....	20
6.1 Last Six Months in the Reporting Period.....	20
6.2 Next Six Months in the Reporting Period	21
7. Geographical Information System (GIS)	27
Appendix A: The Utility Online Webpage	31

List of Figures and Tables

Figure 1-1. Lowell Wastewater Collection and Treatment Systems Overview.....	4
Figure 3-1 Centralville Sewer Separation.....	11
Figure 4-1 Phase 3 Sewer Separation Target Areas.....	15
Figure 5-1 SSES Program Phases.....	17
Figure 5-2 2023 City-wide Flow Metering Program Monitoring Areas.....	18
Figure 7-1 Infrastructure Remediation Summary.....	28
Figure 7-2 MS4 Investigations & Sampling.....	30
Table 1 Summary of Consent Decree Activities.....	7
Table 2 Illicit Discharge Summary.....	22
Table 3 SSO Summary (Last 6 Months).....	22
Table 4 Outfall Priority Matrix.....	23

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.

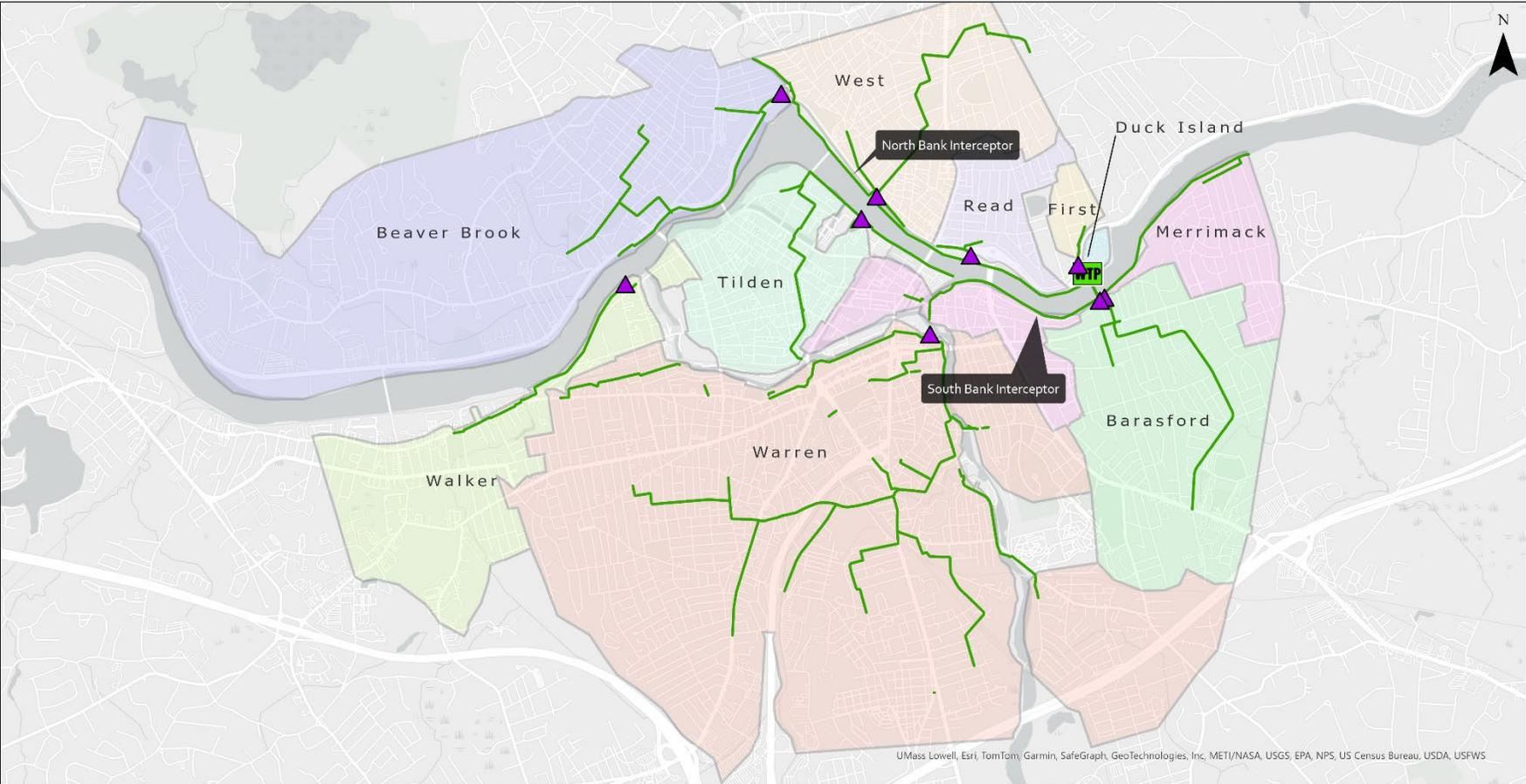
1.2 Utility Operations

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



Legend

Station Type

- WTP Wastewater Treatment Facility
- Diversion Station

Gravity Main

- Gravity Main

Sewersheds

- Barasford
- Beaver Brook
- Duck Island
- First
- Merrimack
- Read
- Tilden
- Walker
- Warren
- West

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

1.3 Consent Decree

In 2022, the United States Environmental Protection Agency (USEPA), Massachusetts Department of Environmental Protection (MassDEP), and the City of Lowell, working with the US Department of Justice and the Commonwealth of Massachusetts Attorney General, initiated negotiations for a Consent Decree (CD) regarding compliance with certain aspects of the federal and state Clean Water Acts, NPDES permits for the Publicly Owned Treatment Works (POTW) and the Small Municipal Separate Stormwater Sewer System (MS4) 2003 Massachusetts General Permit, federal and state Combined Sewer Overflow (CSO) control policies, and other applicable federal and state regulations. The CD was finalized in late 2023, entered into Federal Court on April 29, 2024, and an Effective Date for the CD is pending.

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 April 2024 Six-Month Compliance Report (Compliance Report #1) 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

The City of Lowell experienced a cyber attack in April 2023. This event affected most systems within the City and some data may have been lost, corrupted, or made otherwise inaccessible. This document represents the Utility's best representation of collection system activities performed throughout 2023 from available data.

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](#) - *Stormwater (MS4) Compliance Program*
- [Section 7](#) - *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 (October 1, 2023, to March 31, 2024)	Next Six Months (April 1 to September 30, 2024)
Centralville Area Sewer Separation Preliminary Design Report (PDR) (Humphrey's Brook)	10	Dec. 31, 2023	Centralville PDR submitted on December 31 st , 2023. MassDEP and USEPA provided comments in a letter dated March 5, 2024. The City met with MassDEP/USEPA virtually to discuss the schedule for the preparation of responses to agency comments. The full PDR report is in Appendix A .	The City will continue to meet with key stakeholders. This includes a meeting with MassDEP/USEPA on May 10, 2024 to discuss the final responses to the agency comments and to establish a schedule for the updated PDR.
Centralville Area Sewer Separation Removal of Humphrey's Brook and Dracut Surface Flows (Phase 1)	10.b.i	Dec. 31, 2027	The borings and most of the final survey of the main conduit route were completed, along with further development of the pipe routes and utility conflict resolutions, drainage outfall design, and meetings were held with USACE, EEA, DCR, MassDOT for project coordination and permitting.	The Final Design Project Bid Documents (Plans and Specifications) will continue to be advanced for an October 2024 SRF Loan Application Submittal and an early 2024 Bid Period. Additional meetings will be held with permitting agencies and MassDOT for integration and permitting. The City will attend a meeting with the Centralville Neighborhood Association on April 1, 2024 to discuss the project. Additional public meetings to discuss the project are being planned.
Centralville Area Sewer Separation (Phase 2)	10.b.ii	December 31, 2031	Phase 2 development will continue to ensure compatibility with Phase 1 mainline conduit.	Phase 2 development will continue to ensure compatibility with Phase 1 mainline conduit.
Phase 3 Areas Sewer Separation Report	11	Dec. 31, 2024	Development of initial pipe drawings to check on utility conflicts, outfall locations and feasibility, and project cost estimates. Comments from the public were solicited via an online questionnaire linked from the City's website (Sewer Issues Survey). A notification post card was sent to every property address with the survey link and the public input will be assessed to consider prioritization of project work, along with other matrix issues. The Utility has received over 700 responses.	Calibration of the SWMM model for the combined sewer areas in the Tilden, Warren, 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.
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	No work occurred.	No planned work will occur.

CMOM Program Implementation Annual Report	17	April 30th yearly	Submitted with the 2024 NPDES Permit Annual Report (Appendix A) on March 31, 2024. The CMOM Program Implementation Annual Report, required by the CD, will continue to be submitted as part of the NPDES Annual Report.	No planned work will occur.
I/I Analysis Report	18	Jan. 31, 2024	The I/I Analysis Report was submitted on January 31, 2024. The full I/I Analysis Report is linked in Appendix A .	The City will inspect approximately 47,000 linear feet of interceptor to review general condition of the large diameter pipes and to identify any potential sources of extraneous flow. The Utility will also be performing additional SSES investigations in three Meter Areas (37, 38, and 57) including manhole and pipeline CCTV inspections. Additional flow re-metering will be performed in several key areas.
Co-Permittee I/I Analysis Annual Report	19	April 30th yearly	Submitted with the 2023 NPDES Permit Annual Report (Appendix A) on March 31, 2024. The Co-Permittee I/I Analysis Annual Report will continue to be submitted as part of the NPDES Annual Report.	No planned work will occur.
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 the agencies on March 19, 2024.	No Action Required
Implement Updated IDDE	24, 25, 26, 27 and 30	Dec. 31, 2023	Updated IDDE Program submitted on December 31, 2023. Lowell's Stormwater Ordinance was amended to include legal mechanism to prohibit non-stormwater discharges to Lowell's storm drains and waterbodies.	The City will continue to implement the IDDE program.
Wet Weather Sampling Program	28	June 15, 2031	Wet-weather outfall inspections resulted in the collection of seven (7) samples. Results are included in Table 4 .	Continue monitoring and sampling drainage outfalls for wet-weather flow.
Illicit Discharge Removal/Abatement	29		Lowell's Stormwater Ordinance was amended to include legal mechanism to mitigate illicit discharges to municipal drainage systems and waterbodies. One (1) illicit discharge was 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 April 30, 2024.	Work will be performed to prepare the Semi-Annual Compliance Report for October 31, 2024.
Best Management Practices	32		No work occurred.	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 (<i>Appendix A</i>).	The City will report on its progress on the SWMP in the annual MS4 Compliance Report to be submitted on April 30, 2024.
Phosphorus Source Identification Report	33.c (ii)	January 31, 2026	City continues to work on identifying subcatchments to each drainage pipe/subsystem.	City will continue to work on identification of subcatchments to each drainage pipe/subsystem.
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	Work continued to update the Stormwater GIS.	Initial catchment areas for stormwater outfalls will be provided in the GIS Map Update on September 30, 2024 as defined in CD Paragraph 35.
Annual GIS Update	36	April 30th yearly	The Updated GIS Map for the April 30, 2024 will include the best available information on the sewer and stormwater collection systems. A link to this Map was provided to the agencies in the CD Compliance Report transmittal email on April 30 th , 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 April 30, 2024.	Work will be performed to prepare the CD Annual Compliance Report for October 31, 2024.
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 March 18, 2024 to begin initial discussions of the comments and the Utility responses and set a meeting for May 10, 2024 to fully discuss the comments and provide further Utility input. CDM Smith continued with calibration of the SWMM model in the Centralville basin and prepared for the analysis required to assess CSO reduction and benefits.

3.1.2 Next Six Months of the Reporting Period

Over the next six months, CDM Smith will complete the analysis of the Centralville Basin for the separation program, develop approaches to address the agency comments, optimize the design of the sewer separation program, and finalize and submit the PDR based on the responses to the agency comments. It is expected that the Final PDR will be submitted on June 15, 2024.

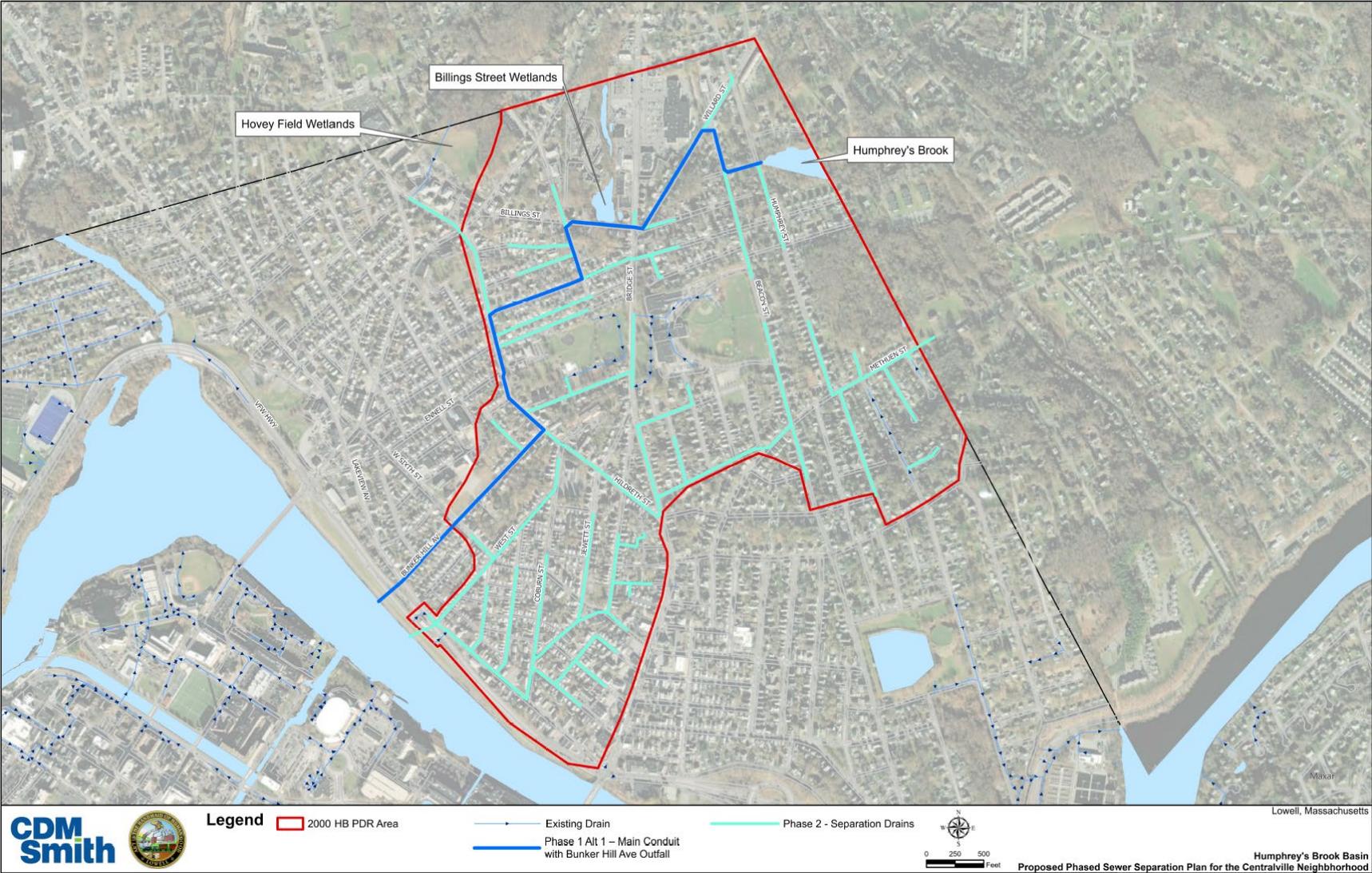


Figure 3-1 Centralville Sewer Separation

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 48 inches in diameter to a 5-foot by 6-foot box culvert and a new outfall to the Merrimack River.

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:

- Development of a public outreach online survey to request input on sewer system and street flooding issues.
- Completion of approximately 17,000 linear feet of topographic survey along the pipeline route to collect information on the existing subsurface utilities and surface information,
- Completion of most of the required subsurface borings to identify soil material characteristics. Approximately 39 borings and a total of 1,059 vertical feet of borings were completed.
- Meetings with USACE, EEA (MEPA, EJ, and DCR), MassDOT, MassDEP/USEPA, and internal City departments
- Initial design and layouts of the drain outfalls, and

- Further 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:

- Near completion of the Final Design Documents (Drawings and Specifications)
- Development of the MassDEP SRF Loan Application for submittal in mid-October 2024
- Continued 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) over the last six months. This work will continue over the next six months.

Full design effort for the Phase 2 Design (survey and borings) will not be initiated until the Phase 1 Design is completed and bid in Spring 2025. This design is anticipated to begin in 2026.

4. Phase 3 Sewer Separation Program

The Phase 3 Sewer Separation Program (Paragraph 11) involves the a preliminary design of sewer separation for 18 combined sewer system subbasins in the Tilden, Warren, Barasford, and Merrimack CSO Basin shown in *Figure 4-1*. 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 has been developing 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, who is 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 has completed calibration and extensive analysis of the SSO conditions, using SWMM,

along Douglas Road in the Wentworth Avenue/Douglas Road area. The effort has 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.

4.2 Next Six Months in the Reporting Period

CDM Smith and the Utility will continue work necessary to complete the PDR. The work will include calibration of the SWMM model for the combined sewer areas in the Tilden, Warren, 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.

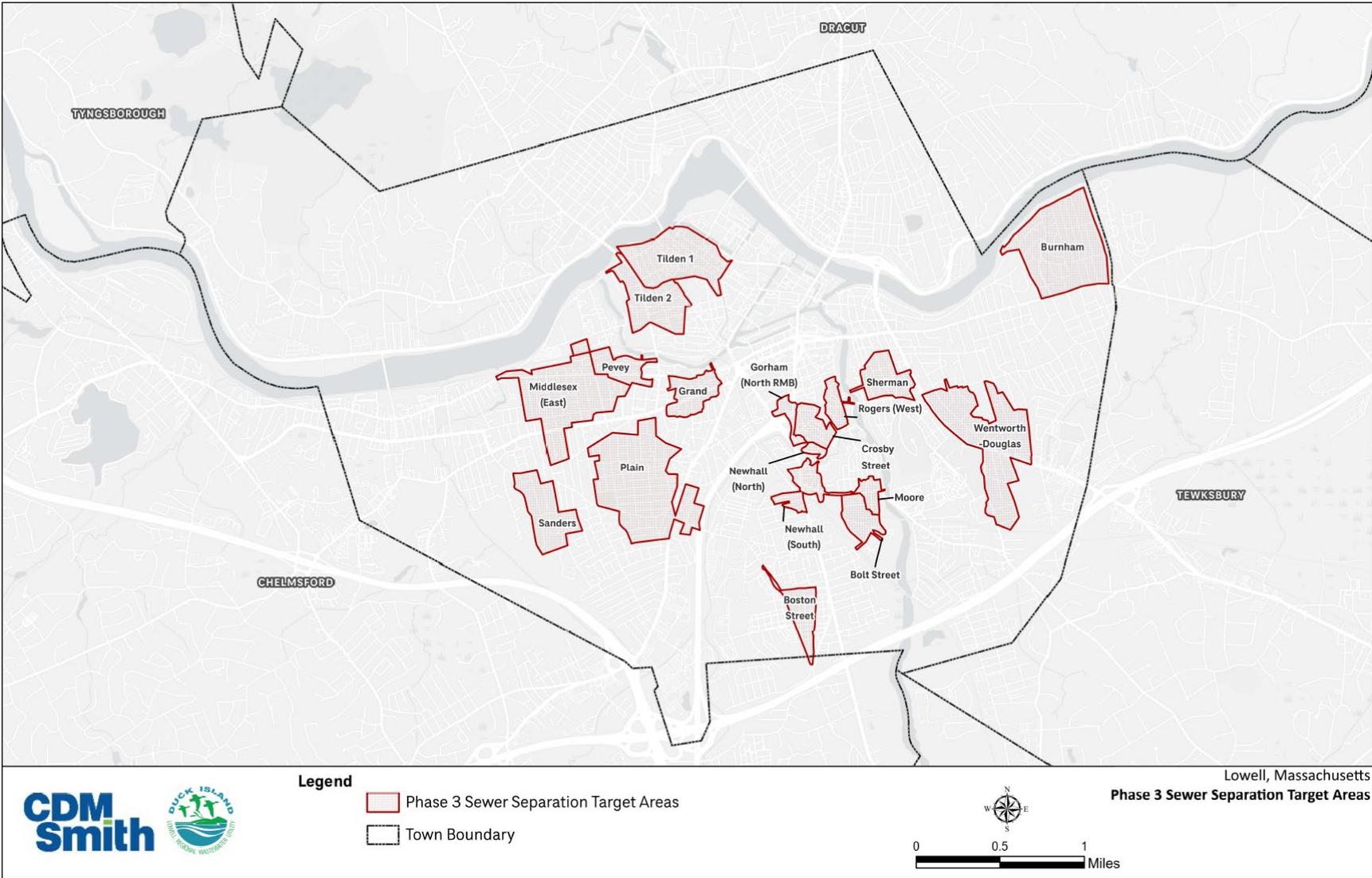


Figure 4-1 Phase 3 Sewer Separation Target Areas

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

Kleinfelder completed an I/I analysis for fifty-two (52) metered areas in accordance with the MassDEP Guidelines. In March 2023, ADS Environmental Services (ADS) installed sixty-three (63) temporary gravity sewer flow meters for a period of ten (10) weeks from March 24, 2023 to June 2, 2023. [Figure 5-2](#) provides an overview of the collection system divided into the 63-meter area locations.

The I/I analysis led to the development of the I/I Analysis Report, which was submitted to USEPA and MassDEP on January 31, 2024 ([Appendix A](#)). The report provides a comprehensive approach and schedule to identify and investigate potential locations of excessive I/I within the Utility's sewer system compliant with MassDEP regulation 314 CMR 12.04(2).

In March 2024, the Utility summarized Member Community sewer system characteristics based on the available flow data provided by the Member Communities for the 2023 calendar year. Chelmsford, Dracut, and Tewksbury were found to contribute average daily flows of 2.89 MGD, 2.99 MGD, and 2.08 MGD, respectively. A small tributary area of Tyngsborough contributed 0.03 MGD to their direct connection to Lowell along Pawtucket Boulevard.

5.2 Next Six Months in the Reporting Period

Planned investigations and actions include the implementation of Phase 1 of the SSES Implementation Plan. This work includes the completion of CCTV and manhole investigations of some of the Utility's oldest infrastructure in the downtown area of the City in Meter Areas 51, 38, and 37; the removal of the Kearney Square inflow source (identified in earlier investigations); and completion of a comprehensive multi-sensor inspection (Digital CCTV and Sonar) of the Utility's river-front interceptor piping network, which encompasses approximately 47,000 LF of sewer ranging in size from 36 to 120-inch in diameter. The planned multi-sensor inspection is shown in [Figure 5-3](#).

Additionally, ADS will conduct flow monitoring to re-meter 10-meter areas in Spring 2024 where the initial data had poor data quality and resulted in flow balancing issues between sites. A supplemental memorandum to the submitted I/I Analysis Report will be prepared to summarize the I/I analysis of the 10-meter areas.

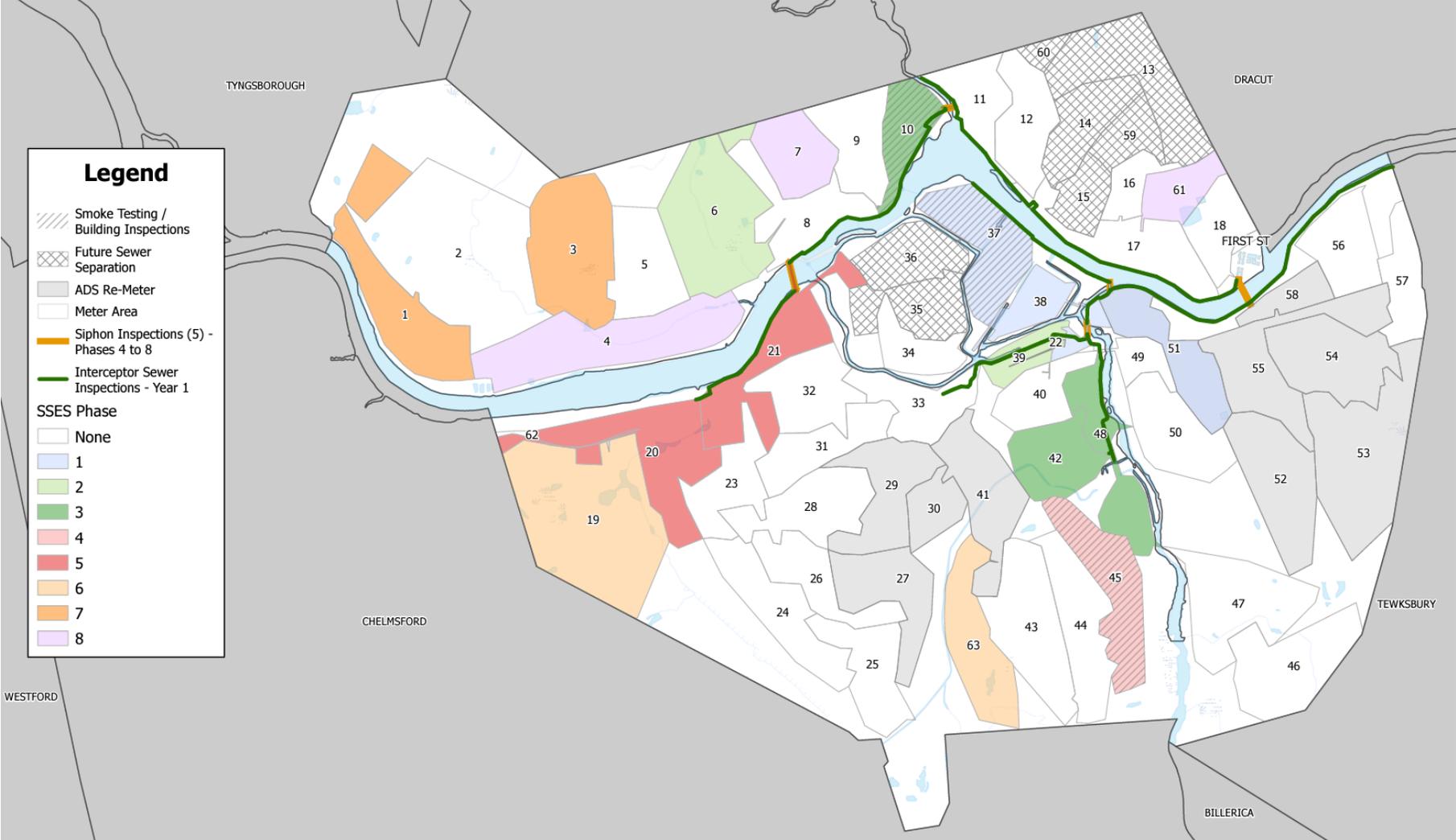


Figure 5-1 SSES Program Phases

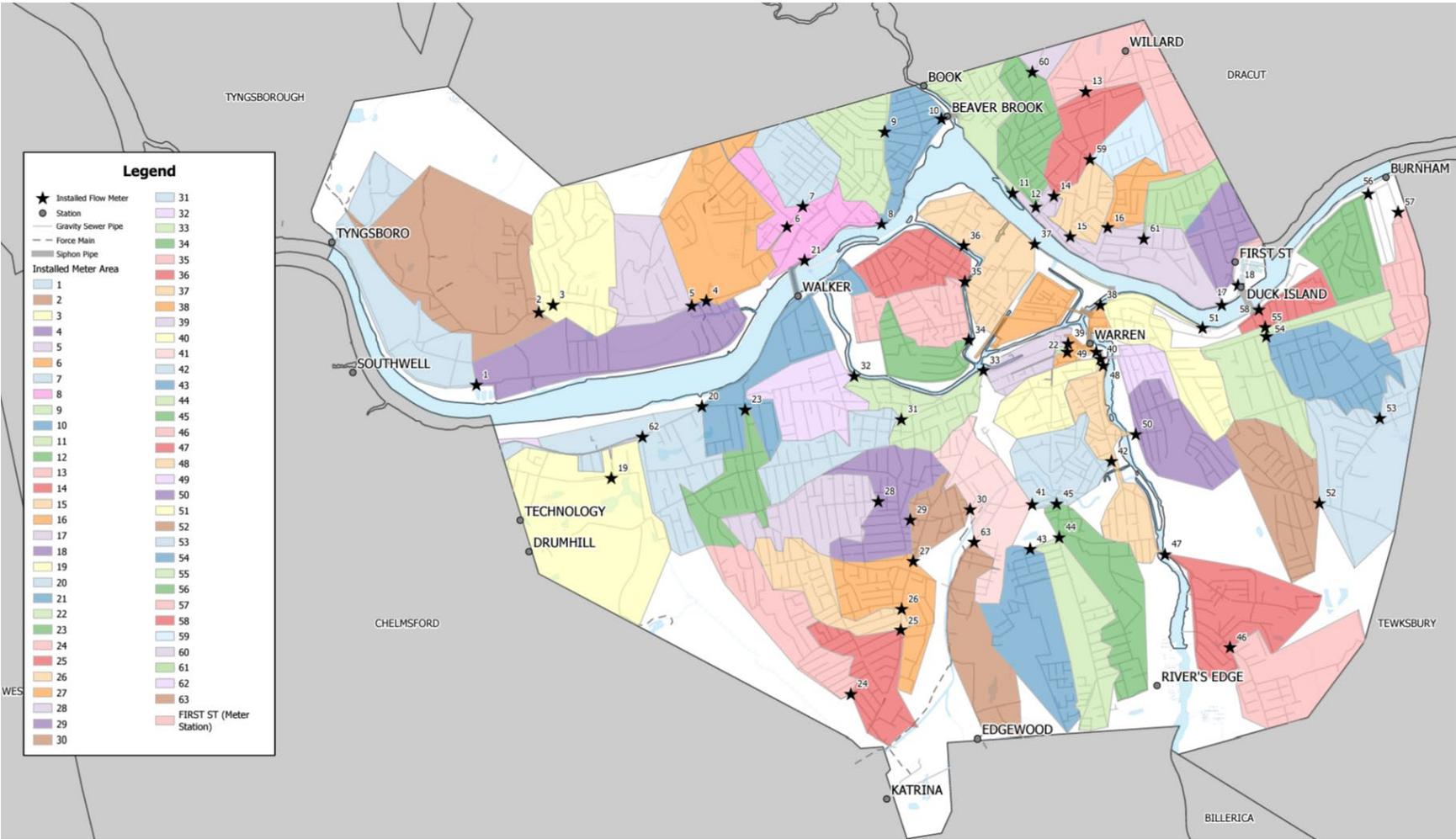


Figure 5-2 2023 City-wide Flow Metering Program Monitoring Areas

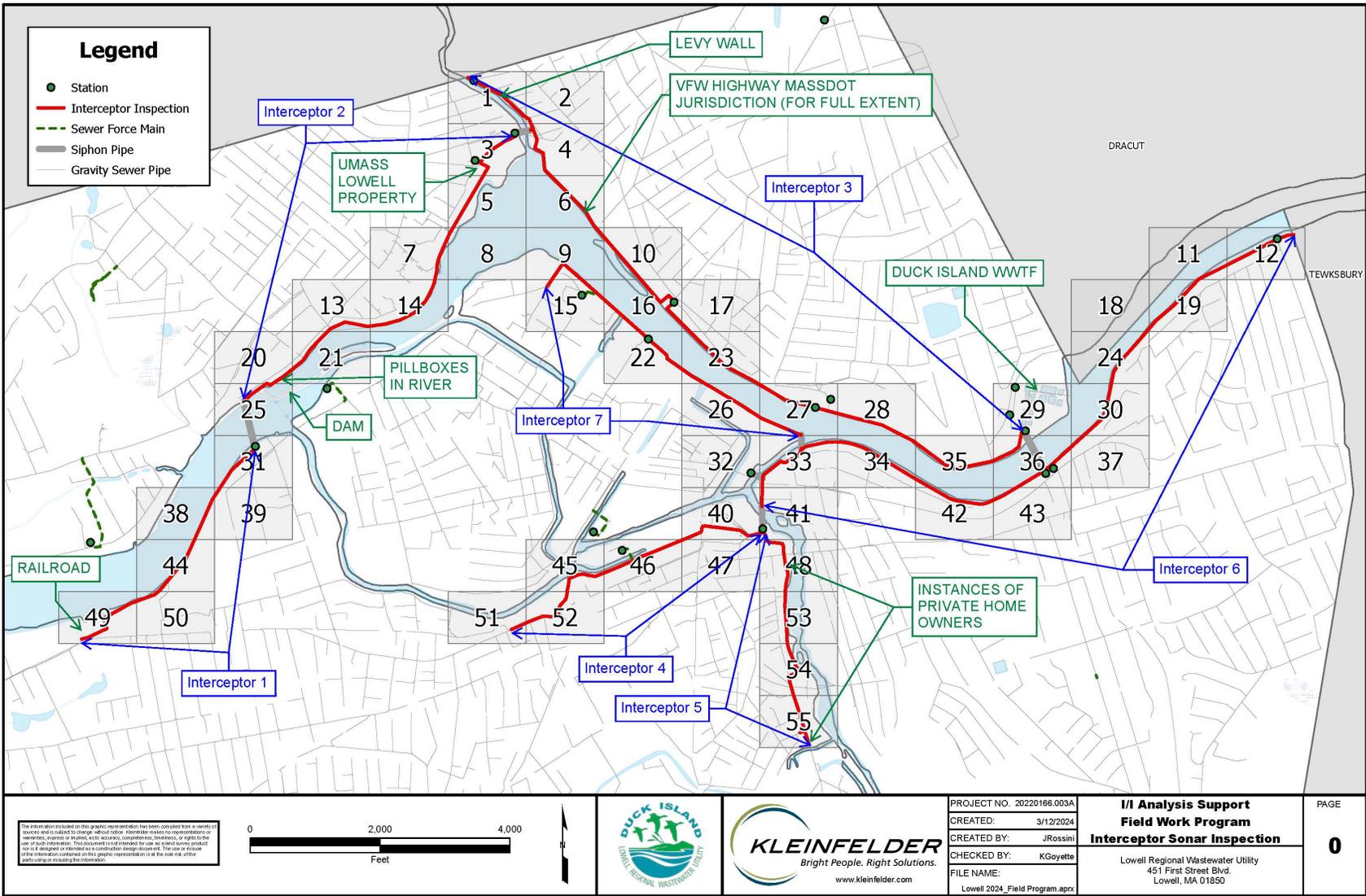


Figure 5-3 Multi Sensor Interceptor Inspection

6. 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 (a link to the report is provided in [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](#)).

6.1 Last Six Months in the Reporting Period

In the last six months work included:

- Revised and submitted both an Illicit Discharge Detection and Elimination (IDDE) plan and a Stormwater Management Program (SWMP) plan on December 31st, 2023.
- Developed and sought amendments to the City's stormwater ordinance to create a legal mechanism that allows the City to prohibit non-stormwater discharges to Lowell's storm drains and waterbodies, and to mitigate the impacts brought on by stormwater runoff from construction activities that result in land disturbances of greater than or equal to one acre in magnitude. These ordinance amendments were adopted by the City on January 2, 2024.
- An assessment and ranking of Lowell's municipally owned outfalls was performed to prioritize future investigatory activities. As a result of this ranking effort, seventeen (17) outfalls were classified as having a "Potential Illicit Discharge", seven (7) outfalls were classified as having "High Bacteria Discharges", and 246 outfalls were identified as having "Low Potential Illicit Discharges".
- Catchment mapping and investigation processes were formalized as part of the IDDE plan.
- One hundred fifty-six (156) drainage structures, across fourteen (14) drainage catchments were mapped. Seventy (70) newly identified drainage structures, including six (6) manholes and sixty-four (64) catch basins, were discovered as part of this process.

- Site-specific SWPPPs were 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, catchment mapping procedures, and good housekeeping practices were held on October 24 and December 11, 2023. Four (4) municipal employees participated in the October training and three (3) municipal employees participated in the December training.
- One (1) Illicit Discharge was discovered and removed from Lowell's MS4 when a commercial restaurant was found to be disposing used frying oils and grease into a private catch basin that connected into the local drainage system. Further summary of corrective actions taken are presented in [Table 2](#).
- SSO discovery and actions taken are presented in [Table 3](#).
- One (1) wet-weather sampling event occurred during the past reporting period on October 10, 2023. Eight (8) outfalls were inspected during the event; wet-weather flows were present in seven (7) 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](#)).

6.2 Next Six Months in the Reporting Period

In the next six months, planned work includes:

- Conduct catchment mapping and investigations based on the initial outfall inventory and priority ranking matrix for screened outfalls presented in [Table 4](#).
- Conduct wet and dry weather outfall screening and sampling. Based on the dry- and wet-weather sampling data, the ranking will be updated to reflect current information on the water quality of wet-weather and any dry-weather flow from the outfall. This data will then be used to prioritize the future catchment investigations as part of the IDDE program.
- Public education and outreach, including attending the Lowell Folk Festival in July.

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	
Private Catch Basin	OUTGPS-000330	3/14/2024	Burger King 926 Chelmsford St	Commercial	~ 5 gallons per event; total volume unknown	<ul style="list-style-type: none"> 3/13 – Lowell Wastewater personnel conducted initial investigation of reported illicit dumping. Upon confirmation, private business owner informed to cease any dumping activities. 3/14 & 3/15 - Lowell maintenance personnel equipped with municipal Vac-Con were sent to clean impacted infrastructure. 	Investigation revealed that this catch basin was connected to the municipal drainage system, and that this dumping had been a long-standing practice. As a result, the impacted infrastructure has been thoroughly cleaned, and the private business owner has been informed that this dumping constitutes an illicit discharge, 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.	3/14/2024	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
SSO (Sanitary Sewer Manhole)	11/29/2023 2:21 PM	11/22/2023 12:10 PM	Barasford CSO Station	LRWWU Staff	Rain event and operational error	1.82 MG	Merrimack River	Updates to the SCADA logic and head operator training	11/30/2023	No previous SSOs have occurred at this location
SSO (Sanitary Sewer Manhole)	11/27/2023 10:28 PM	11/27/2023 11:20 PM	131 Bellevue Street	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.	11/28/2023	No previous SSOs have occurred at this location
SSO (Sanitary Sewer Manhole)	12/15/2023 4:00 PM	12/15/2023 4:30 PM	350 Adams Street	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.	12/18/2023	No previous SSOs have occurred at this location
SSO (Sanitary Sewer Manhole)	1/10/2024 3:13 AM	1/10/2024 3:50 AM	Windward/Douglas Road	Level monitor alert notification	Rain event	3,582 gallons	Unnamed wetland 3,582 gallons	The area and alternative solutions are being evaluated as part of the Phase 3 PDR.	1/10/2024	8/18/2023

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-000043								Potential Illicit(A)
OUTGPS-000298								Potential Illicit(A)
OUTGPS-000330								Potential Illicit(A)
OUTGPS-000382								Potential Illicit(A)
OUTGPS-000352	Dry Weather	Yes - Dry Weather Flow	Yes	0.36	0	0.09		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		0.27	0.5	0.89	1986	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-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
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-000134	Wet Weather	Yes - Wet Weather Flow		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		0.17	0	0.03	272	Low Potential Illicit

OUTGPS-000145	Dry Weather	Yes - Dry Weather Flow		0.14	0	0.01	172	Low Potential Illicit
OUTGPS-000314	Wet Weather	Yes - Wet Weather Flow		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		0.1	0	0.06	102	Low Potential Illicit
OUTGPS-000383	Wet Weather	Yes - Wet Weather Flow		0.24	0.25	0.09	81	Low Potential Illicit
OUTGPS-000283	Wet Weather	Yes - Wet Weather Flow		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-000250	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.29	0	0.45		Low Potential Illicit
OUTGPS-000248	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.22	0	0.2		Low Potential Illicit
OUTGPS-000400	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.22	0	0.02	236	Low Potential Illicit
OUTGPS-000143	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.19	0	0.24		Low Potential Illicit
OUTGPS-000249	Wet Weather	Yes - Wet Weather Flow	No - Scentless	0.16	0	0.15		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		Low Potential Illicit
OUTGPS-000400	Dry Weather	Yes - Dry Weather Flow		0.12	0	0.07		Low Potential Illicit
OUTGPS-000360	Wet Weather	Yes - Wet Weather Flow						Low Potential Illicit
OUTGPS-000097	Dry Weather	Yes - Dry Weather Flow						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
OUTGPS-000236	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-000239	Dry Weather	No Flow						Low Potential Illicit
OUTGPS-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

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.

7. 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. The Utility engaged Hazen & Sawyer to facilitate these upgrades, with an expected completion date tentatively scheduled for late Spring 2024.

The annual updated GIS Map, for April 30th, 2024, 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. 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 7-1](#), and [Figure 7-2](#).

Infrastructure Remediation Summary

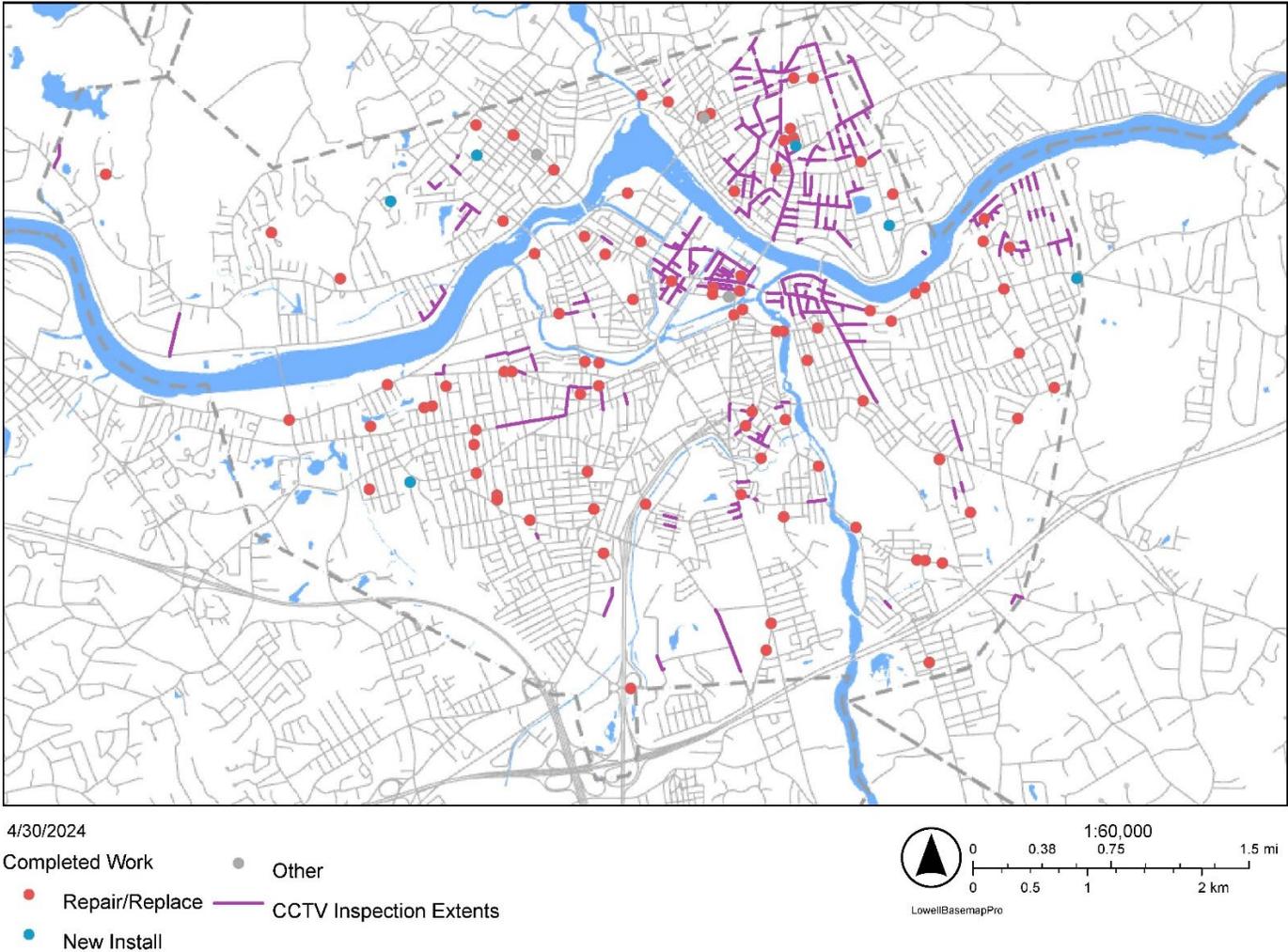
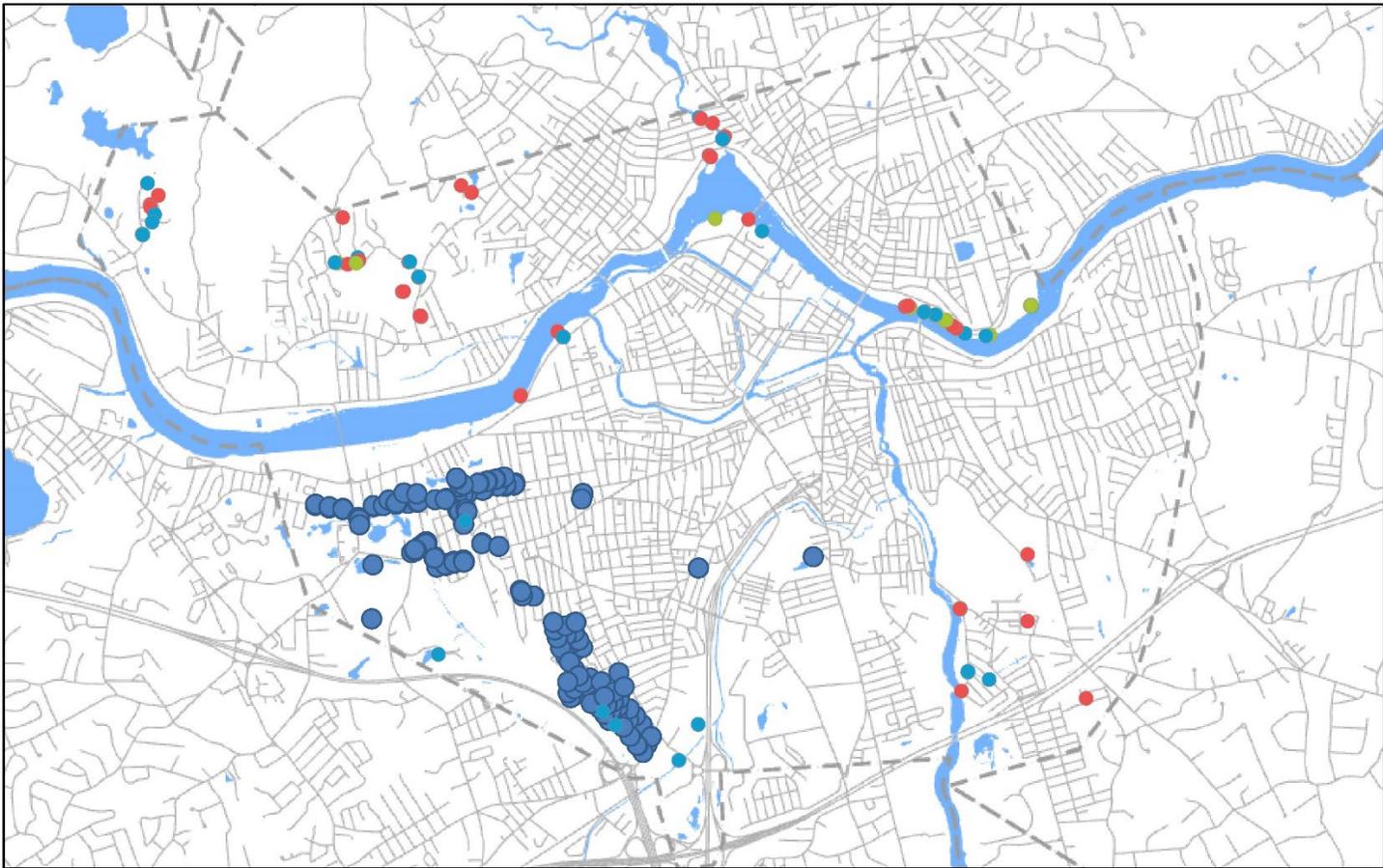


Figure 7-1 Infrastructure Remediation Summary

MS4 Investigations & Sampling



4/30/2024

- Yes - Dry Weather Flow
- No Flow - No Sample Taken
- Yes - Wet Weather Flow
- Drainage Structure Investigation

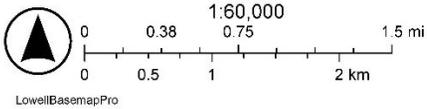


Figure 7-2 MS4 Investigations & Sampling

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 directly within the 2023:

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

Inflow and Infiltration Analysis Report 2023: <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

2023 MS4 Annual Report: <https://www.lowellma.gov/1702>