

Municipality/Organization: City of Lowell, Massachusetts
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NPDES PII Small MS4 General Permit ANNUAL REPORT

Part I. General Information

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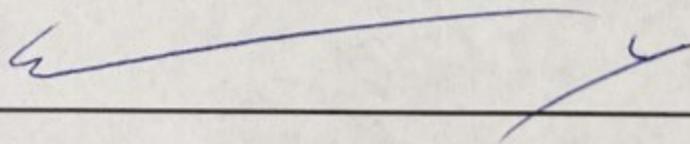
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Certification:

I certify under penalty of law 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 am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature: 

Printed Name: Aaron Fox

Title: Operations Manager

Date: 4/28/2023

Part II. Self-Assessment

Past Program Overview:

In 2003, the Lowell Regional Wastewater Utility (LRWWU) hired an outside contractor to conduct field inspections of stormwater outfalls within the City. City maps provided initial locations for field crews to complete visual inspections of outfalls along the City's municipal waterways and wetlands. An outfall data sheet was completed for each outfall located in the field, and the location of the outfall was added to a master outfall map. If an outfall had observed dry weather flow at the time of inspection, the outfall was identified for later follow-up sampling and water quality analysis. In total 193 total outfalls were inspected, with nineteen (19) outfalls showing signs of dry weather flow, or evidence of potential illicit connections.

In 2010, the City of Lowell initiated a new drainage outfall identification project. After a decade of implementing this program, approximately 400 outfalls were identified in the field, characterized in an inventory report, and captured in the City's Geographical Information System (GIS). During this time, eighty-two (82) drainage outfalls were recorded to have dry-weather flow. In 2019, these 82 outfalls were inspected and assessed; if dry-weather flow was still present, and if water levels in the receiving streams were below the invert of the outfall, a sample was collected for analysis. These samples were analyzed for pH, conductivity, dissolved oxygen, turbidity, temperature, E. coli, and fluoride; physical and olfactory conditions of the samples were also recorded. Eighteen (18) of the 82 samples resulted in E. coli levels over 235 E. coli colonies per 100 mL. In October 2021, an additional sampling effort was made to inspect these 18 outfalls where a combination of significant dry weather flow and high E.coli levels were previously observed. This led to seventeen (17) outfall inspections; samples were collected once again where dry weather flow was present. Results obtained from this round of sampling were used to prioritize future catchment mapping and tracing efforts.

Permit Year Twenty Efforts:

In May 2022, Lowell Wastewater engineering staff consolidated existing data from multiple sources, and used both desktop analysis and field verification to improve the accuracy of the existing GIS mapping data. A thorough review of the Utility's mapped drainage systems and outfalls was performed. Lowell defines the extents of a municipal drainage system as starting at the outfall, to the most upstream piece of stormwater conveyance infrastructure located in the municipal right-of-way. All of the infrastructure that falls inline downstream of this inlet is considered municipal. Recorded outfalls were queried based on parcel ownership; outfalls that fell on a non-municipally owned parcel and without municipal connections were deemed private, and pulled from the total count of Lowell's outfalls. Resulting from this effort, a new total count of 233 municipally owned MS4 outfalls were identified.

The Utility made substantial efforts towards upgrading its stormwater program. Major activities are summarized below:

- Lowell staff procured additional field kits, water quality meters, and sampling reagents to analyze samples for additional parameters, including ammonia, chlorine, conductivity, salinity,

surfactants, temperature and turbidity. The Utility has complete field kits for up to four field crews to be able to conduct concurrent dry and wet weather sampling.

- The Utility contracted private engineering services to assist in the development and submittal of both an Illicit Discharge Detection and Elimination (IDDE) plan and a Stormwater Management Program (SWMP) plan.
- As part of the IDDE plan development process, an assessment and ranking of Lowell's municipally owned outfalls was performed to prioritize future investigatory activities. Additionally, the plan formalized Lowell's catchment mapping and investigation processes. Trainings related to prescribed EPA sampling protocols and catchment mapping procedures were held in September and November, respectively.
- As part of the SWMP plan development process, a holistic review and revision of the City's MS4 Minimum Control Measures was taken, including the identification of all City departments necessary to properly adhere to the established control measures.

Lowell Regional Wastewater Utility (LRWWU) has formalized its approach for mapping drainage systems throughout the City of Lowell. A drainage system is first mapped in its entirety, starting at the outfall and working upstream. Mapping staff are equipped with the necessary tools, including an iPad with access to the City's GIS network through Esri's collection of field worker applications. LRWWU obtains GPS coordinates for all the catch basins, drain manholes, and outfalls using a Leica GG04+ receiver and edits/records data using ArcGIS Collector software. This allows LRWWU to obtain high-accuracy location information on each asset and will support better understanding of the dynamics of stormwater flow through the drainage system as system mapping progresses.

Once the drainage system has been fully mapped, the system is then traced. Starting at the outfall and working upstream, the main-line of the drainage system is traced and inspected for dry-weather flow. Inspection records for each manhole are made and stored using ArcGIS Collector and Survey123 – records include a listing of all connecting inlets, a photo of the dry-weather flow within the manhole, and descriptive information related to the flow. This tracing process is repeated until no signs of dry-weather flow are found, thereby bracketing the source of flow to the immediate downstream pipe segment. Samples are collected from the source manhole, as well as the drainage system outfall for further analysis. In the event that multiple branches of the system have dry weather flow, the larger branch is traced first, and a sample from each branch is collected at the junction manhole.

One (1) illicit connection was discovered on October 31, 2022 when a concerned citizen filed a notification report with the Utility, stating that discolored wash-water was sheet flowing from an automated car wash and into a nearby catch basin. Further investigation led to the discovery that the receiving catch basin was chained to another basin that had a potential drainage/sewerage cross connection, which was confirmed via dye testing. Following this confirmation, a sample was collected from the corresponding drainage outfall along the Concord River and analyzed for the full range of sample parameters; an exceedance of the bacteria threshold concurrent with a detectable level of ammonia was observed. Official notice of this cross connection was given to the regulatory agencies on November 1, 2022. The outlet pipe to the outfall has since been fitted with a plug to prevent any further discharges to the MS4.

The City of Lowell approves construction plans that conform to City policies for erosion control and site stormwater management. Private property development projects are reviewed by several city departments for adherence to Massachusetts Stormwater Regulations when applicable. The stormwater

management of areas outside of MS4 jurisdiction are regulated by Lowell standards and specifications that are currently being developed.

For many years, the City of Lowell has implemented street sweeping and catch basin cleaning programs to reduce the migration of solids in the City's drainage system. After catch basins are cleaned, the City of Lowell labels the basins and collects vital information such as physical characteristics, GPS locations, and all elevations of these catch basins. LRWWU hires a contractor to clean drainage system catch basins and coordinates this work with the contractor using an iPad and ArcGIS Workforce software. The contractor collects a digital survey for each catch basin cleaned, measures a pre- and post-clean sump depth, records photographs of the basin after cleaning, and documents any potential illicit connections entering the catch basin. In 2022, 404 drainage system catch basins were cleaned by this contractor.

The City of Lowell has successfully increased stormwater awareness amongst the public by implementing the following programs: Earth Day activities; hazardous waste collections; pet waste disposal policies; catch basin labeling; and distribution of stormwater educational materials.

The City of Lowell has completed the required self-assessment and has determined that the municipality is in compliance with its MS4 permit conditions.

Part III. Summary of Minimum Control Measures

1. Public Education and Outreach

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year Twenty (2022) (Reliance on non-municipal partners indicated, if any)	Planned Activities –
1.1	Hold annual Earth Day Celebration	Neighborhood Services Department	Event Held	The City of Lowell returned to hosting its annual Earth Day Parade and Festival, following multiple years of the event being held virtually due to Covid-19 restrictions.	Lowell Wastewater plans to expand this BMP to include its participation at many of the City’s other public events held throughout the year.
1.2	Develop and Distribute Stormwater Brochure	Lowell Regional Wastewater Utility	Develop stormwater brochure in Year 1 and distribute in subsequent years	Copies of the previous years’ stormwater brochure are available to the public at City Hall; DPW; Water Plant; Wastewater Plant; City Clerk’s Office; City Hall; Public Libraries; Division of Planning & Development; and Neighborhood Services Department. The Utility also made expanded efforts in 2022 to distribute online materials through the City’s website.	The Utility will continue to ensure that copies of the existing Stormwater Brochure are available at the public distribution sites as needed. The Utility will expand its online presence through social media. Lowell Wastewater is working with contracted engineering services to develop seasonally targeted stormwater brochures; distribution of these materials is tentatively set for July 2023.
1.3	Enhance Awareness of Proper Pet Waste Disposal at City Parks	City Clerk, Parks Dept.	Pet Waste Brochure developed in Year 2; and distributed to all licensed dog owners in Years 3-5. Pet waste signs to be installed at City Parks in Years 2-5.	Flyers discussing the Animal Control Ordinance are available at DPW and posted on signs at the City’s parks. Lowell maintains approximately 100 signs at City parks posting the Animal Control Ordinance. The City consists of 92 parks all of which contain at least one sign. Signs are posted wherever notable animal waste is present and all are maintained and replaced by the Parks Department.	<ul style="list-style-type: none"> • Continue to maintain supply of Stormwater Brochures. • Coordinate with City Clerk’s Office to ensure awareness of Animal Control Ordinance. • Procure Duck Island branded pet waste disposal bags and distribute at public events alongside BMP 1.1.

2. Public Involvement and Participation

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year Twenty (2022) (Reliance on non-municipal partners indicated, if any)	Planned Activities –
2.1	Comply with State Public Notification Guidelines	City Clerk; other City Dept.	Comply with State public notification guidelines	City of Lowell posted all applicable meetings and environmental awareness events according to state guidelines including local access TV channel.	The City continues developing website-based meeting notifications.
2.2	Hold Annual Household Hazardous Waste / Tire / Electronics Collection Days	SW&R Office, DPW	Hold hazardous waste collection day two times a year.	Household Hazardous Waste Collection Days were held on 6/11/2022 and 10/1/2022. The events were advertised in the local newspaper, on local access TV, AM Radio, Quarterly Newsletter, and on the City website . A total of 120 pre-registered residents may participate in each event. DPW retains the manifests of the household hazardous waste collected.	2023 Hazardous Waste Collection Days are scheduled for June 3 rd and September 30 th . Sign-ups for each event begin in May and August respectively.
2.3	Install Catch Basin Plaques	Lowell Regional Wastewater Utility	50 catch basin plaques installed each year.	<p>Lowell Wastewater made an extensive effort towards installing catch basin plaques, labeling a total of 92 drainage and 485 combined catch basins in 2022. Staff began using a new steel plaque with the phrase “<i>Our river starts here</i>” inscribed thereon. Plaques were mounted to the directly to the catch basin frame using a carriage bolt and frame, as opposed to being adhered to the curb.</p> <p>Oftentimes when out installing catch basin plaques, residents would inquire about the work being done; Lowell Wastewater staff took this opportunity to inform passersby, teach about the collection system, and promote good stormwater management practices to the public.</p>	Lowell Wastewater will continue installing catch basin plaques in accordance with its submitted 2022 SWMP following formal review and approval by the Agencies.

3. Illicit Discharge Detection and Elimination

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year Twenty (2022) (Reliance on non-municipal partners indicated, if any)	Planned Activities –
3.1	Map Drain Outfalls and Receiving waters	Lowell Regional Wastewater Utility	Complete map of outfalls and map of drainage system	<p>Lowell Wastewater engineering staff continued system-characterization and mapping program in 2022, using two full-time engineers equipped with high-accuracy GNSS receivers and Esri's Field Worker Application package for iPads to improve mapping and investigation of stormwater outfalls.</p> <p>In May 2022, Lowell Wastewater engineering staff consolidated existing data from multiple sources, and used both desktop analysis and field verification to improve the accuracy of the existing GIS mapping data. A new total count of 233 municipally owned MS4 outfalls were identified.</p>	<p>Lowell Wastewater will continue to map and investigate the City's municipal separate storm sewer systems data and will collect and record data in Lowell's drainage system geodatabase.</p> <p>Lowell Wastewater is in the process of improving its stormwater data model following Esri best practices, and is in the process of upgrading to an Enterprise network. The new data model will support live data editing, and automated catchment delineation once individual catchments are fully confirmed in the new geodatabase. Execution and adoption of the Enterprise network is tentatively scheduled for late Spring/early Summer 2023.</p>
3.2	Continue Inspections of New Sanitary Sewer Connections	City Engineering	Continue existing program	The City inspected ninety new/updated sewer services.	The City will continue with inspections of new sewer connections.
3.3	Continue enforcement of illicit connection/illegal dumping bylaws	City Engineering & Lowell Regional Wastewater Utility	Continue existing program	The City prohibits illicit connections/illegal dumping as established through its Sewer Use Ordinance. One (1) illicit cross connection between a sewer and drainage system was discovered and disconnected in Permit Year Twenty.	The City is developing a comprehensive stormwater management plan that will work in conjunction with its stormwater ordinance to regulate discharges into the municipal system.
3.4	Dry weather screening of drain outfalls	Lowell Regional Wastewater Utility	All outfalls screened once during permit period	<p>A total of 82 drainage outfalls were previously observed to exhibit dry-weather flow. These outfalls were inspected and analyzed for pH, E. coli, and Fluoride. Visual and olfactory observations were also recorded for these discharges.</p> <p>The Utility contracted private engineering services to assist in the development and submittal of both an Illicit Discharge Detection and Elimination (IDDE) plan. As part of the IDDE plan development process, an assessment and ranking of Lowell's municipally owned outfalls was performed to prioritize future investigatory activities.</p>	LRWWU will continue to analyze dry weather discharge as part of its dry weather tracing program.

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year Twenty (2022) (Reliance on non-municipal partners indicated, if any)	Planned Activities –
3.5	Develop and Implement System for Elimination of Illicit Discharges	Lowell Regional Wastewater Utility	Based on prioritized results in BMP No.3.4, determine procedures to identify and remove illicit connections to drain; maintain records	<p>The Utility contracted private engineering services to assist in the development and submittal of both an Illicit Discharge Detection and Elimination (IDDE) plan. As part of the IDDE plan development process, an assessment and ranking of Lowell’s municipally owned outfalls was performed to prioritize future investigatory activities.</p> <p>One (1) illicit cross connection between a sewer and drainage system was discovered and disconnected in Permit Year Twenty.</p>	LRWWU has developed a refined IDDE program which couples investigation of dry-weather flows with catchment mapping, so as to identify the source of the dry-weather flow in each catchment.

4. Construction Site Stormwater Runoff Control

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year Twenty (2022) (Reliance on non-municipal partners indicated, if any)	Planned Activities –
4.1	Continue to Apply Standard 8 of MA Stormwater Policy	Conservation Commission	Standard 8 of MSP applied	The City of Lowell’s Conservation Commission requires proper stabilization of all sites during construction including, but not limited to, the installation of erosion control measures.	Continue enforcement of Standard 8 for proposed development projects in the City.
4.2	Continue to Inspect/Maintain Control Measures at Construction Sites	City Engineer	Continue Existing Program	City Engineer’s Office inspects all sites while construction activity is underway. Any activities that need to be addressed are brought to the attention of the site developer immediately, corrective action is taken and the site is re-inspected. No violations were reported during Permit Year Twenty.	Continue City’s Site Inspection Policies.
4.3	Continue to Enforce procedures for collection/filing of public comments	All Departments	Continue Existing Program	All departments keep their own public comments on file. When the public places a complaint through the Civic Plus software, the complaint is automatically sent to the specified department. All departments make effort to respond to comment in a timely manner and keep the public updated throughout every step of completing the task.	The City will continue to implement and maintain the Civic Plus software and track public complaints.
4.4	Develop and present an Ordinance for Erosion Control Measures and Construction Material Management for Construction Sites more than 1-acre.	City Engineer	Draft Ordinance language and present to City Council for approval	The City Engineer Office and Planning Board have established erosion control measures for all projects that come under their review.	The Utility is in the planning stages for developing a schedule detailing the full requirements and corresponding timeline to perform a review, revision, adoption and implementation of relevant stormwater ordinances.

5. Post-Construction Stormwater Management in New Development and Redevelopment

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year Twenty (2022) (Reliance on non-municipal partners indicated, if any)	Planned Activities –
5.1	Continue application of Planning Board Rules and Regulations for Subdivisions	Planning Board	Continue enforcement of existing regulations	The City has applies Rules and Regulations to all projects that come under its review.	Continue application of existing Rules and Regulations. New site-stormwater management review procedures have been established. Standards and specifications are in development to improve the rate of ‘incremental improvement’ required as properties are developed. This program has been outlined in Lowell’s application for an individual permit.
5.2	Apply Standards 2, 3, 4, 7 and 9 of MA Stormwater Policy	Planning Board, Conservation Commission, & Lowell Regional Wastewater Utility	Develop/ Incorporate modifications to existing regulations as needed	MA Stormwater standards applied to subject development projects, where applicable.	MA stormwater standards are applied to all projects within the WPA jurisdictional area. New standards and specifications are in development outside of these areas, as described at BMP 5.1.
5.3	Develop/Implement Ordinance/Regulation to ensure long-term maintenance of private structural BMPs.	Planning Board & Lowell Regional Wastewater Utility	Draft and adopt stormwater ordinance	Projects undergoing re/development that have newly proposed or previously existing private drainage systems, including structural BMPs, are required to submit and adhere to an Operations and Management Plan specific to the individual system.	A local stormwater ordinance will be developed upon substantive adoption of new stormwater standards and specifications. The ordinance will reference the revised standards and specifications so that Lowell Water will have the authority to revise standards and specifications without need to revise the ordinance.

6. Pollution Prevention and Good Housekeeping in Municipal Operations

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year Twenty (2022) (Reliance on non-municipal partners indicated, if any)	Planned Activities –
6.1	Continue Street Sweeping Program	DPW & Lowell Regional Wastewater Utility	Percentage of streets swept annually with emphasis on sensitive receptors	The City of Lowell currently performs all street sweeping operations in-house in order to ensure the effectiveness of this preventative maintenance program. The City maintained its current biannual street sweeping and residuals disposal program to reduce the migration of solids in the city’s drainage system. All City streets were swept twice in 2022, with some streets having been swept more often, as needed. Biannual street sweeping yielded 425 tons of sediment and debris in 2022.	The City of Lowell will continue existing program.
6.2	Continue Catch Basin Cleaning Program	Lowell Regional Wastewater Utility	Percentage of catch basins cleaned annual; with emphasis on sensitive receptors	The Utility maintained its current catch basin cleaning and residuals disposal program to reduce the migration of solids into the City’s drainage systems. In 2022, 404 drainage catch basins were cleaned by Lowell Wastewater staff and hired contractors. This accounts for approximately 20% of all drainage catch basins.	Lowell Wastewater will continue implementing existing program. A new Workforce application will be developed to better manage catch basin cleaning assignment inventory.
6.3	Continue Salting and Snow Removal Practices	DPW	Continue existing programs for salt storage/use and management, especially in sensitive areas	The City continued its existing salt storage/snow removal practices. Records of salt use are kept by DPW. Lowell has stopped spreading sand on the roads and now uses salt. This has decreased the amount of sediment getting into the sewage and drainage systems and water resources. DPW uses the Cirrus salt-tracking system to ensure that the salt has been evenly distributed with the newest and most effective techniques, while tracking and calibrating the dispensing technique based on weather conditions.	The City of Lowell will continue existing program. Options are being considered to reduce salt usage in the future.
6.4	Continue Vehicle Washing Practices	DPW	Continue existing program in DPW yard	City vehicles were washed in approved areas.	Continue existing program. Modify practices as necessary to minimize stormwater impacts.

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year Twenty (2022) (Reliance on non-municipal partners indicated, if any)	Planned Activities –
6.5	Continue Vehicle Maintenance	DPW	Continue existing program in DPW garage	City vehicle maintenance is performed in approved designated areas. Byproduct vehicle waste oil was either used to heat the DPW's maintenance garage using two new clean burn, oil fired heating systems or disposed of off-site by approved waste handlers.	Continue existing program. Modify practices as necessary to minimize stormwater impacts.
6.6	Park and Landscape Maintenance	Parks Department	Minimize herbicides, pesticides, fertilizers in sensitive areas; maintain records	The City utilizes reduced-phosphorus fertilizers and has reduced its use thereof, improving stormwater quality in the process. Records of fertilizer/herbicide/pesticide use are maintained by the Parks Department.	Continue existing program. The City will continue to examine existing fertilizer practices and make revisions as necessary to minimize impact to stormwater runoff and receiving streams.
6.7	Employee Education Program	Lowell Regional Wastewater Utility	Awareness training on stormwater topics	LRWWU staff attended various stormwater webinars and reviewed potential training materials. Training sessions were held in September and November, detailing sampling practices and drainage system mapping procedures, respectively.	Stormwater awareness training is being developed to educate city employees. Per Duck Island's 2021 SWPPP, stormwater management training shall be provided to appropriate facility personnel.

7. BMPs for Meeting Total Maximum Daily Load (TMDL) Waste Load Allocations (WLA)

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year Twenty (2022) (Reliance on non-municipal partners indicated, if any)	Planned Activities – Permit Year
Not Applicable					
Revised					
Revised					
Revised					
Revised					
Revised					

7a. Additions

7b. WLA Assessment

Part IV. Summary of Information Collected and Analyzed

N/A